

JUHO LINDHOLM

Knowledge and Practice

A Criticism of Epistemology



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UNIVERSITY OF TARTU
Press

Department of Philosophy, Institute of Philosophy and Semiotics, University of Tartu, Estonia

The Council of the Institute of Philosophy and Semiotics of the University of Tartu has accepted this dissertation for the defense for the degree of Doctor of Philosophy (in Philosophy) on September 16, 2024.

Supervisor: Research Fellow Ave Mets, PhD, University of Tartu, Estonia

Opponent: Professor Sami Pihlström, PhD, University of Helsinki, Finland

The thesis will be defended at the University of Tartu, Estonia, on November 28, 2024, at 12:15 p.m. in the UT Council Hall, Ülikooli 18.

This research has been supported by the European Social Fund's Doctoral Studies and Internationalisation Programme DoRa (Archimedes Foundation); the University of Tartu ASTRA Project PER ASPERA (2014-2020.4.01.16-0027), financed by the (European Union) European Regional Development Fund; and the Centre of Excellence in Estonian Studies (TK145), financed by the (European Union) European Regional Development Fund. It was also funded by Estonian Research Council's research projects PUT732 "Essentialism in the Context of Interdisciplinary Research: A Philosophical and Cultural Analysis of Stereotypes in Scientific Communities" and PRG462 "Philosophical Analysis of Interdisciplinary Research Practices."

ISSN 1406-9520 (print)

ISSN 2806-2515 (pdf)

ISBN 978-9916-27-733-1 (print)

ISBN 978-9916-27-734-8 (pdf)

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University of Tartu Press

<http://www.tyk.ee>

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Acknowledgments

I thank my supervisor Ave Mets not only for advice but also for making it possible for me to write a PhD thesis on a subject I love. She has also supported me through the COVID-19 pandemic.

I thank Ahti-Veikko Pietarinen for his constructive feedback on Peirce's philosophy and his support.

I thank Endla Lõhkivi for supporting me in many ways. She has funded some of my conference trips and granted me personal stipends.

I thank Peeter Müürsepp for helping me publish my research.

I thank Pentti Määttänen for explaining pragmatism to me in terms that I understood at the beginning of my career in philosophy.

I thank my parents Tiina and Sakari Lindholm for all the sacrifices they have made to help me realize my dream, including helping me with moving my stuff and helping me to attend to conferences across Europe.

I thank Erik Ingberg for helping me realize the affinity between Pyrrhonic skepticism and fallibilism. Now I believe that science is about *learning* rather than knowing.

I thank Janika Päll, Kadri Novikov and Elo-Mall Toomet for introducing me to the fascinating world of ancient Greek language.

I thank Esa Saarinen for supporting me before I took up philosophy.

I thank Miika and Daria Oksman for their continuous, selfless support in these difficult times. Miika has also greatly helped me with LaTeX.

The whole family of Rintahaka — Jori, Heidi, Taru and Lilja, Kanerva Keränen, and Jori's brother Pyry — deserve thanks for being such good friends.

I thank Eveli Neemre, Ahto Möttus, Kati Terandi, Eric Smith and Robert Kolk for being such great friends.

I thank my teachers at Helsinki University of Technology — Heikki Koivo, Jean-Peter Ylén, Kai Zenger, and especially Heikki Hyötyniemi for inspiring me to develop cybernetic epistemology.

I thank my colleagues for constructive feedback and support: Chiara Ambrosio, Monika Bar, Angelo Bottone, Andrea Di Carlo, Hasok Chang,

Alexander Davies, Wolfgang Drechsler, Jaana Eigi, Juliette Ferry-Danini, Apostolos Gerontas, Stijn van Gorkum, John Greco, Raymond Gunning, Deirdre O'Halloran, Juhan Hellerma, Céline Henne, Hesam Hosseinpour, Litman Huang, Henri Hyvönen, Maria Hämeen-Anttila, Don Ihde, Erik Ingberg, Roomet Jakapi, Nick Johnston, Isabel Kaeslin, Luke Kallberg, Siobhan Kattago, Eve Kitsik, Kristin Kokkov, Riin Kõiv, Olena Kushyna, Markus Lammenranta, Lilian Langsepp, Kristi Lõuk, Artha Lufie, Sofia Abelha Meir-elles, Heidy Meriste, Amirouche Moktefi, Eri Mountbatten-O'Malley, Felix Ó Murchadha, Karel Pajus, Bruno Mölder, Emmi Kaaya, Philip Nguyen, Ilkka Niiniluoto, Cara Nine, Takaharu Oda, Francesco Orsi, Sami Pihlström, Marika Proover, Francesca Putignano, Merike Reiljan, Semyon Reshenin, Davide Rizza, Anne Elise Rohtmets, Jenni Ryttilä, Henrik Saarinen, Sergey Samokhin, Sergey Sazonov, Nikolai Shurakov, Henrik Sova, Edit Talpsepp-Randla, Guido Tana, Pille Tekku, Raul Veede, Mats Volberg, Cuizhu (Dawn) Wang, Ky York, Jay Zameska, Shaban Zanelli and Lisa Zorzato.

I thank my friends for the years we have spent together: Johanna Anteroine, Juha Helenius, Mörkö “Heikki” Hirvonen, Heikki Hyyti, Jenna Järvenpää, Lotta Kannari, Jani and Leea Kautto, Ossi and Marika Koivula, Eeva Koltola, Pilvi and Shane Lamb, Antti Matinlauri, Erkkä Mutanen, Susanna Nenonen, Tuomas Paasonen, Sami Salonen, Olli Sjöberg, Veera Snellman, Marko Turunen, Ville Valtonen, Tiia Vento and Eero and Eeva Vesaoja. Ville and Jani are skilled in arts and crafts and have inspired this treatise on practice.

I thank Maria Hämeen-Anttila, Niko Lempa and Tommi Pajala for philosophical discussions.

I thank decino and Major Slack for helping me survive the COVID-19 restrictions.

In the memory of Matti Vesala (1985–2018), my multitalented but misunderstood and underappreciated friend. He could have become anything.

This study was supported by the Estonian Research Council (PRG 462) and by the European Union European Regional Development Fund (Centre of Excellence in Estonian Studies).

Chapter 1

Introduction

1.1 The Purpose of this PhD Thesis

Analytic philosophers usually consider science their ally and the scientific method — the *experimental* method — the best way to acquire knowledge. Yet analytic epistemology largely ignores experiment: for instance, there is a semi-authoritative anthology of analytic epistemology in which *not a single author* studies the epistemic import of experimentation (Sosa, Kim, Fantl, & McGrath 2008).

On the other hand, analytic philosophy of science *does* address experiment. However, the experimental method is not exclusively a scientific matter. We are not infallible.¹ That makes *all* experience experimental (Dewey 1916a: 163–178, 237, 317–322; [1925] 1929a: 70): all our beliefs are at test all the time; we make experiments all the time; both everyday experience and scientific experiments conform to the *belief–doubt model of inquiry*.² In particular, the way an infant learns to navigate their way through the world is experimental. Children are “little scientists,” to use Jean Piaget’s ([1936] 1953) terminology.

Since the experimental method is common to both everyday experience and science, these two are not divorced. On the contrary, science not only *presupposes* but also *extends* and *refines* ordinary experience.³ Experimental practice keeps science within the *lifeworld*⁴ and its objects *ready-to-hand*⁵ —

¹I will argue that all knowledge is revisable in Section 4.2.

²I will explain the belief–doubt model of inquiry in Section 4.3.

³This notion appears in Charles S. Peirce’s later writings (CP 5.438–452, 5.494; EP 2: 346–354, 419–420). John Dewey took it up (1929b: 79–80, 84–85, 124, 199, 220, 240–242, 271, 295; 1938: ch. IV).

⁴For the notion of the *lifeworld* (*Lebenswelt*), see Husserl ([1936] 1976a; [1939] 1976b).

⁵For the notions of *readiness-to-hand* (*Zuhandenheit*) and *presence-at-hand* (*Vorhan-*

a point that Don Ihde⁶ and Joseph Rouse⁷ have made. Hence experimentation deserves to be analyzed in a non-scientific context as well. Then the scientific context can be explained as a special case.

Hence, unlike Husserl ([1936] 1976a; [1939] 1976b) believed, there is no crisis in science. On the other hand, there has always been a crisis in the *philosophy* of science. I believe that the reason for *this* crisis is an overintellectual, logocentric, representationalist,⁸ disembodied, exalted notion of science that still prevails in much of analytic philosophy of science. (Cf. Dewey 1929b.)

I will cite two twentieth-century examples of overintellectual philosophy of science. Popper ([1934] 1953: 107) argued that the theoretician does all the significant work and that the experimenter merely instantiates it by following the instructions of the theoretician. Reichenbach (1938a; 1938b) distinguished between the “context of discovery” and the “context of justification.” He believed the former to be a mere “subjective”⁹ event devoid of philosophical significance. For him, the exclusive problem for philosophy of science was the latter: the *rational reconstruction* of theories. If that were the case, scientific practices and their biological, technical, and social context could be removed from the picture without remainder.¹⁰ But then the existence of a theory becomes the default case. If scientific practice is ignored, it becomes a mystery, how science ever acquired these theories. Moreover, one is entitled to ask, what theories abstracted from practice even *mean* in the first place. *This* is the crisis in the philosophy of science. (Lindholm 2021; 2023b.)

The root of this trouble is ancient — indeed, almost as old as epistemology itself —: the demarcation between scientific knowledge (ἐπιστήμη) and skill or art (τέχνη). Originally these Greek words were considered synonymous. For instance, Xenophon (1997a; 1997b) uses them interchangeably.

denheit), see Heidegger ([1927] 1977a: §§ 15–16).

⁶See Ihde (1974; [1977] 2012; 1979; 1983; 1990; 1991; 1993a; 1993b; 1998; 2002; 2009).

⁷See Rouse (1987; 1996; 2002; 2015).

⁸I use the terms *logocentrism* and *representationalism* to denote any theory that is confined to the logical analysis of representations.

⁹I reject the subject-object dichotomy, because my methodological concepts are both “subjective” and “objective” simultaneously, as I will explain below. These concepts include *habit*, *practice*, *experience*, *meaning*, *situation*, and *phenomenon*. I believe that everything important is both “subjective” and “objective” at once: if it were not “subjective,” it could not appeal to us; and if it were not “objective,” it could not have an effect upon our life. Therefore I have decided to write “subjective,” “objective” and the related terms within scare quotes to indicate non-commitment to such concepts.

¹⁰See Dewey (1938: chs. II–III).

It was Plato who made a distinction between them.¹¹ Aristotle followed him. (Parry 2020.) Their authority seems to have maintained the distinction through more than two millennia, though not without sporadic protests, most notably de Spinoza ([1677] 1905),¹² the early political economists, German idealism, Marxism, classical pragmatism, certain strands of phenomenology,¹³ the later Wittgenstein ([1953] 2009; 1969), Ryle ([1949] 1951; 1971) and Polanyi ([1958] 1962; [1966] 1983). The traditional definition of knowledge — true justified (un-Gettiered)¹⁴ belief¹⁵ — seems to be adapted to this distinction: it does not explicitly mention skill or art.

It seems to me that the Greeks maintained that to be is to be invariant; to change is to have a deficient kind of existence. In particular, the object of knowledge needed to be invariant: knowledge was supposed to be universal and therefore independent of time, and therefore a changing object of knowledge would have been tantamount to changing knowledge about the object. That would have been a *contradictio in adjecto* for the Greeks. Needless to say, such exclusion of change from epistemic matters also means the exclusion of practice and experiment — the deliberate introduction of changes to objects. (Cf. Kaila 1939: esp. 56–57, 73.) Thus the traditional definition of *knowledge* is the universal point of reference in the history of logocentrism and representationalism.

Chang (2022: 12, 15) is dissatisfied with the traditional analysis of knowledge for the same reason: he is more interested in what people *do* rather than what they *possess* when they know, especially when they engage in *scientific practices*. He studies the *ongoing process* of the acquisition of knowledge rather than its *finished product*.¹⁶

¹¹Plato's overintellectualism has a still more ancient lineage: it seems to be largely based upon the philosophies of Pythagoras (cf. Diogenes Laërtius 1905: 338–359; Diels & Kranz 1960: 14A, C) and Parmenides (cf. Diogenes Laërtius 1905: 384–385; Diels & Kranz 1960: 28A, B, C).

¹²See also Oittinen (2002) and J. Pietarinen (2019).

¹³Like the early Heidegger ([1927] 1977a), the later Husserl ([1936] 1976a; [1939] 1976b), and Merleau-Ponty ([1942] 1967; [1945] 2002).

¹⁴Edmund Gettier (1963) provided counterexamples to the traditional definition. Subsequent epistemology knows the method of devising such counterexamples as *Gettiering*.

¹⁵The traditional definition is Plato's, though he did not accept it himself. In the *Meno*, he studies the notion that knowledge be “right belief” (ὀρθὴ δόξα) with “recollection” (ἀνάμνησις) (1952a: 97d–98a). In the *Theaetetus*, he examines the notion that knowledge be “true belief with a reason” (μετὰ λόγου ἀληθὴ δόξα) (1977: 201c–d).

¹⁶Chang (2022: 15) does point out that at least some reliabilist epistemologists, stemming from Frank P. Ramsey if not earlier, do emphasize inquiry as a process. Yet, he continues, “reliability” is assessed in the terms of the product, namely propositions. Moreover, Chang (2022: 17) continues that even when epistemologists grant the existence of different kinds of knowledge, they still consider propositional knowledge paramount (cf. Lehrer

I agree with Chang (2022: 15) that the neglect of processes creates the misleading impression that knowledge be something we passively accept or reject, rather than actively seek, create and evaluate. In particular, we cannot consider the possession of theories the default case — least of all if we ignore how we discovered them. It is a teleological fallacy to claim that inquiry discovers truths because they are true. We cannot presuppose an awkward backward causation from the (alleged) product to the process of inquiry. It remains to be shown that *real* (rather than *ideal*) inquiry tends to converge; and that what it converges to can only be truth. We have no guarantee for either of the two claims: the success of inquiry is entirely unpredictable (because otherwise there would be no *point* in inquiry, because we would already know the result). (Cf. Dewey [1925] 1929a: 308–309; Lindholm 2021: 11; Chang 2022: 109–110.) That would leave significant scientific work unexplained, thus rendering scientific progress a mystery. On the contrary, Chang (2022: 18–19) argues that “[a]ctive knowledge is at the core of scientific knowledge.”¹⁷ Chang (2022: 24–26) continues that for this reason, in order to understand the nature of knowledge, we must also consider the process of the acquisition of knowledge, or *inquiry*.¹⁸

However, it seems to me that Plato got something right after all: knowledge *does* seem to be a subspecies of belief. For what could knowledge that nobody believes be?¹⁹

Thus the traditional split between theory and practice has an influential pedigree. According to Dewey, it has arisen from ancient class structures: there was an upper, aristocratic class that could dedicate its life to contemplation, and the lower classes would have to work to maintain the society. Anything related to work would have defiled a *καλὸς καγαθός*. Because aristocrats did not have to work, it seemed that theorizing could be independent of practice. There was — and, to a degree, still is — an intellectual division

1990: 3–4). According to Chang, this approach is not necessarily *wrong*, but it *limits* the scope of epistemology. Propositional knowledge might be more easily *communicable*, but that does not mean that it be the most *important* kind of knowledge.

¹⁷However, my method differs from Chang’s. I study practices in general and consider scientific practices as a special case; Chang (2022: 12–13) studies scientific practices in particular in order to discover how the express acquisition of knowledge exemplifies the acquisition of knowledge in general.

¹⁸Thus epistemology must apply to itself. Dewey ([1925] 1929a: 428) argued that we understand a phenomenon insofar as we are able to initiate, sustain, and terminate it at will. Thus, if he is right, then we understand *knowledge itself* only if we are able to account for its acquisition and sustainment.

¹⁹In Subsection 2.5.2, I will define *belief* operationally as *habit*. That makes the concept of belief empirically responsible. In Subsection 2.3.5, I will argue that *habit* and *practice* are at least roughly synonymous. In what follows, I will use them interchangeably.

of labor: thinking is the business of aristocracy, unintelligent bodily toil is the duty of everybody else. Because of the higher social status of aristocrats, their activities have been considered more worthwhile. Alas, independence from practice has been understood as a *merit*. On the one hand, practice is confined to a point of view; it presupposes a purpose; and, last but not least, it can always fail. On the other, theory has been considered universal and independent of any purpose; and it has seemed that certainty could be achieved in theory *because of* its alleged independence from practice. Theorizing provides a false sense of certainty. Therefore it has enjoyed a much higher epistemic status than practice.²⁰

The emergence of philosophy was possible in a relatively small, connected and wealthy society without organized priesthood, where free men could gather for relatively “democratic” political action. But initially philosophy had to compete with myth. Philosophy also had to borrow the form of presentation from myth because it was already there and audience was used to it: the early attempts to demonstrate that nature have a single origin (ἀρχή) like water (Thales), air (Anaximenes), or fire (Heraclitus), were essentially mythical. Even Plato could not dispense with myth: for instance, the *Meno* (1952a) and the *Timaeus* (1981) involve myths. It is easy to imagine the marketing slogans by which philosophers may have tried to win the audience. The notion of mathematical proof had already shown that whole classes of problems can be solved in theory without bodily effort. Given the drudgery and precariousness of mundane affairs, the appeal of ease and irrevocable certainty must have been a rhetorically strong argument. No doubt, the sophistication and elegance of rational argumentation has had an aesthetic appeal too. The drama that is involved in public debates must also have had a considerable force for people dulled by daily routine. Moreover, even the most carefully thought out argument of a philosopher might have been considered just another opinion, and hence there may have been an incentive to cite a supernatural authority like Plato’s *demiurge* (δημιουργός) (1981: 28a ff.) or Aristotle’s *unmoved mover* (ὁ οὐ κινούμενον κινεῖ) (1934: bk. VIII; 1935a: bk. XII). At any rate, philosophy must have been marketed as something completely different from everyday affairs. That provides a strong motivation for overintellectualism.

Though the distinction between theory and practice emerged in specifically ancient conditions, later generations have had their own reasons to

²⁰This notion recurs in Dewey’s middle and later works. See, e.g., Dewey (1916a: chs. XIX and XX; 1920: 12–26; 1922: 146–147, 257–258; [1925] 1929a: 28–29, 50, 91–92, 124–125, 149–150, 251–252; 1929b: chs. I and II; 1938: 73). However, Dewey was not the first to posit such origin for philosophy; Marx and Engels ([1845–6] 1978: 26–27, 37–38) did the same over seven decades earlier.

retain it. Hellenistic philosophy spread from the higher ranks of society to a larger audience. It acquired an ethical character. After the introduction of Christianity, nature was seen as corrupt and fallen. The decadence of imperial Rome and its eventual decline corroborated this notion. Now the disdain of earthly activities acquired a supernatural rationale based on a supernatural authority. The problem of free will replaced the problem of knowledge. *Vita contemplativa* trumped *vita activa*. Philosophy became the business of clerics. It moved from ἀγορά to monasteries and, later, universities. Philosophy became ancillary to theology and thus acquired a pedantic, bookish and dogmatic character. The situation changed when science gradually adopted the experimental method in the high middle ages, the renaissance, and especially the 17th century.²¹ But ancient ideals lingered on in philosophy. It retained the old contempt of the body and its activities. In particular, Descartes's division between "subject" and "object" invests the immaterial soul with reason and despises the body as a completely unintelligent mechanism. Such a notion necessarily has a low opinion on the value of skill and practice. The exile of the body from philosophy achieves its peak in Kant ([1781/7] 1956). As I have indicated, there have been dissenters, but the Cartesian subject-object dichotomy is still with us.²²

But there is a danger. Speculation is prone to become a method of escapism where to evade the stubborn facts of life that cannot be done away with just by thinking. The value of such an intellectual asylum is merely sentimental, but that is enough for too many people. Their powerful intelligence would be needed elsewhere. Therefore Peirce (CP 2.137–174) argued that the sole motive for reasoning is to discover mind-independent facts, because they determine the prospects for possible action and hence are the only *interesting* facts. Thus reasoning — including philosophy — serves a purpose external to itself (cf. Dewey [1910] 1933: 100–101) and makes no sense if abstracted from that purpose (cf. Dewey 1916a: 169).²³ (Cf. Bergman 2016: 185; Peirce NEM 3: 192.)

But according to Rouse (1996: 127), *theorizing is itself a peculiar practice* among other practices (cf. Dewey 1916a: 169; 1922: 69, 77; [1925] 1929a:

²¹There were certain experimenters already in ancient Greece, like Strato of Lampsacus, Archimedes, and Hero of Alexandria. Medieval experimenters include Ibn al-Haytham (Alhazen), Ibn Sīnā (Avicenna), Abu'l-Barakāt al-Baghdādī, Robert Grosseteste, Roger Bacon, and Petrus Peregrinus.

²²I have derived this sketch of the history of the negligence of technics from Dewey (1916a: 292–316, 321; 1916b: 198, 243–244; 1920: 18–19, 66, 79–81, 93–94; [1925] 1929a: 123–125, 134–135, 152–154, 354–355; 1929b: 18–37, 37n, 49–57, 88–101, 110, 119–122, 185–186, 212; 1938: 57–59, 73–76, 83–97, 116, 211–213) for the most part.

²³I will elaborate on these notions in Section 4.5.

358; Barad 1996: 166) — and not even an independent practice: on the contrary, theorizing is a highly specialized activity that presupposes a rich background of other activities from which it acquires its meaning, significance, purpose, and resources (Dewey 1916b: 1–13). We could live without theory; but we certainly could not live without practice, because life *is* practice (cf. Marx [1844] 1968: 515). Perhaps a completely impractical life could be possible for an immaterial Cartesian soul, but there is little evidence for the existence of such things.²⁴

The development of experimental science has blown up the distinctions between theory and practice and between science and art — at least *de facto* if not *de dicto* —, thus jeopardizing the ancient notions that still haunt analytic philosophy in general and analytic epistemology in particular. Experimentation exhibits no split between knowledge and practice. On the contrary, both polar opposites are united in conducting an experiment. (Dewey 1916b; 1920; [1925] 1929a: ch. IX; 1929b; 1938.) Thus science refutes, rather than corroborates, the “spectator theory of knowledge,”²⁵ according to which knowledge has nothing to do with actual or potential action (Dewey 1929b: 23, 196, 204, 211, 213, 245, 291).

The trouble with the classical definition of knowledge is that it is difficult to determine empirically, how it can be attributed to anybody (or anything, for that matter). Especially since Descartes, belief has been considered “private” and “subjective” and hence completely inaccessible from the third-person point of view. The criterion of the attribution of *knowledge* cannot possibly be private; it could not have an independent check and would then be no criterion at all. The criteria of criterion itself are publicity and independence from the whims of individuals. (Cf. Wittgenstein [1953] 2009: §§ 72, 118, 138–242, 429, 492; Pears 1988: 368–369.)

On the other hand, Bennett and Hacker (2003: esp. ch. 4) suggest that *belief* and *knowledge* be attributed on the basis of *behavior*, including speech acts. That would make the criterion of their attribution public and “objective” but still fallible.

Now one can protest that a person can have reasons *not* to behave according to their belief or knowledge. Then the attribution can be false. But none of that is evidence against Bennett and Hacker’s view. First, the issue is not about *truth* but *meaning*. Even if belief and knowledge could be truly (or falsely, for that matter) attributed to a person, it cannot be *meaningful*

²⁴Hence one is entitled to question the *anthropological presuppositions* of logocentric, representationalist epistemology and philosophy of science. It seems to me that no human being can consistently live by logocentric or representationalist epistemology.

²⁵The Greek term θεωρία: “theory” is literally derived from θεωρός: “spectator,” which partially justifies Dewey’s terminology.

without behavioral evidence. If such a claim was made in the absence of related behavior, including speech acts, nobody could understand, what is being talked about. Second, Bennett and Hacker maintain that the criterion is *fallible*. If there arise reasons to revoke the attribution, that can be done. And the criterion on revoking is, again, behavior, including speech acts.

Thus it seems that belief — and *a fortiori* knowledge — has to do with *potential action*. A habit, understood in a technical sense that cuts across the subject–object dichotomy,²⁶ determines potential action. Action and habit fall under different categories:²⁷ action is strictly singular, habit universal. Now, universals are not just what can be *predicated* of many *things* (cf. Aristotle 1962b: 17a35–b5). That is a special case of a more comprehensive statement: universals can be *enacted* in many *situations*; and *predication* is a special case of *enactment*. Because habits determine potential actions, the latter justify an abductive inference (Lipton [1991] 2004; Niiniluoto 2018) to the former. I consider “habit” and “practice” synonymous. Therefore I will argue in this PhD thesis that *knowledge is practice*. Given that science is the perfection of knowledge and that art is the perfection of practice, my thesis has the corollary that *science is art*.

One can object that practices are “subjective,” and hence the identification of knowledge with practice would make knowledge “subjective” too. I reply that practice cannot possibly be understood as a redefinition of “subjectivity.” Practices cannot be understood in abstraction from their concrete setting, possibly including instruments, because they are modes of *organism*–

²⁶I will explain in Section 2.3 how the classical pragmatists understand the concept of *habit*.

²⁷In Western philosophy, *categories* have been traditionally understood as the *highest genera of being*. In Aristotle (1962a), categories exist in nature, though he abstracts them from the structure of language. In Kant ([1781/7] 1956), however, categories exist only in the understanding. He argues that they are necessary conditions of the possibility of experience. Hence they are also necessary conditions of the possibility of empirical knowledge. Peirce intended his categories to appear in experience; see Section 3.2. But because there is no distinction between experience and nature, as I will argue in Chapter 3, the categories of *experience* are simultaneously the categories of *being*. See also Lindholm (2023a: 9n19).

environment intra-action,²⁸ or *experience*.²⁹ They may involve the mind, but they also involve the body and the surrounding conditions, possibly including instruments.

For instance, take chopping wood. If we consider only whatever is “subjective” in it, we are left with the behavior of the agent (at most). But if the practice of chopping wood is “subjective,” then it could be understood as chopping wood without an ax and without wood! Performing the bodily movements of chopping wood without proper equipment and material can be understood only in a derivative sense. Practices are therefore both “subjective” and “objective” at once: they cut across the subject–object dichotomy. (Lindholm 2023a: 14.)

Moreover, practices are social. A practice is public and observable. Hence it is at least potentially shareable. I believe that most practices are indeed actually shared; otherwise they would not have been established. An idiosyncratic practice is possible but rare. That holds especially for *scientific* practices. Therefore, henceforth, when I use the terms *agent* and *agency*, I include *collective agents* and *collective agency*: a well-organized group can perform as a single agent with a unified purpose.

The purpose of the present criticism of theorizing should not be taken as a *refutation* of theorizing. On the contrary, theorizing is immensely valuable. Much of the comfort of the life in postindustrial societies would not be possible without theory. But, obviously, the *practical value* of theory does not imply that theory be *independent of* practice. Dewey (1916a: 169) goes as far as to claim that a theory could not even be articulated as a theory if detached from practice. I am merely arguing that theorizing is a peculiar practice that presupposes many other practices (Rouse 1996: 127; Dewey 1916b: 1–13; cf. Barad 1996: 166). In a word, this criticism is only intended to specify the proper place of theorizing in human activity. It provides meaning and control over our environment, but practice in general is its necessary condition.

The case may have been otherwise with our intellectual ancestors, but

²⁸Karen Barad (1996) has criticized the commonly used term “interaction” for presupposing that the relevant actants be definitely bounded systems independent of their interaction. She proposed the neologism in order to avoid such connotations and to express how the actants become definite only through their mutual dynamic relations. (Rouse 2002: 147n9.)

Dewey (1929b: 235, 244) anticipated Barad’s (and Rouse’s) position. He argued that if objects were independently determinate, there would be no such thing as a situation which is problematic (for the notion of *problematic situation*, see Subsection 3.1.3.). Their determinacy is something *to be effected* through inquiry consisting of practical operations. Thereby a problematic situation is resolved.

²⁹I will explain this definition of *experience* in Chapter 3.

we do not need to imagine castles in the air to justify the office of philosophy. Empirical reality already provides enough justification — in ethics and politics in particular. The impending ecological catastrophe — population explosion, climate change, pollution, the degradation and depletion of natural resources, and mass extinction — is a significant reason for reconsidering what *good life* is and what is *just* (cf. e.g. Kyllönen & Oksanen 2020). It also provides a reason to determine, whether and how scientific knowledge, technics³⁰ and economy have contributed to it, and whether and how they can help solve it.

Practice-based philosophy of science has already alleviated the crisis of the philosophy of science significantly. It has emerged in the sociology of scientific knowledge (SSK) and science and technology studies (STS) in the 1970s and 1980s.³¹ It has been motivated by dissatisfaction with mainstream analytic philosophy of science:³² the theory-driven picture of science has seemed remote from what scientists usually do. It often sets out from Thomas S. Kuhn’s epoch-making *The Structure of Scientific Revolutions* ([1962] 1996).

It seems that Kuhn has usually been understood as a proponent of the theory-driven picture of science. Rouse (1987: ch. 2) has challenged that

³⁰I prefer “technics” to “technology” for two reasons: (1) “technology” seems too “objectivistic” since it seems to refer to instruments abstracted from their concrete use, which seems to divest them of their status as instruments (Dewey 1922: 25–26); and (2) “technics” seems to translate the Greek τέχνη, the Latin *ars*, the German *Technik*, the Dutch *techniek*, the Swedish *teknik*, the Russian техника, the Finnish *tekniikka* and the Estonian *tehnik*a more accurately.

According to Ihde (2015: vii), “technology” is a fairly recent term. It came into use in the 20th century. Before that, “industrial arts,” “engineering” and “machines” were used instead.

³¹Considerable works in practice-based philosophy of science include, besides the works of Ihde and Rouse, Latour and Woolgar ([1979] 1986), Knorr-Cetina (1981; 1999), Cartwright (1983; 1989; 1994; 1999), Hacking ([1983] 2010), Heelan (1983), Latour (1983; [1984] 1988; 1987; 1993; 1996), A. Pickering (1984; 1989; 1992; 1995), Ackermann (1985), Shapin and Schaffer (1985), Franklin (1987), Galison (1987; 1988; 1997; 1998), Giere (1988; 1999; 2006), Radder (1988; 1996), Traweek (1988; 1992), Gooding, Pinch, and Schaffer (1989), Gooding (1990), Rheinberger (1992; 1994; 1995; 1997), Kohler (1994), Buchwald (1995), Cartwright, Cat, and Chang (1996), Cartwright, Cat, Fleck, and Uebel (1996), Baird (2004), Chang (2004; 2012; 2022), Boon (2004; 2009; 2011a; 2011b; 2012; 2015; 2017), and Currie (2018). The Estonian philosopher Rein Vihalemm introduced the program of *practical realism* (2011; 2012; 2013; 2015a; 2015b; 2016) which shares the motivation behind practice-based philosophy of science. I have contributed to practice-based philosophy of science myself; see Lindholm (2021; 2022; 2023a; 2023b; 2023c; 2024a; 2024b).

³²I follow Rouse (1996; 2002: ch. 4) and define *mainstream analytic philosophy of science* as the union of scientific realism (e.g. Popper, Putnam, Boyd, Niiniluoto, Psillos), empiricism/instrumentalism (e.g. van Fraassen, Stanford), historical rationalism (e.g. Lakatos, Laudan), and social constructivism (e.g. Barnes, Bloor, Collins, Fuller, Pinch).

notion. He argues that Kuhn understood science as practice. He also believes that Kuhn’s criticism of the representationalist theory of knowledge has been largely ignored. In my reading of Kuhn, it seems that the justification of Rouse’s position stems largely from the *Postscript* (Kuhn [1962] 1996: 174–210) which Kuhn added in 1969 in order to clarify his position and to reply to some criticisms.

The classical definition of *knowledge* has become almost a truism. It has been taken for granted so long that philosophers rarely, if ever, bother to defend it. That is already a problem. We must reconsider, whether Plato’s celebrated dialogues are fit to answer present needs. The concept of knowledge urgently needs an update. Hence I will question the distinctions between theory and practice and between science and art. My thesis is that such distinctions do not exist: *knowledge is practice* and *science is art*. This thesis reunites scientific knowledge (ἐπιστήμη) and skill or art (τέχνη) after more than two millennia of divorce. Thus I will defend classical pragmatism — the philosophies of Peirce and Dewey in particular. Neither was always right, but I will argue that their occasional mistakes do not compromise the unity of knowledge and practice.

In this sense, my account of knowledge is closer to Aristotle’s (1954: bk. VI) notions of *production* (ποίησις) and *prudence* (φρόνησις) than his notion of scientific knowledge (ἐπιστήμη). It does not imply certainty, necessity, or immutability. It does not require demonstration from first principles. Its criterion is *the rates of success and failure* (rather than the accuracy of representation). The appropriateness of each concept and theory must be always empirically tested anew, because similar situations may never recur, or, at least, if they do, that is uncommon. The world itself may change (Hume [1739–40] 1854a: bk. I, pt. III; [1748] 1854b: § 4). Hence knowledge in my sense is more akin to an *active process of adaptation and readaptation* rather than to something fixed and independent of what agents do. This notion is naturalist: the criterion of knowledge is an experimental issue — rather than the mysterious “correspondence” between two non-empirical entities, like between propositions in their traditional sense and noumena.

My thesis applies to itself: my philosophy consists in a peculiar practice. Everything I have said about practices applies to it. That includes moderate historicism: what I say is a product of twenty-first-century Nordic society and may not apply universally.

This is a non-logocentric and non-representationalist thesis. But my thesis is neither *anti*-logocentric nor *anti*-representationalist: my purpose is not to disavow logic or representations. My purpose is, rather, to show their proper place. Logic is an integral part of a more comprehensive scheme of experimentation, understood in the terms of the *belief-doubt model of in-*

quiry and the *tertiary classification of inferences* which Peirce instituted.³³ Knowledge may or may not involve representations — for instance, maps, diagrams, models, simulations, etc. —, but representations cannot constitute knowledge alone. They must be incorporated in a living practice. Hence they are not essential. In many instances, it is possible to establish knowledge (practice) without using representations at all.

Non-logocentrism and non-representationalism seem to introduce a problem with propositions³⁴ in general and propositional knowledge in particular, given that propositions are representations *par excellence*. I believe that Peirce’s *semiotic theory of propositions* solves that problem. Peirce defined *propositions* as *dicisigns* — a class of signs the properties of which he derived from Aristotle’s definition of *proposition*³⁵ (Peirce CP 2.309–331; EP 2: 275–288). Stjernfelt (2014) has insightfully examined Peirce’s dicisign theory.

I am not the first to relate knowledge to practice. Marjorie Grene has already argued that “knowing is something people do, an activity” (1974: 172); and that the “full, concrete, historical person [...] is the essential agent of knowledge” (1974: 158). I agree with this formulation, adding that the agent can be collective. However, I and Grene have attained our conclusions by very different means.³⁶ I am also in agreement with Chang (2022). My work supplements his *activist realism* in many respects: I investigate further

³³See Section 4.3.

³⁴In mainstream analytic philosophy of language, propositions have usually been understood as *abstract entities*. Some authors consider them as unstructured, others as structured. Some authors reduce them to some other ontological class, others consider them as a *sui generis* class. Propositions have several functions to perform: (1) they constitute the content of indicative sentences; (2) they are the primary bearers of truth-value; (3) they are bearers of modal attributes such as being possible, necessary and impossible; (4) they are the objects of propositional attitudes such as believing, doubting, assuming and suspecting; (5) they constitute the content of perceptual experiences — but this position is controversial; (6) the so-called possible worlds can be identified with complete, consistent sets of propositions; (7) they play a significant role in characterizing context and conversational record; (8) that-clauses designate propositions; (9) they account for the validity of inferences; (10) that-clauses designating propositions are used to attribute other properties to propositions; (11) sometimes propositions are designated by demonstratives; (12) certain expressions function like names of propositions, such as “Gödel’s theorem,” “Goldbach’s conjecture” and “logicism”; and (13) sometimes quantifiers range over propositions (J. C. King 2014d). I will provide a semiotic analysis of propositions in Section 5.10.

³⁵“We call propositions those only that have truth or falsity in them” (ἀποφαντικὸς δὲ οὐ πᾶς, ἀλλ’ ἐν ᾧ τὸ ἀληθεύειν ἢ ψεύδεσθαι ὑπάρχει) (Aristotle 1962b: 17a1–5).

³⁶I learned about Grene too late for her epistemology to substantially influence my thesis: my thesis was already finished and in review when I read about her in Chang (2022: 18).

the same concepts and theories, especially by providing a phenomenological justification to them. Thereby I complete some of the tasks Chang (2022: 254) sets for further inquiry.

The purpose of my thesis is to demonstrate that *knowledge is practice*. That holds for philosophical knowledge too: it is one peculiar kind of practice. Therefore I have a firm conviction that philosophy must address vital needs and solve vital problems — a conviction which seems to be consonant with the general pragmatist spirit and which I have acquired primarily from William James and John Dewey³⁷ but also from Søren Kierkegaard, Karl Marx, Friedrich Engels, Friedrich Nietzsche, the early Martin Heidegger, and Hannah Arendt.³⁸ In particular, for moral and political reasons, I wish to emphasize (not necessarily human) *agency* in the construction of knowledge. Moreover, my account on knowledge is fallibilist, which has political ramifications (D. R. Anderson 1997). It seems to me that restrictions of agency result in restrictions of the validity of knowledge: there cannot be genuine, justified knowledge without public criticism; there cannot be public criticism without divergence in opinions; there cannot be divergence in opinions without genuine agency; there is no genuine agency without sufficient liberties; therefore, without sufficient liberties, knowledge itself will be corrupted. That, in turn, will corrupt the whole society: nobody can trust anything or anybody *unless their trust is bought or extorted*. The protection of the rights of the individual from the whims of politicians, popular collective movements, demagogues, bureaucrats, and especially religious authorities is key. I also believe that an analogous argument can be made about morals. An appeal to the alleged “common good” — or even to the alleged “best interest of the individual” — is by definition a violation of liberty. Even if such appeals were *morally* legitimate, they cannot possibly be *epistemically* legitimate: because we all are fallible, nobody knows certainly in advance what the best interest of an individual or of a society is. Some novel solutions can be serendipitous. Therefore paternalism is never legitimate: people must be allowed to experiment and also to make occasional mistakes. However, I will not explore that line of inquiry here.

As concerns vital needs, I believe that *philosophy belongs to everybody*. If Mumford (1952: 33ff.; 1967: 5ff.) is correct, *philosophy itself* may be a vital need. The human brain is highly developed. Therefore it has intellectual needs, of which philosophy may be one. Thus the need of philosophizing can be a *scientific fact* based on biology.

³⁷See Dewey (1917), Dewey (1920), and especially Dewey ([1925] 1929a: ch. X) for an argument that philosophy is *criticism of criticism* that grows naturally out of our practices.

³⁸See also Chang (2022: 206, 254–255).

The natural habitat of philosophy is ἀγορά — public discussion. As the very term φιλοσοφία indicates, philosophy is *love of wisdom*.³⁹ It is a *practical* affair, though it does involve theorizing. *Everybody* can love wisdom in their practical life. *Any* practice can be engaged philosophically — that is, with a critical point of view about its ends and methods. According to Dewey ([1925] 1929a: ch. X; 1929b: ch. X), the philosophy of a particular activity is continuous with that activity. According to Plato, Socrates argued that “an unexamined life is not a life for a human being.”⁴⁰ Hence I hope that my thesis will not remain a strictly academic matter.

1.2 Method

I will make three methodological commitments. My first commitment is *anti-dogmatism*. I understand that as the rejection of the *a priori* method: *a priori* claims are, by definition, independent of experience and hence immune to empirical revision; and the impossibility of empirical revision entails dogmatism.⁴¹ Any axiomatic–deductive system is necessarily dogmatic. Hence, if there is justified knowledge, it must be *a posteriori*. Thus anti-dogmatism entails *empiricism*. The method of divesting oneself of *a posteriori* beliefs and the attempt to establish *a priori* beliefs without them is Cartesian — or, perhaps, *hyper-Cartesian*⁴² —, possible only for an immaterial Cartesian soul.

My second commitment is *cybernetics*.⁴³ Cybernetics studies feedback systems. I understand *cybernetics* as a method of studying everything in their *intra-action* with their surroundings. That seems to follow from empiri-

³⁹Though Socrates should have called it σοφοφιλία, as in “bibliophilia” or “Slavophilia.” I believe that love of wisdom is largely a non-academic affair. Haack (1997: 253–259) explores scathingly the state of academic philosophy that has forgone the love of wisdom as a result of professionalization, bureaucratization, and (sometimes) politicization. See also Peirce (CP 1.49, 1.51, 1.58–59).

⁴⁰ὁ δὲ ἀνεξέταστος βίος οὐ βιωτὸς ἀνθρώπῳ (Plato 2005: 38a).

⁴¹There have been people who openly subscribe to dogmatism (e.g. Theodoridis & Psimopoulos 1988). I recommend J. S. Mill’s *On Liberty* (1859) and my Chapter 4 to them.

⁴²Felix Ó Murchadha suggested this term to me (private communication). He believes that Descartes himself was too smart to try acquiring knowledge by mere thinking, completely disconnected from experience.

⁴³I have acquired this method from my M. Sc. degree in control engineering. Cybernetics was founded by Wiener (1948). He defines *cybernetics* as *control and communication in the animal and the machine*. However, Wiener’s definition is too narrow, even by his own principles: the laws of control and communication apply to *entire systems* which may or may not include animals or machines. For instance, the climate of the earth is a cybernetic system independently of whether there are animals or machines.

cism, given that experience itself is *organism–environment intra-action* and hence involves feedback⁴⁴ (Lindholm 2023a). That also relinquishes the pre-supposition that there be mutually independent and independently definite entities. Chang (2022: 74) calls such notion *the fallacy of pre-figuration*.⁴⁵ We simply cannot establish that by metaphysical fiat. That might be the case, but that must be determined experimentally case by case. It follows from the concept of intra-action that the organism and its environment exist in the same sense. That can be understood as a version of the thesis of *ontological symmetry*. Thus cybernetics seems to imply *naturalism* in Dewey’s (1916b; 1920; 1922; [1925] 1929a; 1929b; 1938) sense: experience is a natural process; it takes place within nature; there is no metaphysical split between the knower and the known.⁴⁶

My third and most important commitment is the rejection of the subject–object dichotomy. That follows from cybernetics and the naturalism it implies. My methodological concepts — *experience*, *situation*, *habit* and *practice* — are both “subjective” and “objective” at once and thus cut across the dichotomy. Hence they cannot possibly be redefinitions of “subjectivity” and cannot possibly render knowledge “subjective.”

Peirce, following Jeremy Bentham, called philosophy *cenoscopy*,⁴⁷ the lookout upon the common. It only presupposes ordinary experience, in principle available to everybody. I will adopt this notion. My purpose is to make my thesis at least potentially verifiable by anybody. My treatment also falls under what Don Ihde ([1977] 2012: xix, ch. 10; 2009: ch. 1) has called *postphenomenology*, defined as the union of classical phenomenology, classical pragmatism, and empirical philosophy of technics.

I subscribe to naturalism, which I define as a *commitment to experimentalism*: a thing is natural if it is experimentally accessible;⁴⁸ arguably, that covers everything that interacts causally with us, with or without technical

⁴⁴I will elaborate on this notion in Chapter 3.

⁴⁵Chang (2022: 70ff.) disambiguates between *mind-control* and *mind-framing*. Almost tautologically, we can only think by concepts. Hence everything we think about is mind-framed. But that is completely unproblematic. Problems arise if being mind-framed is (mistakenly) considered to entail being mind-controlled, as it may be the case in much of the debate about scientific realism.

Another problem arises if the world is assumed to be determinate independently of our concepts. It is obviously contradictory to consider things simultaneously being mind-framed (determinate) *and* not mind-framed (independent of our concepts). In Section 3.1, I will show a way out of this dilemma.

⁴⁶Cf. Rouse (2002).

⁴⁷From *κοινοσκόπια*.

⁴⁸I will define *experiment* in Section 2.4.

intermediaries. I naturalize concepts by defining them operationally.⁴⁹

Lammenranta (1992b) succinctly captures the skeletal structure of my method. He distinguishes between dialectical and historical (causal) justification. Dialectical justification requires that knowers be able to ground their beliefs (cf. Lehrer 1965: 169; Pappas 1979: 54–56). This requirement seems too demanding. Historical (causal) justification only requires that the beliefs in question be formed by reliable epistemic skills (cf. A. I. Goldman 1979; 1986; Harman 1970; 1973; Swain 1979; 1981; Kornblith 1985). He also distinguishes between two senses of “justification”: (1) the epistemic status of being justified and (2) the act of justifying. He argues that theories of dialectical justification equivocate between these two senses but historical (causal) theories account for the difference. (Cf. Alston 1980: 145; 1985: 58.) The historical (causal) theories also seem more adequate to account for the knowledge of infants and animals. He continues that a historical (causal) theory of justification is a way of naturalizing epistemology: the description of epistemic competence (skill) becomes a task for epistemology, and this requires the assistance of empirical cognitive sciences (A. I. Goldman 1986: 81–93). Hence epistemology cannot stick to the traditional *a priori* method (Harman 1986: 11–20).

There are two problems: (1) cognitive sciences merely *describe* thought-processes, but the point of epistemology is to *normatively evaluate* them; and (2) the method begs the question by justifying experience by an appeal to experience. Lammenranta solves the first problem by emphasizing that before one can determine the norms of our thought-processes and evaluate them, they must know what such processes are like (A. I. Goldman 1986: 181; cf. Harman 1973: 18–19; 1986: 7). He argues that the second problem arises from Cartesian presuppositions. He submits that one can begin from common sense without first establishing its justification, provided that one eventually succeeds in describing and explaining, why it was justified all along. Thereby one may need to revise the beliefs from which they set out. Thus there is no *circulus vitiosus*.⁵⁰

I add that cognitive sciences make sense best if they are understood in an evolutionary framework. Hence they make sense best when the reliability of cognitive processes is measured by the *appropriateness of the responses to the environmental stimuli they produce* (rather than by the degree of correspondence of internal representations, like beliefs in the traditional sense, to the structure of mind-independent realities). (Cf. Johnson 2010.) The ap-

⁴⁹I will define *operational definition* in Section 2.2 and Subsection 2.5.2.

⁵⁰I will argue in Chapter 4 that setting out from common sense is perfectly unproblematic: the *belief-doubt model of inquiry* permits setting out from *any* set of beliefs, provided that the agent is genuinely committed to revising any belief if needed.

propriateness of behavior is a matter of *skill*, and hence the whole organism–environment system must be taken into account (rather than merely neural processes) (Dewey 1896; 1922; [1925] 1929a; 1929b; 1938; 1941). The neural mechanisms *are* important *as causal conditions* of action, but they should not be studied in abstraction from actual behavior in a concrete situation. The problem is how one *uses* them. I believe that sometimes even defective observations can be used successfully with appropriate skill (habit, practice). An expert knows their subject matter. Therefore they need not concentrate on all the details with the highest possible distinctness. For the converse, sometimes even the most acute observations can lead to a miserable failure without appropriate skill (habit, practice). Too much clarity and distinctness in observation might just accumulate irrelevant details that consume cognitive resources and thereby compromise the possibility of success in action.

Sami Pihlström has always emphasized *reflexivity* in the Kantian sense from a naturalist point of view (see, e.g., Pihlström 2024): a method must apply to itself to be justified. My Chapters 3 and 6 contain resources to address this issue. I reply that experience is experiment; an experiment can be studied experimentally; knowledge is practice; a practice can be studied practically. In short, the domain of all practices contains its own metapractice. Pihlström adds that practices are “transcendental” in the sense that we are always already engaged in practices. Therefore we cannot step outside practices and assume a God’s eye position in epistemology — not even with regard to practices themselves. They can be studied from the third-person view, but that can only be possible from a first-person view. Therefore knowledge is situated. Because metapractice is a practice itself, my method does not transgress the boundaries of all possible practices. Therefore it justifies itself in this sense.

It must be borne in mind that the classical pragmatists use the term *habit* in a technical sense. For this purpose and others, I contend that *habit and skill are equivalent*. On the one hand, a habit accomplishes its purpose at least to a sufficient degree; otherwise it would change. Therefore it is a skill. On the other, a skill determines actual and potential actions. Therefore it is a habit.⁵¹ (Dewey 1922: 15, 64–65, 71–72.)

I disagree with Lammenranta about one point: he understands skills in the terms of following a rule (1992b: 195–196). I, on the other hand, follow Rouse (2002) and determine them as responsible to what is at stake and at issue with them. Whether a skill follows a rule is incidental, and that presupposes normativity instead of grounding it.

The usual criticism of such reliabilism is that it insulate justification from

⁵¹I will continue the analysis of the concept of habit in Section 2.3 and Subsection 3.2.5.

the space of reasons, making it dogmatic. That is not the case. Deweyan pragmatists and contemporary virtue epistemologists can reply that the mechanisms which produce reliable beliefs *are* within the space of reasons, namely *technical norms*⁵² (von Wright 1963; cf. Määttänen 2009: 33). I cannot see why skill (habit, practice) would be outside the space of reasons. Even a bad habit, being *bad*, is, by definition, within the space of reasons.⁵³ It must be pointed out that not all epistemic norms are discursive: some norms are internal to practices (skills, habits). Practices can be *epistemic virtues* at least in the ideal case, and their justification is that they deliver their goods — a matter of *success or failure*. There is no apparent reason, why such justification could not be potentially expressed in language, at least in principle. If there is no vocabulary, people are at liberty to introduce it.⁵⁴

Many contemporary pragmatists seem to have one favorite pragmatist, whether Peirce, James, Dewey, Mead, Schiller, Santayana, or Royce. I, on the other hand, consider classical pragmatism as more or less unified. The differences between the philosophers are small, usually just matters of emphasis. Hence my approach is somewhat syncretistic.

⁵²See my version of technical norm in Subsection 2.5.2.

⁵³Peter Railton (2004: 186; 2006: 13) argues that the conduct of an agent can follow norms even if they do not explicitly consider them. Korsgaard (1997; 2008: 213) makes a distinction between acting *in accordance with* a norm and acting *on* a norm: the latter requires explicit approval from the agent. Stanley (2011: 19–22) discusses the relative merits of both views but does not make conclusions.

⁵⁴For discussion on reliabilism, see A. I. Goldman (1979; 1986; 1988; 2008; 2009; 2011; 2014; in press), Bonjour (1980), Pollock (1984), Feldman (1985), Foley (1985), Lammenranta (1992a; 1996; 1998; 2003), Alston (1995), Conee and Feldman (1998), Greco (1999), Vogel (2000), Sosa (2001), Riggs (2002), Leplin (2007), Kornblith (2009), Comesaña (2010), Jönsson (2013), Lyons (2013; 2019), Dunn (2015; in press), Matheson (2015), Fricker (2016), McLaughlin and Kornblith (2016), E. Olsson (2016), Tang (2016), M. Williams (2016), Tolly (2017; 2019), Frise (2018), Kampa (2018), Constantin (2020), Beddor (2021), and A. Goldman and Beddor (2021).

For discussion on virtue epistemology, see Montmarquet (1987; 1993), Sosa (1991; 1993; 2003; 2007; 2010; 2015a; 2015b; 2021), Greco (1993; 2001; 2002; 2004; [2005] 2014; 2007; 2009; 2010; 2012; 2015), Axtell (1997; 2000), Zagzebski (1997; 2005), Heller (1999), Fairweather and Zagzebski (2001), Pritchard (2003; 2005; 2008a; 2008b; 2009; 2010; 2012; 2014), Riggs (2003; 2006), Baehr (2006a; 2006b; 2008; 2010; 2011), Brogaard (2006; 2014), Axtell and Carter (2008), Battaly (2008), Napier (2008), Kvanvig (2011), Alfano (2012), Greco and Turri (2012), Morton (2013), Turri (2013; 2015a; 2015b; 2015c; 2016b; 2016c; 2016a; 2016d; 2017), Carter (2014), Fairweather (2014), Fairweather and Flanagan (2014), N. L. King (2014a; 2014b), Carter, Jarvis, and Rubin (2015), Miracchi (2015), M. Williams (2016), Green (2017), Kelp (2017), Turri, Alfano, and Greco (2017), Beddor and Pavese (2020), and Greco, Alfano, and Turri (2021).

Virtue epistemology can be understood as a species of moderate foundationalism. In Section 4.4.5, I will argue that moderate foundationalism ultimately boils down to what I call *indefinitism*: epistemic justification can involve an indefinite number of stages.

Pragmatism may be best known for its theories of truth. I will not discuss truth in this volume. In my analysis, knowledge is practice rather than justified true belief. This result dispenses with the need to delve into the nature of truth.⁵⁵ Let me just say this: truth (or truthlikeness, or verisimilitude) is not the ultimate purpose of inquiry: not because it be a constituent of knowledge, but because it serves the resolution of problematic situations. We are not immaterial Cartesian souls who could live happily just contemplating truths. We need to *act on* them to live. But that does not mean that science should settle for *less* than truth. On the contrary, the pursuit of science is a lot *more* comprehensive than a mere quest for truth. The result of inquiry must be not only *true* but also *applicable*. These desiderata might be partially contradictory. Hence trade-offs are to be expected. Truth is *a* goal of inquiry, but an intermediate one: its purpose is to be applied so that a problematic situation be resolved.⁵⁶ I also will not discuss pragmatist ethics⁵⁷ or political philosophy⁵⁸ here.

Much of what I will say may look like *a priori* argumentation. But that is not the case: Chapters 2, 3, and 4 are entirely empirical.

In Chapter 2, I will derive a theory of meaning that is impeccably experimental: all meanings arise from experiment (see especially Section 2.4). Moreover, I will eliminate everything non-experimental from discourse (see especially Sections 2.5 and 2.6).

In Chapter 3, I will make an empiricist (phenomenological) analysis of experience itself by applying the experimentally generated concepts of Chap-

⁵⁵Arguably, one can make an operational analysis (see Subsection 2.5.2) of *belief*. The result is that *belief is habit* or *practice*. A habit or practice carries its own justification insofar as it accomplishes its purpose to a sufficient degree. Truth simply drops out of the picture.

⁵⁶The reader may consult Peirce (CP 5.407, 5.430, 5.553; EP 1: 139; EP 2: 379–380, 432–433; W 2: 4), James ([1907] 1916: 64, 80, chs. VI–VII; 1909a: v–xx, chs. III, V–IX, XII–XIII) and Dewey (1916b: 240–241, 324–325; 1920: 155–60; 1938: 7–9; 1941: 178–179; cf. R. A. Putnam 2010: 36–38). For discussion, see also Fine (1986), Niiniluoto (1987), Rouse (1987: 7–8), H. Putnam (1995b: 10–11), Lakoff and Johnson (1999: 6, 94–95, 98–106), Short (2007: 333), Capps (2017; 2019: § 5), Chang (2022: chs. 2 and 4), and Lindholm (2024b: 61). For background, see Aristotle (1933: 1011b25), Thomas Aquinas ([1256–9] 1918: pt. 1, q. 16, a. 2, arg. 2), Husserl ([1900] 1975; [1901] 1984a; [1901] 1984b; 2002; 2005), Russell ([1918] 2010), and Wittgenstein (1922).

⁵⁷The reader may consult Peirce (CP 1.180–202, 1.573–574, 5.35–36, 5.111, 5.120–150, 5.419, 5.448n, 5.549–554; EP 2: 142–143, 188–189, 196–207, 252–253, 258–262, 272, 337, 342–343, 371–397, 459) and especially Dewey (1916a: esp. chs. VIII, XV, XVIII–XXVI; 1916b: ch. XIV; 1920: chs. VII–VIII; 1922; [1925] 1929a: ch. X; 1929b: ch. X), Dewey and Tufts ([1908/32] 1959), Haack (1997: 244), Gale (2010: 71–73), and Gustafsson and Pietarinen (2016).

⁵⁸Pragmatist epistemology does, however, have political ramifications, as D. R. Anderson (1997) explains.

ter 2 (see especially Subsection 3.1.3 and Section 3.2).

In Chapter 4, I will simply argue that nothing is certain; or even if something is, we cannot *identify* its certainty, because we do not know what the *criterion* of certainty could be. This position is as empirical as anything can be.

The only Chapter that appears to conform to the *a priori* method is Chapter 5, in which I explain Peirce's semiotics. But even there the *a priori* is only operational (cf. Lewis [1929] 1956; Dewey 1938): the concepts to be analyzed by using *a priori* methods are ultimately derived from experience, namely, from Peirce's phenomenology. Operational *a priori* means that the method is independent of what it is applied to in a particular case, but not independent of experience in general.⁵⁹ As I will argue in Chapter 3, reasoning, including the operational *a priori* method, operates upon habit and hence cannot be applied independently of all experience. In short, when we perform deductions on habit, that constitutes a part of an experience. In Chapter 3, I will argue that the rational is a possible part of the phenomenal world. Hence such deductions cannot be *a priori*. In Chapter 6, I will simply apply my previous results to the concept of *knowledge*.

1.3 Sources

In this Section, I will judge my sources. From the set of classical pragmatists, I have selected Peirce and Dewey because they make in-depth analyses of experiment unlike the rest — and because James's prose is too imprecise.⁶⁰ I emphasize that my purpose is not to provide a faithful, historically accurate Peirce or Dewey exegesis. I am arguing that knowledge is practice, but the resources I use to construct my argument are largely due to Peirce and Dewey. My view may, and in some respects certainly does, differ from theirs.

1.3.1 Peirce

Like Marx and Wittgenstein, Peirce published relatively little in his lifetime. Most of his output has become available only posthumously.

⁵⁹Thus Chang (2022: 245): "From the perspective of epistemic iteration, 'a priori' just means being *prior*, in the sense of being accepted without question at the start of each inquiry, rather than prior to all experience — and who among us can tell what anything is like prior to *all* experience?"

⁶⁰James uses a lot of metaphors, of which some I cannot understand at all. For instance, James ([1907] 1916: 222) says that "[e]xperience, as we know, has ways of *boiling over*." What in the world is it supposed to mean that experience "*boils*," let alone "*boils over*," and in different ways at that?

The best-known source is probably still the eight-volume *The Collected Papers of Charles Sanders Peirce* (CP; 1931–1935; 1958). It is not organized chronologically, which makes it difficult to follow — especially because Peirce’s thought evolved significantly. Moreover, the CP contains many texts only in part.

More recently, there has appeared *The Essential Peirce: Selected Philosophical Writings* (EP; 1992; 1998) of two volumes. It contains most of Peirce’s most important texts; the most conspicuous omission is probably the 1906 “Prolegomena to an Apology for Pragmaticism,” which is, however, available in the CP.⁶¹ The EP makes up to many of the shortcomings of the CP: it is chronological and showcases most texts in full.⁶² Hence my primary source is the EP. I have, however, included also the reference to the CP, if the text is available in both.

The New Elements of Mathematics by Charles S. Peirce (NEM; 1976) of four volumes was discovered posthumously. The NEM is highly relevant for a more comprehensive understanding of Peirce’s thought. But because my purpose is to *use* rather than *represent* Peirce’s thought, I will only make occasional reference to the NEM.

Peirce’s *Nachlass*, consisting of a large number of manuscripts on microfilm (MS; 1966), is nowadays available online. Like the NEM, the MS is highly relevant for a comprehensive understanding of the development of Peirce’s thought. Again, my purpose is to use rather than represent. Some of the manuscripts provide useful ideas. But due to the size and variety of Peirce’s *Nachlass*, I cannot consider it in its entirety, and therefore I will exclude most of it outside this thesis.

The publication of *Writings of Charles S. Peirce, A Chronological Edition* (W; 1982–), a complete chronological collection of Peirce’s works, is still in progress. A total of thirty volumes is projected. I have no access to the collection; but I will refer to it, if I have to use a reference made by some other source of mine like Short (2007).

Peirce’s correspondence with Victoria Welby, an important semiotician, is available in *Semiotic and Signifys: The Correspondence between C. S. Peirce and Victoria Lady Welby* (SS; 2001), but parts of it are also available in the CP and the EP.

There is a problem in Peirce scholarship, how seriously Peirce’s unpublished works should be taken. It can be suspected that many of Peirce’s manuscripts were experimentations on private, sporting ideas, alternative hypotheses to be analyzed without committing to their truth, or working

⁶¹See Peirce (CP 4.530–572; 4.537n3).

⁶²When a text is abridged, the excluded parts do not contain new information.

notes, never meant to be published. On the other hand, publishers turned many serious projects of his down — like the 1893–1894 *Grand Logic* and the 1907 semiotic proof of pragmatism. Hence his manuscripts are a mixed bag. (Dipert 2004: 303–304.) My interpretation strategy is chiefly to rely on the judgment of the Peirce scholars who have decided to include some of his previously unpublished manuscripts in the EP. What matters for my purpose is not whether the MS is representative of Peirce’s true opinion but whether their content can be developed further. Hence, the manuscripts, which others have not judged before, I take up on the merits and weight of their own and judge myself.

The most important secondary source of Peirce scholarship from which I draw is without doubt T. L. Short’s semi-authoritative *Peirce’s Theory of Signs* (2007). When it specifically comes to Peirce’s theory of propositions, I rely on Frederik Stjernfelt’s *Natural Propositions* (2014). I also have *The Rule of Reason: The Philosophy of Charles Sanders Peirce* (Bunning & Forster 1997), *The Cambridge Companion to Peirce* (Misak 2004), *Consensus on Peirce’s Concept of Habit* (D. E. West & Anderson 2016), and *Peirce’s Speculative Grammar: Logic as Semiotics* (Bellucci 2018) at my disposal.

Peirce’s own account is not always clear. For instance, sometimes he subsumes law under thirdness, sometimes under secondness,⁶³ and sometimes he conceives the ultimate logical interpretant as habit, sometimes as habit-change.⁶⁴ I am unable to decide, which interpretation represents Peirce’s own view (if any). Bergman (2016) convincingly argues that Peirce intended habit-change to be the ultimate logical interpretant. Secondary literature is sometimes divided between law as a third and law as a second.⁶⁵ In what follows, I will follow Stjernfelt (2016: 250–251) and consider fixed law and the establishment of law on a continuum; I will therefore consider both as a species of thirdness. Analogously, I will consider fixed habit and habit-change on a continuum; I will therefore consider the ultimate logical interpretant as both habit and habit-change, depending on context.

1.3.2 Dewey

Unlike Peirce, Dewey published copiously. Dewey’s complete works have been published in the five volumes of *The Early Works of John Dewey (1882–1898)*, the fifteen volumes of *The Middle Works of John Dewey (1899–1924)*, and the seventeen volumes of *The Later Works of John Dewey (1925–1953)*. I have no access to these collections. The texts which I use might differ from

⁶³See Section 3.2.

⁶⁴See Sections 5.6 and 5.13.

⁶⁵See, e.g., Andacht (2016: 355) on Miller’s (1995) account on habit and law.

the critical editions, and I may have to revise my account on the basis of that.

The primary sources which I use are the originals: the revised edition of *The School and Society* ([1900] 1915), the revised edition of *How We Think* ([1910] 1933), *The Influence of Darwin on Philosophy, And Other Essays in Contemporary Thought* (1910), *Democracy and Education* (1916a), *Essays in Experimental Logic* (1916b), *Reconstruction in Philosophy* (1920), *Human Nature and Conduct* (1922), the revised edition of *Experience and Nature* ([1925] 1929a), *The Quest for Certainty* (1929b), *Logic: The Theory of Inquiry* (1938), and *Problems of Men* (1946). I cite Dewey's classical articles "The Reflex Arc Concept in Psychology" (1896) and "Propositions, Warranted Assertibility, and Truth" (1941) as well. I also have access to reprints of the revised edition of *Ethics* (co-authored with James H. Tufts) ([1908/32] 1959), *Art as Experience* ([1934] 1980), and *Experience and Education* ([1938] 1997). I do not have access to *The Study of Ethics* (1894), *Studies in Logical Theory* (1903), *The Public and Its Problems* (1927), *Individualism Old and New* (1930), *Philosophy and Civilization* (1931), and *Liberalism and Social Action* (1935). I may have to revise my thesis on the basis of these works.

For secondary literature on Dewey, I largely follow Larry A. Hickman's brilliant *John Dewey's Pragmatic Technology* ([1990] 1992), which remains faithful to Dewey's original technological point of view and does not try to square it with the linguistic turn.⁶⁶ I agree with Hickman in most points; the only qualms with him are (1) his unqualified techno-optimism and (2) the absence of a consideration of the *cost* of increased control over environment (cf. Lindholm 2023b). If he is correct, Dewey had from early on the notion of the primacy of technics also in philosophical affairs, and, arguably, his whole corpus deserves to be called a philosophy of technics on its own right. I also have *The Cambridge Companion to Dewey* (Cochran 2010) at my disposal.

1.4 Contents

As I have already said, the purpose of this PhD thesis is to demonstrate that *knowledge is practice*. I will eventually make a semiotic argument for this thesis in Chapter 6. But in order to understand the semiotic argument, many preliminaries are needed. Semiotics must be placed into its proper context in Peirce's philosophy. Dewey's philosophy provides assistance in explaining Peirce's thought naturalistically. I have made a methodological

⁶⁶For instance, Alhanen (2013) has provided an otherwise well-informed account of Dewey's notion of experience, but he seems to write from the point of view of the linguistic turn.

commitment to empiricism. That dictates a certain order of presentation: discussion on the concepts of meaning, experience, fallibilism, semiosis, and finally knowledge.

My overall argument is complex. It involves the following main theses:

The meaning of a thing is the *potential practical effects* of that thing, or the *habits* that pertain to that thing, where “habit” is understood in a technical sense which I will explain shortly below. Concepts can be defined operationally by specifying the potential practical effects of their objects.

Operationally, *experience* can be defined as *organism–environment intra-action*,⁶⁷ and *habit* can be defined as an (*approximately and relatively*) *invariant pattern of possible organism–environment intra-action*. Habit is a mode of experience. Both habit and experience are both “subjective” and “objective” at once.

Thus defined, there is no split between experience and nature. Experience can be analyzed into three categories without remainder. The three categories are defined according to whether they involve relations between one, two, or at least three things. Because experience is not distinct from nature, the categories of *experience* are simultaneously the categories of *being*.

Habit is a manifestation of the third category, because three things are involved: it determines possible actions on the basis of a sequence of past actions. A habit can be intelligent or unintelligent; the former sense is primary. “Intelligent habit” and “practice” are at least roughly synonymous. Reason operates upon intelligent habit, or practice. Hence mathematics and logic ultimately refer to possible experience.

All knowledge, whether propositional or non-propositional, including mathematics and logic, is fallible. Knowledge is acquired by epistemic activity. The latter acquires its meaning, significance, resources, and purpose from a broad background of non-epistemic activities. A failure in habitual behavior prompts epistemic activity. It conforms to Peirce’s *belief–doubt model of inquiry*. The model entails epistemic indefinitism for propositional knowledge. Epistemic justification issues from the *process* of self-correction rather than from a set of obvious or self-justifying basic beliefs. Thus it does not matter from which beliefs one sets out. Therefore this study on the nature of knowledge has been justified.

Semiotics, or the science of interpretation, is based on the thesis of the fallibility of all knowledge: because any thing can be a sign (because any thing

⁶⁷Dewey uses the ordinary term *interaction*; I have substituted it with Karen Barad’s (1996) revised term *intra-action*. Given that Dewey himself describes experience also as “*trans-action*” (Jung 2010: 148), I believe that he would have accepted this application of Barad’s conceptual apparatus.

can have potential practical effects), its epistemic status is problematic. Experience provides *problems to be solved*, and the construction of solutions is up to us. Semiosis, or interpreting signs, is teleological: it tends towards the complete discovery of an object independent of its representation. In the terminus of semiosis, all potential practical effects of the object are understood. But because we do not possess the criterion of ultimate truth, inquiry is condemned to go on and postpone final judgment indefinitely.

The type–token–tone distinction can be derived semiotically on the basis of the categories. Propositions are *dicisigns*, a subclass of types.

Intelligent habits, or practices, are types; and particular actions determined by them are their tokens. This relation justifies abductive inference from action to habit and hence from performance to practice.

Knowledge can be intelligibly attributed to a person only upon certain criteria. Criteria must be public and independent of idiosyncrasies. Therefore knowledge can be attributable to a person only on the basis of the *behavior* of that person, including speech acts. However, the criterion is fallible. Moreover, because knowledge is a subclass of belief, it is also a subclass of habit, namely intelligent habit. Therefore Peirce’s belief–doubt model also applies to knowledge.

Therefore knowledge is practice, or intelligent habit. But there are two kinds of practice that serve as evidence: *bodily* and *verbal*. Therefore it is possible to distinguish between two senses of “knowledge”: *strong* and *weak*. Knowledge in the strong sense is manifest in the skillful handling of its objects (a kind of behavior). Its criterion is *the rate of success or failure*. This sense is primary. Knowledge in the weak sense involves a verbal description of knowledge in the strong sense (another kind of behavior). It is based on testimony. This sense is secondary. In both senses, knowledge is fallible. Moreover, science is the perfection of knowledge, and art is the perfection of practice. Therefore a corollary follows: science is art — both a fine art and a useful art simultaneously. That concludes my argument.

My argument involves many cross-references between its parts. The connection of many of these theses to my main thesis is very indirect. I have, however, arranged the parts thematically in order to explain the justification of the argument more easily. For the most part, the order of presentation will follow the logical order of justification.

Recall the importance of reflexivity: my thesis must apply to itself in order to be justified by its own standards. As an empiricist thesis, it must not involve supra-empirical concepts. In particular, in order to revise the concept of *knowledge*, it must be ensured that it is understood in empiricist terms: the (fallible) criterion of the attribution of *knowledge* to an agent (or any organism, for that matter) must be public (empirically ascertainable) and

independent of idiosyncrasies in order to be experimentally testable. Hence it is appropriate to anticipate Chapter 3 and begin by naturalizing the concept of *meaning*. In short, meaning must be part of nature and hence experimentally testable. In this sense, linguistic meanings constitute a proper subset of all meanings. I have four theses: (1) the meaning of a thing (possibly a speech act) is its *potential practical effects* (possibly another speech act), that is, the *habits* of responding to that thing; (2) the pragmatist concept of *habit* is both “subjective” and “objective” at once and thus cuts across the subject–object dichotomy; (3) “habit” is synonymous with “practice,” which will make it possible for me to assert that knowledge is practice; and (4) this theory of meaning commits one to a *universal hermeneutics* which is, in effect, a practice that interprets other practices, possibly involving instruments.

I reject semantic anti-naturalism largely prevalent in mainstream analytic philosophy of language. I will justify this rejection with an appeal to second-generation cognitive science in Section 2.1.

My alternative is the completely naturalist theory of meaning instituted by Peirce and developed further by Dewey. Its core is the revised version of the *pragmatic maxim* which I will defend in Section 2.2. According to the revised pragmatic maxim, the meaning of a thing consists in its *potential practical effects*; and these consist in the *habits* of responding to it. It must be borne in mind that the classical pragmatists use the term *habit* in a technical sense that cuts across the subject–object division. I will explain the concept of *habit* in Section 2.3. I will distinguish between intelligent and unintelligent habit. I consider “intelligent habit” and “practice” — and hence my notion of knowledge, to be developed later — synonymous. Recall my example of chopping wood: a habit (practice) makes sense only if the concrete setting, possibly including instruments, is taken into account. Hence the pragmatic maxim does not make meaning merely “subjective” (or merely “objective,” for that matter), though it does involve certain “subjective” (and “objective,” for that matter) traits.

In order to understand meaning in naturalist terms, its genesis must also be understood in naturalist terms. In Section 2.4, I will explain the emergence of meaning from experiment: repeated correlations between cause and effect give rise to a habit that associates an object with its potential practical effects. That involves a (further) revision of the pragmatic maxim itself: potential practical *causes* can constitute meaning at least sometimes.

I will explore the consequences of the pragmatic maxim in Section 2.5. First I will refute essentialism. That provides room for *operational definitions* that determine what a thing *does* rather than *is*. In short, an operational definition states what a concept means in practice. The application of the

pragmatic maxim to a concept yields its operational definition. This is my way of naturalizing my methodological concepts: *experience*, *situation*, *habit*, and *practice*. That makes my philosophy empirically testable at least in principle. In particular, I will follow Dewey and define *experience* operationally as *organism–environment intra-action*. Obviously, this notion overcomes the subject–object dichotomy.

In Section 2.6, I will explain discourse in non-representationalist terms. I will argue that the purpose of language is *agreement in action* rather than accurate representation. That holds for ordinary and scientific language alike: scientific concepts refer to the ways we deal with their objects, the *possible operations* we can perform upon them.

Finally, in Sections 2.7 and 2.8, I will explore certain possibilities that the pragmatist theory of meaning opens by suggesting *universal hermeneutics*.

Having defined *experience* operationally (and hence naturalistically) as *organism–environment intra-action*, I can analyze *empiricism itself* and its consequences naturalistically. I will do that in Chapter 3. I will begin by citing Dewey’s phenomenology that shows why the concepts of *experience* and *situation* have both “subjective” and “objective” traits and hence, like the concepts of *habit* and *practice*, cut across the subject–object dichotomy. Experience is not complete within itself: it presents *problems to be solved* rather than self-sufficient data that knowledge would cover. The construction of a solution to these problems is up to us. Thus epistemology is all about *construction*. I do not mean *conceptual* construction. That may or may not be involved. I mean *technical* construction — rearranging the subject matter of experience so that a problematic situation is resolved. This is a *technical* notion to which I will return below.

A discussion on Peirce’s phenomenology will follow. Peirce derived his three mutually irreducible, mind-independent categories — *firstness*, *secondness*, and *thirdness* — phenomenologically. He argues that they are manifest in “qualities of feeling,” the co-occurrence of effort and resistance, and the establishment of habit, respectively. He argues that each category is necessarily present to experience. The discussion shows how habit is a mode of experience. That justifies its status as simultaneously “subjective” and “objective.”

Given that experience is organism–environment intra-action, and given that phenomenology is the science of experience *qua* experience, phenomenology studies a class of *natural* processes. Therefore there is no split between experience and nature. Therefore the categories of *experience* are simultaneously the categories of *being*. Especially the presence of secondness proves that the pragmatist notion of *experience* overcomes the subject–object divide: the co-occurrence of effort and resistance shows that experience is not

ontologically different from nature.

Thirdness is the category of cognition. Habits are manifestations of thirdness, and cognition operates upon habit. The presence of thirdness to experience shows that reason is not distinct from — let alone opposed to — experience.

I will emphasize the primacy of practice in empiricist epistemology by deriving the thesis of the *practice-ladenness of experience* from the categories.

Peirce's phenomenology is the basis of his semiotics which I will engage in Chapter 5. But before that, I must discuss other preliminaries as well.

Peirce's categories can be applied to his theory on how perception acquires propositional content. I will review his concepts of *percept*, *perceptual judgment*, and *percipuum*. A percept initiates the process of interpreting signs, or *semiosis*.

I will accommodate Eino Kaila's concept of *invariance* to Peirce's phenomenology in Section 3.4. Each invariant is a universal, and each universal is a manifestation of thirdness. Peirce believed that thirdnesses evolve. Hence all invariances can change and are therefore only approximate and relative.

After reviewing the concept of invariance, I am ready to formulate epistemology as an engineering problem in Section 3.5. That is the purpose of *cybernetic epistemology* which I have introduced in Lindholm (2023a).

Given the technical nature of epistemology, much of the acquisition of knowledge can be seen as instrumentally mediated. I will discuss that aspect of epistemology in Section 3.6.

I will conclude Chapter 3 with a defense of naïve realism in Section 3.7. Because experience and nature have no difference in quality, the world as we experience it is a real world (Dewey 1929b: 295).

In Chapter 4, I will describe the import of *fallibilism*: the position that *any* single belief, including mathematics and logic, can be questioned, if there arise positive reasons to do so. It is a middle between, and a refutation of, dogmatism and global skepticism.⁶⁸

The basic idea behind fallibilism is the operational definitions of *belief* and *doubt*. According to Peirce, belief is *habit* and doubt is *the privation of habit*. I will explain that in Section 4.1. I will proceed to outline fallibilism in Section 4.2.

In Section 1.2, I argued why one is *prima facie* justified to set out from common sense, if they eventually succeed in discovering its justification. I will justify this position in Section 4.3. According to Peirce's *belief-doubt model of inquiry*, it does not matter at all from what set of beliefs one sets

⁶⁸I define *global skepticism* as *the method of systematic doubt*, or the doctrine that *all* beliefs ought to be questioned at once.

out, because epistemic justification arises from the *process* of self-correction. It does not make sense to doubt beliefs (habits) insofar as they deliver their goods. Hence fallibilism prescribes that piecemeal, gradual revisions be made and only when necessary; radical break with prior belief ought to be avoided.

Given that knowledge is a species of belief, the aforementioned doctrine of fallibilism also applies to knowledge, whether propositional or non-propositional. When it specifically comes to propositional knowledge, fallibilism entails *epistemological indefinitism*. We do not possess the criterion of irrevocable truth. And even if we did, the world can change. Therefore inquiry (including epistemic justification) must be carried on indefinitely. In this sense, fallibilism has an affinity with *Pyrrhonic skepticism* (Sextus Empiricus 1933). I will explain the case of propositional knowledge in Section 4.4.

My purpose is *not* to refute mathematics and logic. I only intend to show their proper function in inquiry: they serve as guidelines for more comprehensive experimentation. I will give an empiricist account on mathematics and logic. I will show why mathematics and logic ought to be considered fallible, even if many orders of magnitude more certain than all other beliefs, in Section 4.5. I will conclude my discussion on fallibilism in Section 4.6.

After having explained Peirce's categories and fallibilism, it is finally possible to engage Peirce's semiotics in Chapter 5. It is an outgrowth of the experimental method.

I will begin by making basic definitions — including *sign-relation*, *sign-vehicle*, and *interpretant* — in Section 5.1. Because anything can have potential practical effects (or causes, for that matter), anything can have meaning. Hence anything can be a sign-vehicle. That explains why brute experience only provides *problems to be solved* rather than solutions: because anything can be a sign of something else, its epistemic status is problematic rather than categorical. I will supplement my account by citing T. L. Short in Section 5.2.

I will explain *semiosis*, or the process of interpreting sign-vehicles, in Section 5.3. According to Peirce, semiosis is teleological⁶⁹ and hence tends to termination: ideally, at each successive interpretation, our understanding of what is being interpreted improves until no further increase of knowledge is possible. Because semiosis is not always ideal, and because the object of interpretation can change, semiosis is at least potentially infinite. I will argue that linguistic interpretation is but a special case of semiosis in Section 5.4.

Each subclass of sign-vehicles is based on the application of the categories to each aspect of signification. I will explain the taxonomy of sign-vehicles in

⁶⁹Short (2007: chs. 4 and 5) has provided a naturalist account on teleology.

Section 5.5, the taxonomy of interpretants in Section 5.6, and the taxonomy of objects in Section 5.7. Some of the subclasses of interpretants and objects are related. I will discuss their mutual relations in Section 5.8.

I will derive the type–token–tone distinction semiotically in Section 5.9. That is a prerequisite of my main argument. Because propositions are representations *par excellence*, I will put some special emphasis on the concept of *proposition*, a subclass of types, in Section 5.10. That illuminates how propositional knowledge ought to be understood in pragmatism.

After citing the necessary conceptual machinery, I will reply to Horkheimer’s ([1947] 2004: 33) criticism of the pragmatic maxim. Horkheimer is basically correct, but I will turn his criticism into a description of semiosis.

I will discuss the relative merits of Peirce’s semiotics to other theories of signification in Section 5.12.

In Section 5.13, I will cite Peirce’s semiotic proof of pragmatism and judge that it remains inconclusive. I will rely on Robin’s (1997) interpretation and argue that an *a priori* proof should not be sought at all: in order for pragmatism to remain consistent, its proof must be *experimental*. That makes pragmatism more akin to a *research program* than to a doctrine.

In Chapter 6, I will finally argue that knowledge is practice. I will begin my argument by showing how and why one can make an abductive inference from action (token) to habit (type) in Section 6.1. I will apply the same strategy and show how and why one is entitled to make an abductive inference from performance (token) to practice (type) in Section 6.2. I will also restate my defense of Dewey’s ([1925] 1929a: ch. IX) thesis that science is art and art is practice (Lindholm 2021) in Section 6.3.

Finally, in Chapter 7, I will conclude my thesis. I will restate my understanding of experience, knowledge, and practice in Section 7.1. I will point out some weak points in my argument in Section 7.2. I will also suggest many prospects for subsequent inquiry in Section 7.3.

Chapter 2

Meaning

In this Chapter, I will provide an empirically responsible, experimentally testable theory of meaning upon which my method¹ is ultimately based. Its purpose is to naturalize philosophical and scientific terminology, including “knowledge,” in order for my empiricist method (see Chapter 3) to apply to itself and to justify itself. That is a prerequisite of naturalist theories of knowledge in general and my thesis that knowledge is practice in particular.

In this Chapter, I will argue that *meaning is habit*. In pragmatism, *habit* is understood in a technical sense that cuts across the subject-object dichotomy. Habits come in two archetypal varieties, between which there is a continuum: *intelligent* and *unintelligent* habit, of which the former is more basic. I will identify intelligent habit with practice.

The pragmatist theory of meaning enables *operational definitions* which state what a concept means in practice. That paves way for the following Chapters in which I will discuss *experience*, *belief*, *types*, *propositions*, and *knowledge*. In Chapter 3, I will define *experience* operationally as *organism–environment intra-action* which has an experimental character because each situation is at least potentially different. That determines the jurisdiction of naturalism: legitimate entities and events, including concepts, must be amenable to experiment. In Chapter 4, I will define *belief* operationally as *habit*. Its purpose is to derive the *belief–doubt model of inquiry*, which describes the experimental dynamics of belief. In Chapter 5, I will study Peirce’s theory of signs in general and that of types (legisigns) and propositions (dicisigns) in particular. Semiosis, or the process of interpreting signs, conforms to the belief–doubt model of inquiry: it is an experimental way of studying what signs mean. I will thereby show how signs, including types and propositions, can be understood in impeccably naturalist, experimen-

¹See Section 1.2.

tal terms. In Chapter 6, I will conclude that *knowledge* is a general type (legisign), namely *practice*, that is realized in particular performances (sign replicas). Hence meaning, belief, and knowledge are not strictly distinct: each is a mode of understanding the world that reduces to intelligent habit (practice).

I have to remove a formidable obstacle of naturalization: the mainstream theories of meaning prevalent in analytic philosophy that hold that meaning be entirely formal and *a priori*. I will explain why I reject these theories and offer the pragmatist theory of meaning as an alternative by citing Lakoff and Johnson (1999), who argue that second-generation cognitive science provides empirical evidence against most analytic theories of meaning.

On the other hand, the pragmatist theory of meaning, the basis of which Charles S. Peirce laid down, is empirically responsible. In a word, *meaning is habit*, and habit is a perfectly natural phenomenon that can be studied experimentally. Peirce provided a quasi-behaviorist terminology, which allows one to determine meanings empirically by observing how different organisms behave in different conditions. John Dewey showed how meaning emerges from experiment.

If Peirce and Dewey are right, then there are no semantic facts distinct from our ability to predict the behavior of organisms² — though my reasons for the rejection of the independence of semantics are different from Quine’s (1951; 1960).

In Section 2.1, I will cite Lakoff and Johnson’s overview of second-generation cognitive science and its philosophical entailments which refute the dearest presuppositions of analytic philosophy. They show how analytic philosophy is based on folk theories and metaphors, many of which Aristotle and Descartes introduced. Such basis does not invalidate analytic philosophy by itself; empirical results do. According to second-generation cognitive science, most meanings are not literal, and there are no purely objective, formal, or disembodied meanings.

In Section 2.2, I will introduce Peirce’s *pragmatic maxim*, which I will use throughout this thesis. It involves a pragmatist theory of meaning, according to which the meaning of a thing is the *potential practical effects* of that thing; and these effects consist in *habits*. Thus meaning is neither confined to language nor to humans.

Many people might consider habits “subjective.” In Section 2.3, I will explain why that is not the case. The classical pragmatists use the term *habit*

²For instance, a statement about the phases of Venus reduces to the behavior of the people who intra-act with Venus: for instance, how they use the telescope, or whether they plan to send a Venus rover. But as I will explain in Section 2.3 and Chapter 3, that requires both the agents and the planet.

in a technical sense that cuts across the subject–object dichotomy: a habit is both “subjective” and “objective” at once. Habit does not necessarily denote mindless repetition: intelligent, mentally active habit is primary, un-intelligent habit derivative. Moreover, reasoning operates upon habit. Hence reason is not distinct from — let alone opposed to — experience in general and habit in particular. (Peirce CP 2.176, 3.163, 6.86, 6.286, 6.481; EP 1: 202; EP 2: 447–448; Dewey 1916a: 39–40, 54–58, 62, 120, 153–154, 263–264, 319, 323, 400; 1922: 177; cf. Bisanz & Cunningham 2016: 402–411; Bellucci 2018: 102.)

In Section 2.4, I will cite Dewey’s explanation, how meaning emerges from experiment. In short, we commit an action (possibly nothing,³ possibly a speech act), undergo its results (possibly nothing, possibly another speech act), and (fallibly) correlate the action and its results. By acting, undergoing and correlating in different conditions, we establish a habit which associates possible actions with possible results: actions and results become (fallible) signs of each other. That gives rise to linguistic and non-linguistic meanings alike.

In Section 2.5, I will outline several consequences of the pragmatic maxim. First, it entails *non-essentialism*: there is no need to postulate “essences” which be somehow “behind” phenomena. This prompts a revision of Aristotle’s influential definition of *definition*: instead of stating “essences” of things, that is, their necessary and sufficient conditions, I will use the pragmatist theory of meaning to yield *operational definitions*. They do not describe, what things essentially *are*; rather, they describe, what things *do* — what they mean in practice. That is not intended to *refute* Aristotle’s notion of *definition*; I merely explain it in operational terms. Moreover, I will argue that abstractness comes in degrees, and that completely abstract entities are meaningless and hence eliminable from discourse. That does not, however, mean that there be no unobservables: observability is neither necessary nor sufficient for potential practical effects. I will also explain a non-subjectivistic notion of *phenomenon* and eliminate noumena from discourse as meaningless.

On the basis of the pragmatist theory of meaning, in Section 2.6, I will briefly cite Dewey’s broad notion of language as *discourse*, the purpose of which is *agreement in action* rather than accurate representation. Thus language is not an abstract, formal, disembodied system.

The pragmatic maxim makes everything potentially interpretable and thus resurrects the medieval notion of *book of nature*. Hence making sense of the world becomes a kind of hermeneutics. I will briefly explain Joseph Rouse’s *practical hermeneutics* and Don Ihde’s *material hermeneutics*, which

³By “nothing,” I mean that everything is done in the usual way.

are designed to serve that purpose, in Sections 2.7 and 2.8, respectively.

2.1 Criticism of Analytic Philosophy

In this Section, I will cite Lakoff and Johnson's (1999) criticism of the mainstream theories of meaning in much of analytic philosophy. My purpose is to make room for the pragmatist theory of meaning; and the purpose of the pragmatist theory of meaning is to naturalize philosophical and scientific concepts. Lakoff and Johnson's arguments are based on the results of second-generation cognitive science, according to which there are no purely objective meanings. Meaning arises from our brain and body and our intra-actions with our surroundings. But that does not render meaning "subjective": there are approximately constant traits in human anatomy and physiology and our environments that make meanings communicable.

Most analytic theories of meaning have an *a priori* nature which I consider *overintellectual* and *dogmatic*. Meanings are not simply something that can be thought about; they are something that can also be *enacted*; and such enactment is eminently fallible and hence an empirical matter.

It is widely held that meanings are abstract entities like propositions (e.g. Ajdukiewicz 1967; Adams 1974; 1981). If that were true, humans (or any species, for that matter) would die out rather quickly. If an abstract entity exhausted everything there is to a thing, nobody would have the slightest reason to act upon it: the opportunities for action which the object of the given meaning affords would be external to that meaning, *because they are concrete*. If food is present, we could eat it; if predators are present, we could flee them; but that would be merely accidental. There would be no *reason* for us to do so, given that an abstract entity which is the content of a thought exhausts the meaning of food or predators. Meanings and their possible practical accompaniments would have no lawlike connection. Any practical reaction to a thing would be *arational* and hence *incomprehensible*.

Living creatures learn meanings in an emphatically anti-intellectualist manner. It seems undeniable that non-language-using organisms are able to make sense of their environment, because they are able to negotiate their way through it. Meaning seems to be connected with coping with the environment in that sense. If Darwin's theory of evolution (1859; [1871] 1877) holds, it seems that the human way of making sense of the world has developed from such abilities. In that sense, meaning has to do with *anticipation of possible action*. (Cf. Lakoff & Johnson 1999: 75–78.)

That is not to say that thought be not involved in the appreciation of meanings; quite on the contrary. Anticipating possible courses of action

requires thought. In fact, all controlled bodily movements require intellectual effort. Hence there are as many kinds of intelligence as there are activities. Hence thought and action are not disconnected, let alone opposed (cf. Dewey 1916a; 1916b; 1929b). Thinking without doing (and doing without thinking, for that matter) is indeed a *possibility*. But it cannot be the standard case. It is a specific form of action without movement, which is possible only in highly specific conditions. The cognitive powers of people who engage in the contemplation of meanings, disengaged from bodily activities, are products of evolution. Their cognitive powers are largely adaptations to an environment. Hence there seems to be no reason, why even the most abstract form of reasoning would not make use of other cognitive functions. Practice is the rule, and theory (i.e. a highly peculiar practice) is an exception.

2.1.1 Second-Generation Cognitive Science

Lakoff and Johnson (1999: 73, 90, 93) argue that the results of second-generation cognitive science entail three main claims: (1) most of human cognition is unconscious; (2) the human mind is embodied; and (3) thought and meaning are largely metaphorical. These claims refute disembodied realism, or the position that our concepts and forms of reason be characterized not by our bodies and brains, but by the external world itself, making scientific truths absolute. They also refute the strict subject–object dichotomy, also made by disembodied realism. As I will emphasize in Chapter 3, there is no empirical reason to consider objects independently determinate. We and our conceptual apparatus are not divorced from reality but continuous with it. Embodiment, not its transcendence, and imagination, not its avoidance, make science possible.

Neuroscience provides evidence that conceptual systems grow out of our bodies. Therefore meaning is grounded in and through them. Conceptual systems arise from, are shaped by, and are given meaning through living human bodies. Many, if not all, abstract concepts are defined in significant part by conceptual metaphors which are embodied and largely make use of our sensorimotor functions. Thus concepts cannot be purely formal. On the contrary, perception and movement perform conceptual functions. The literal part of concepts is not rich enough to serve as a full-fledged concept and has to be supplemented by a metaphorical part. In this way, it is metaphorical thought that makes scientific and philosophical theorizing possible. It also largely explains, why we are able to cope with everyday life. But this is inconsistent with the classical correspondence theory of truth. Moreover, formal logic has no resources for characterizing any of the aspects of human concepts and human reason if it is conceived as disembodied, literal,

non-imaginistic, and non-metaphorical. But these claims should not be considered as shortcomings but as intellectual gifts which allow us to make sense of experience. (Lakoff & Johnson 1999: 6, 36–44, 128–129.)

As I will argue shortly below, mainstream analytic philosophy tries to define all important concepts exactly. But there are dissenters. Some philosophers have come to the conclusion that even scientific concepts may not be perfectly precise and accurate (e.g. Wilson 2006; Teller 2017; 2020).

Metaphor makes abstract thought, including science and philosophy, possible. The underspecified non-metaphorical conceptual skeletons of scientific and philosophical concepts are associated with several metaphors which provide most of their content. Some of them can be mutually incompatible. But the plurality of metaphor forgoes the notion of a single, literal truth. However, these metaphors are not arbitrary, culturally specific, novel historical accidents, or innovations of great poets or philosophers. Moreover, they are not entirely abstract, because they are based on bodily experience. (Lakoff & Johnson 1999: 71–72, 134, 160.)

The authors provide empirical analyses of our conceptualizations of time (Lakoff & Johnson 1999: ch. 10), events and causes (*ibid.*: ch. 11), the mind (*ibid.*: ch. 12), the self (*ibid.*: ch. 13), and morality (*ibid.*: ch. 14). It does not make sense to ask, what such concepts mean *in themselves*, since such questions and what qualifies for an answer are already determined by our brain and body. It does make sense, however, what they mean *for us*. (*Ibid.*: 136.) That does not make meaning “subjective,” “relative,” or “arbitrary” (though there is some room for convention), because there are significant similarities in human bodies and brains and inhabitable environments that make shared meanings possible to a large degree (*ibid.*: 5–6, 96, 462–463, 467). Hence the alleged “objectivity” of meaning is not necessary for the communication of meanings.

Lakoff and Johnson (1999: 11–12) reject the traditional confinement of the concept of *cognition* to conceptual or propositional structure or rule-governed operations on such structures. They also reject the traditional confinement of *cognitive meaning* to truth-conditional meaning which is not defined “internally” in the mind or body but by reference to things in the “external” world. By *cognitive*, they denote *any* mental operations and structures that are involved in language, meaning, perception, conceptual systems, reason, and aspects of our sensorimotor system that contribute to our abilities to conceptualize and to reason.

Complex metaphors are compounded of atomic (or primary) metaphors. The latter rise automatically and unconsciously from everyday experience, as cross-domain associations are formed by means of conflation. Primary metaphors are part of the *cognitive unconscious*, defined as “the totality of

those theoretical cognitive mechanisms above the neural level that we have sufficient evidence for, but that we do not have conscious access to.”⁴ They are not arbitrary social constructs: they are highly constrained both by the nature of our bodies and brains and by the reality of our daily interactions. They are embodied in three ways. First, they are embodied through bodily experience in the world, which pairs sensorimotor experience with “subjective” experience.⁵ Second, the source-domain logic arises from the inferential structure of the sensorimotor system. Third, the source-domain logic is instantiated neurally in the synaptic weights associated with neural connections. Primary metaphors are independently grounded in experience, but their compounds need not be. (Lakoff & Johnson 1999: 46, 56–57, 60–73, 78, 96, 112, 115–117.)

There are some non-metaphorical concepts. For instance, basic-level concepts, the spatial-relations concepts, and sensorimotor concepts are literal. Those concepts of “subjective” experience and judgment which are not structured metaphorically are literal too. But without metaphor, such concepts are relatively impoverished. (Lakoff & Johnson 1999: 58–59, 70–73.)

Metaphors are not necessarily false. They can be as true as literal expressions. (Lakoff & Johnson 1999: 164.)

According to Lakoff and Johnson (1999: 74–79), among the *a priori* doctrines which the second-generation cognitive science has demolished are the following:

1. that meaning and reason are disembodied, or completely independent of the body and brain;
2. that the mind is characterized in terms of its formal functions;
3. that thought can be represented using formal symbol systems where symbols are meaningless in themselves;
4. that thought is manipulation of such symbols according to formal rules which operate independently of meaning possibly attributed to these symbols;
5. that meanings either are what the symbols compute and are defined entirely in terms of the internal relationships among symbols, or the

⁴Lakoff and Johnson (1999: 254–255) point out that the received views about language and mind rule the possibility of the cognitive unconscious out *a priori*. That is ironic, since it is precisely the theory of the cognitive unconscious that predicts that our metaphors about language and mind *must* give rise to theories which deny the existence of cognitive unconscious itself!

⁵I will explain the pragmatist concept of *experience* in Chapter 3. Like the concept of *habit*, it is both “subjective” and “objective” at once. Here the emphasis on “subjective” experience means simply that only the “subjective” part of experience is considered; the “objective” part is there but it is ignored for the purpose of this sentence.

symbols characterizing thought are internal representations of an external reality which are given meaning through reference to that external reality;

6. that the mind is analogous to software and the brain is analogous to hardware or wetware;
7. that the software can be run on any hard- or wetware;
8. that the hard- or wetware can run any appropriate software;
9. that the mind can be studied fully independently of any knowledge of the body and brain by looking at functional relations among concepts represented symbolically (*functionalism*);
10. that cognitive operations are formal operations on symbols without regard to what those symbols mean (*symbol manipulation*);
11. that mental representations are symbolic; that they get their meaning either by relations to other symbols or by relations to external reality (*representational theory of meaning*);
12. that categories are defined by necessary and sufficient conditions (*classical categories*); and
13. that all meaning is literal; that no meaning is fundamentally metaphorical or imagistic (*literal meaning*).

A philosophical theory of meaning entails a corresponding theory of mind capable of dealing with meanings. According to Lakoff and Johnson (1999: 5–6), second-generation cognitive science refutes the existence of

1. the Cartesian, dualistic person, sharing the same transcendent reason with everybody else, and capable of knowing everything about their mind by introspection.
2. the Kantian, radically autonomous, absolutely free person; once we have learned a conceptual system, it is neurally instantiated in our brains and we are not free to think just anything.
3. the “utilitarian person,” i.e. the *homo economicus*, in full control of their reasoning.
4. the “phenomenological person,”⁶ able to discover everything about the mind and experience by introspection.
5. the poststructuralist, decentered person, for whom all meaning is arbitrary, totally relative, and purely historically contingent, unconstrained by body and brain; there is a degree of contingency, but much of human cognition is invariant across languages and cultures.
6. the “Fregean person” — as posed by analytic philosophy — for whom thought and meaning are disembodied, purely objective, defined by the

⁶Lakoff and Johnson do not cite any phenomenologists who have posited such person.

external world, and whose language can fit the world independently of embodiment.⁷

7. the “computational person,” i.e. the person posed by first-generation cognitive science, whose mind is like a formal software and derives meaning from taking meaningless symbols as input, manipulating them by rule, and giving meaningless symbols as output.
8. the Chomskyan person, for whom language is pure, completely genetic syntax, pure form insulated from and independent of all meaning, context, perception, emotion, memory, attention, action, and the dynamic nature of communication.

2.1.2 Presuppositions of Analytic Philosophy

As concerns analytic philosophy, Lakoff and Johnson detect its origin in the linguistic turn instituted by Frege (1879; 1884; 1892). Analytic philosophers have identified their profession with logical analysis of language ever since. Lakoff and Johnson lament the narrowness of Frege’s account of meaning and thought. Frege was primarily preoccupied with refuting psychologism and demonstrating the universality and absoluteness of mathematics. Thus he posited that all meaning and thought, in order to be shareable and communicable, must be objective but abstract, disembodied and formal. He understood *meaning* as an abstract relation between a word and an aspect of the mind-independent world. Thus he banished cognition from semantics. But this position is able to account only for a tiny part of natural language. Lakoff and Johnson maintain that all approaches to analytic philosophy share this problem; that might be an exaggeration, but it may also contain seeds of truth. Frege’s mistake was to consider the psychological as entirely “subjective” and idiosyncratic. In fact, the body can ground meaning intersubjectively, and imaginative mechanisms like metaphor can preserve inference. Lakoff and Johnson discuss formalist philosophy, ordinary language philosophy, and meaning holism. On the other hand, they admit that their presentation of analytic philosophy is only a rough classification of its assumptions and motivations. (Lakoff & Johnson 1999: 440–441, 468.) I will briefly cite the criticism of formalist philosophy and meaning holism in the following two Subsections.

The rough overview of analytic philosophy identifies the following presuppositions (Lakoff & Johnson 1999: 248–255, 442–444):

⁷Lakoff and Johnson (1999: chs. 18, 19 and 21) describe in detail, how Aristotle and Descartes have been important inspirations for the metaphors that underlie the Fregean notion of meaning, and how the structure of our thought itself gives rise to these metaphors.

1. To analyze language is to analyze thought.
2. Linguistic meaning is mind-independent, objective, and publicly accessible.
3. The meaning of a linguistic expression is given by what it can correspond to in the world.
4. The correspondence theory of truth: A sentence is true if the words fit the state of affairs in the world.
5. All meaning is literal.
6. Meaning is disembodied.
7. We can, just by thinking about our own ideas and the operations of our own minds, with care and rigor, come to understand the mind accurately and with absolute certainty.
8. Since philosophical reflection is sufficient, no empirical study of language or thought is necessary. Only training in philosophical analysis via self-reflection is sufficient to answer philosophical questions, especially questions about the nature of meaning and truth. No empirical study is necessary; nor could it add anything.

According to Lakoff and Johnson (1999: 444), analytic philosophy has inherited the last two presuppositions from Descartes. They mean that a formal and rigorous logical analysis be sufficient for the determination of meanings; that experiment be superfluous. It is no different from armchair philosophizing in quality; it is just more exact. If the authors are correct, then *analytic philosophy is inherently Cartesian*. These presuppositions are derived from certain folk theories and metaphors, which are oversimplifications at best and fallacies if taken seriously.

According to Lakoff and Johnson (1999: 377), analytic philosophy has also inherited the notion that the structure of language is the structure of the world from Aristotle (1962a). Lakoff and Johnson (1999: 392, 404–409) also detect the origin of formalist philosophy in Descartes: he argued that mathematics is about form, not content, and hence certain; and that thought is formal like mathematics.

Lakoff and Johnson (1999: 255–256) state bluntly that second-generation cognitive science is fundamentally at odds with analytic philosophy in any form, *including many of its allegedly “naturalized” versions*.

2.1.3 Presuppositions of Formalist Philosophy

Formalist philosophy, a subclass of analytic philosophy, is committed to the presuppositions of analytic philosophy in general *and* the following additional tenets (Lakoff & Johnson 1999: 249, 445–449):

1. Just as in mathematics numbers can be accurately represented by sequences of written symbols, so concepts are seen as adequately represented by sequences of written symbols.
2. Just as mathematical calculation is mechanical (i.e., algorithmic), so is reasoning.
3. Just as there are systematic principles of mathematical calculation that work step by step, so there are systematic principles of reason that work step by step.
4. Just as numbers and the principles of mathematical calculation are universal, so concepts and reason are universal.
5. A formal “language” is a system of symbols in which individual symbols are conceptualized as individual linguistic elements and well-formed symbol sequences as sentences. Principles for combining symbols or transforming symbol sequences into other symbol sequences constitute the “syntax” of the formal “language.”
6. A system of formal logic consists of a formal language, a set of axioms, which are sequences of symbols in that language taken as being true, and syntactic rules of transformation, which transform sentences taken as true into other sentences taken as true.
7. The symbols of a formal language, in themselves, are meaningless. A formal language needs to be interpreted to become meaningful.
8. A state of the world consists of a set of entities, properties, and relations between those entities.
9. States of the world can be modeled using set-theoretical structures.
10. Meaning is a relationship between symbols of a formal language and entities in a set-theoretical model.
11. Truth is a correspondence between a symbol sequence indicating a predication in a formal language and a membership relation in a set-theoretical model.
12. Church’s Thesis: All functions we intuitively regard as computable are technically computable by a Turing machine — or an equivalent system, that is, a system of formal logic or a Post production system (Kleene 1967: 240–241). Any precisely formulated theory or collection of ideas can be stated in a formal system, that is, either a Turing machine, a system of formal logic, or a Post production system.⁸
13. Scientific (or philosophical) theories are systems of axioms in a mathematical logic, where the symbols are meaningless and to be interpreted

⁸This tenet is derived from the previous one by applying Descartes’s Thought as Mathematical Calculation metaphor.

in terms of set-theoretical models.⁹

14. To be is to be the value of a variable.¹⁰

The first four are entailed by Descartes's Thought as Mathematical Calculation metaphor, the following two by the Formal Language metaphor, the following five by the World as Set-Theoretical Models and the Formal Semantics metaphors. The eleventh one stems from Aristotle (1962c: 24b).

Lakoff and Johnson (1999: 457, 462–463) conclude that each formalist presupposition is empirically false, for reasons explained above.

2.1.4 Presuppositions of Meaning Holism

Lakoff and Johnson (1999: 453–461) put a special emphasis on W. V. O. Quine's meaning holism. They argue that it is a natural outgrowth of formalist philosophy: Quine accepts all the fourteen formalist presuppositions enumerated above. He is preoccupied with ontological commitments — for reasons which formalism itself makes pertinent: since choosing a logic commits one to the existence of the values of the variables that that logic is allowed to vary over, the choice of a logic is necessarily a choice of a metaphysics. By Ockham's razor, he eliminates what he considers unnecessary presuppositions — for instance, properties and relations. He maintains that they exist only inhering in objects (*in rebus*). Using higher-order logics would commit one to their independent existence (*ante rem*), which he considers unscientific. Hence his logic of preference is first-order logic. He also adds a discussion on Löwenheim–Skolem theorem (Quine 1959: 259–260). Together these additions entail consequences which depart radically from the rest of formalist philosophy:

1. Words, via their objective senses, can pick out unique references to objects in the world.
2. Logic does not mirror nature.
3. Philosophical ontologies are relativized to the way that reference is fixed **for an entire language**.
4. There is no analytic–synthetic distinction.
5. Duhem–Quine thesis:¹¹ No part of a scientific theory can be confirmed

⁹This tenet follows from the previous one.

¹⁰This is how Quine put one consequence of the previous tenet, namely, that the ontological claims of a philosophical or scientific theory are given by the entities in the set-theoretical models of world-states that the variables in such axioms can take as values.

¹¹It seems, in a closer scrutiny, that Duhem ([1906] 1954) and Quine (1951) have two different theses, or at least they arrived at the same result by different means.

or disconfirmed; only the theory as a whole can be confirmed or disconfirmed.

6. Translation is indeterminate.¹²

Because of its formalist presuppositions, Quine’s philosophy collapses as empirically false; moreover, Löwenheim–Skolem theorem is irrelevant, since mathematical logic is not applicable to thought in general. Quine gives a technical meaning to terms like *language*, *meaning*, *interpretation* and *translation* but continues to use them as if they were words of ordinary language. He also treats the set-theoretical models of world-states as if they were the world itself. (Lakoff & Johnson 1999: 457–459, 462–463.)

Given that Quine’s philosophy turns on formalist presuppositions, it is natural to ask, to what extent his “naturalized epistemology” (1969) is naturalist, if at all. By the previous discussion, Quine is not naturalist enough: he does not extend the jurisdiction of naturalism to logic and language.

Lakoff and Johnson’s criticism casts doubt upon the very method of analytic philosophy. For instance, it seems airy to think that questions concerning the existence of “unobservables” like electrons or genes could be decided merely by logical analysis of physical or biological theories (Niiniluoto 1999; Psillos 1999).

2.1.5 Richard Rorty’s Philosophy

Richard Rorty is, on the one hand, one of the followers of Quine and, on the other, a prominent neopragmatist. According to Lakoff and Johnson (1999: 461–462, 467), Rorty consistently reformulates Quine’s meaning holism with its formalist presuppositions into a thoroughgoing meaning relativism.¹³ Such relativism is alien to embodiment and human cognition as second-generation cognitive science describes them.¹⁴ Thus he is implicitly committed to an empirically unsupported *a priori* philosophy. The *a priori* character of Rorty’s philosophy is obvious when he chides Dewey for not dropping the concept of experience altogether instead of redefining it (Rorty 1998: 297).¹⁵ If there is no experience, then what are we talking about,

¹²This point has an affinity with Thomas S. Kuhn’s ([1962] 1996) notorious thesis of the incommensurability of the vocabularies of different paradigms: they cannot be mutually translated.

¹³According to Sami Pihlström (private communication), Rorty *denies* being a meaning relativist, though he does display some relativism. Hence I recommend that what follows be taken with a grain of salt.

¹⁴Lakoff and Johnson’s antipathy against Rorty might stem from the latter’s position that metaphors be meaningless (Rorty [1989] 1993: 18).

¹⁵See also Rorty ([1979] 2009).

if not *a priori* prejudices? Hence one is entitled to ask, whether Rorty's own "vocabulary"¹⁶ is fit for the job he assigns to it. He is clearly a fierce opponent of logocentrism, but to me he seems to merely substitute an anti-representationalist logocentrism for a representationalist one.

Rorty overstates the role of language and discourse in matters of knowledge. He reduces science to "conversation" (1982: 165) and explains its success by its "vocabulary" (1982: xxxvii, xl–xlii, xlv n25, 152–154, 162–163, 192–198, 203–204), though elsewhere he seems to accept a physicalist ontology ([1979] 2009). He does not, however, explain, how "vocabularies" make things work. He denies the possibility of language-independent access to nature (1997: 17; 1999: 56), which makes it difficult for him to account for the physical efforts made and resistances encountered by non-language-using animals and small children.¹⁷ He also states that the world does not tell us what language-games to play ([1989] 1993: 6), though it is obvious that the world does at least constrain the choice of the language-games. One cannot make a bicycle into a spacecraft by a speech act. One cannot play rugby or grow vegetables without solid ground. In short, one cannot play any language-game whatsoever without a biological structure and environment which make the existence of language-games possible in the first place.

Rorty correctly emphasizes the social dimension of knowledge but downplays its natural dimension like Collins (1981) and Fuller (1992). Rorty (1997: 17) states that the more one thinks about language, the less one needs to think about nature, thus eliminating nature from discourse by an appeal to language. Thus he makes the material facet of practices unintelligible (Rouse 2002: 129–134, 157).

Rorty appears to be arguing against foundationalism, but I suspect that he does not have an issue with foundationalism at all. To me, it seems that he is replacing ontological and epistemological foundationalism with social foundationalism. Hence he does not see the foundational *structure* of much of Western philosophy problematic, only its *content*.

2.1.6 Poststructuralism

According to Lakoff and Johnson (1999: 463–467), poststructuralism has interesting parallels with Quine's holism and Rorty's relativism. It rests to a large extent on four claims about language:

¹⁶Rorty seems to be concerned about vocabulary in many instances.

¹⁷Rorty, in effect, denies the independence of secondness from, or the irreducibility of secondness to, thirdness. Secondness and thirdness are two of Peirce's categories; see Section 3.2.

1. the complete arbitrariness of the sign; that is, the utter arbitrariness of the pairing between signifiers (signs) and signifieds (concepts);
2. the locus of meaning in systems of binary oppositions among free-floating signifiers (*différance*);
3. the purely historical contingency of meaning; and
4. the strong relativity of concepts.

Second-order cognitive science refutes each claim. On the other hand, poststructuralists have made an important discovery: meaning does vary in time and may differ across cultures, though not totally. There are universals roughly invariant in every culture.

2.2 The Pragmatic Maxim

If Lakoff and Johnson are correct, then analytic theories of meaning must be abandoned. The pragmatist theory of meaning is different and remains a contender. In fact, it receives support from cognitive science.

In this Section, I will introduce Peirce's *pragmatic maxim*, upon which the pragmatist theory of meaning is based. It identifies the meaning of a thing (possibly a speech act) with the *potential practical effects* of that thing (possibly another speech act); and these effects with the *habits* pertaining to that thing. It must be borne in mind that the classical pragmatists use the term *habit* in a technical sense that overcomes the traditional subject–object dichotomy: as a mode of organism–environment intra-action, a habit is both “subjective” and “objective” at once. I will postpone the analysis of the concept of habit to Section 2.3.

Peirce introduced the pragmatic maxim in 1878 and later revised it significantly. I believe that much of the opposition to the pragmatist theory of meaning is related to the shortcomings of the early account: it fails to explain *counterfactuals* and *conditionals*. Therefore I have decided to discuss his early and mature accounts separately to indicate how the mature theory makes up to the failures of the early theory. I will cite his early theory in Subsection 2.2.1 and his mature theory in Subsection 2.2.2.

Peirce's theory of meaning postulates *non-linguistic meanings*. I will defend this postulate in Subsection 2.2.3.

In the name of clarity, I will explain, how the pragmatist theory of meaning differs from Kantianism and traditional empiricism in Subsection 2.2.4. Then I will explain, how it differs from verificationism in Subsection 2.2.5.

To my knowledge, few have defended the pragmatic maxim. In Subsection 2.2.6, I will sketch a modest argument for it.

I will reply to a number of criticisms of the pragmatic maxim. In Subsection 2.2.7, I will reply to Richard Rorty. In Subsection 2.2.8, I will reply to T. L. Short, with whom I agree upon most points. In Subsection 2.2.9, I will reply to Robert Brandom. In Subsection 2.2.10, I will reply to Hilary Putnam. In Subsection 2.2.11, I will reply to Hookway and Legg’s criticism. I will address the problem of the empirical underdetermination of theories in Subsection 2.2.12. I will present Max Horkheimer’s criticism in Subsection 2.2.13, but because my reply presupposes Peirce’s semiotics, I must postpone my defense to Section 5.11.

In Subsection 2.2.14, I will suggest that the pragmatist theory of meaning has a lot in common with the later Wittgenstein, according to whom *meaning is use*.

In Subsection 2.2.15, I will argue that the pragmatic maxim does not entail instrumentalism about the so-called “theoretical entities”: observability is neither necessary nor sufficient for potential practical effects, or meaning.

The purpose of this Section is to make room conceptually for the introduction of crucial methodological moves: *operational definitions*, the *belief–doubt model of knowledge*, and *semiotics*. They are needed for my argument that *knowledge is practice*, which I will eventually present in Chapter 6.

2.2.1 Peirce’s Early Account

Peirce published a thoroughly empiricist account of meaning in “How to Make Our Ideas Clear” in 1878:

Consider what effects, which might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object. (Peirce CP 5.402; EP 1: 132.)

He explains:

[...] what a thing means is simply what habits¹⁸ it involves (Peirce CP 5.400; EP 1: 131).

Further,

¹⁸Peirce considered habit sometimes in an anthropomorphic sense, sometimes in a cosmological sense. Usually it can be seen from the context, which kind of habit he intends.

Bergman (2016: 174) considers it problematic, whether the notion of habits *produced on us* is equivalent to that of habits *involved in things* under consideration. I believe that they need not be equivalent, but they are *mutually co-produced* in the sense of *intra-action* (Barad 1996).

[...] we come down to what is tangible and practical, as the root of every real distinction of thought, no matter how subtile [*sic*] it may be; and there is no distinction of meaning so fine as to consist in anything but a possible difference of practice (*ibid*).

James ([1907] 1916: 46–47) explains that the conception of practical effects means what sensations we are to expect from the object and what reactions we must prepare, and that the effects can be either immediate or remote. Peirce (CP 5.2) agrees and explains that practical consequences mean conduct to be recommended or experiences to be expected, if the conception of the object be true. Dewey (1916b: 331) adds that the maxim does not state that consequences be *themselves* practical, but that practical consequences *from them* may be appealed to in order to decide the specific question of whether two proposed meanings differ save in words.

Thus, what a thing means is *how one can practically respond to it*. Hence meaning is not confined to language. It is also not confined to humans. Rather, meaning pervades all practices of all organisms. *Anything* that has practical effects can have meaning.¹⁹ Language is a special case, one meaningful practice among others.

Peirce’s quasi-behaviorist²⁰ theory of meaning is perfectly naturalist. Unlike the semantic anti-naturalists Frege (1879; 1884; 1892), Husserl ([1900] 1975; [1901] 1984a; [1901] 1984b; 2002; 2005), and Carnap,²¹ he does not understand meanings as abstract entities which are somehow “outside” or “beyond” nature but, rather, as *habits*, which are completely natural. This makes the analysis of meanings at least partially an experimental affair: in order to determine what a thing means, one can observe how different organisms respond to it. This is what he means when he states that the pragmatist method of ascertaining the meaning of a symbol (e.g. a conception) is the experimental method (Peirce CP 5.465; EP 2: 400–401). It leaves no room for completely *a priori* analysis of meanings: *that* would qualify as activity devoid of meaning and significance.

Bergman (2016: 179) argues that the pragmatic maxim does not reduce

¹⁹In Chapter 5, I will show that Peirce’s functionalist definitions of *sign-relation* and its relata — *object*, *sign-vehicle* or *representamen*, and *interpretant* — allows in principle *anything* to be a sign.

²⁰Nöth (2016: 43–44) explains why Peirce was not a behaviorist: (1) for behaviorists, learning consists in repetition of *external* stimuli, but Peirce emphasizes self-control in the formation of habits (CP 5.487; EP 2: 413); (2) for Peirce, habit is not mechanical (CP 2.315; EP 2: 277–278); (3) Peirce allowed innate, instinctive habits (CP 2.297; EP 2: 9; cf. Stjernfelt 2016: 248–252); and (4) for Peirce, habit-formation was not merely a disposition but a *law*, which involves a *purpose* (CP 5.487, 6.262; EP 1: 346–347; EP 2: 413).

²¹See Rouse (2002: ch. 1).

meaning to sensations (thought Peirce himself sometimes seems to do so). A thing can (and usually does) have practical bearings beyond sensation.

The pragmatic maxim is the missing link between semiotics, epistemology and philosophy of technics. It also suggests the recent 4E theories of cognition that maintain that cognition is embodied, embedded, enacted, and extended (cf. Menary 2010; Newen, De Bruin, & Gallagher 2018).

2.2.2 Peirce's Mature Account

Peirce came increasingly under the influence of Plato as he aged.²² That prompted revisions of his earlier philosophy, including the pragmatic maxim. The positive import of this development was his distancing from the vestiges of nominalism.²³ He was a sworn scholastic realist from early on, but he had unwittingly adopted some nominalist notions tacitly prevalent in contemporaneous scientific practice. Later he identified and criticized these notions and started to revise his older doctrines. Another, related reason for revision is the criticism of psychologism. He conceived the pragmatic maxim as a *logical* principle and logic as methodologically prior to psychology. Hence the formulation of the maxim should not depend on psychology. (Peirce CP 5.28; EP 2: 140.)

In Peirce's early account, meaning is equal to *actual* practical bearings: in order to have meaning, a sign (e.g. a conception) must *actually* be interpreted in practice. This can be seen in his treatment of the question, whether diamonds are hard: he claims that the utterance "this diamond is hard" is merely a question of nomenclature without real content unless experimentally tested (Peirce CP 5.403; EP 1: 132–133). That invites trouble with *conditionals* and *counterfactuals*: it seems that expressions such as "this diamond *would not* break under such and such pressure" are indeed meaningful.

Later, by 1902–1907, he corrected his actualism on this basis and claimed that in order to have meaning, an interpreted object must be merely *interpretable* in practice: it suffices that its effect upon an interpreter be merely potential.²⁴ By that time, he had concluded that potentiality is real, which allowed him to account for conditionals and counterfactuals. In the 1903 *Harvard Lectures on Pragmatism*, he explains that the "practical bearings"

²²See especially his "On Science and Natural Classes" of 1902, where he defines natural classes with reference to final causes (CP 1.203–237; EP 2: 115–132), and "New Elements" (possibly) of 1904 (EP 2: 300–324). Short (2007: chs. 4 and 5) has provided a naturalist account of final causation; see also Salthe (2016).

²³Cf. e.g. CP 5.402n3.

²⁴Peirce himself described this requirement in technical terms. For the definitions of *sign-vehicle* and *interpretant*, see Section 5.1.

of a theoretical judgment in the indicative mood consist in a *tendency* to enforce a practical maxim expressible as a *conditional sentence* (Peirce CP 5.18; EP 2: 134–135). He also states that the practical bearings of a conception need to be not *actual* but only *conceivable* and determining not merely how we *would* act but how we *should* act (EP 2: 145). He allows any flight of imagination, any number of interpretations mediating thought and practice, provided that thought ultimately bears on practice (CP 5.196; EP 2: 234–235). In 1905, Peirce (CP 5.453; EP 2: 354) paraphrases “this diamond is hard” into “this diamond *would* resist many attempts to scratch it.” He identifies the entire intellectual purport of a symbol²⁵ with the total of all general modes of rational conduct which, conditionally upon all the possible different circumstances and desires, would ensue upon the acceptance of the symbol (CP 5.438; EP 2: 346).²⁶ The conditional can still be considered as a question of nomenclature, but the mature Peirce had understood the import of scholastic realism more completely and recognized that symbols are real. The hardness of a diamond is not an isolated fact but is related to many other things: for instance, other objects which have the same physical and chemical makeup. Thus conditional expressions have real content in the sense that at least some possibilities are real. (CP 2.92, 2.275, 5.453, 5.457; EP 2: 354, 356.) In short, the meaning of a thing is the *potential practical effects* of that thing. The grounding of meaning upon real possibilities relinquishes the psychologism inherent in Peirce’s early account. The potential practical effects that the meaning of a thing comprises need not exist *habitualiter*; existence *virtualiter*, that is, unconsciously, but potentially consciously, is sufficient (Stjernfelt 2016: 253–254; cf. Peirce CP 2.398n). Short (2007: 173) calls this “the subjunctive version of pragmatism”: the meaning of a proposition is how it *would* influence conduct — that is, our habits — *were* it believed and *had* we some practical purpose to which it was germane (cf. Peirce CP 5.504).

Peirce adds in 1905 that *rational* meaning consists in *general kinds of experimental phenomena*, where “phenomenon” is understood as “effect” in “the Hall effect” or “the Zeeman effect.”²⁷ He means that *if* the actions

²⁵For the definition of *symbol*, see Subsection 5.5.1.

²⁶See also Peirce (CP 5.453; EP 2: 354).

²⁷Hence “phenomena” in Peirce’s sense are repeatable configurations of the *world*, not of a “subject.” This notion differs from the subjectivistic interpretation of phenomena of, for instance, Niiniluoto (1999: 91). Hacking ([1983] 2010: 220–232) and Rouse (2002: ch. 8) also have a notion of “phenomenon” which is strikingly similar to Peirce’s. I consider them synonymous. According to Sami Pihlström (private communication), Kant’s ([1781/7] 1956) notion of *phenomenon* is “non-subjectivist”: phenomena are objective and empirically real. At the present stage of inquiry, I cannot agree even if I trust Pihlström: to my (relatively modest) knowledge on Kant, Kant himself has not given sufficient reasons

of the experimenter fulfilled certain conditions, certain effects *would* follow. He also says that everything that influences conduct can be experimentally discovered. (CP 5.425–427; EP 2: 339–341.) This is another way in which the pragmatist method of ascertaining the meaning of a symbol is the experimental method (CP 5.465; EP 2: 400–401).

Subjunctive pragmatism implies that meanings have an *esse in futuro*. Meanings are conditionals of the form: *if* such and such states of affairs (possibly including actions) obtained, *then* such and such experiences could be expected. But the past is already determined. Hence such conditionals can describe only future occasions which are still open to us to explore. (Cf. CP 5.427; EP 2: 340–341.)

Peirce argued that meaning is inexhaustible. He seems to mean that a habit, insofar as it is still alive, keeps developing and is potentially realized in an innumerable set of possible actions. (Bergman 2016: 180; cf. Peirce CP 1.343; MS 599: 32.)

2.2.3 Non-Linguistic Meanings

The pragmatic maxim postulates non-linguistic meanings. The term might look like an oxymoron to somebody trained in twentieth-century philosophy with its obsession about language (cf. Ihde 1998: 116). But I submit that there are at least three kinds of non-linguistic meanings: aposematism,²⁸ perceptual and motor functions of cognition (Lakoff & Johnson 1999), and cause–effect relations, conceived as means–end relations²⁹ (Lindholm 2023a: 17; 2023b).

According to Määttänen (2009; 2015), non-linguistic meanings are more basic than linguistic meanings. Nöth (2016: 43) too argues that verbal knowledge and linguistic competence result from habits. Language could not function without an already existing stock of non-linguistic meanings that connect speech acts to practice — not least of all because an agent must make use of perceptual and motor meanings in order to produce speech acts in the first place (Lindholm 2023a: 17).

to believe so. How can Kant consider experience representationally and representations as partially constituted by the transcendental ego if he does not simultaneously consider phenomena “subjectivistically”? Why does Kant never mention bodily action? Considering Pihlström’s by far greater expertise, I believe that it is highly likely that I am wrong about Kant, but so far I have no grounds for believing so.

²⁸*Aposematism* is the evolutionary development of the traits of a species that give the signal that the species is dangerous or at least inedible. For instance, bright red color is a common signal that tells predators to avoid a species.

²⁹I will justify this claim in Section 2.4.

2.2.4 Kant, Traditional Empiricism, and Pragmatism

Kant ([1781/7] 1956) famously confined the application of his twelve categories to possible experience. Likewise, the pragmatic maxim confines meaningful discourse to possible experience — namely, to potential practical effects. Here pragmatism seems to side with Kant. Indeed, for such considerations, some philosophers have identified pragmatism with idealism. But this affinity is only *de dicto*. The pragmatist notion of *experience* is a lot broader than Kant’s. Besides observation, it includes actions and habits. Hence it does not denote merely a “subjective” domain of “appearances.” It also denotes *effort and resistance* — something that could not possibly make sense without an “external,” “objective” world, including the body of the agent and the surroundings of which it is a part. And it also denotes the *establishment of habits* — something that would not be possible without concrete conditions to which to adapt.³⁰

By the same considerations, because of its broader notion of “experience,” pragmatism is a more consistent version of empiricism than the traditional one which Locke, Berkeley, and Hume heralded. Dewey (1920) finds Francis Bacon’s experimentalism more cognate with his pragmatism.

2.2.5 Verificationism

The pragmatic maxim bears some resemblance to verificationism, popular among the early logical positivists, which claims that the meaning of a proposition is equal to the method of its verification (e.g. Ayer 1936; Carnap 1936; 1937; Schlick 1936). For instance, Ayer (1968: 55) maintains that the pragmatic maxim is equivalent to the physicalist interpretation of the verification principle. But Peirce does not restrict the applicability of his maxim to propositions; in principle, it can handle *any* object. And the meaning of an object is its possible *practical* bearings, of which methods of verification are only a tiny subset. Moreover, logical positivists and empiricists had a very narrow notion of experience, which encompasses only observation, and even that is reduced to qualitative contents. Peirce, on the other hand, includes action (“effort and resistance”) and habits as well (cf. Short 2007: 84), and if he is right, they do not reduce to qualities.³¹ “Practical bearings” are *opportunities for action*, or *affordances*³² (Gibson 1979; cf. Sonesson 2010;

³⁰I will explain the pragmatist notion of *experience* in detail in Chapter 3. I have explained my understanding of Kant above, regarding Sami Pihlström’s greater expertise and his comments on Kant (private communication).

³¹See Section 3.2.

³²Interestingly, Gibson (1979: 129) rejects the subject-object dichotomy because the concept of *affordance* cuts across it.

D. E. West 2013; 2014: 118f).

By the same considerations, because of its broader notion of “experience,” pragmatism is a more consistent version of empiricism than logical positivism.

2.2.6 An Argument for the Pragmatic Maxim

To my knowledge, not many people have tried to defend the pragmatic maxim. On the contrary, neo-pragmatists like Hilary Putnam and Robert Brandom have rejected it. Hence I have suggested a sketch of an argument in its defense (Lindholm 2023b; 2023c: 104) which I will restate here. What is to be shown is that *the meaning of a thing consists in the potential practical effects of that thing*. I will reply to Putnam and Brandom below.³³

First, let us show that potential practical effects are a necessary condition of meaning. For a *reductio ad absurdum*, suppose that a thing has meaning but no potential practical effects. In the absence of potential practical effects, its existence would be completely insignificant for any embodied interpreter. This insignificance contradicts the hypothesis that the thing have meaning. In fact, we would not even know that such thing existed in the first place. Hence having potential practical effects is a necessary condition of meaning.

Second, let us show that potential practical effects are a sufficient condition of meaning. For a *reductio*, suppose that a thing has potential practical effects but no meaning. This amounts to saying that that thing would potentially determine the outcome of a practical affair but we could not understand it. But taking such potential determination of an outcome into account already bestows the thing in question with meaning. Again, this contradicts the hypothesis. Hence having potential practical effects is also a sufficient condition of meaning.

Hence, I conclude that potential practical effects are the necessary and sufficient conditions of meaning. That means that the meaning of a thing consists of the potential practical effects of that thing, *quod erat demonstrandum*. It does seem nonsensical to say that something has meaning but does not affect our conduct in any way; or that “*X* means certain things to agent *A*, but they would never act accordingly.” Of course, actually some other thing may prevent *A* from acting accordingly. But because of subjunctive pragmatism, one must also take *potential* behavior into account. That makes it possible to identify that something is preventing *A* from acting accordingly in the first place.

The pragmatic maxim can be applied to itself.³⁴ Then, the meaning of

³³See Subsections 2.2.10 and 2.2.9, respectively.

³⁴This kind of reflexivity is important, because it shows that a principle does not make

a given meaning consists in the potential practical effects of that meaning. Then, meanings themselves must have potential practical effects. Otherwise meanings would be meaningless themselves. Everything would be nonsense. But potential practical effects require that meanings be completely natural: they are not distinct from nature, let alone opposed to it. That refutes semantic anti-naturalism.

Peirce himself devised different proofs for his maxim: an argument from phenomenology (CP 1.317–321; EP 2: 360–370), an argument from normative science (CP 1.573–574, 5.448n, 5.549–554; EP 2: 371–397), and an argument from semiotics (CP 1.560–562, 5.11–15, 5.464–496; EP 2: 398–433; MS 318). Peirce’s arguments are significantly longer and more sophisticated than my rough-and-ready sketch. I will address his semiotic proof in Section 5.13.

Pragmatists usually subscribe to Peirce’s fallibilism,³⁵ or the doctrine that any single belief, including mathematics and logic, can be questioned, if there arise positive grounds for doing so.³⁶ Dewey (1929b) explicitly rejected what he called “the quest for certainty.” Now, fallibilism can be applied to the pragmatic maxim. Hence the argument sketched above should not be taken to claim universality. Pragmatists should acknowledge the possibility that their ideas can fail, even if they be widely applicable. Robin (1997) may have hit upon truth when he suggested, in effect, that the real proof of pragmatism is to apply it. William James seems to have suggested a proof of pragmatism by living by it (Rydenfelt 2009: 48). On strictly pragmatist grounds, the validity of pragmatism can be only established experimentally: pragmatism must itself make a practical difference to be significant. Experimentation is needed to determine whether and how pragmatism fails. Then the possible negative results can be used to improve pragmatism. Hence pragmatism is akin to a *research program* rather than a doctrine.³⁷

Thus, I acknowledge the possibility of the failure of the pragmatic maxim. Now I will proceed to defend it against the criticisms of Richard Rorty, T. L. Short, Robert Brandom, and Hilary Putnam. Then I will make a couple of remarks with regard to Hookway and Legg’s conception of the maxim and to its affinity with the later Wittgenstein.

itself an exception. If that were the case, it would make the principle an article of faith, vulnerable to criticism for dogmatism.

³⁵See Chapter 4.

³⁶Isaac Levi (1983) is one of the notable exceptions. He rejected fallibilism in favor of what he called corrigibilism. I am unsure whether these positions differ except in name.

³⁷I will continue this line of thought in Section 5.13.

2.2.7 Rorty's Criticism

Rorty (1982: 161) entertained an unfavorable opinion about Peirce from a more general perspective. He criticized Peirce for not engaging with vital problems. He said that Peirce only contributed to pragmatism its name and stimulated William James. My reply to Rorty is twofold.

(1) Peirce indeed designed the pragmatic maxim for the clarification of scientific and philosophical concepts to dispel nonsensical metaphysics.³⁸ But his intention does not forbid its applicability to *any* concept. *A fortiori*, there is no obstacle for its application to vital problems as well. In 1905, Peirce himself explained the pragmatic maxim as determining the rational purport of an expression as its conceivable bearing upon *the conduct of life* (CP 5.412; EP 2: 332). In 1906, he argued that regarding a truth as purely theoretical does not prevent its being regarded as a possible *determinant of conduct* (EP 2: 372).

(2) Even if the application of the maxim is confined to science and philosophy as Peirce may have intended, it has indirect effects also in vital problems through its very application in science: just consider, how widely science is manifest in modern and postmodern society. Dewey's middle and later works (1916a; 1916b; 1920; 1922; [1925] 1929a; 1929b; 1938), which Rorty knew very well, bear testimony for this point. Science is not distinct and alienated from the *lifeworld* (*Lebenswelt*).³⁹ Its practices and instruments bring otherwise inaccessible objects *ready-to-hand* (*zuhanden*).⁴⁰ Some scientific problems arise out of everyday life, and some scientific results transform everyday life in return. The experimental method is common to everyday problem-solving and science⁴¹ (Dewey 1916a: 163–178, 237, 317–22; 1929b: 84–85, 123–124, 198–199, 220, 240–242, 271–273, 295; 1938: ch. IV), as the *belief-doubt model of inquiry*⁴² suggests.

2.2.8 Short's Criticism

Short (2007: 263) is skeptical about Peirce's maxim. He claims that Peirce did not give the term “meaning” any special place in semiotics. I disagree. Short himself acknowledges on the very same page that Peirce's theory of the

³⁸Peirce did not intend to dispel *all* but only *nonsensical* metaphysics. His own metaphysics is presented, for instance, in his evolutionary cosmology (CP 6.7–65, 6.102–163, 6.238–271, 6.287–317; EP 1: 285–371).

³⁹For the definition of *Lebenswelt*, see Husserl ([1936] 1976a; [1939] 1976b).

⁴⁰For the definitions of *Zuhandenheit* and *Vorhandenheit*, see Heidegger ([1927] 1977a: §§ 15–16).

⁴¹See Chapter 3.

⁴²See Section 4.3.

interpretant,⁴³ in its various divisions,⁴⁴ is his technical counterpart to the tangled uses “meaning” has in ordinary language. This should count as evidence *for* the fact that “meaning” is an umbrella term for the different kinds of interpretants. Peirce’s theory of the *final logical interpretant*,⁴⁵ devised in 1907, can be read as a reformulation and confirmation of his pragmatic maxim.⁴⁶

2.2.9 Brandom’s Criticisms

According to Brandom (1994: 123), pragmatists of the classical sort make the mistake of identifying propositional contents exclusively with the consequences of endorsing a claim: looking downstream to the claim’s role as a premise in practical reasoning and ignoring its proper antecedents upstream. He fails to understand that the pragmatic maxim is about the practical consequences of *objects* or *states of affairs* rather than *endorsements of claims*. Moreover, the scope of the pragmatic maxim is not restricted to propositions but applies to any conception.

But Brandom adds immediately that the fact that the pragmatist’s emphasis is on practical consequences is not relevant. He thinks that the problem is that one can know what follows from the claim that someone is responsible for a particular action, that an action is immoral or sinful, that a remark is true or in bad taste, without for that reason counting as understanding the claims involved, if one has no idea when it is appropriate to make those claims or apply those concepts.

I have a twofold reply. First, as I already said, the pragmatist is not concerned solely about what follows from *claims* but also about what follows from *objects* or *states of affairs*. Second, the pragmatic maxim requires *operational definitions* of concepts.⁴⁷ It follows that the criterion of the application of concepts to objects is what has taken place when operations have been performed upon the *object*. Thus the classical pragmatist makes a distinction between the criterion of the application of a concept and what would follow from that application. Hence they are not even trying to do what Brandom thinks they are doing — defining the meaning of a concept as the consequences of applying it. Perhaps Brandom is correct that both are needed in order to understand that concept, but that does not do away

⁴³See Section 5.1.

⁴⁴See Section 5.6.

⁴⁵See Sections 5.6 and 5.13.

⁴⁶This notion belongs to the purview of Peirce’s semiotic proof of pragmatism which I will critically engage in Section 5.13.

⁴⁷See Subsection 2.5.2.

with the distinction.

Brandom (1994: 428–429) also considers a case of a thermostat that keeps the temperature of a room within a certain range by turning a furnace on and off. If the thermostat has only one way of measuring temperature — for instance by the bending of a bimetallic strip until it touches either the left electrical contact (too cold) or the right one (too warm) — he thinks that there is no way to say that what the system is responding to is the temperature of the room, rather than the temperature of the bimetallic strip or the curvature of the bimetallic strip or the closing of the circuit between the bimetallic strip and one or the other of the contacts. He claims that a pragmatist appeal to practical *consequences* of the response in question is of no help here; turning the furnace on affects not only the temperature of the room but also that of the bimetallic strip, its curvature, and so its relation to the electrical contacts. Here he understands practical consequences extremely narrowly, without the mature Peirce’s subjunctive sense. It is not enough to consider what actually takes place. One can determine operations by which a practical difference *could* be made between these effects. If one warms the room up by any means and then cools the bimetallic strip down with, say, ice cubes, one could determine that the system responds to the temperature and the curvature of the strip and the closing the circuit, but not to the temperature of the room. Hence one possibility is excluded. Similar operations can be devised to exclude two more so that the remaining alternative is that the system responds to the closing of the circuit. That possibility is based on the fact that there is no necessity that the effects occur simultaneously. Electric current turns the furnace on; that can be achieved by closing the circuit; and that can be achieved by many means.

2.2.10 Putnam’s Criticisms

Hilary Putnam criticized the pragmatic maxim in several publications. I am unable to address them all within the confines of this thesis. I have selected one of his criticisms because my reply illustrates what Peirce seems to have intended with the maxim.

H. Putnam (1995a: 293–295) confuses the pragmatic maxim with verificationism,⁴⁸ ignores the essential idea of pragmatism that actions and habits fall under “practical bearings,” and mistakenly understands it non-subjunctively. He studies, whether the claim that “[t]here do not happen to be any stars arranged as the vertices of a regular 100-gon (in a region of space otherwise free of stars)” have meaning according to the pragmatist maxim. According to

⁴⁸See Subsection 2.2.5.

our present understanding of physics, if that claim is true, no creature whose knowledge depends on physical signals can possibly know that it is true. The only information available results from interaction with objects within the creature's light cone. Putnam concludes that the practical consequences of the claim equal those of the claim that "[n]o one will ever encounter any causal signals from a group of stars arranged as the vertices of a regular 100-gon (in a region of space otherwise free of stars)," and hence the meanings are equal too. He correctly thinks that such equation would be an obvious mistake, if it could be made. But I think that it is this equation that is mistaken. According to subjunctive pragmatism, the first claim is equal to "no *possible* creature *would* ever encounter any causal signals from a group of stars arranged as the vertices of a regular 100-gon (in a region of space otherwise free of stars)." That is a *modal* claim. Its scope exceeds Putnam's second claim, which is merely indicative. Hence Putnam's criticism misses the mark.

2.2.11 Hookway and Legg's Criticism

According to Hookway and Legg (2019: § 2), the maxim is in the end only a tool for clarifying meaning, not Peirce's theory of meaning proper. The latter is to be found in his theory of signs. I refute the former claim by pointing out the context in which the pragmatic maxim was presented: it was connected to Peirce's claim that what a thing *means* is what habits it involves (CP 5.400; EP 1: 131). Short (2007: 263) disagreed about the latter claim. I would say that Peirce's maxim and semiotics are not entirely distinct. When Peirce introduces his concept of *final logical interpretant*⁴⁹ and the termination of semiosis, it is not difficult to grasp the affinity with his maxim. If semiosis terminates in the establishment of a habit, then what a thing means is indeed what habits it involves.

2.2.12 The Empirical Underdetermination of Theories

The problem of empirical underdetermination seems *prima facie* to undermine the pragmatic maxim: two very different hypotheses can imply the same empirical effects but still be mutually incompatible and thus mean different things. I reply that in the absence of possible practical difference, there is no conceptual difference. Once a possible practical difference is made, a conceptual difference becomes possible. For instance, oxidization and de-phlogistication are different because there are possible practical differences

⁴⁹See Sections 5.1, 5.6 and 5.13.

between these two operations. Hence empirical underdetermination is merely a pseudo-problem.

On the other hand, because anything can have meaning (that is, potential practical effects, or habits), that makes experience (more general than observation) practice-laden (more general than theory-laden). The meaning of a thing is a habit, and habit associates the thing with what can be expected on the basis of the occurrence of the thing (cf. Peirce CP 8.178–179; EP 2: 493–494).⁵⁰ (Cf. Lindholm 2023b.)

2.2.13 Horkheimer’s Criticism

Horkheimer ([1947] 2004: 33) and others have pointed out that the pragmatic maxim leads to an infinite *progressus*, if taken literally. The conception of the object is the conception of its practical bearings; then, the conception of the practical bearings is the conception of the practical bearings of these practical bearings, and so on, *ad infinitum*. That may be problematic: if such *progressus* arises, we have to wait infinitely long until we can determine the meaning of a thing.

This is a serious problem which deserves a careful reply. I have defended the pragmatic maxim in Lindholm (2023b; 2023c: 103–106). My reply to Horkheimer cites Peirce’s semiotics. I will restate my defense after explaining Peirce’s semiotic apparatus in detail.⁵¹

2.2.14 The Later Wittgenstein

It is easy to see how the pragmatic maxim parallels the later Wittgenstein ([1953] 2009). Määttänen (2005) has argued that Wittgenstein’s principle “meaning is use” is an instance of Peirce’s maxim. But some caution is needed. It might perhaps be true that Wittgenstein’s principle holds intra-linguistically: the meaning of a word or a sentence is how it is used *in language*. But this is not Peirce’s point. It is not necessarily relevant what we do with language. What is crucial is what we do with the *things* spoken of when we use language. Thus the principle “meaning is use” parallels Peirce’s maxim only if *use* is understood to involve *behavior in general*, including speech acts. Hence, the meaning of a word or a sentence is how the *things* spoken about are used *in practice*. If moves in a language-game were intra-linguistic, the meaning of an expression would be determined only with respect to other linguistic meanings, and it would not be possible to get from

⁵⁰I will explain the potential practice-ladenness of all experience in Subsection 3.2.6. I will connect practice-ladenness to Peirce’s semiotics in Section 5.4.

⁵¹See Section 5.11.

language to the world. But once non-linguistic behavior is included, Peirce's and Wittgenstein's accounts escape the problems associated with definition by ostension, by other expressions, or by mental contents. (Määttänen 2015: 45.)

2.2.15 Instrumentalism

Arguably, the pragmatic maxim is necessarily committed to instrumentalism, because it eliminates unobservables from discourse as nonsensical. I have argued in Lindholm (2023b) that that is not the case. Observability is neither necessary nor sufficient for potential practical effects. An unobservable entity can have potential practical effects; and an observable entity can have no potential practical effects. Hence discourse about unobservables makes sense, if they have potential practical effects. For instance, electrons may be unobservable, but they still qualify as meaningful and real, because we can spray them (Hacking [1983] 2010: 22–24). For the converse, an epiphenomenon is observable, but by definition, it has no potential practical effects.

Dewey (1916b: 29–32, 44–46, 52–54, 331–334) *did* call his position “instrumentalism.” Some might even consider him the father of instrumentalism. But he did not mean what contemporary philosophers of science mean by that term. He does not consider “theoretical statements” as mere “conceptual shorthands” the purpose of which is “economy of thought.” To my knowledge, Dewey did not deny that some scientific theories could be literally true, or that certain unobservable entities literally exist. (Cf. Henne 2023; Lindholm 2023b.)

Dewey (1916b: 30) defines *instrumentalism* as the position that “thinking is instrumental to a control of the environment, a control effected through acts which would not be undertaken without the prior resolution of a complex situation into assured elements and an accompanying projection of possibilities — without, that is to say, thinking.” He continues:

Speaking from this point of view, the decisive consideration as between instrumentalism and analytic realism is whether the operation of experimentation is or is not necessary to knowledge. The instrumental theory holds that it is; analytic realism holds that even though it were essential in *getting* knowledge (or in learning), it has nothing to do with knowledge itself, and hence nothing to do with the known object: that it makes a change only in the knower, not in what is to be known. And for precisely the same reason, instrumentalism holds that an object as a knowledge-object is never a whole; that it is surrounded with

and inclosed [*sic*] by things which are quite other than objects of knowledge, so that knowledge cannot be understood in isolation or when taken as mere beholding or grasping of objects. That is to say, while it is making the sick man better or worse (or leaving him just the same) which determines the knowledge-value of certain findings of fact and certain conceptions as to mode of treatment (so that by the treatment they become definitely knowledge-objects), yet improvement or deterioration of the patient is other than an object of cognitive apprehension. Its knowledge-object phase is a selection in reference to prior reflections. (Dewey 1916b: 32–33.)

Hickman ([1990] 1992) has provided an insightful exposition of what Dewey did mean by the term. He argues that Dewey’s instrumentalism is a *technological method* in epistemology (see also Dewey 1946: 291, 291n3). It might be more adequately called *constructive realism*:

The position taken in the essays is frankly realistic in acknowledging that certain brute existences, detected or laid bare by thinking but in no way constituted out of thought or any mental process, set every problem for reflection and hence serve to test its otherwise merely speculative results. It is simply insisted that as a matter of fact these brute existences are equivalent neither to the objective content of the situations, technological or artistic or social, in which thinking originates, nor to the things to be known — of the objects of knowledge. Let us take the sequence of mineral rock in place, pig iron and the manufactured article, comparing the raw material in its undisturbed place in nature to the original *res* of experience, compare the manufactured article to the objective and object of knowledge, and the brute datum to the metal undergoing extraction from raw ore for the sake of being wrought into a useful thing. And we should add that just as the manufacturer always has a lot of already extracted ore on hand for use in machine processes as it is wanted, so every person of any maturity, especially if he lives in an environment affected by previous scientific work, has a lot of extracted data — or, what comes to the same thing, of ready-made tools of extraction — for use in inference as they are required. We go about with a disposition to identify certain shapes as tables, certain sounds as words of the French language, certain cries as evidences of distress, certain massed colors as woods in the distance, certain empty spaces

as buttonholes, and so on indefinitely. The examples are trivial enough. But if more complicated matters were taken, it would be seen that a large part of the technique of science (all of science which is specifically “inductive” in character) consists of methods of finding out just what qualities are unambiguous, economical, and dependable signs of those other things which cannot be got at as directly as can the sign-bearing elements. And if we started from the more obscure and complex difficulties of identification and diagnosis with which the sciences of physiology, botany, astronomy, chemistry, etc., deal, we should be forced to recognize that the identifications of everyday life — our “perceptions” of chairs, tables, trees, friends — differ only in presenting questions much easier of solution. (Dewey 1916b: 35–36.)

In this passage, Dewey clearly intends the technological analogy to indicate that his method is technology. The iron ore is analogous with the antecedents or brute existences; pig iron, with extracted data and already established habits; and steel articles, with a resolved problematic situation. This tripartite distinction is not absolute: the pig iron can be both material for something else and a tool of analysis to develop better smelting methods, and data can in the same way be used as a tool for further extraction of data. Thus the extracted materials are “general” in the sense that they have many features, or that they can be made into many things — that is, they have many meanings and point in many directions. In this sense, the objects of everyday life do not have “significance” in the same sense that scientific objects do. Dewey’s point is that it is by the means of technology that everyday objects are purified and refined into data that is unambiguous and, hence, can be used for further construction. (Hickman [1990] 1992: 49–50; cf. Dewey 1916b: 35–37, 41, 104–105.)

According to Hickman ([1990] 1992: 50–51), the trouble with realism is that the world is finished, already there ready to be discovered, without need for technological intervention; the pig iron already exists effortlessly. Simultaneously, the trouble with idealism is that the world is constituted by thinking, without raw material; one is capable of creating pig iron in the absence of iron ore. Hence both realism and idealism lack the mediating category and cannot have an adequate account on technology.

Hickman ([1990] 1992: 55) adds that this is the case because realism requires that knowledge conform to an external set of conditions, objective idealism insists that knowledge is constituted by a supernatural or transempirical thinker, and subjective idealism proceeds without reference to objective checks and cues.

2.3 Habit

I have explained that the meaning of a thing consists in its potential practical effects, or the habits associated with it. The classical pragmatists use the term *habit* in a technical sense that cuts across the subject–object dichotomy. According to Peirce (MS 681: 23–25), it stems from Aristotle’s (1954: bk. II) δῶθεις which refers to good or bad behavior (see Gorlée 2016: 14). Bergman (2016: 183–184) explains that Peirce may also have meant *self-controlled* conduct (cf. Peirce CP 5.461, 8.191; EP 2: 359).

I will begin in Subsection 2.3.1 by citing a number of definitions of *habit*. I believe that they are compatible.

I will proceed in Subsection 2.3.2 to refute the popular prejudice that habit be about mindless repetition.

In Subsection 2.3.3, I will explain why habit is both “subjective” and “objective” at once. The purpose of this Subsection is to disavow “subjectivism” and idealism. If I am right, then the problem of the “objectivity” of meaning does not arise.

A habit makes purposive behavior possible. I will explain the relationship between habit and purpose (or *end-in-view*, as Dewey says) in Subsection 2.3.4. The purpose of this Subsection is to naturalize the notion of *purpose*. I will employ the naturalized concept extensively in Section 3.1.

I have argued in my previous works that the pragmatist notion of *habit* and Joseph Rouse’s notion of *practice* are at least roughly synonymous, though Rouse’s “practice” might capture better what Dewey intended by “habit.” I will defend that claim in Subsection 2.3.5. In what follows, I will use “habit” and “practice” interchangeably.

The analysis of the concepts of *habit* and *practice* is necessary for two purposes: first, the naturalization of *meaning*; second, the identification of knowledge with practice. When I eventually make the identification in Chapter 6, it ought to be clear that my naturalization of the concept of practice does not make knowledge mindless repetition or “subjective.”

2.3.1 Definition

According to Peirce, a *habit* is simply “some general principle working in a man’s nature to determine how he will act” (CP 2.170), “a rule active in us” (CP 2.643; EP 1: 199), “a rule of action” (CP 5.397; EP 1: 129), “any lasting state whether of a person or a thing, this state consisting in the fact that on any occasion of a certain kind that person or thing would, either certainly, or even only probably behave in a definite way” (MS 673: 14–15), or “the reality of a *general fact* concerning the conduct of any subject” (MS

671: 7), which, according to Bergman (2016: 184), includes the law-bound dispositions of inanimate objects (cf. Peirce MS 321: 19d). S. B. Rosenthal (1982: 231) argues that a habit has a schematic structure, and Stjernfelt (2016: 244) believes that it can be represented as a diagram (cf. Peirce CP 2.148; Stjernfelt 2007: ch. 4).

According to Peirce (NEM 4: 143), habits are formed “by the logical development of the potential germinal nature of the man, generally by an effort, the accident of having done this or that merely having an adjuvant effect.” Habits lead us to act in a certain way in a certain kind of situation (CP 2.664). Every habit has, or is, a general law, the mode of being of which is *esse in futuro* (CP 2.148). A habit is established inductively (CP 2.643, 5.297, 6.145; EP 1: 46–47, 198–199, 327–328). One can also establish a habit by rehearsing a pattern of experience in imagination; arguably, imagination keeps our conduct from hardening into mindless routine (Peirce CP 5.487, 5.533; EP 2: 413; MS 318; Andacht 2016; V. Colapietro 2016). In this sense, habits can be bodily, mental, or both (EP 2: 464); and there are habits of feeling that include emotions, sensations and modes of perception (Nöth 2016: 38–39, 44; cf. Peirce CP 1.377). The law of habit includes the habit of habit change⁵² (Nöth 2016: 40, 61; cf. Peirce CP 6.101). The habit of habit change is a prerequisite for the advance of knowledge and scientific research (Nöth 2016: 57).

In some of his writings, Peirce introduced a relative distinction between *habit* and *disposition*: the former is acquired and subject to a degree of self-control (Bergman 2016: 184; cf. Peirce CP 5.487, 8.322; EP 2: 348, 413; MS 318: 48n). Self-control has both negative and positive traits (Bergman 2016: 185; Peirce MS 499 s). In other writings, Peirce seems to consider the difference between habit and disposition as merely verbal (Peirce CP 2.170, 5.540; MS 288: 65–67; cf. Stjernfelt 2016: 248).

Dewey (1916a: 54–58; cf. 1922: 14ff.) defined *habit* in more length as “a form of executive skill, of efficiency in doing”; “an ability to use conditions as means to ends-in-view;” and “an active control of the environment through control of the organs of action.” Habits involve certain properties of nature at our disposal.⁵³ Habits involve the cooperation of organism and environment.

Peirce’s and Dewey’s notions of *habit* seem compatible with each other. They also seem compatible with Locke’s ([1690] 1823a: II, XXII, § 10) notion: “power or ability in man, of doing any thing, when it has been acquired by frequent doing the same thing, is that idea we name habit.” Habit is also

⁵²Perhaps the habit of habit change could be described as a second-order habit.

⁵³This definition is *operational*; see Subsection 2.5.2.

the eighth of Aristotle's categories (1962a). He defines *habit* (ἔξις)⁵⁴ as “a disposition, in virtue of which the thing which is disposed is disposed well or badly, and either independently or in relation to something else”⁵⁵ (1933: 1022b).

Määttänen (2015: 33) summarizes that habits are *schematically structured sequences of acts in the world*. They are formed during actual behavior when action accommodates to the objective conditions of action. Nöth (2016: 37) argues that *continuity* in time is a distinguishing feature of a habit.

I suggest one more definition: *habit* is an (approximately and relatively) invariant pattern of potential organism–environment intra-action⁵⁶ (Lindholm 2023a: 8, 13, 33–34; cf. Jung 2010: 154); “invariant,” because it determines an entire class of actual and potential actions; “approximately,” because such determination is only schematic; actual conditions fill in the details; and “relatively,” because habits evolve as they adapt and readapt to changing conditions; hence they are virtually never absolutely the “same” (whatever that could mean); the comparison between two instances of habit is always diachronic, because it is impossible to determine a non-historical essence of a given habit. The organism and its environment, of which it is a part, exchange causal signals (including observations and actions) in space and time, and recurring patterns in such exchange are *habits*.

Peirce observed how habit increases order by categorizing signals according to the response to which they lead in the organism; controlled action is based on the ensuing uniformity of response (Gorlée 2016: 22; cf. Peirce CP: 6.261–270, 6.300; EP: 1: 346–350, 360–361; Esposito 1980: 169). Locally, entropy decreases, which seems to violate the second law of thermodynamics; but globally, the expenditure of energy in the rearrangement increases entropy elsewhere.

Sometimes Peirce does use the term *habit* in the sense of *repetition*. Kilpinen (2016: 201–202) cites the young Peirce's lengthy explanation of how he conceives the origin of logic in the terms of cerebration. In the philosophy of logic, Peirce was an anti-psychologist, but that does not mean that logic have nothing to do with psychology. (CP 3.154–164; EP 1: 200–203.) Kilpinen also cites Peirce's “Evolutionary Love” from his evolutionary cosmology period as one instance of habit being identified with routine (CP 6.301; EP 1: 361). I believe that Peirce uses both passive and active notions of *habit* and that the active notion should be granted primacy in order

⁵⁴From ἔχω: “I have,” “I possess.”

⁵⁵See also Peirce (MS 681: 20–22) for his account on Aristotle's notion of *habit*.

⁵⁶I will define, after Dewey and Barad, *experience* as *organism–environment intra-action* in Subsection 2.5.2 and Chapter 3. Thus habits are (approximately and relatively) invariant patterns of potential experience.

to understand the greater part of his theory of action. The passive notion has some applications, but they are secondary. This distinction brings us to Dewey's distinction between *intelligent* and *unintelligent habit*.

Habits associate objects with their potential practical effects (cf. Peirce CP 8.178–179; EP 2: 493–494).⁵⁷ Thus they allow us to project *ends-in-view*⁵⁸ and thereby to act purposively.

2.3.2 Intelligent and Unintelligent Habit

In the vernacular, habit is associated with dull, mechanical, mindless routine and repetition. That is indeed the nature of *unintelligent* habit. But unintelligent habit presupposes *intelligent* habit:⁵⁹ one must first actively adapt behavior to conditions to be able to repeat the “same” act in the first place (Dewey 1938: 32–33; cf. M. Anderson 2016: 2). Intelligent habit creatively and actively adapts to novel conditions; the agent keeps learning (Dewey 1916a: 57–58; 1922: 15, 42, 69, 70–71, 77, 208–209; [1925] 1929a: 358; cf. Ryle [1949] 1951: ch. 2; 1971). Nöth (2016) has, in effect, found the notion of intelligent habit already in Peirce. (Cf. D. E. West 2016: 216, 219–220; Peirce CP 1.390.) Peirce esteemed the importance of imagination in habit-taking and habit-change highly (CP 6.286). A Peircean habit is not something fixed once and for all but, on the contrary, a flexible rule of procedure adopted for a practical purpose (Gorlée 2004: 63; cf. Cannizzaro & Anderson 2016: 325). Moreover, “it is not the muscular action but the accompanying inward efforts, the acts of imagination that produce the habit” (Peirce CP 5.479). Thus, according to Andacht (2016: 350), imaginative rehearsal of actions is a genuine component of our adaptive readiness to act in certain ways. Even in order to remain the “same,” a habit needs to change in the sense that imagination is necessary for a habit to adapt to changing circumstances. Thus, paradoxically, for a Peircean habit to remain the “same,” it must evolve (Cannizzaro & Anderson 2016: 325). Peirce likened habit to non-conservative laws of nature at least twice (CP 1.390, 6.23; EP 1: 264–265, 292; cf. Stjernfelt 2016: 249–250). Henceforth, when I refer to habit *simpliciter*, I mean emphatically *intelligent* habit unless indicated otherwise.

Magnani, Arfini, and Bertolotti (2016) distinguish between *knowledge-based habit* and *ignorance-based habit*. They argue that both can be found in

⁵⁷See Section 2.4.

⁵⁸See Subsection 2.3.4.

⁵⁹Dewey prefers “intelligence” to “reason” because of the traditional metaphysical connotations of the latter. According to Gale (2010: 58), “intelligence” means *inquiry* in Dewey.

Peirce (e.g. CP 2.189, 5.358–387, 7.354; EP 1: 109–123). They argue that the former is related to the justification of what the agent already knows, while the latter is instinctual and related to removing doubt by leading the agent to introduce new ideas (abduction). The former is driven by *logica docens*, the latter by *logica utens* (cf. A.-V. Pietarinen 2005b). Ignorance-based habit provides the *initial push* that drives the agent to the irritation of doubt which urges them to innovate, and knowledge-based habit is the *conclusion* or the *final outcome* of inferential activity. On the other hand, knowledge-based habit can turn into an ignorance-based habit when the agent encounters something surprising that impedes action (cf. Peirce CP 5.443; EP 2: 348). Thus both kinds of habit can be understood as parts of a single process. They can also be understood as two different states of human cognitive activity that share the same broad definition but that must be studied separately. In this sense, habit mediates belief and doubt. Repetition, or unintelligent habit, becomes possible only after knowledge-based habit is established.

Intelligent habit arises from inquiry; but once established, it tends to become unintelligent. Therefore, according to V. Colapietro (2016: 304), “the more perfect our knowledge is, the *less* conscious it is.” That is both positive and negative: positive, because it allows us to attend to other things more intelligently; negative, because our awareness of the operation of the habit becomes increasingly automatic, which decreases our agency. (Cf. Dewey 1922: 175–176.)

According to Tiles (2010: 110), we make inferences all the time when acting according to an intelligent habit. Inference allows us to react in advance to what is absent.

Intelligence, in this sense, is not a property of a person but of their activity (Dewey 1916a: 155). By developing intelligent habits, we develop mind (Dewey 1916a: 39, 57, 344, 392–393). *Knowledge* consists in intelligent habit (Dewey 1916a: 400; cf. Peirce CP 4.531) — or so I am going to argue.⁶⁰

Dewey (1896; 1938: 29–32) criticizes the behaviorist notion of the *reflex arc*. The stimulus to action is not reducible to excitation. The total condition of the organism (including habits) must be taken into account. That makes the organism a living state machine which has its unique, path-dependent history of experience that makes its deeds continuous. That preserves the unity of the course of action and spares cognitive resources. Otherwise the organism should re-estimate the situation at each instant of time when each new stimulus is registered.

Dewey continues that mind arises from intelligent habit, not *vice versa*. He argues that *mind* is an organized habit of intelligent response, the power

⁶⁰See Chapter 6.

to understand things in terms of the use made of them (1916a: 39–40); *mind* is intentional purposeful activity controlled by perception of facts and their mutual relationships, capacity to refer present conditions to future results, and future consequences to present conditions (1916a: 120, 153–154). He continues that “[t]here is no immaculate conception of meanings or purposes”: reason emerges from prior habit (Dewey 1922: 30–31). “The ways we think are just as much bodily habits as the ways we walk, sing, or throw a ball” (Johnson 2010: 131).

The way in which habits constrain the acquisition of knowledge has both positive and negative effects. The positive function is that it enables concentration of attention. The negative function is that the acquisition of new information may become impeded by the hardened expectations produced by prevailing habits. But the positive function is prior to the negative. (Dewey 1922: 175–176.)

2.3.3 Habit, “Subjectivity” and “Objectivity”

Dewey (1922: 14–15) compares habits to physiological functions. Both habits and physiological functions require the cooperation of an organism and environment. Habits are like breathing and digestion in that they are not complete within the body but can be continually realized only in an environment. If the body or the environment changes too much, habits must change as well. The “same” habit can manifest itself in different ways in different environments. The habit can remain the “same” only in a relatively stable environment. Therefore both physiological functions and habits can be meaningfully predicated only of certain organism–environment intra-actions. They differ in that habits are acquired, whereas physiological functions are involuntary. M. Anderson (2016: 7) considers the concept of habit essentially *ecological*: it resides in all possible interactive *relations* uniting agents and patients. Hence the concept of habit cuts across the subject–object dichotomy: it reduces neither to the subject nor to the object; it is both “subjective” and “objective” at once (see also Peirce MS 930: 31 and D. E. West 2014).

Recall my example of chopping wood.⁶¹ Mere behavior is not sufficient for habit. A habit cannot be understood without taking conditions, possibly including tools and instruments, into account. Neither organism nor environment can determine a habit alone: without the cooperation of environment, the activity of the organism will probably fail; and without the cooperation of the organism, the activity of the environment will produce the desired results only by accident. (Lindholm 2023a: 13–14.)

⁶¹See Section 1.1.

Thus habit presupposes at least two “objective” entities: an organism and its environment. This objectivity does not, however, preclude “subjectivity.” Habit can be described as a *configuration of the world*, not merely of an agent. Short (2007: 86n14) rejects the view that habits be exclusively “mental”: habit mirrors law, as that relation is publicly observable, not private and “inner.”

This definition of habit allows continuity between inanimate and animate nature — a consequence of Darwin’s theory of evolution (1859; [1871] 1877). Peirce was aware of the necessity of such continuity and sometimes talked about the habit-formation of plants and even rivers (CP 2.274, 5.492, 6.17, 6.300; EP 1: 290, 360–361; EP 2: 273, 418; cf. Nöth 2016: 36–37, 45–46; Lindholm 2023a). Many habits are connected with nutrition (Peirce CP 6.283; cf. Nöth 2016: 46). Peirce would have included bacteria, archaea, protozoa, chromista, and fungi (M. Anderson 2016: 2–3) and even fossils and crystals (Nöth 2016: 36–37, 45–46; cf. Peirce CP 5.538, 6.250; EP 1: 342–343) along with animals and plants into the class of habit-taking entities. Anderson believes that Peirce anticipated Jakob von Uexküll’s ([1934] 1957) concept of *Umwelt*. Coletta (2016) argues that geological phenomena can be understood as habit-taking and hence interpretive: they give rise to natural propositions (Stjernfelt 2014) and thus are instances of physiosemiosis (Deely 2001). J. Pickering (2016) defends the extension of habit to physical nature on the basis of Gibson (1979) and von Uexküll ([1940] 1982), criticizes reductionism, and even suggests a panpsychism that expands rather than opposes science and considers nature as both material and meaningful at once.⁶² Peirce audaciously extended the domain of habit into atomic physics (CP 1.409; EP 1: 277; MS 671: 7),⁶³ but that can be criticized (e.g. Kull 2014), and, strictly speaking, it is not necessary to follow him that far.

Habits constitute our personality (Peirce CP 6.228; Dewey 1922: 19, 24, 38, 40, 43, 121, 136). Literally speaking, we do not have habits; on the contrary, it is our habits that have *us*: “we dwell in and through habits” (M. Anderson 2016: 2; cf. Nöth 2016: 39). Culture can be understood in systems-theoretic terms as a dissipative structure that builds on habits, making culture more amenable to scientific analysis (M. Anderson 2016: 5–6; cf. Prigogine & Stengers [1979] 1984).

Rorty (1991: 93) conceives *habit* as a state of the *body*. Hence he reduces

⁶²See also Bohm (1985).

⁶³This broad sense of *habit* also appears in James (1890: I.4: 104): “The moment one tries to define what habit is, one is led to the fundamental properties of matter. The laws of Nature are nothing but the immutable habits which the different sorts of elementary matter follow in their actions and reactions upon each other.” (Cf. Peirce CP 6.261; EP 1: 346.)

a property of intra-action to one of its relata. If that were so, a habit could be sustained even if the environment changed radically. But, obviously, it cannot: for example, the habit of walking cannot be sustained in space. (Cf. Määttänen 2009: 58–61).

2.3.4 Means and Ends

Dewey (1916a: 121–123, 127–129, 205–206) distinguished between (*categorical*) *ends* and *ends-in-view*. On the one hand, a (categorical) end is independent of, and hence external to, any practice. It leaves no room for deliberation and criticism. Hence it is both epistemically and morally unjustified. Positing a categorical end runs the risk of dogmatism. On the other, an end-in-view is internal to a practice. Ends-in-view are flexible, revisable and adaptable to conditions. They are constantly re-evaluated if something unexpected happens during the course of action. In certain conditions, they can be even discarded and replaced. (Lindholm 2023a: 13n26; cf. Peirce CP 1.574; MS 478: 18.) Thus the concept of end-in-view accounts for what Chang (2022: 56–57) calls “the adjustment of aims.” He continues that “[a]n iterative process is necessary for the development of aims because we cannot judge whether an aim can be plausibly pursued, without having tried to achieve it. This is a parallel point to the lack of an indubitable foundation in the justification of knowledge” (Chang 2022: 246), which I will address in Chapter 4.

A habit associated with an object suggests possible ends-in-view — what can be achieved with the object (Dewey 1916a: 120, 153–154). Each habit is also a means for such ends-in-view. Thus habits are responsible both for the ends-in-view to project and for the means to achieve them.

Jung (2010: 149–154) argues that ends-in-view are vague for a purpose: the agent must prepare for contingencies. If definite means are selected, we can *discover* what can be achieved by using them. Thereby the end-in-view can become definite. Therefore *means are not neutral*: in a sense, they *create* ends-in-view. Jung continues that action cannot always be understood in the terms of ends and means: for instance, scientific, artistic, and religious activities are intrinsically motivating modes of action.

Dewey argued that “means” and “ends” are merely two names for the same reality, viewed from the opposite points of view. Each stage in a unified course of habitual action is a means for the next stage and the end of the previous stage. (Dewey 1922: 34–37.) Moreover, an end-in-view is a means for organizing present action. And when an end-in-view is reached, it potentially becomes a means for a subsequent endeavor. (Dewey 1916a: 119–120; 1922: 223–237; 1929b: 151; cf. Lindholm 2023b.)

He also argued that the end of the useful is fine; and that smooth, efficient operation is itself an immediate, aesthetic good (1916a: 278–279, 284; [1925] 1929a: 364–365). He added that fine art consciously undertaken as such is peculiarly instrumental in quality, a device in experimentation carried on for the sake of education; it exists for the sake of training of modes of perception (Dewey [1925] 1929a: 392). (Cf. Lindholm 2023b.)

Dewey (1922: 25–26) distinguished between *active* and *passive means*. He understood *habits* as active means and *bodily organs and instruments* as passive means. When not used, a passive means is just a thing. In order to actualize it, and in order for it to acquire the status of instrument, it must be actively used in a practice, or active means. This distinction is important for the philosophy of technics: rather than instruments themselves, the important thing is their *active use*. Moreover, what characterizes a tool, or its parts, is not its constituents but its adaptation to an end (Dewey 1916a: 260–261); that notion disavows any “objectivistic” philosophies of technics that would reduce the nature of an instrument to the physical properties of its parts.⁶⁴ Of course, they must be taken into account; but purpose must be cited as well. Instruments have psychological and social effects, but such effects follow from their active use (rather than merely from their physical properties). By being incorporated in our habits, technics become part of our very being, because we *are* our habits (Peirce CP 6.228; Dewey 1922: 19, 24, 38, 40, 43, 121, 136; cf. V. Colapietro 2006; 2016: 300); with different use of technics, we would be different people. Hence the concept of *habit* is crucial for the philosophy of technics; and the philosophy of technics is crucial for philosophical anthropology.

On the other hand, the body is not merely an instrument. It is also *expressive*. (Jung 2010: 159–160.)

2.3.5 Habit and Practice

I have suggested that Dewey’s notion of *habit* and Rouse’s notion of *practice*⁶⁵ are at least roughly synonymous (e.g. Lindholm 2021: 7; 2023a: 13–14). Therefore Rouse’s account on practice enriches my account on habit.

To my knowledge, Rouse never cites Dewey. I believe that the former may have become acquainted with the position of the latter through Richard Rorty.

Rouse defines *practice* as a *pattern of activity in response to a situation* (Rouse 1996: 26); *meaningful situations or configurations of the world*

⁶⁴This is a justification for my preference of “technics” over “technology.”

⁶⁵Rouse’s notion of practice is available in Rouse (1987: chs. 4 and 7; 1996: chs. 5–9; 2002: chs. 5–9.)

(Rouse 1996: 30). This characterization is presumably meant to capture the material embodiment of practices. He states that they are *dynamic*, because these patterns exist only through being continually reproduced. They are also essentially *social*, since their coherence and continuity depend both on coordination among multiple participants and things and on the maintenance of that coordination over time. He allows considerable “slippage” for the ongoing reproduction of the “same” practices because of local differences of conditions. Moreover, practices are intrinsically open to multiple interpretations: he states that the most basic way to “interpret” a practice is to continue it or extend it to new situations, because the reproduction of the practice cannot be determined by rules. This latter fact makes practices largely non-explicit.

He also understands practices as *the meaningful situations within which doings of human agents can be significant*, not those doings themselves — again possibly referring to the necessity of material embodiment. He denies that meaning be bestowed upon on the world by agents or their shared forms of life. Rather, it emerges from patterns of interaction within the world.⁶⁶ In this way he claims to eschew both “naturalistic reductions of intentionality to causal processes”⁶⁷ and humanistic exaltations of subjectivity and freedom. If this strategy succeeds, it avoids the pitfalls of different anthropomorphisms. (Rouse 1996: 30, 37–38.)

According to Rouse (1996: 162), a pattern of events counts as practice only if it can be constructed as having been brought about in part by agents. Now, agency implies purpose. And to have a purpose is a complex capability which requires some understanding of how to do many other things, including how to utilize appropriate means and how to situate the intended action with respect to some further purpose. Hence a completely pointless or unintelligible action is a contradiction in terms. (Cf. Okrent 1988; Rouse 1987: chs. 3 and 4.)

He claims that his account on scientific practices cannot be assimilated to epistemological holism which would incorporate practices within “background knowledge.” He holds that knowledge is not *something* [*sic*] that agents possess or exchange but instead characterizes how they are situated in the world. (Rouse 1996: 38–39.) Presumably he means that practices cannot be reduced to background knowledge, considered as an immaterial

⁶⁶Rouse does not tell how, but I will provide an account in Section 2.4. I have explained it also in Lindholm (2021; 2023a; 2023c; 2023c).

⁶⁷Rouse seems to be unaware about that not all naturalisms are reductionist. In fact, he developed later a version of non-reductive naturalism himself (Rouse 2002). Määttänen (1993; 2009; 2015) and Pihlström (1996; 2002; 2003; 2005; 2009; 2012) are examples of non-reductive (pragmatist) naturalism.

representation, because they are also material. (Cf. Rouse 1996: 27, 179, 188–189.)

He acknowledges the tension between intelligibility and incoherence: dispersion and openness to multiple interpretations threaten the coherence of practices, but any specific research only becomes intelligible and significant as a contribution to a project shared with others. Hence trade-offs sensitive to local circumstances are to be expected. (Rouse 1996: 27.)

He claims that practices are not just agents' activities but also the *configuration of the world* within which those activities are significant, and that attributions of knowledge are more like a characterization of the situation knowers find themselves within rather than a description of something they acquire, possess, perform, or exchange. He emphasizes that science as practice, conceived in this way, is not subject-centered. This is the main difference with the humanist accounts mentioned above. Rouse credits, however, Sellarsians and Dreyfusians — even though he considers the latter as flawed because they posit an underlying dualism between nature and practices. (Rouse 1996: 133–134.)

In short, he has ten detailed theses about practices (Rouse 1996: 134–135):

1. practices are composed of temporally extended events or processes;
2. practices are identifiable as patterns of ongoing engagement with the world, but these patterns exist only through their repetition or continuation;
3. these patterns are sustained only through the establishment and enforcement of “norms”;
4. practices are therefore sustained only against resistance and difference and always engage relations of power;
5. the constitutive role of resistance and difference is a further reason why the identity of a practice is never entirely fixed by its history and thus why its constitutive pattern cannot be conclusively fixed by a rule (practices are open to continual reinterpretation and semantic drift);
6. practices matter (there is always something at issue and at stake in practices and in the conflicts over their ongoing reproduction and reinterpretation);
7. agency and the agents (not necessarily limited to individual human beings) who participate in practices are both partially constituted by how that participation actually develops, and in this sense, ‘practice’ is more basic category than ‘subject’ or ‘agent’;⁶⁸

⁶⁸Recall the claim of Heidegger ([1927] 1977a) that *Dasein* is more basic than “subject”

8. practices are not just patterns of action, but the meaningful configurations of the world within which actions can take place intelligibly, and thus practices incorporate the objects that they are enacted with and on and the settings in which they are enacted;
9. practices are always simultaneously material and discursive;
10. practices are spatio-temporally open, that is, they do not demarcate and cannot be confined within spatially or temporally *bounded* regions of the world.

2.4 The Genesis of Meaning

Recall that Peirce (CP 5.465; EP 2: 400–401) claimed that the way to determine what a thing means is the experimental method. However, he did not explain his claim in sufficient detail. On the other hand, Dewey (1929b: 81–84) showed how meaning emerges from experiment.⁶⁹ The same pattern is characteristic of both everyday problem-solving and scientific inquiry alike (cf. Dewey 1916a: 163–178, 237, 317–322). The process can be schematized as follows; I have improved slightly upon my previous accounts (Lindholm 2021: 7; 2023a: 16; 2023c: 106–108):

1. A known change (possibly nothing,⁷⁰ possibly a speech act) is instituted deliberately.
2. Something else (possibly nothing, possibly another speech act) changes as a result.
3. The resulting change is measured.
4. The changes are correlated.
5. The experiment is repeated.
6. If the correlation persists, it gives rise to a habit (practice).
7. The habit (practice) associates the cause (the action) with its (putative) effect (cf. Peirce CP 8.178–179; EP 2: 493–494).
8. Thereby the cause and the (putative) effect become (fallible) signs of each other: the presence of the one *means* the presence of the other.

By suggesting hitherto unrealized potential practical effects to us when we encounter things, habits provide cognitive distance to the prevailing situation. Thereby they enable us to think about things that are not immediately present (Määttänen 2015: 41).

and “object.” If *Dasein* could be interpreted as practice, as Kochan (2011) suggests, then Rouse is Heideggerian.

⁶⁹A. Pickering (1984), Galison (1987) and Traweek (1988) have expressed analogous ideas.

⁷⁰By “nothing,” I mean that activities are performed in the usual way.

The meanings that emerge from experiment are typically non-linguistic. Linguistic meanings are a special case: the cause and the effect may be speech acts (Dewey 1916a: 14–19). Non-linguistic meanings can, of course, be subsequently *expressed* in language, if need be. If there is no vocabulary, agents are at liberty to introduce one. This class of meanings allows one to anticipate the reactions of the environment, including other agents and their speech acts.

Dewey’s account suggests one way in which the pragmatic maxim may be inadequate. Dewey seems to have held that the cause and the effect are signs of each other. Hence signification by causation is *symmetric* for Dewey. But the pragmatic maxim, literally taken, says that only the cause can be a sign of the effect, not *vice versa*. Hence signification by causation is *asymmetric* for Peirce. I see no reason, why that should be the case. For instance, the reading of a barometer is an effect of air pressure. But that makes the former a sign of the latter; for that is the very purpose for which the instrument has been designed. Hence it seems that, at least in some cases, an effect can be a sign of its cause. It is strange that that did not occur to Peirce, given that he studied similar examples of indices, a subclass of signs (see, e.g., CP 2.285, 5.73; EP 2: 8, 163). Hence I conclude that meanings *can* include *both* possible practical effects *and* possible practical causes. In short, *to be potentially meaningful is to be potentially causally active*.⁷¹ At any rate, Peirce was on the right track. His crucial insight was that causality is constitutive of meaning. Thus Dewey’s account is not a refutation but a generalization — a continuation of Peirce’s work. (Lindholm 2023a: 16; 2023c: 106–107.)

Dewey’s schema also suggests *process ontology*. We introduce a known *change*, and it results in another *change*. Thus we have *correlations between changes* rather than between objects.

Dewey (1916a: 163–178, 237, 317–322; [1925] 1929a: 70) equates experiment with experience in general⁷² and argues that the emergence of knowledge from experimentation accompanies that of meaning (cf. Tiles 2010: 111). Thus Dewey ([1910] 1933: 132, 137–8) says that *to understand is to grasp meaning*. Hence knowledge and meaning cannot be strictly distinguished. This notion underlies Dewey’s elaborate philosophy of education:⁷³ even small children learn experimentally — a process that Dewey (1916a: 217) calls “learning by doing.” We are natural born experimenters. Thus

⁷¹This argument can be used as a further reply to Brandom; see Subsection 2.2.9.

⁷²See Chapter 3.

⁷³Dewey discusses education in several volumes, including *The School and Society* ([1900] 1915), *How We Think* ([1910] 1933), *Democracy and Education* (1916a), and *Human Nature and Conduct* (1922).

Dewey anticipated Jean Piaget’s ([1936] 1953) notion of “little scientists.”

Social behavior can be learned in this way as well, by testing what kind of reactions other people perform when certain actions are carried out. That allows one to anticipate the reactions of other agents. Expectations about others’ behavior gives rise to institutions and culture. Once in existence, culture transforms meanings: “language” in Dewey’s broad sense⁷⁴ is the only means of retaining and transmitting to subsequent generations acquired skills, information, habits and customs. Hence practice both gives rise to culture and transmits it. (Dewey 1938: 56.)

I have explained that, according to Dewey ([1925] 1929a: 369–370), all intelligent activities of men, no matter whether expressed in science, fine arts, or social relationships, have for their task the conversion of causal relations into means and consequences (Lindholm 2021: 7). Dewey means that when a causal relation is discovered, one learns to indirectly regulate the occurrence of the effect by directly manipulating the cause. Thereby one reconceptualizes the effect as an end-in-view and the cause as a means for that end-in-view. That facilitates the intelligent regulation of environing conditions. In particular, it allows, in Francis Bacon’s ([1620] 1762; [1620] 1901) fashion, one to deliberately increase beneficial phenomena and to decrease harmful phenomena,⁷⁵ whereas otherwise their occurrence would be a matter of accident (Dewey [1925] 1929a: 372, 426–427; 1929b: 32–33, 47, 81, 132–133, 199, 251–252, 263–265, 279, 298–299). In the reconceptualization of causes as means and effects as ends-in-view, meaning — or “language” in Dewey’s broad sense — emerges from intra-action with the environment. (Dewey [1925] 1929a: 136, 177, 180–183, 369–370; 1929b: 84, 295–296.) When the task is fulfilled, he calls the result *art* (Dewey [1925] 1929a: 370; cf. 1916a: 320).

Studying relations between causes and effects has two steps. First, events are, for the purposes of inquiry, reduced to data. Thus the qualitative differences of events are overlooked for the purposes of inquiry: they are treated as homogeneous or at least commensurable — calculable in mutually shared terms. Second, correlations among different data are sought. When the second step has been completed, there emerges the possibility of a third — namely, the reconceptualization of causes as means and effects as ends-in-view. It is important to bear in mind that correlation does not imply causation. Correlation is a symmetric relation, while causation is emphatically asymmetric. Rather, the second and the possible third steps intertwine:

⁷⁴I believe that Dewey’s notion of *language* is too liberal. I will criticize it in more detail in Subsection 2.6.3.

⁷⁵See Dewey (1920). Dewey’s (1929b: ch. X) term for such activity is “the construction of good.”

by manipulating the correlates alternately, it becomes possible to determine, whether one correlate is a cause and the other an effect. Causal relations between data allows scientists to examine certain quantities in the terms of others. By consistently applying the experimental method, the network of interconnected events grows. The nodes of such network are calculable in the terms of any other node. That gives rise to meaning in the sense of calculable or predictable connection between events. It also gives rise to opportunities of control: thinking things as related to one another makes them instruments.⁷⁶ This common origin suggests that meanings, at least in a sense, are instruments of control. As our understanding of causal relations grows, so does our understanding of the meaning of events. (Dewey [1910] 1933: 18–21; 1929b: 124–135.)

Dewey (1929b: 135–136, 295), however, warns not to mistake the quantitative data for the event itself. The event remains as it is; its reduction to data takes place only for the sake of inquiry. It does not replace the real thing. Data is merely an *instrument*. It has no greater claim for reality than the original event. Dewey ridicules eliminativists who search something “more real” than events from scientific objects: numbers or equations cannot serve the same purposes as the events themselves, in the same way as a person can wear clothes but not the loom.

2.5 Consequences of the Pragmatic Maxim

In this Section, I will explain the philosophical import of the pragmatist theory of meaning. I will begin by rejecting essentialism in Subsection 2.5.1.

Non-essentialism prompts a revision of the definition of *definition*. I will introduce the concept of *operational definition*, which I will use throughout the rest of this thesis, in Subsection 2.5.2. An operational definition states what a concept means in practice. Its purpose is to naturalize concepts and the criteria of their meaningful application.

I will reject abstract objects in Subsection 2.5.3. The pragmatic maxim entails that meanings, or potential practical effects, are always concrete. Thus I will argue that abstractness comes in degrees. The degree of abstraction corresponds to how remote the concept is from direct application. A completely abstract concept has no application whatsoever. Hence such things can be eliminated from discourse.

I will continue the analysis of instrumentalism (see Subsection 2.2.15) in Subsection 2.5.4. In short, I will explain that observability is neither

⁷⁶Heidegger ([1953] 2000a) abhorred this way of seeing things, though he agreed with Dewey that it makes science profoundly technological.

necessary nor sufficient for potential practical effects, or meaning.

I will continue explaining the difference between Kantianism and pragmatism in Subsection 2.5.5. I will argue that phenomena are both “subjective” and “objective” at once. Therefore the problem of “objectivity” does not arise when restricting discourse to phenomena. Moreover, because noumena cannot appear in experience, concepts cannot be applied to them. Therefore they can be eliminated from discourse.

The upshot of this Section is (1) to jettison Aristotelian epistemology, according to which to know is to know the essences of substances; (2) to refute the notion, prevalent in mainstream analytic epistemology, that there be abstract objects, of which a subspecies, propositions, constitutes knowledge; (3) to reject instrumentalism; and (4) to show that even if knowledge is restricted to the phenomenal world, that does not threaten its “objectivity.”

2.5.1 Non-Essentialism

The pragmatic maxim eliminates Aristotelian essences⁷⁷ from discourse — but not necessarily from ontology. Peirce (CP 2.113n1, 4.234, 4.463, 5.448, 8.12; EP 2: 394, 545n29), Dewey (1922: 110–111), and Rorty (1982: xxiv–xxv) argue that invoking an essence to explain phenomena just restates these phenomena in different terms and also duplicates ontology without increasing knowledge. It makes no practical difference, whether one considers phenomena as such or as effects of essences; and because essences make no practical difference, such “explanations” are meaningless. Essences, if they exist, would be like Wittgenstein’s ([1953] 2009: § 293) “beetle in the box.” Hence, by Ockham’s razor,⁷⁸ essences should not be postulated.⁷⁹

⁷⁷See Aristotle (1929; 1933; 1934; 1935a).

⁷⁸Ockham’s (or Occam’s) razor is the principle of parsimony which states that entities should not be multiplied beyond necessity (*entia non sunt multiplicanda praeter necessitatem*). This principle was used already before William Ockham (c. 1287–1347), though it is named after him, possibly because he applied it extensively. Its upshot is to provide a constraint for acceptable explanations. A new hypothetical entity can be introduced only if it is necessary to furnish an explanation.

⁷⁹Molière famously parodied Aristotelian medicine in *Le malade imaginaire* ([1673] 1877: 149) in which physicians attempt to explain, why opium puts men to sleep, by saying that it has a *virtus dormitiva*.

Peirce, however, eventually realized that while being uninformative, such pseudo-explanation is not completely futile: it contains the beginning of further inquiry by introducing a *hypostatic abstraction* — that is, that there is *something* in opium that puts men to sleep (CP 5.534).

According to Stjernfelt (2014: 162–173), hypostatic abstraction permits making explicit and controlling various pre-human semiotic capacities. That makes them indispensable for the construction of human thought and language. Logically speaking, in a hypostatic

Dewey applies non-essentialism to the notion of *qualia*. He argues that they ought to be understood as *adverbial aspects of behavior* rather than “internal” or “mental entities” (whatever that is supposed to mean). The function of qualia is to guide action. (Jung 2010: 148–149, 158.)

Rorty (1982: 162) identifies pragmatism with *anti*-essentialism, or the *rejection* of essences. I identify it with *non*-essentialism, or the *suspension of judgment* about essences.

The non-essentialism involved in the pragmatic maxim captures an important notion implicit in the progress of modern science. Dewey (1910: ch. I) argues that the triumphs of physics of the 17th century were possible because of the rejection of essentialism. Instead of fixed essences, physicists were drawn to the conditions of the initiation, sustainment, and termination of phenomena. Knowledge about these conditions allowed them to regulate the occurrence of phenomena. He said later that we understand a phenomenon insofar as we are able to initiate, sustain and terminate it at will (Dewey [1925] 1929a: 428). He credits Darwin for carrying the same principle over to biology: instead of fixed species, there is evolution; and a species is generated and annihilated in certain particular conditions and not others. That, he continues, makes it more likely that the same principle could be applied in social and moral sciences, which would enable a criticism of many traditional institutions which have become detrimental because of modernization. This is just more evidence for my view that the domain of the pragmatic maxim is not confined to science.

At the methodological level, non-essentialism implies empiricism (but not *vice versa*). Because essences do not make sense, there is no room for *a priori* armchair philosophizing; each phenomenon cannot but be studied empirically at its own terms.

Because things cannot be said to have essences, they can manifest *mul-*

abstraction, a subject is constructed of a predicate, which adds a new second-order individual to the represented domain. Hypostatic abstraction fosters cognitive economy since it permits to use the same means for the investigation of generals which are used with particulars. Hypostatic abstraction also quantifies over other signs such as predicates, which connects it to second-order logic. The capability to hypostatic abstraction promotes self-control, by the virtue of which inferences count as real reasonings (cf. Peirce CP 5.480, 5.533).

I will not discuss Peirce’s theory of the hypostatic abstraction here; see, for instance, Peirce’s own account on abstraction and the construction of the concept of number (CP 4.227–323, 5.533, 8.320; NEM 4: 49), Reese (1961), Dougherty (1980), Zeman (1982), Short (1988; 1997; 2007: 267–268), V. M. Colapietro (1997), Otte (1998), Legg (1999), M. H. G. Hoffmann (2003), Bakker and Hoffmann (2005), Stjernfelt (2012; 2013; 2016: 258), Bellucci (2013; 2014b), Goudge (2013), A.-V. Pietarinen and Bellucci (2014), and Aames (2018).

tistability: the “same” object can appear in many ways in experience. How an object appears depends on context and purpose. Thus objects are “underdetermined” in this sense.⁸⁰

2.5.2 Operational Definitions

A thing can be defined *operationally* by applying the pragmatic maxim. An operational definition states what a thing means in practice.

Usually the definition of a thing is understood as the *necessary and sufficient conditions* of that thing. Then a definition states what applies to its objects, all its objects, and nothing but its objects. It is widely believed that these conditions are discovered through analysis. This traditional notion stems from Aristotle. He defined *definition* as “a phrase indicating the essence of something.”⁸¹ I have eliminated essences from discourse.⁸² That prompts a revision of Aristotle’s celebrated definition of *definition*. Thus I will apply the pragmatic maxim to the concept of definition itself. That will yield an operational definition of *definition* that eschews essences and emphasizes relations.

The result is that *all real definitions*⁸³ are *operational*: phrases which state what can be done with the things in question, with what results; that is, what opportunities for action, or *affordances* (Gibson 1979), they provide.⁸⁴ For example, Dewey’s definition of *habit* is operational.⁸⁵

This is not a refutation but a *revision* of Aristotle’s definition of definition. I have only explained operationally, what necessary and sufficient conditions mean in practice. Hence I disagree with Aristotle only in that definitions indicate *relations* rather than essences.

In this way, the application of the pragmatic maxim clarifies concepts. Peirce argues that the clarity of an idea of an object has three degrees. In the first degree, one is acquainted with the object and has some vague expectations about its nature. In the second degree, one can give a verbal account of the object. The application of the pragmatic maxim will provide the highest degree of clarity. (Peirce CP 5.388–402; EP 1: 124–132; cf.

⁸⁰See Section 2.8.

⁸¹ἔστι δ’ ὁρος μὲν λόγος ὁ τὸ τί ἦν εἶναι σημαίνων (Aristotle 1960b: 101b35–102a5).

⁸²See Subsection 2.5.1.

⁸³As opposed to nominal definitions. A nominal definition explains a word with other words. It remains within the domain of language and thus cannot indicate alone *what* is being talked about.

⁸⁴Peirce’s definition of *lithium* elucidates the nature of operational definition: it prescribes what one should *do* in order to gain a perceptual acquaintance with lithium (CP 2.330; EP 2: 286).

⁸⁵See Subsection 2.3.1.

Stjernfelt 2016: 244.) Hence, if Peirce is right, the completest possible clarity cannot be attained merely by giving nominal definitions, substituting words for other words within language. A nominal definition only specifies how the *word* for an object is appropriately used *in discourse*. In order to attain the highest clarity, one needs a *real*, that is, an *operational* definition — a specification, how the *object itself* is appropriately used or manipulated *in practice*. That is determined by a habit (practice). In the 1905 “What Pragmatism Is,” Peirce states that only what can be experimentally discovered can influence the conduct of life, and hence all conceivable phenomena which experimentation *could* yield exhaust a definition (CP 5.412; EP 2: 332). In other words, everything can be exhaustively defined operationally. Peirce revisited this notion in 1907–8: that the pragmatist method of ascertaining the meaning of a symbol is the experimental method (CP 5.465; EP 2: 400–401); and that nothing can be understood merely by substituting definitions; ultimately the analysis of meaning must reduce to habits (practices) (CP 6.481; EP 2: 447–448).⁸⁶ I will now proceed to define my methodological concepts operationally in order to use them in an empirically responsible way — to make my subsequent arguments testable in practice.

The concept of *experience* is crucial for my argument: it determines what empiricism amounts to.⁸⁷ Dewey defined *experience* operationally as *organism–environment interaction*⁸⁸ (cf. Tiles 2010: 102–103). The purpose of this definition is to reject the dualism between experience and nature by defining experience in natural terms (cf. Dewey [1925] 1929a). Arguably, this notion appears already in Peirce (see CP 1.324, 1.336). Peirce also calls experience “the enforced element in the history of our lives” (CP 5.581; EP 2: 47), meaning that it involves a partially uncontrollable and surprising element. However, I will make a slight revision, which I believe Dewey (and Peirce) would have approved: I substitute Karen Barad’s (1996) term “intra-action” for “interaction” in order to emphasize that the actants are not necessarily determinate, bounded, numerically identical units independently of their mutual relations.

Dewey (1938: 66–67) defined *situation* operationally as *a contextual whole within nature within which experience, as defined above, takes place*. This concept is crucial for an adequate description of experience in the terms of

⁸⁶According to Misak (2021), understanding requires *all three* degrees of clarity. Hence pragmatism should not be taken as reducing understanding to habits.

⁸⁷See Chapter 3.

⁸⁸This notion appears implicitly in Dewey (1896). It develops throughout his middle and later works; see Dewey (1916a: 163–178; 1916b: 136n1, 270–278, 388; [1925] 1929a: 3a, 246–247, 279–280, 283, 314, 344–346; 1929b: 172–173, 234; [1934] 1980: 22, 53, 56, 132, 246, 251; 1938: chs. I–V). He makes the notion explicit in Dewey (1941: 183–184).

experience itself.⁸⁹

Dewey ([1910] 1933: 20, 136–137; [1925] 1929a: 166, 174) defined *object* operationally as a *meaningful thing*; that is, a thing that happens to mean something for a potential interpreter; that is, a thing which an interpreter knows to have potential practical effects. The upshot is that that explains, how things stand out as determinate objects in the field of experience. Dewey (1938: 66–67) explains that there is never any isolated singular object or event in actual experience due to the holistic character of experience within a situation as defined above. There is always a field, including the purpose of ongoing action, within which observation of a certain object or event occurs. An object stands out as a determinate unit, distinct from its surroundings, because, thus determined, it is believed to have certain potential practical effects upon that course of action.⁹⁰

Peirce (CP 2.435, 2.643, 4.53, 5.367, 5.417, 5.480, 5.510; EP 1: 112, 114, 198; EP 2: 19, 336–337) defined *belief* operationally as a *habit*⁹¹ and *doubt* as the *privation of habit* (see Aliseda 2016). The essence of a belief is the establishment of a habit, and beliefs are distinguished by the rules of action to which they give rise (Peirce CP 5.398; EP 1: 129–130). According to Peirce (CP 5.400; EP 1: 131) and James (1909b: ch. I), the whole function of thought is to produce habits of action; and what is tangible and conceivably practical is the root of every real distinction of thought. To say that “agent *A* has a certain belief but never acts accordingly” is patent nonsense.⁹² However, a belief (habit) need not be conscious⁹³ (e.g. Peirce CP 2.148, 4.476, 5.417, 5.492; EP 2: 336–337, 418; cf. Stjernfelt 2016: 254). These definitions are crucial for fallibilism⁹⁴ and especially the non-foundationalist *belief–doubt model of inquiry*.⁹⁵

Dewey (1938: 104–105) defined *inquiry* operationally as “*the controlled*

⁸⁹See Chapter 3.

⁹⁰In this way, epistemic activity becomes possible against a broad background of other activities from which it acquires its purpose and meaning (Dewey 1916b: 1–13). Dewey’s thesis has an affinity with Heidegger’s ([1935/36] 1977b; [1935/36] 1984) dialectic of earth (*die Erde*) and world (*die Welt*): things acquire meaning and determinacy only against an indeterminate background; and thereby the background becomes partially articulated.

⁹¹See how Peirce applies this notion in mathematics (CP 3.160–161; EP 1: 201–202). Peirce (CP 5.12; EP 2: 399) said that he had acquired this notion from Alexander Bain (1818–1903). See also Stjernfelt (2016: 246–247).

⁹²Even if true, such claim simply cannot be understood. The (fallible) criterion of the attribution of a psychological predicate is *behavior*; and in the absence of behavior that would give public evidence for attributing a psychological predicate, nobody could understand what is being talked about. See Bennett and Hacker (2003: esp. ch. 4).

⁹³On the other hand, see Peirce (CP 5.480; MS 318).

⁹⁴See Chapter 4.

⁹⁵See Section 4.3.

or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole.” In Chang’s (2022: 25) words, “[i]nquiry is a striving towards greater operational coherence,” or “aim-oriented adjustment,” which means that action be coordinated towards a common goal so that our pursuit makes sense.

By adapting von Wright (1963) and Määttänen (2009: 33), I define *technical norm* as determined by the following inference:

- (1) Agent *A* must fulfill purpose *P*.
 - (2) Agent *A* believes to be in situation *S*.
 - (3) Agent *A* believes that action *x* is a necessary condition of fulfilling purpose *P* in situation *S*.
-
- ∴ (4) Agent *A* must commit action *x*.

This is a *hypothetical* or *conditional* imperative in Kant’s ([1788] 1913) sense. A technical norm is also close to what Chang (2022: 134) calls *ontological* or *metaphysical principles*. By engaging in an activity, we make certain ontological commitments. They are *a priori* with regard to the activity in question, but ultimately they have been learned *a posteriori*. According to Chang (2022: 135), “[f]or each well-defined type of activity, there is an associated ontological principle that makes it performable and intelligible.” We can deny an ontological principle, but then it would make no sense to engage in the activity. Thus, while ontological principles are taken for granted in a particular activity, they remain fallible and revisable outside that activity.

The concept of habit is *normative*; that follows from *technical norms* as defined above. Dewey (1922: 15, 32–33, 42, 70–71, 77, 208–209) understands *habit* as a *skill*: a habit is established only if it serves as a sufficiently reliable means for an end-in-view.⁹⁶ This does not, however, imply that an existing habit be the *optimal* means to ends. It is *a* means which will do insofar as there are no better options available. Fallibilism⁹⁷ requires that future experience may give reasons to adopt some other habit.

Rouse (1996: 127) defined *theorizing* operationally as a *special kind of practice* (cf. Dewey 1916a: 169; 1922: 69, 77; [1925] 1929a: 358; Barad 1996: 166). Hence I reject the sharp distinction between theory and practice which has wrought havoc in Western philosophy.

I will *not* define *nature* in this thesis. I will just bluntly presuppose that nature consists of everything causally active (and hence amenable to experimentation), independently of whether it reduces to elementary particles.

⁹⁶See Subsection 2.3.4.

⁹⁷See Chapter 4.

This position is an approximation of *emergentist materialism*: it is possible that elementary particles are responsible for everything that appears in experiment, but that may also be irrelevant for understanding the dynamics of ontologically higher levels; for instance, we can manipulate macroscopic processes without citing quantum mechanics; on the contrary, setting out from quantum mechanics would make everything so complicated that, in practice, we could never acquire the capacity to manipulate anything (Hofstadter 2007; Coletta 2016). Konstantinov (1959: 10–21) considers the problem of the existence of mind-independent nature the fundamental problem of philosophy. I am unsure whether it is possible to *prove* the existence of nature *a priori* so that the proof would convince most *a priori* philosophers. But I believe that if it is possible, the proof would look like what de Spinoza ([1677] 1905: pt. I) says.⁹⁸

2.5.3 Concrete and Abstract

The pragmatic maxim applies to so-called abstract entities analogously with Aristotelian essences. A thing is concrete, if it has potential practical effects; and abstract otherwise. But then, by the pragmatic maxim, abstract entities are meaningless. Whether they exist or not makes no practical difference. Thus the pragmatic maxim eliminates abstract entities from discourse — but not necessarily from ontology. Pragmatism remains agnostic about whether there are such things. Again, by Ockham’s razor, they should not be postulated. Hence all meaningful discourse is confined to the concrete.

One could argue that some potential practical effects can be *unrealized but realizable effects*. Thus some *abstracta* remain meaningful. I will reply to this criticism shortly below.

According to Sami Pihlström (private communication), a thoroughgoing pragmatist would argue that discourse and ontology interpenetrate. I agree with him, but I emphasize that I am not making a faithful pragmatism exegesis; I am just applying two pragmatist philosophies. It is true that theory (which involves some discourse) and practice (which involves some ontology) interpenetrate, especially given that theorizing is one of our possible practices. But then the extent of practice determines the extent of the theory involved.

There may be reasons for eliminating *abstracta* from ontology. I will suspend judgment about that, because that is not required for this thesis. There may also be reasons for preserving *abstracta* in discourse for the practical purposes they serve. But then they retain a degree of concreteness, as

⁹⁸See also Oittinen (2002) and J. Pietarinen (2019).

I will argue in the following.

Concreteness and abstractness come in degrees: a thing retains meaning to the degree it retains concreteness. Instruments, including speech acts, make it possible for their users to take cognitive distance to the situation at hand and refrain from direct or immediate action. That allows indirect or delayed action. This process is abstraction. The more indirect or the more delayed an action is, the more abstract the corresponding concept is. As the degree of abstractness increases, it retains a diminishing degree of concreteness: it still refers to possible practical effects. If all concreteness is lost, a thing becomes entirely abstract and hence also entirely meaningless.⁹⁹ (Cf. Dewey 1929b: 154.)

Now we can address the problem of unrealized effects. I reply that unrealized effects retain a degree of concreteness and hence they can influence our conduct, though only indirectly. By subjunctive pragmatism,¹⁰⁰ we are able to understand *conditionals* and *counterfactuals*. Thus we can understand what *could* have happened, *if* the effect in question *had been* realized, and we can prepare for such a scenario and modify our behavior accordingly.

One should not make rash interpretations of this distinction between the concrete and the abstract. My position is, after all, close to the emergentist materialism of Niiniluoto (1990: 14–42), though I do not subscribe to the Fregean–Popperian interpretation of three worlds.¹⁰¹ Niiniluoto considers cultural constructs as abstract objects which inhabit World 3. He maintains that they interact mutually in certain ways with matter, which constitutes World 1, and mind, which belongs to World 2. He believes that Worlds 2 and 3 supervene on World 1 but do not reduce to it. He allows that abstract objects can be created, altered and destroyed by humans in a particular place at a particular time.¹⁰² I conceive the matter somewhat differently, but these qualms are largely terminological. Niiniluoto seems to define nature as World 1 and World 1 as the domain of elementary particles. I do not share this definition. For me, *nature* means collectively everything that exists, independently of whether it reduces to elementary particles or not. I question the existence of abstract objects, but I do not question the existence of many things which Niiniluoto considers as abstract. Rather, I maintain that they are neither abstract nor objects. For example, Niiniluoto maintains that a natural language is an abstract object. I hold that it is neither abstract nor an

⁹⁹I will discuss this point in greater length in Subsection 2.6.2.

¹⁰⁰See Subsection 2.2.2.

¹⁰¹The term “third realm” comes from Frege and was adopted by Popper, but in fact Chrysippus’s ἀξιώματα and Bolzano’s *Sätze an sich* anticipated this notion.

¹⁰²In this respect Niiniluoto departs from Bolzano, who took *Sätze an sich* to exist non-spatiotemporally.

object.¹⁰³ Rather, it is a *concrete communicative practice* which takes place within nature. Linguistic regularities are practical regularities sanctioned by biology¹⁰⁴ and society. In an analogous manner, many things which have been traditionally taken as “abstract,” turn out to be concrete in the sense explained above.

2.5.4 Unobservable Entities

As I have already said, the pragmatic maxim does *not* eliminate unobservable entities from discourse. An unobservable entity, like an electron, a gene, or dark matter, can have potential practical effects and therefore also be meaningful.¹⁰⁵

What counts as observable is a contingent matter: had evolution gone otherwise, we could have different sense organs; and we can extend our observational capacity by devising instruments which intra-act (Barad 1996) with the so-called “unobservables.” Psillos (1999: 22–23, 187–188, 192) grants that,¹⁰⁶ hence scientific realism should not have an issue here with pragmatism.

Instrumentalists limit the application of the concept of existence to experience. Likewise, the pragmatic maxim confines meaningful discourse, including existence, to experience. Here pragmatism seems to side with instrumentalism. Indeed, some philosophers have identified pragmatism with instrumentalism for this apparent affinity. But this affinity is only *de dicto*. The pragmatist notion of “experience” is a lot broader than that of instrumentalism:¹⁰⁷ besides observation, it includes actions and habits. Hence observability should not be taken as the criterion of meaning. A better criterion is *interactionability* or *manipulability* (cf. Hacking [1983] 2010: 22–24; Määtänen 2015: 80; Chang 2022: ch. 3; Lindholm 2023b).

By the same considerations, because of its broader notion of “experience,” pragmatism is a more consistent version of empiricism than instrumentalism.

¹⁰³Voltaire ([1756] 1773: 338–339) said in the same fashion about the Holy Roman Empire that it was not holy, nor Roman, nor an empire.

I suspect that the temptation to conceive a language as an entity springs from an illegitimate reification. Once language is (mistakenly) conceived as a thing, it naturally must be conceived as abstract, since it does not consist of matter, though, according to Niiniluoto, it does exist in space–time.

¹⁰⁴According to Brattico (2008), the biological structure of humans in general, and their brains in particular, determines the limits of the possible use of language.

¹⁰⁵See Subsection 2.2.15.

¹⁰⁶Cf. van Fraassen (1980: 16, 58).

¹⁰⁷See, e.g., van Fraassen (1980; 1989; 1991; 2002; 2008) and Stanford (2006).

2.5.5 Phenomena and Noumena

Kant ([1781/7] 1956) made a sharp distinction between *phenomena* and *noumena*. Many post-Kantian philosophers have adopted this distinction. On the one hand, a *phenomenon*¹⁰⁸ is something that appears in experience. On the other hand, a *noumenon*¹⁰⁹ is a *thought-object* — an object which can only be thought about because we have no empirical access to it. Thus there arises the problem, *who guards the guards*: if a noumenon is only accessible to thought, there is no independent check for its existence (cf. Määttänen 2015: 6). Hence one ought to suspend judgment about noumena.

Kant ([1781/7] 1956) argued that his twelve categories only apply to possible phenomena. That can be understood as anticipation of the pragmatic maxim.¹¹⁰ But therefore Kant should have concluded that *noumena are meaningless*. *Dinge an sich* are nonsense; they may or may not exist, but our concepts do not apply to them.¹¹¹

If concepts only apply to phenomena, there remains the problem, whether phenomena are “subjective” or “objective.” In much of modern philosophy, phenomena have been considered “subjective.” Hacking ([1983] 2010: 220–232) and Rouse (2002: ch. 8) understand phenomena differently. For them, the notion is more basic than and prior to the distinction between “subject” and “object.”¹¹² According to Rouse, both objects and agents are part of, and are accessed through, phenomena. Phenomena are reproducible configurations of the *world, including agents*. Hence a phenomenon is both “subjective” and “objective” at once; the concept cuts across the subject–object dichotomy.¹¹³ Hence the elimination of noumena from discourse is compatible with ontological and epistemic realism: the problem of the “objectivity” of knowledge does not arise.

¹⁰⁸From φαίνωμενον: “what appears.” It is the neuter middle-passive present participle of φαίνω: “I cause something to appear,” “I bring to light,” “I show,” “I uncover,” “I reveal.”

¹⁰⁹From νοούμενον: “what is thought.” It is the neuter middle-passive present participle of νοέω: “I think,” “I mean.” It is related to νοῦς: “perception,” “mind,” “understanding.”

¹¹⁰See Subsection 2.2.4.

¹¹¹Peirce criticized Kant on such grounds (CP 5.452, 5.525; EP 2: 353; cf. CP 3.417ff., 7.569; EP 2: 2.).

Chang (2022: 74–76) also makes the same critical point. He argues that the fallacy of pre-figuration, or the metaphysical thesis that objects be determinate independently of our activity, which I mentioned in Section 1.1, amounts to treating noumena as phenomena, or imagining that things-in-themselves can and should be characterized in terms of our concepts. In short, *reality cannot define itself*.

¹¹²Heidegger ([1927] 1977a: § 7), in effect, also made the same claim.

¹¹³See also Peirce (CP 5.425; EP 2: 340), who considered phenomena in the sense of “effect,” as in “the Zeeman effect” and “the Hall effect.”

Niiniluoto (1999: 91) claims that physical objects are the objects of knowledge and that they are noumena.¹¹⁴ Thus he eliminates phenomena as “subjective.” This is a confusion. He is correct in that the object of perception is not a sense datum (or any other kind of mental entity, for that matter), because it is a material phenomenon. He is also correct in that our knowledge about the perceived object is immediate, because there are no middle-men sandwiched between us and the objects we interact with (except when we use instruments). Moreover, he is correct in that physical objects are the objects of knowledge, because they constitute the phenomenon. But precisely therefore it is a *non sequitur* that the objects of knowledge be *noumenal*. Physical objects are *phenomena*, but phenomena are not merely “subjective.” He misunderstands Peirce’s (CP 5.310–311; EP 1: 51–52) criticism of the *Ding an sich*. Peirce’s point is not that the *Ding an sich* can be cognized but, rather, it is *not* a *Ding an sich* because it can be cognized. Perhaps there remains room for a pragmatist Kantianism that collapses the distinction between phenomena and noumena. Then I believe that the result would be Peirce’s distinction between dynamical and immediate object, which I will explain in Section 5.7.

Engels ([1886] 1962: 276–277) claims that the experimental praxis of science and industry can transform *Dinge an sich* into *Dinge für uns*. He argues that we verify our conception of natural processes by producing these processes ourselves and making them serve our ends — an application of the notion of *maker’s knowledge* (Hintikka 1969: 19–34).¹¹⁵ Hence it can be known, and Kant’s agnosticism is false. But this does not show that noumena be the object of knowledge. On the contrary, it demonstrates how something hitherto unknown can be turned into an object of knowledge by experimentally producing *phenomena*. It was not known before, not because it is a noumenon, but because it was only potentially a phenomenon. Its actualization needed instrumental mediation. (Lindholm 2024b: 60.)

2.6 Discourse

Many analytic philosophers seem to consider language as *representation*. In this Section, I will reject that notion. In Subsection 2.6.1, I will explain that language is *communicative practice* that takes place in the midst of other practices. Its purpose is *agreement in action* rather than accurate representation.

¹¹⁴See also Hintikka (1975).

¹¹⁵See also Marx ([1845] 1978: 7), Dewey ([1925] 1929a: 428) and Kuusinen (1959: 98–99, 111).

In Subsection 2.6.2, I will argue that meaningful concepts refer to *possible operations*. Their purpose is to take cognitive distance to the prevailing situation and simulate possible practical effects of actions in the mind (or paper, or silicon) before committing them.

The purpose of this Section is to show how language, including scientific discourse, can make sense even if representationalism and its disembodied notion of language is false. Discourse may or may not approximately correspond to a fact, but that does not constitute its meaning. Discourse acquires its meaning from being embedded in a nexus of other practices which it articulates. If language sometimes functions representationally, it still owes its meaning to the ways it can be applied. Only an immaterial Cartesian ego without bodily needs could consider representations as self-sufficient and final. Essentially, this Section is simply a corollary of, and explicates what is implicit in, Section 2.2. In Chapter 6, I will distinguish between *strong* and *weak* knowledge. The latter operates upon testimony. The account on discourse which I present here shows how testimony works.

Dewey made grave mistakes in his theory of discourse. I will point them out in Subsection 2.6.3. I believe, however, that his errors do not compromise the rest of his theory.

2.6.1 Discourse as Practice

Dewey ([1925] 1929a: ch. V; 1929b: ch. VI; 1938: ch. III) rejects the notion, largely accepted in analytic philosophy, that language could be something apart from communicative practice. Everything that language does can be explained with reference to such practice. Hence, by Ockham's razor, semantic facts, apart from our ability to predict the behavior of each other (including speech acts), can be eliminated from ontology. Thus, in this respect, Dewey seems to side with Quine,¹¹⁶ though for different reasons. In effect, Dewey's account involves a rejection of the notion of private language.¹¹⁷

For Dewey ([1925] 1929a: 168, 186, 247), meanings are *the tool of tools* or, perhaps, *second-order tools*: they determine the use of first-order tools. Meanings are habits. In order to be able to use a tool, one must first comprehend its meaning, that is, how it is habitually engaged. This notion coincides

¹¹⁶Quine rejected the existence of semantic facts apart from people's ability to understand each other's behavior, including speech acts; see Quine (1951; 1960) and Rouse (2002: ch. 3).

¹¹⁷Thus Dewey anticipated Wittgenstein ([1953] 2009: §§ 243–271) roughly by two decades. But he was not the first to do so. Marx and Engels ([1845–6] 1978: 30) seem to have rejected private language already in 1845–6; Marx ([1857] 1983a: 20; [1857–8] 1983b: 96, 393, 398) reiterates essentially the same argument in 1857–8.

with the distinction between active and passive means:¹¹⁸ first-order tools are passive means, second-order tools are active means.

Dewey ([1925] 1929a: 179) states that the essence of language is not expression of something antecedent (e.g. a thought) but *communication* — the establishment of cooperation in an activity in which there are partners, and in which the activity of each is modified and regulated by partnership. Its one mode is to state truths, but that serves a more comprehensive purpose, namely *agreement in action* (Dewey [1925] 1929a: 179; 1938: 46–47). Thus accurate representation is not essential: it may or may not be involved in using language. He contends that the import of logical and rational essences is the consequence of social interactions, of companionship, mutual assistance, direction and concerted action in fighting, festivity, and work (Dewey [1925] 1929a: 171). Language is primarily a mode of action used for the sake of influencing the conduct of others in connection with the speaker (Dewey [1925] 1929a: 205n4). That is, the most important aspect of language is not syntax or semantics but pragmatics (cf. Morris 1938; 1946).¹¹⁹ For these reasons, language need not be understood as an abstract system¹²⁰ but, rather, as a form of action¹²¹ (Dewey [1925] 1929a: 184). Abstracted from action, “words” are mere physical events and hence no words at all. But they gain meaning and become words when their use establishes a genuine community of action. (Dewey [1925] 1929a: 184–185.)

For Dewey (1938: 45–46), language in its wide sense is the medium through which culture is propagated and which permeates cultural contents. Language in the ordinary, narrow sense, as oral or written speech, is certainly part of that. But Dewey includes material culture too. He says that “[l]anguage in its widest sense — that is, including all means of communication such as, for example, monuments, rituals, and formalized arts — is the medium in which culture exists and through which it is transmitted” (Dewey 1938: 20). It includes not only gestures but also rites, ceremonies, monuments, and the products of industrial and fine arts like tools and machines (Dewey 1938: 46). Even non-conventional articles like rocks as minerals can signify something for a society that has learned to work metals (Dewey 1938: 60).

Hence language is not an idealized class of abstract entities but of *functions* of concrete biological behavior. It makes use of physical entities like sounds, marks on paper, a temple, a statue, or a loom. Hence language

¹¹⁸See Subsection 2.3.4.

¹¹⁹In analytic philosophy of language, Hintikka (1975) has acknowledged that semantics is based on pragmatics.

¹²⁰Thus he rejects Rudolf Carnap’s notion of language; see Rouse (2002: ch. 1).

¹²¹Hence Austin’s (1962) theory of *speech acts* is nothing new for a Deweyan pragmatist.

cannot be abstracted from matter and experience. Communication presupposes some physical medium. Peirce (EP 2: 326) stated that ideas cannot be communicated at all except through their physical effects. But the physical entities used as language do not *operate* or function as mere physical things when they are media of communication. They operate in virtue of their *representative* capacity¹²² which Dewey calls *meaning*. But *how* physical entities represent is up to convention. A physical entity acquires meaning when it is agreed to promote agreement in action. Hence meanings exist only insofar as they have an operational use. *Anything* can be language, provided that it is used accordingly. (Dewey 1938: 46–48.)

To repeat, Dewey denies that language could be possible in abstraction from biology. But he continues that language effects the transformation of the biological into the intellectual and the potentially logical. No new entities are brought into existence; rather, what was already there acquires cultural attributes and potentialities through being embedded in certain practices. (Dewey 1938: 45–48.) Thus his theory of meaning is of the *in rebus* variety, as distinguished from the *ante rem* variety.

Scientific inquiry emerges from everyday problems which are inherently social. Problems which take place on a purely biological level are comparatively rare. Usually society has influenced the problems which are encountered in practice in one way or another. The physical environment is embedded in cultural practices. Organic structure and heredity of course determine certain things, but their meaning is social.¹²³ Biology “foreshadows” intellectual operations, but once it has given rise to culture, including language in the widest sense, a qualitative change occurs. The biology of individual organisms is irrelevant for controlled inquiry.¹²⁴ Hence culture not only changes the problems we have to solve; it also gives the general *means* to solve them. Controlled inquiry requires the suppression of individual idiosyncrasies; that requires socialization; and that requires transcending the biological level.¹²⁵ (Dewey 1938: 42–44.)

When situations which stir imagination occur regularly enough, there develop habits of reasoning. Once instituted, such habits become capable of independent development. That gives rise to logic. In this way logic (and science in general) is a development and a more critical extension of

¹²²Despite this expression, Dewey does not commit to representationalism.

¹²³I presume that Dewey meant that their meaning is *also* social, *among other things*.

¹²⁴This is not entirely true. Lakoff and Johnson (1999) have argued that body and brain largely determine cognition. Even Rouse (2002: chs. 6 and 7) has granted that the embodiment of the inquirers may have significance.

¹²⁵Obviously, Dewey does not mean that social phenomena be transcendent. He is saying that they *supervene on* biology.

everyday problem-solving. But it can be considered fallacious to think that independence of context justify the hypostatization of Reason and Language (with capitals) as ideal entities outside nature. Independence from context means that logic has *some* context not specified in advance. It does *not* mean that it involves *no* context.¹²⁶ (Dewey 1938: 57–59; Tiles 2010: 110.)

Dewey ([1925] 1929a: 188) denies that the generality of meaning be generalized from particular cases. He maintains that meanings are already general. When encountering new things, we apply already existing meanings, and failures in doing so will force us to revise them. He also denies that this generality be produced by reason. He thinks, on the contrary, that reason is produced by the circumspection of meanings by observation and experimentation.

According to Dewey ([1925] 1929a: 175), significance resides not in the bare fact of association but in the *consequences* that flow from the distinctive patterns of human association. Thus language equals the *use* made of occurrences like gestures and sounds. In a word, it arises from practice. This seems like a restatement of the pragmatic maxim and anticipation of Wittgenstein's principle "meaning is use."¹²⁷

Dewey gives a simple example of communication between *A* and *B*, where the former utters a sign and the latter responds. But in order for the communication to take place, *B* must respond *from the standpoint of A*, that is, observing how the referents of the sign could figure in *A*'s experience. Likewise, *A* conceives the things referred to not only in its direct relationship to themselves, but as things capable of being grasped and handled by *B*. That is, both must expect the other to understand the purpose of communication. This kind of expectation is no mere reaction to the sign but anticipation of consequences. He concludes that to understand is to anticipate together, to make a cross-reference which, when acted upon, brings about a partaking in a common, inclusive undertaking. (Dewey [1925] 1929a: 178–181.)

According to Dewey ([1925] 1929a: 183, 202, 204–205), discourse is valuable both instrumentally and intrinsically: it can be used to achieve ends but also enjoyed for its own sake as creating and serving a community. In an important sense it is instrumental in liberating thought from the pressure of the immediate present.

Black (1962: 507) maintains that the novelty of Dewey's philosophy of language can be understood in contrast with Locke's *Essay* ([1690] 1823a; [1690] 1823b; [1690] 1823c). Locke's notion of the function of language is

¹²⁶"[...] the abstractions of mathematics and physics represent the common denominators in all things experienceable. Taken by themselves they seem to present a *caput mortuum*. Erected into complete statements of reality as such, they become hallucinatory obsessions." (Dewey 1929b: 218.)

¹²⁷See Section 2.2.

individualistic: private ideas or mental representations are first-order meanings, and shared languages are second-order meanings; and the function of shared languages is to reproduce the ideas of the speaker in the audience. Perhaps it could be said that Locke's nominalism contrasts with Dewey's constructive realism.

2.6.2 Discourse as Designation of Possible Operations

Dewey (1929b: 137) understands conceptions and ideas as *designations of operations to be performed or already performed*.¹²⁸ It follows that their value is determined by the outcome of these operations. Hence a concept, say "sweetness," involves a prediction, under what conditions certain sensations can be had, independently of whether these conditions obtain at a given time.

Dewey (1929b: 137) applies this idea to mathematics. The world can be thought in mathematical terms, but that does not reveal the independent essence of the universe. Rather, it is to describe experienceable objects as material upon which certain operations are performed.

According to Dewey (1929b: 137–138), this notion shows the proper value of ideas. They must be put to work. Their office is to reconstruct the world so that the supply of certain goods be made more dependable and regular. Thus Dewey (1929b: 128) substitutes the quest for *theoretical* certainty with the quest for *practical* certainty: he turns the former into the search for methods of control (that is, technics). Otherwise the value of ideas remains sentimental and socially irresponsible.

Dewey (1929b: ch. VI) argues that this applies to scientific concepts, including mathematics. By showing how mathematics acquires its fullest sense, from possible experimental operations, he makes the traditional hypothesis, that mathematical objects inhabit a reality of their own which is distinct from and opposed to nature, unnecessary. Then, by Ockham's razor, such hypothesis must not be accepted. Hence, if correct, he completely naturalizes science. Peirce thought that mathematics operates upon hypothetical entities: *if* certain axioms *were* true, *then* certain consequences *would* follow (cf. CP 3.428, 5.39–40, 5.145, 5.154, 5.161–162; EP 2: 35, 51, 144, 146, 205, 209–210, 212–213, 458; cf. Vehkavaara 2007: 270). Dewey cashes the meaning of these conditionals out in experimental terms: *if* certain operations *were* made, *then* certain effects *would* take place. For Dewey (1929b: 147), mathematical and logical forms are "statements of the means by which it is discovered that various inferences may be translated into one another, or

¹²⁸According to Church (2006: 212), Sigmund Freud, the founder of psychoanalysis, also understood thought as experimental anticipation of opportunities for possible action. See also James (1909a: ch. I).

made available with respect to one another, in the widest and most secure way.” Their rational character has been perfected by adapting them to concrete problem-solving. Thus they are not “intrinsically rational” (whatever that means) or what determines what “rationality” means and what concrete operations merely approximate. They *can become* rational *insofar as* they are effective in problem-solving. Rationality is not transcendent. It is a *mode of behavior* — an affair of the relation of means and consequences (Dewey 1938: 9) — which comes in degrees. People *produce* it. The standards of rationality can become an independent field of study, but it nevertheless remains a product of concrete activity. A form of “rationality” which is so alienated from nature and organic activities that it becomes inapplicable in practice is a mere pretension, whatever its theoretical possibilities. Living organisms have no reason to call it “rational.” (Johnson 2010: 136–141.)

Dewey (1929b: 150ff.) constructs this applicability in terms of *symbolic* operations, in distinction with *overt* ones. Dewey understands symbols as the constituents of his broad notion of language. The use of symbols allows language-using organisms to conceive ends-in-view¹²⁹ also when they are not present to experience. That, in turn, allows intentional regulation of conditions. Symbolic operations make it possible to rehearse the outcome of an overt operation in the mind, or on paper or silicon. This is the means of forming expectations about how the environment, including society, will respond. Overt operations would involve the risk of an adverse result that cannot be undone, and if that can be anticipated by the means of symbols, one does not need to make such move. When developed sufficiently far, symbols can be developed further as such, independently of context — not in the sense of existing and referring to states of affairs independently of application, but in the sense of applicable to *some* state of affairs, unspecified in advance. That may be how the notion of mathematical proof emerged from the practice of geometers (cf. Husserl [1939] 1976b). Overt acts are often ambiguous but particular, but symbols allow more precise definitions and generalizations. Dewey does not, however, guess how symbols originally came into existence; he merely describes, how they are used. But once in use, there seems to be no limit for the development of symbols.

According to Dewey (1916b: 57; 1929b: 150), if a logical or mathematical formula is applicable, then it is also *real* and no mere figment of the mind — as real as a self-binding reaper. It is also *concrete*, or non-abstract, by its very applicability. Dewey (1929b: 154) defines the *concreteness* of things as “the degree in which they are either means directly used or are ends directly appropriated and enjoyed.” Hence abstractness also comes in

¹²⁹See Subsection 2.3.4.

degrees but, insofar as symbols retain significance, never achieves completion: a completely abstract thing would be completely meaningless. According to Dewey (1929b: 155), the distinction between “concrete” and “abstract” is one between operations to be actually performed and possible operations as such, as merely possible. The value of abstractions is to suggest possibilities of concrete operations which would not have occurred to language-users otherwise. Thus Dewey (1929b: 156) suggests that the failure of empiricism to account for mathematical ideas is due to its failure to connect them with acts performed. On the other hand, Dewey (1929b: 156–157) also suggests that rationalism follows from the application of the aesthetic ideals of the Greeks to mathematics. Dewey (1929b: 159) defines numbers as designations of potential operations instead and mathematics not as a mode of being but a way of thinking about things.

Dewey (1929b: 159–161), however, points out an ambiguity of the term “possible” as used in this context. Concrete notions suggest operations upon things, but abstract notions suggest *operations upon other operations* whose standard is the principle of non-contradiction.¹³⁰ Hence there are two kinds of possibilities: material and symbolic. But this distinction does not entail two orders of being. Rather, even formal logic is an offshoot of material operations which extends, but ultimately refers to, acts performed. Dewey does not intend to denigrate mathematics and logic but to put them in their proper place where they yield enormous value.

Means–ends relations determine conditions for any means for an end-in-view to be fulfilled. That makes certain structures of operations necessary: in order to perform one complex operation, it must be divided into certain simpler operations. This procedure can be iterated until one encounters an operation possible in the prevailing conditions. Such implication relations make deductions possible. (Dewey 1929b: 162–165.)

Dewey (1929b: 165–169) concludes that all universals are hypothetical: they determine the conditions of the occurrence of particulars. The power of formulating such hypotheses makes it possible for language-users to exceed the limitations of the prevailing observed situation. This emancipation is the positive import of hypotheses. The negative import is that because they are conditionals, they must be tested. Their value is in the effects they make possible. All scientific notions are such hypotheses, not revelations of a prior and independent reality. Their value is not in correspondence to an antecedent reality, but in what can be achieved by using them. Hypotheses give rise to thought, but it is not something apart from nature, but a mode

¹³⁰I believe that Dewey refers more generally to Chrysippian logics which also include the principle of bivalence and the principle of the excluded middle.

of directed overt action. Thus science is prospective, not retrospective. More generally, ideas are plans of action for the reconstruction of antecedent conditions. Thus idealism is correct in that ideas are real and operative in the world, but wrong in that they be somehow non-natural and abstract. All ideas are hypothetical. Hence they are not final but initial. They must be evaluated experimentally in order to be accepted. Moreover, “action is at the heart of ideas” and “knowing is itself a kind of action” (i.e. a practice), and hence there is no room for the distinction between theory and practice.¹³¹ “Ideas direct operations; the operations have a result in which ideas are no longer abstract, mere ideas, but where they qualify sensible objects.” But Dewey is not suggesting a reform of science; what he says is already part of scientific practice. Hence what he suggests is a reform of the *philosophy* of science.

What Dewey said about scientific concepts has an important implication: *scientific discourse cannot be abstracted from its concrete context in experimentation or fieldwork*. If thus abstracted, it becomes nonsense. One can arrive at the same conclusion also beginning from the pragmatist requirement that all real definitions be operational. A concept which does not ultimately acquire its meaning from something that is doable cannot possibly be understood.

According to Dewey ([1925] 1929a: 166, 174), language in his broad sense turns events into objects, where he defines *objects* as *things with meaning*.¹³² That allows us to refer to them when they are not present to experience. Simultaneously brute efficiencies and inarticulate consummations are liberated from local and accidental contexts. An event with meaning is not only what it is as such: it also has implications. Thus they are subject to ideal experimentation: their meanings may be infinitely combined and re-arranged in imagination, and the outcome of this experimentation in thought may issue forth in interaction with crude or raw events. Hence inferences and reasoning become possible. This suggests that mind emerges from meanings, not *vice versa*.¹³³

Dewey (1938: 51–53, 57) divides signs into natural and artificial signs. Natural signs are contextual, but artificial signs — which he calls *symbols*¹³⁴ — are independent of context.¹³⁵ Symbols do not indicate actual existence

¹³¹Cf. Dewey (1916a: 169; 1922: 69, 77; [1925] 1929a: 358), Barad (1996: 166) and Rouse (1996: 127).

¹³²Or, alternatively, *things with a definite significance* (Dewey [1910] 1933: 20).

¹³³This is how Peirce inverted Locke’s ([1690] 1823a; [1690] 1823b; [1690] 1823c) thesis that signs emerge from mind; see Skagestad (2004).

¹³⁴Dewey’s notion of *symbol* differs from that of Peirce; see Subsection 5.5.1.

¹³⁵Dewey does not mean *ontological* independence. He means that in order for a thing

but make way for organized discourse precisely because of their independence of situation. For example, that gives rise to the possibility of devising hypotheses. The use of symbols abstracted from the particularity of a context allows one to rehearse experiments in thought without commencing them in practice. Therefore we can make not only situated but also hypothetical expectations. This allows more leeway for planning our actions more broadly and intelligently. Trying out potential consequences in thought (or on paper or silicon) saves the trouble of concrete operations with their costs and risks of unforeseen consequences that cannot be undone. Simulations in this broad sense can yield knowledge about situations which have not hitherto been encountered. That allows people to artificially create such conditions if they are expected to be beneficial, and forestall their occurrence if they are expected to pose a threat. This kind of proxy experiments have many uses in science. (Cf. Currie 2018: ch. 9.)

Once liberated from the particularity of a context, symbols do not by themselves single out what is spoken about.¹³⁶ But they can be said to *refer* if they are connected to experience by custom or conjoint activities. (Dewey 1938: 53–54.)

Dewey ([1925] 1929a: 192–193) holds that it is legitimate and even indispensable to pass over the human meanings of the consequences of natural interactions in science. Abstraction from social or shared situations is necessary for the freer intelligent experimentation with meanings. He suggests that mathematical relations are meanings without direct reference to human behavior; and that is precisely what makes them so effective in science. He thinks that a mathematical meaning expresses the purely instrumental without reference to the objects to which the events in question are instrumental. Thus abstraction from any particular consequence opens the way to new uses and consequences. Hence the (relative) abstractness of mathematics provides a kind of concreteness, new opportunities for action. In short, the relinquishment of particular, socially established uses of symbols is necessary for inventing new uses for them. New uses of old symbols may serve human needs better. And that is the business of science. Dewey contends that the abstraction is complete in physics.

In short, scientific analysis can reveal hitherto unknown potentialities and thus enlarge the existing meanings. For example, the word “water” means what we usually do with its referent. But conceiving it as H_2O suggests more possible operations — for instance, physical and chemical in the terms of

to function as a symbol, it must be embedded in a practice in *some* context, not specified in advance. That follows from the *in rebus* character of his theory.

¹³⁶Language largely consists in symbols, which are general. Hence, in order to single out the universe of discourse, one needs *indices*. For discussion, see Subsection 5.5.1.

hydrogen and oxygen, and even mathematical in the terms of “2” — though the referent is the same. Some of the previously unknown opportunities provided by science can be used technologically to promote welfare. But water does not lose its ordinary meaning though it is subjected to scientific analysis. (Dewey 1916b: 435; [1925] 1929a: 193–194; 1929b: 158–159; 1938: 130.)

Dewey ([1925] 1929a: 194–196, 200–201) conceives logic as the rules of combination and separation of meanings, which he conceives as intellectual experimentation. New combinations and separations of previous meanings potentially yield new meanings. Logic is useful if some of the new meanings, the conception of which it makes possible, are useful. An invention may result from purely mathematical calculations. But it is not obvious that the liberation of logical discourse from particular circumstances would legitimate the postulate of an independent realm of logical or mathematical objects conceived as distinct from nature.

The dual character of discourse, both as instrumental and final, applies also to science. Scientific discourse may be instrumental in function, but it also is capable of becoming an enjoyed object. But it is not the satisfactoriness of such discourse which determines science but its content. Anyway, science has also aesthetic consequences. That could be the reason why Dewey holds that impartial and disinterested thinking, discourse in terms of scrutinized, tested, and related meanings, is a *fine art*. (Dewey [1925] 1929a: 203.)

Dewey (1938: 49–50) argues that there are differences between common-sense and scientific language (even though he seems to think that common sense and science as practices form a continuum). Everyday language hangs together because of group activities, group interests, customs and institutions. Scientific language is subjected to a test over and above this criterion: each scientific meaning is expressly determined in its relation to other members of the system.

2.6.3 Criticism

Dewey does not extend his broad notion of language to other animals (cf. Johnson 2010: 127). Thus it remains anthropocentric, perhaps even anthropomorphic.¹³⁷ This is strange, for Dewey took the theory of evolution seriously (cf. Dewey 1910: ch. I). If meaning arises from the discovery of cause–effect relations and reconceptualizing them as means–ends relations,

¹³⁷Dewey ([1910] 1933: 17–18, 22) denies that “lower” animals think. According to Dewey ([1925] 1929a: 168–169), language makes the difference between humans and other animals.

how can it be possible that meaning is denied of animals? If there is a breach between humans and other animals, it is a mystery how it appeared in natural history.

Animal communication studies refutes that. For example, apes (e.g. Scott-Phillips 2016; Tomasello & Call 2019), whales and dolphins (e.g. Tyack & Clark 2000), corvids (e.g. Pika & Bugnyar 2011; Güntürkün & Bugnyar 2016), bees (e.g. Hrncir, Barth, & Tautz 2005), ants (e.g. Hölldobler 1999), and perhaps even plants (e.g. Karban 2008; Heil & Karban 2010) communicate and hence have language in Dewey's broad sense. It should be no news for anybody who has witnessed a singing bird or a barking dog. The existence of the discipline of biosemiotics (cf. Barbieri 2007) testifies for animal communication.

Dewey also claims that "sub-human"¹³⁸ animals behave in ways which have no direct consequences of utility to the behaving animal, but which call out certain characteristic responses in other animals. He continues that these signaling acts form the basic material of language which, however, are not language nor its sufficient condition. He contends that the response of other animals to it is not to a sign, but, by some preformed mechanism, to a direct stimulus. (Dewey [1925] 1929a: 176–178.) This seems to me like a Cartesian doctrine where "soul" which makes humans unique is simply replaced with "language," and other animals merely act mechanically.

I do not mean to argue that animals have language in the same extent that humans do. I am only criticizing Dewey's own logic. In Dewey's broad sense, animals certainly have language. I, on the other hand, would consider animal (or plant) communication for the most part an instance of non-linguistic meanings.

Most outrageously of all, Dewey ([1925] 1929a: 185–186) claims that non-human animals do not "think" because they do not have tools and hence they have no way of distinguishing the immediate existence of anything from its potential efficiencies. He uses the word within scare quotes, possibly indicating that he has some technical sense of "thinking" in mind, but he does not explain it. But be as it may, he is wrong: animals do think and anticipate potential consequences of events, and some animals also have tools. For example, beavers build dams, bees build hives, ants build anthills, birds build nests, and spiders build webs. "Higher" apes can be taught to use some tools. Shrikes are carnivorous birds which use thorns and barbed wire to impale their prey to fix them in order to rip their bodies with their beaks into smaller pieces and use them as food caches. If animals did not think,

¹³⁸This expression implies that humans be better in some sense than other animals, but Dewey does not explain that sense.

how could they survive?

Arguably, some animals do have tools, but there still remains a difference in magnitude between them and humans. I agree with that, but tools cannot be categorically denied of animals.

It is very surprising that Dewey the naturalist makes such claims. He has been concerned with reconciling philosophy with the theory of evolution (e.g. Dewey 1910: ch. I), emphasizing that *homo sapiens* is continuous with the rest of fauna. Hence I would have expected him to make the opposite claim: that there is no positive reason to posit a sharp distinction between the communicative capabilities of humans and other animals. The irony is that Dewey ([1925] 1929a: 168) accuses other philosophers *of the lack of a naturalist notion of the origin and status of language*.

If there is a difference between humans and other animals, it is not because of language but because of the evolution of specific organs. The differences which Dewey attributes to language as a means of communication are due to the evolution of the human larynx and other vocal organs which allows a wide range of different vocal sounds. If language arises from means–ends relations, then the differences are due to the evolution of the human thumb which enables the “precision grip” peculiar to humans, the evolution of the upright posture and gait, and to the increase of the volume and the surface area of the brain. Then there has been the evolution of childbirth organs: their size constrains the size of the head of the infant, which makes extended childhood and the associated acculturation necessary. Hence what Dewey takes to be the cause of the peculiarity of humans — language in the wide sense — is in fact its *effect*. But it is of course possible that, say, the already existing ways of communication have favored the evolution of the size of the brain. If hominids develop a complex society, then they also need to develop complex communication, which requires brains. Hence it is a legitimate hypothesis that not merely biological but also social conditions have favored the reproductive success and survival value of those individuals who have the most developed capabilities of communication and hence also better cognitive capacities. (Cf. Mumford 1967.)

It seems to me that Dewey’s notion of language is anthropomorphic. Hence it is no wonder that he does not find language in animals. That method reverses the cause and the effect. The problem is not “Do animals have language the way that we do, and if not, why not?” but “As animals ourselves, how is it that we have language?” The methodologically correct move is to explain how language has emerged from more basic systems of signification. I will cite Peirce’s non-anthropocentric semiotics in Chapter 5 that seems capable of accommodating biosemiotic phenomena. (Cf. Favareau 2007: 29.)

Dewey also uses the term “meaning” ambiguously. In some contexts, he means *communication*; in others, *means–ends relation*. These definitions are not equivalent. One can understand means–ends relations, but not communication, without society. In some occasions, Dewey (1938: 47) does indeed recognize that meaning as means–ends relation is not up to social negotiation: the “meaning which a conventional symbol has is not itself conventional.”

I understand language as a *conventional institution*. Dewey ([1925] 1929a: ch. V; 1938: ch. III), on the other hand, deliberately uses the term “language” in a very broad sense — for anything that has meaning. His definition includes many things that are not conventional and hence not language in my sense. *Stella polaris*, or the pole star, can assist a navigator without being language (cf. Ahlman [1920] 1967: 72; Tarasti 2004: 101–108). The way in which the direction of the pole star is related with geography, due to which the former can function as a sign of the latter, is non-conventional and hence cannot be linguistic. The method of navigation can be expressed in language, but that has become possible only because the verbal formulation has been adapted to this non-conventional relation.

Hence I suggest that a difference should be made between linguistic and non-linguistic meanings. Causal relations, conceived as means and ends, are the supreme example of non-linguistic meanings.¹³⁹ Thus it would be more appropriate for Dewey to say that *meanings* are the tool of tools, and language is a special case.

2.7 Theoretical and Practical Hermeneutics

Since anything whatsoever can have meaning, that is, be a sign, Peirce’s theory of meaning resurrects the medieval notion of the *book of nature* in a secular sense. How we make sense of the world involves a *universal hermeneutics*.

Rouse (1987: ch. 2) has distinguished between two ways of reading Thomas S. Kuhn’s epoch-making *The Structure of Scientific Revolutions* ([1962] 1996): a *theory-driven* and a *practice-driven* view. The former is the standard reading; the latter is Rouse’s own. He argues that Kuhn understood science as practice and the notorious concept of *paradigm* as shared practice instead of shared belief. Rouse (1987: ch. 3) has argued that these ways correspond to two kinds of universal hermeneutics: *theoretical* and *practical*. In theoretical hermeneutics, interpretation is likened to *translating a sentence*; in practical hermeneutics, to *engaging in a practice*. Theoretical hermeneutics takes practices as *evidence* for the interpretation of certain statements

¹³⁹See Subsection 2.2.3 and Section 2.4.

or beliefs. Practical hermeneutics interprets these *practices themselves* and also tries to understand the point and significance of engaging with them. Both kinds of hermeneutics can be found explicitly or implicitly already in Dilthey (1956; 1957).

Theoretical hermeneutics begins with Quine's philosophy of language and is manifest in Davidson, Rorty, Hesse, Kuhn and Feyerabend. In theoretical hermeneutics, interpretation takes place within a language against a background of theories. It consists in the formation of interpretive hypotheses. It denies language- or theory-independent access to the world. It distinguishes observation and theory only relatively: if one takes something as an observation, they have already conceived it against a network of theories. Thus the aim of theoretical hermeneutics is truth, or accurate representation.¹⁴⁰ In theoretical hermeneutics, learning can be modeled as Hesse's (1980: 125–128) self-reprogramming device. The theory-dominance of theoretical hermeneutics has two senses: (1) theory guides and gives sense to experiment, and therefore both the starting point and the end of an inquiry are theories; and (2) theory is conceived as disengaged from and independent of practice, agent or knower, and social context. Thus experiment seems to be only accidentally connected to science, if at all. From this point of view, the actual circumstances of discovery and validation — the local site of investigation, the experimental construction, the technical facilities involved in that construction, the particular networks of social relations within which the scientists are situated, and the practical difficulties of getting on with research — are largely matters of indifference for science, for only their rational reconstruction is theoretically significant. Science in this sense aims at the universal and ignores the particular. The latter merely provides an instantiation of, or a counterexample to, the former. A scientific claim which applies only to particulars is always vulnerable to charges of being an artifact. Therefore experiments have significance only provided that they qualify as generally interpretable instantiations of universally quantified theoretical claims which have invariant truth conditions and from which indexicals are removed. Rouse also observes how the thesis of the theory-ladenness of observation can be used to make science appear theory-dominant. If the thesis is taken to its extremes, then observation does not provide independent evidence for or against theories. It might even undercut the evidential grounding of theories altogether. Laboratories could even be seen as superfluous if they are understood as merely theory by other means, or, even worse, unimportant means. For instance, Popper ([1934] 1953: 107) endorses such theory-driven

¹⁴⁰Rouse may be wrong here. As far as I know, Davidson's and Rorty's theories are emphatically anti-representationalist.

picture of science. (Rouse 1987: 50–58, 69–72, 98; cf. Lindholm 2023b.)

Theoretical hermeneutics is overintellectual. It fails to account for the material and practical dimensions of science which Rouse (1987: chs. 4 and 7; 1996: chs. 5–9; 2002: chs. 5–9) studied. Nature could be eliminated from discourse altogether, perhaps in the vein of Collins (1981) and Fuller (1992). By this consideration, theoretical hermeneutics would necessarily entail anti-realism — or *lingualism* (Hacking 2002: 108, 139, 150).

On the other hand, practical hermeneutics takes its point of departure from Heidegger’s *Sein und Zeit* ([1927] 1977a). Heidegger considers human existence (*Dasein*) as itself hermeneutical. According to practical hermeneutics, everyday practices, different ways of taking account of things, embody an interpretation of the world which need not be representational. Using equipment is one instance: an instrument acquires an orientation, a focus, a significance, or a function through its use; and Rouse counts that as hermeneutic activity. Other examples of interpretation in this sense include avoiding things, taking note of them, caring for them, or discarding them. He explains that what and how things are show up in the ways we deal with our surroundings; and we thereby interpret the world by (consciously or unconsciously) adjusting our behavior in response to the presence of things or events. The learning of a skill is learning a grasp of a field of possibilities for action. This grasp of a field of possibilities is not explicit. Interpretation consists in working out of these possibilities. Unlike in theoretical hermeneutics, these possibilities are not propositional attitudes like belief, or background assumptions. Rather, they are *ways to be in the world* (the early Heidegger), *forms of life* (the later Wittgenstein), or *styles of reasoning* (Hacking). These things are more basic than and the condition of the possibility of representations. Such understanding cannot be grasped formally or as abstractable from our actual involvement with one another in the world. It is local, existential knowledge: it is bound to concrete situations, embodied in an actual tradition of interpretive practices, and located in persons shaped by specific situations and traditions. Hence understanding is not a conceptualization of the world but a performative grasp of how to cope with it. (Rouse 1987: 58–63.)

According to theoretical hermeneutics, the presupposition of some basic beliefs and values is in principle arbitrary; but according to practical hermeneutics, one cannot choose the configuration of the world which it presupposes in order to make sense of things. In the former case, presuppositions are beliefs which *we* have; in the latter case, they are a way into the world that “has” us. The former kind of presuppositions might, at least in principle, be formalizable and representable in a calculus; the latter presuppositions are irreducibly material. Renouncing them would be to lose grip.

Theoretical hermeneutics aims at representing accurately what the *case is*; practical hermeneutics considers interpretation to be a concern for what *matters*. In the former case, the presupposed beliefs are just like others and can be altered and rejected. Hence they do not matter to us; we can remain indifferent about them. But in the latter case, our actual involvement with a situation that matters to us is what governs the interpretation. In theoretical hermeneutics, the context of interpretation is a “web of belief”; in practical hermeneutics, a configuration of equipment, persons, and physical setting which is already directed and opened towards possibilities. In the former, interpretation is set against a background of representations; in the latter, against a configuration of presences and absences. It may involve representations, but they are not privileged or universal. Encountering the world without the mediation of theories or hypotheses is possible, but not without presupposing a form of life. (Rouse 1987: 64–65.)

In theoretical hermeneutics, interpretation discloses what the *case is*; in practical hermeneutics, what it is to *be*. The latter is exhibited in the degree of coherence of what we do. It is shown rather than said, and some instances show it better than others. Theories are not in a dominant position in practical hermeneutics even though it emphasizes presuppositions and interpretation. (Rouse 1987: 67–68.)

2.8 Material Hermeneutics

Don Ihde (1998: chs. 11–14; 2009) has developed Rouse’s (and Latour’s) ideas further in his *material hermeneutics*. It is ultimately based on his notion of *multistabilities*, or perceptual variations that exceed the usually noted bivariational ambiguities (Ihde [1977] 2012: 145): the “same” thing can have multiple appearances in experience. He has argued that science is instrumentally embedded in multiple ways (e.g. Ihde 1990: ch. 5): the varieties of human–instrument relations¹⁴¹ are multistable. He argued that there are at least four kinds of human–technics relations, which are not mutually exclusive: embodiment relations, hermeneutic relations, alterity relations and background relations. In hermeneutic relations, we access the world by interpreting the readings of an instrument. A class of non-linguistic meanings can be encountered in such relations to apparatus, namely, the visual outputs of scientific instruments, of which we try to make sense in order to get to phenomena.

Material hermeneutics studies the ways in which meaning emerges from scientific imaging and thereby “overcomes or even reverses the linguistic

¹⁴¹See Section 3.6.

turn” (Ihde 2020: 7): it extends the notion of meaning beyond language.¹⁴² In particular, this is the case in the visual displays of scientific instrumentation. Ihde follows Latour (1987: 67–68) and defines *scientific instrument* as an *inscription-producing device*: a typical scientific instrument creates a visual display and records data upon it.¹⁴³ Ihde (1998: chs. 11–14) calls the interpretation of such displays *visualism in science*. Ihde (2020: 9) admits that he did not invent this kind of hermeneutics: it is already standard practice in many sciences, such as physical anthropology and archaeology.

Visualism in science means how scientific objects are accessed by the technological construction of images. The hermeneutics of science is of a special kind: not necessarily linguistic or even propositional but first and foremost *bodily* and *perceptual* — *visual* in particular. Here he follows Husserl and Merleau-Ponty. The range of scientific imaging ranges from isomorphic to non-isomorphic depictions of scientific objects. The less it retains isomorphism with the object, the more hermeneutic activity is required to make sense of it. (Ihde 1998: 151, 184, 187, 196.) The interpretation of visualizations of data is a matter of *learning to see* — to figure out which patterns indicate something else and which do not. Such learning takes place dialectically with the development of the instruments of observation, recording, and visualization. (Ihde 1998: 177–180.)

He outlines a “weak program” of identifying hermeneutic dimensions implicit within current science praxis (Ihde 1998: ch. 12) and a “strong program” which examines the cutting edges of science’s knowledge constitution in a hermeneutic way (Ihde 1998: ch. 13). He defines the former as “an attempt to reconstruct accounts of science praxis, showing the implicit *hermeneutic practices* already at play within science” (Ihde 1998: 152) and the latter as “potentially more normative” and as “an attempt to push, positively, certain P–H [phenomenological and hermeneutic] practices by way of suggestion and adaptation toward science practice” (Ihde 1998: 152). Ihde’s description of the “strong program” and how it differs from the “weak program” are vague. I gather that the “strong program” builds upon the “weak program” but extrapolates already existing possibilities into the future.

The “weak program” is partly based on the insights of the earlier, non-hermeneutic tradition. First, science used to be distinguished from the life-world (*Lebenswelt*),¹⁴⁴ but Ihde argues that such dualism is false: scientific practices and instruments keep science strictly within the confines of the life-

¹⁴²This is an obvious example of the experimental generation of meaning as explained in Section 2.4.

¹⁴³However, not all scientific instruments are visual; consider, for instance, the stethoscope.

¹⁴⁴For the definition of the *Lebenswelt*, see Husserl ([1936] 1976a; [1939] 1976b).

world. Laboratories and their instruments give a “voice” to things, which yields information about them, by recording measurements in visual outputs like graphs or diagrams. Thereby they make non-visual phenomena visual. But it is not the object measured alone that “speaks”; it is the system of the object and the measurement apparatus. Hence “instrumental artifacts” and calibration errors are always possible and must be accounted for (Ihde 1998: 185–186). In order to determine the part of the object, the part of the instrument can be eliminated by making “instrumental phenomenological variations” — for example, by using different instruments, multivariant set of measurements, intersubjective checking, deliberate application of focus shifts, and figure/ground reversals (Ihde 1998: 185–186). Due to the effect of instrumentation, the objects are not simply “given” but, rather, made “readable.” That creates the need for the instrument to be as transparent¹⁴⁵ as possible. In an important sense, the resulting images are constructs, but the very effect of a successful construction is emphatically to present the object as authentically as possible. In other words, construction of the image is needed in order to cancel the effects of the environment of the object and of the instrument used. The “weak program” is manifest in imaging technologies such as oscillography, spectrography, intestinal probes, X-ray imaging, ultrasound, sonograms, MRI, fMRI and PET scans, radioactive tracers and “dyeing,” uranium series dating, carbon 14, electron spin resonance techniques, thermo-luminescence techniques, DNA fingerprinting, mDNA lineage tests, computer-assisted tomography, and radio astronomy. Ihde recognizes three trajectories in the “weak program”: optical imaging; non-optical imaging, which begins with X-ray imaging and continues in, for instance, fMRI and PET scans; and microscopy, which continues in, for instance, electron microscopy and radio crystallography. These trajectories retain a degree of isomorphism with the object. The situation changes with oscillographs, spectrographs, charts, graphs, and diagrams. Even mathematics can be made perceptual by depicting curves and surfaces; and computer graphics makes it possible to depict even fractals, chaotic and random phenomena. (Ihde 1998: ch. 12.)

As concerns the “strong program,” Ihde extrapolates technological possibilities already present in contemporary instrumentation. As previously indicated, the development of visualizations is accompanied by learning to see. One important contemporary technique to assist in such learning is image manipulation — especially zooming in and out, enhancement, contrast, and false color —, often by computers. The effect of the atmosphere can be computationally removed from telescope images. Thermal imaging extends

¹⁴⁵See the notion of *embodiment relations* in Section 3.6.

human vision into serpentine vision, light amplification, into feline vision, and wide-angle imaging, into insect vision. Several sources of visual information can be fused into composite images. Computers allow even more imaginary transformations of the visual: avatars, online meetings (which the recent pandemic made popular), computer graphics, virtual or augmented reality, or holography. (Ihde [1977] 2012: 164–165; 1998: ch. 13, pp. 191–192.)

Ihde also probes beyond visualism. Multisensory technologies are commonplace in entertainment, such as cinema. Simulated learning environments, such as pilot simulators, were an early instance of virtual multisensory reality. In such applications, isomorphism with non-mediated reality remains important to recreate the situation in question. Virtual reality can be combined with isomorphic displays in augmented reality. Remote sensing and manipulation have become possible with robotics and teleoperation methods with feedback. Pilots of fighters and ships can be assisted by displays which visualize large amounts of information in a single picture and make the environment observable even in difficult weather or underwater conditions. These technologies may not be science, but nothing prevents applying them in science as well, at least in principle. (Ihde 1998: ch. 14.)

Neither Rouse nor Ihde explain, what theory of meaning they presuppose — what the meanings are that practical or material hermeneutics interprets. I have suggested that Peirce’s pragmatic maxim can account for them perfectly (Lindholm 2022; 2023c).

Chapter 3

Experience

In this Chapter, I will provide an empirically responsible theory of experience, or *organism–environment intra-action*.¹ Its purpose is to reform empiricism, to determine its jurisdiction, and to resolve its opposition with realism and rationalism. In particular, I will emphasize the importance of what we *do* when we experience things: habits or practices are epistemically more basic than observations, objects, or agents.² I will argue that experience acquires meaning from our actions, undergoing their results, and correlating the actions and their results. Because each situation is at least potentially different to a certain degree, experience has always an experimental character. That determines the jurisdiction of naturalism: legitimate entities and events, including concepts, must be amenable to experiment. Thus “im Anfang war die Tat,” as Goethe says in his *Faust* (1808; 1832).

I will revise the *peripatetic axiom*, according to which all knowledge stems from *sense experience*. My version states that all knowledge stems from *practice*. A sensation gives rise to a *percept*, which initiates a process of interpretation, or *semiosis*, which I will describe in detail in Chapter 5. My argument culminates in *cybernetic epistemology*, according to which experience is a bidirectional feedback process, and the acquisition of empirical knowledge is a control engineering problem — the stabilization of organism–environment intra-action so that invariances can become present to us. A thing is known by subsuming it under a universal; a universal is (approximately and relatively) invariant; invariances appear to experience in stabilized conditions; and such stabilization may either occur naturally (which is rare) or it has to

¹See Subsection 2.5.2 and Tiles (2010).

²According to Tiles (2010: 104–105), an empiricism that neglects the activity of the agent — like much of the classical empiricism of Locke and Hume, and even Quine (1969) — is hardly faithful to its etymological roots. He points out that the very word *εμπειρία* stems from *πειράω*: “I try,” “I make an attempt.”

be effected by the organism.

What experience is is itself an empirical problem. Hence any consistent version of empiricism should reflexively apply to itself. According to Dewey ([1925] 1929a: 8), experience “includes *what* men do and suffer, *what* they strive for, love, believe and endure, and also *how* men act and are acted upon, the ways in which they do and suffer, desire and enjoy, see, believe, imagine”; “it recognizes in its primary integrity no division between act and material, subject and object, but contains them both in an unanalyzed totality.” According to Johnson (2010: 127), “organism” and “environment” are correlative terms in cognitive science. They can be understood only in relation to their continuous intra-action. Mind requires a functioning body and brain; and they, in turn, require cognitive activity engaging the world. (Cf. Damasio 1994: xvii.) Now, *other organisms are at least potentially a part of the environment* (Dewey 1938: ch. III). Thus experience is emphatically *social*. Habit or practice is the medium of social intra-action. Mind emerges from symbolic intra-action and sharing meanings (Dewey [1925] 1929a: 258, 303–304). (Cf. Johnson 2010: 128.)

As I have explained in the previous Chapter, such intra-action consists in the bidirectional exchange of causal signals, including observations and actions.³ This bidirectionality means *feedback*. Now, *cybernetics* is the science of feedback systems (cf. Wiener 1948). Hence an epistemology that adopts a bidirectional notion of experience is a *cybernetic epistemology*. I have made a case for cybernetic epistemology in Lindholm (2023a). I will restate my arguments in what follows.

Experience may or may not have “subjective” traits, but in the main it is a public, observable, and causal process and therefore merits the status of “objectivity.” This definition relinquishes empiricism from its Cartesian underpinnings in general and its (alleged) Berkeley-esque “idealism” and “subjectivism” in particular: it becomes possible to be both an empiricist and a realist in a broad sense of the terms, because experience does not take place within the mind, though it may or may not involve mental activity. On the contrary, reasoning is a possible part of experience. Hence empiricism can achieve what rationalism can achieve — and other things besides, without reproducing the theological and metaphysical problems that stem from the concept of Reason (with capital “R”).

In Section 3.1, I will explore the revised version of Dewey’s operational definition of *experience* — *organism–environment intra-action*. My argumentation involves the determination of the jurisdiction of empiricism.

The first purpose of the first Section is to escape “idealism” and “subjec-

³See Section 2.3.

tivism,” often associated with traditional empiricism. In effect, I will make a version of the Stoic ἀπραξία argument: we are active agents by nature; and an active agent cannot possibly deny reality (the mind-independent world). Action presupposes a medium that cannot be eliminated by thought. Mind-independent traits of the environment both constrain action and make it efficient. Thus, according to Peirce (CP 2.137–174), mind-independent facts are the only *interesting* facts, because they determine opportunities for action, or *affordances* (Gibson 1979). Therefore empiricism and realism are not distinct — let alone opposed.

The second purpose of the first Section is to disavow the “spectator theory of knowledge” (Dewey 1929b: 23, 196, 204, 211, 213, 245, 291). My emphasis is on the activity of the organism, fleshing out the epistemic priority of habits or practices. I will argue that observations are indeed important but not basic: they acquire their meaning and significance from an ongoing course of purposive action; and purpose, or end-in-view, presupposes habit or practice.

In Section 3.2, I will proceed to introduce Peirce’s phenomenology (or “phaneroscopy”). The purpose of the second Section is to derive and justify Peirce’s system of three categories and explain how they are present to experience in general and practice in particular. They are the basis of Peirce’s semiotics which I will introduce in Chapter 5. The conceptual apparatus of semiotics will be necessary for showing that knowledge is practice in Chapter 6. I will argue that given the operational definition of *experience*, phenomenology, the science of experience *qua* experience, is impeccably naturalist. Thus, given that there is no split between experience and nature, the categories of *experience* are also categories of *nature*. Moreover, each of the categories can be shown to be real (mind-independent). Thus phenomenology demonstrates three-category realism by empirical means.

I will briefly cite Peirce’s analysis of observation and how it acquires propositional content in Section 3.3. Peirce introduced the concepts of *percept*, *perceptual judgment*, and *percipuum*. The apprehension of a percept kicks off semiosis, or the process of interpretation of sign-vehicles — in this case, empirical knowledge. The formation of perceptual judgments and percipua are further stages in this development. I will, however, postpone Peirce’s semiotic account on propositions to Section 5.10. The notions of *percept* and *perceptual judgment* can also be applied in explaining Peirce’s *belief–doubt model of inquiry*, which I will present in Section 4.3.

In Section 3.4, I will revise Eino Kaila’s (1939; 2014) thesis that invariances constitute the “objective of knowledge.” I will argue that at least some invariances appear as *stationary states of organism–environment intra-action*. The discovery of invariances in experience proves realism *a posteriori*: they cannot be eliminated from experience merely by altering thinking. This

holds even if the predicate “real” (“mind-independent”) only applies to possible experience, as I have argued in the previous Chapter.⁴ I will argue that such things acquire determinacy in sufficiently stable (invariant) conditions. Thus *the art of stabilizing conditions* — a practical affair — is crucial for the possibility of empirical knowledge. That will dispense with the early modern myth that objects be determinate entities independently of the actions of agents. On the contrary, *determinacy presupposes practice at least potentially*. In some exceptional cases, stationary states of intra-action might obtain effortlessly. But the majority of such states require action from the organism that stabilizes the intra-action between itself and its environment. In many cases, such activity requires instruments. Moreover, even if one succeeds in effortlessly determining a stationary state of intra-action, it acquires novel meanings through action and the introduction of instruments. Hence technics — skills and instruments — are at least potentially constitutive of knowledge. Invariances are universals almost by definition and therefore fall under Peirce’s third category. They are *concrete* to the extent that they can become objects of experience. I will conclude that reality becomes manifest to us in experience in the form of (approximate and relative) invariances: because they are (approximately and relatively) invariant by definition, they are mind-independent — even if they happen to be present to a mind.

The natural consequence of such a view on experience is *cybernetic epistemology*: a theory of how knowledge emerges from stationary states of organism–environment intra-action. Such emergence of knowledge consists in the *learning of skills*, which I have conceptualized as *habits* or *practices*. The upshot of cybernetic epistemology, which I have introduced in Lindholm (2023a), allows one to define epistemological concepts rigorously in the terms of mathematics: trajectory, limit cycle, equilibrium, stability, symmetry, isomorphism, etc. I will summarily explain these concepts in Section 3.5. The use of instruments is an important special case. I will explain the effect of instruments in Section 3.6.

The epistemology which I have explained thus far is *constructivist*: knowledge is not already there in the world ready to be learned; problematic situations do not resolve themselves. On the contrary, we have to *invent* and *create* candidates for solutions, test them and put them into use. Again, practices and technics are paramount.

Finally, I will conclude with a defense of naïve realism, or the position that the world is as it appears in experience. This conclusion is already implicit in what I said about phenomena and noumena in Subsection 2.5.5.

⁴I believe that this line of argument stems from Leibniz ([1704] 1921), if not earlier.

3.1 The Concept of Experience

In this Section, I will explore the notion of *experience*, operationally defined as *organism–environment intra-action*.⁵ The purpose of this Section is to determine the jurisdiction of empiricism without invoking “idealism” or “subjectivism”; and to demonstrate the epistemic significance of what the agent *does* (or at least *effects*) in their environment when acquiring knowledge.

I will argue that experience is a process that consists in bidirectional exchange of causal signals. Hence what the organism *effects* in its environment (wittingly or unwittingly) becomes epistemically important. It will turn out that experience must be understood holistically in order to explain how things become distinct and thereby acquire determinacy. This notion cuts across the subject–object dichotomy and hence dispenses with “subjectivist” and anthropocentric and anthropomorphic theories of experience. It also relinquishes the early modern prejudice that things be already determinate independently of what agents do. In this Section, I will restate my argument in Lindholm (2023a).

Gale (2010: 65) believes that Dewey maintained that the organism and its environment are mutually dependent. I am not aware of Dewey making such claim. Even if Dewey did believe so, I do not. Ontologically, the environment is more basic than the organism. If the organism were removed from the universe, the environment would remain almost completely intact. But epistemically, the effects of the organism and the environment are intertwined and presuppose each other. Hence they are equally basic. Thus Gale’s claim requires an analysis of whether Dewey invoked the mutual dependence of the organism and its environment in an ontological or an epistemical sense. At any rate, my argument is independent of Gale’s claim.

One can argue that the classical pragmatists intended to question the distinction between ontology and epistemology. I reply that I am not making a faithful reconstruction of classical pragmatism. It seems to me that fallibilism⁶ entails a difference between them: our beliefs can be wrong because what exists is distinct from our concepts in some robust sense.

In Subsection 3.1.1, I will argue that experience is bidirectional: the organism and its environment exchange causal signals, including observations and actions. I will criticize mainstream analytic epistemology for ignoring the epistemic import of actions and practices.

In Subsection 3.1.2, I will argue that even if the agent appears to do nothing overtly, bidirectional intra-action is a necessary condition of the pos-

⁵See Subsection 2.5.2.

⁶See Chapter 4.

sibility of experience: because we are not immaterial Cartesian souls, the agent (or at least a measurement device) must be present, which may, by the principles of physics, already have an impact on the object to be experienced. This possible effect must be taken into account and removed or compensated in order to determine the properties of the object. If some experiences happen to be unidirectional, that can be dealt with as a special case of the cybernetic, bidirectional case.

In Subsection 3.1.3, I will explain Dewey’s holistic phenomenology, based on his operational definitions of *situation* and *object*.⁷ That involves a detailed description of the acquisition of empirical knowledge from the first-person point of view. This account makes empiricism compatible with the situatedness of knowledge: that God’s Eye point of view, or an epistemic Archimedean point, is impossible; that knowledge is therefore limited to a point of view but still qualifies as *knowledge*. Its main import is the epistemic primacy of practice.

3.1.1 Uni- and Bidirectional Notions of Experience

In mainstream analytic epistemology, experience is reduced to mere observation (e.g. Sosa et al. 2008) — or even worse, stimulus (e.g. Quine 1995) — a notion that Radder (2006: ch. 2) and Chang (2022: 61) chide. What agents *do* is usually ignored without argument. Hence such omission remains unjustified. It implies that mainstream analytic epistemology still adheres to the “spectator theory of knowledge” which Dewey (1929b: esp. 23, 196, 204, 211, 213, 245, 291) refuted. The “spectator theory” maintains that experience be *unidirectional*: the environment causally influences the agent, but not *vice versa*. This notion excludes experiment, which is strange, given the widespread trust in the experimental method in science.⁸

The unidirectional notion of experience is false to the empirical fact that *even the very possibility of experience effects changes in the environment, including the object to be observed, at least potentially*. Agents are not immaterial Cartesian souls. We have a body; and the body intra-acts with its environment, willy-nilly. In order to have a certain experience, the body of the agent (or at least a measurement device) must necessarily be present. And the presence of their body (or the measurement device) intra-acts with the environment, including the object to be observed. That might alter the object to be observed. That, in turn, might alter the observation of the ob-

⁷See Subsection 2.5.2.

⁸According to Chang (2022: 253), “[t]here is no such thing as truly passive observation.” I will argue in Subsections 3.1.3 and 3.2.6 that our habits or practices constrain observation and in this sense are epistemically more basic.

ject. And finally, that might alter the ensuing knowledge about the object. Thus, what we observe might be an artifact generated by our uncontrolled influence upon our environment. Such alteration must be determined and removed or compensated to secure the reliability of the observation. But the unidirectional notion of experience is, by definition, unable to do that, because it excludes the possibility of action. By leaving the environment intact, it leaves also the very conditions of experience uncontrolled.

Hence it seems that *the control of conditions* — that is, *experiment* — is necessary for the reliability of experience. Therefore Dewey suggested a *bidirectional* definition of experience: *organism–environment intra-action*.⁹ Observation is indeed important — but not just any observation whatsoever. Epistemically important observations are emphatically *results of experimental operations*. Their importance is a result of our prior actions; in a sense, we *make* them epistemically important; the epistemic significance (or the lack thereof) of observations issues from their being related to what we have *done* to control the conditions.¹⁰ In this sense, empirical knowledge is *constructed*. That does not, however, imply that so-called “unobservables” do not exist or that scientific theories about them could not be not literally true.¹¹ After all, constructs presuppose *raw material* (cf. Dewey 1916b: 35–37, 41, 104–105; Hickman [1990] 1992: 49–50).

Dewey (1916a: 163–178, 237, 317–322; [1925] 1929a: 70) interestingly equates *all* experience with experimentation. All our beliefs (habits) are at test all the time. Hence we make experiments all the time. In particular, the way an infant learns to navigate their way through nature and society is experimental; here Dewey anticipates Jean Piaget’s ([1936] 1953) notion of “little scientists.” This notion implies that *science is continuous with everyday life*: both conform to the *belief–doubt model of inquiry*.¹²

The bidirectional paradigm is not unique to classical pragmatism. It can be found (implicitly or explicitly) in, for instance, Marx and Engels ([1845–6] 1978: 20–21, 20n, 21n), Heidegger ([1927] 1977a: §§ 12–13), Husserl ([1936] 1976a; [1939] 1976b), Merleau-Ponty ([1942] 1967; [1945] 2002), Noë (2004) and Määttänen (2009; 2015).

The bidirectional paradigm implies that objects are not objects of knowl-

⁹See Subsection 2.5.2.

¹⁰I will explain and justify this claim in Subsection 3.1.3. The emergence of knowledge from experiment is parallel to the emergence of meaning; see Subsection 2.4.

¹¹There are feminist constructivists who reject both extreme relativism and extreme objectivism: for instance, Donna Haraway (1988), Helen Longino (1990), and Sandra Harding (1991). I personally find Karen Barad’s (1996) “agential realism” especially attractive.

¹²See Dewey (1938: 18–19, 23–24, 101) and Section 4.3.

edge. The object of knowledge is a *relation*: what will *follow* from our actions in the given situation. In a word, the object of experience consists in *opportunities for action*, or *affordances* (Gibson 1979). Määttänen (2015: ix) describes experience thus:

Human beings are embodied creatures, which are in constant interaction with other elements in the world. The world is experienced as possibilities of action. The hidden causes of perception are not the object of knowledge. The structure of experience and the proper object of knowledge can be expressed with the simple scheme: $\mathbf{S}_1 \rightarrow \mathbf{O} \rightarrow \mathbf{S}_2$. The situation $\mathbf{S}_1$ is problematic, and some operations $\mathbf{O}$ have to be performed in order to attain the situation $\mathbf{S}_2$. The latter situation is hidden at first, but not in principle. The object of knowledge is the relation between these situations, and this relation is mediated by controlled activity, certain operations. To know is to know what to do in the situations one encounters in the world. This object of knowledge is within our epistemic access, and there is no need to contrast it with something “more real” beyond the scope of our epistemic access.

His point is not to *reduce* all experience to the anticipation of what consequences will obtain. It is that that is an aspect, *among other aspects*, of experience. For instance, an agent can experience a work of art in a gallery without taking *its* potential practical effects into account.¹³ But they simultaneously experience many other things that happen at their proximity, and they must take *their* practical effects into account. The very possibility of being immersed in a work of art presupposes that collateral experience does not disturb that by suggesting potential practical effects — which is itself, as such, a special practical effect. For instance, there might be a baby, who might begin to cry, in the gallery.

For example, Noë (2004) argues that perception and action are not strictly distinct; their difference is merely relative. In order to perceive anything, our sense organs perform experiments and our minds anticipate their results. Thus perception is not an innate ability: we have to *learn* to perceive. That involves rehearsing certain sensorimotor skills. Even in vision, the eye makes micro-movements (called saccades) that probe the environment.

¹³I thank Ave Mets (private communication) for asking how art relates to the pragmatist notion of experience.

3.1.2 The Effects of the Organism upon the Environment

Because we are embodied creatures, the presence of an agent (or a measurement device) is a necessary condition of the experience about an object. But the presence of the agent already affects the object at least potentially. I have given this account already in Lindholm (2023a: 23–25).

There are, for instance, a gravitational effect (the agent or the measurement device and the object attract each other at any distance), a thermodynamic effect (the agent or the measurement device and the object exchange heat at any distance), and a quantum mechanical effect (the wave functions of the agent or the measurement device and the object might interact at any distance). The effect increases when distance decreases. The bidirectional paradigm can take such effects into account.

Even if experience is restricted to mere unidirectional sensation, it presupposes causal signals from the environment. The production and propagation of these signals effects changes, however minute, in the environment. Vision implies light; hearing implies sound; touch implies friction; and smell and taste imply the emission of aromatic particles. When light or sound is produced by or reflected from a body, the heat of the body changes, and its shape and texture can change too. Exposure to light can function as a catalyst in certain chemical reactions. It can change the color of certain surfaces. It can also make certain materials more fragile. In the case of very loud sounds, the possibility of disfigurement seems obvious: for example, an earthquake or the blast wave of an explosion.

Thus Kuusinen (1959: 92, 100) is correct: objects manifest their properties when they change. By the conservation laws of physics and Newton's laws of motion, the very emission and propagation of a causal signal necessarily changes the object that emits it and its environment. A completely inert object that does not emit causal signals cannot possibly be present to sense. Experiment is a method of introducing controlled changes to objects so that they communicate their properties to the experimenter.

If nothing else, then at least Heisenberg's *principle of indeterminacy* undermines the spectator theory of knowledge. If the very act of measurement necessarily introduces a change to the quantity to be measured, the object of knowledge cannot be independent of the agent. (Dewey 1929b: 201–203.)

3.1.3 Experiential Holism: Dewey's Phenomenology

Now I will argue that experience — organism–environment intra-action — is holistic. I have already presented this account in Lindholm (2023a: 19–

23). It is based on Dewey (1896; 1916a: 42, 56, 91–92, 232–234; [1934] 1980: 37; 1938: 66–70; cf. Jung 2010: 147–149, 155–157). Johnson (2010: 124–125, 132–136) confirms that contemporary cognitive science supports Dewey’s phenomenology (cf. Tucker 2007: 58, 80–81, 97, 169, 202). Arguably, the holistic character that underlies all experience becomes manifest especially in art; a work of art crystallizes meanings that are present in ordinary experience but mixed with other meanings (Dewey [1934] 1980: esp. 192–196, 293). I will slightly expand and clarify Dewey’s account here. Experiential holism is actually phenomenology, but Dewey does not use the term. The upshot of Dewey’s phenomenology is that perceptions accompany an ongoing course of purposive action; and that they acquire their meaning and significance from that course of action. Hence perceptions are not self-sufficient but signify *problems to be solved*. They *initiate* an inquiry rather than conclude one. The conclusion of an inquiry is up to us: we have to *construct* a candidate for a solution from the resources that the prevalent situation affords and *experimentally test* it.

We are not *tabulae rasae*. In that respect, rationalist psychology was correct. We have innate tendencies and impulses that biology has bestowed upon us. They are selective: they determine, which sensations influence further behavior and which do not. But they are not absolute: further experience may change them at least to a degree and lead to the establishment of novel habits. The selectivity of our innate powers is a two-edged sword: on the one hand, it allows concentration, enabling us to think about certain things articulately; on the other, it easily lapses into dogmatism and conservatism, making it more difficult to accommodate novel experiences and to think creatively. (Dewey 1922: 92–93.)

Yet there are no innate *ideas*. In that respect, empiricist psychology was correct. Dewey (1929b: 138) understood an idea operationally: as a *plan of operation* and a *statement of acts to be performed*. Ideas are tentative, intermediate and instrumental rather than eternal, final or self-sufficient. Habit¹⁴ — whether innate or learned — is needed to process experience so that we become able to form ideas. A habit associates an experience with its potential practical effects. Thus we are able to rehearse these effects in thought independently of whether they will obtain or not. That allows us to judge whether they are valuable enough. If they are, we can project them as *ends-in-view*¹⁵ that function as point of reference for subsequent purposive action. Such ends-in-view are *ideas*. (Dewey 1922: 30–31.)

¹⁴See Section 2.3, Subsection 2.5.2, and Subsections 3.2.5 and 3.2.6.

¹⁵See Subsection 2.3.4.

Experience takes place within a *situation*, defined operationally.¹⁶ A situation is a comprehensive, integral whole that involves not only environing conditions but also the agent and their practical and conceptual capacities, possibly including language.¹⁷ An ongoing course of purposive action, facilitated by the habitual projection of an end-in-view, maintains the coherence and integrity of the situation (cf. Tiles 2010: 105–106). Hence the concept of *situation* cuts across the subject–object dichotomy. Only an immaterial Cartesian soul can be detached from phenomena. An embodied agent is necessarily involved in them. According to Jung (2010: 156), situations stand for the way in which possibilities of action are prefigured in embodied qualities.

The holistic character of experience does not mean that the organism attend to *each* part of the whole simultaneously. It means that the organism does not necessarily attend to anything specifically but can *potentially* attend to *anything* within the field of experience.

A situation can be analyzed into its parts, if need be. But that can only begin from the situation as an integral whole: it provides a purpose, meaning, and resources for such analysis and its possible results to be intelligible. Analysis itself is a possible, highly specialized course of action. Hence the agent must have already learned the skill of analysis to be able to determine the parts. The parts are not meaningful as such; they are just there. In order to have meaning, they must be habitually associated with their potential practical effects. Hence meaning is all about the *relations* of the parts to other things rather than the parts themselves. In a word, the meaning of the parts results from their being arranged in a certain way as a whole in the prevailing situation.

Many situations are non-epistemic: for instance, conversation, the use and enjoyment of certain goods, routine work, or games. Analysis and other epistemic activities derive their meaning, significance, purpose, and resources from the background of such activities. (Dewey 1916b: 1–13; 1929b: 103–104, 189–191; 1938: ch. IV.) Hence, in order to identify and determine a constituent, an unarticulated background¹⁸ — not necessarily background

¹⁶See Subsection 2.5.2.

¹⁷Hence Dewey's concept of *situation* is analogous to Rouse's (2002: ch. 8) and Hacking's ([1983] 2010: 220–232) concept of *phenomenon*. Rouse argues that phenomena are more basic than objects (cf. Heidegger [1927] 1977a: § 7) and that the determinacy of the objects presupposes the phenomenon, including the practical and conceptual powers of the agents involved. Peirce emphatically understood phenomena as objective, somewhat akin to “effect,” as in “the Hall effect” and “the Zeeman effect” (CP 5.425–427; EP 2: 339–341): reproducible patterns of events within nature under specific conditions.

¹⁸Dewey's thesis has an affinity with Heidegger's ([1935/36] 1977b; [1935/36] 1984) dialectic of earth (*die Erde*) and world (*die Welt*): on the one hand, determinate, meaningful entities can arise only against an indeterminate background; on the other, thereby

assumptions but emphatically the environing *conditions* that involve such activities — must be presupposed and taken for granted.

As such, a part of the whole is just a thing among other things. There is no reason to consider it and not something else instead. (Cf. Peirce CP 6.176.) It does not stand out on the background of other things. Thus it can be ignored. In order to identify a part *qua* part, it must have potential practical effects related to the ongoing course of purposive action (cf. Tiles 2010: 105–106); that is, it must be identifiable as an object, defined operationally as *a thing with meaning*.¹⁹ In order to be able to associate the part with its potential practical effects, a habit is needed; and that presupposes prior practical acquaintance with the part. That, in turn, presupposes *action*. Action is always selective: to do something is not to do anything else. That provides a reason for us to attend to the part we are operating upon and not anything else. Hence the target of our action stands out. As we undergo its practical effects, we are able to (fallibly) associate them with the part. That begins the establishment of habit that (fallibly) associates the part with its potential practical results when they are not directly present.²⁰ Hence *the determinacy of an object presupposes practice* (cf. Rouse 2002: ch. 8).

On the other hand, in everyday experience, many objects do seem readily determinate. But we cannot suppose in advance that this can be generalized to all objects. Moreover, even our most mundane power of discrimination of objects may be possible only because of prior learning: the mental effort we make to arrange and structure our experience may be so habituated that it goes unnoticed (cf. Piaget 1971).

The whole *may* be ultimately reducible to its parts. That must be tested in each case anew. But even then, the parts cannot be *understood* without taking the whole into account. They are there, perhaps independently of our concepts; but no concept can be applied to them independently of context.

Definite parts are the *result* of analysis. Therefore they cannot be the starting point. For somebody who encounters a certain kind of situation for the first time, the *situation itself* is epistemically basic. Continued involvement with it may result in the determination of its parts. The parts can be epistemically “basic” only in a derivative sense, namely, for an expert with sufficient prior knowledge about the given kind of situation.²¹

*The agent themselves is a part of the whole.*²² What applies to the de-

the background becomes partially articulated.

¹⁹See Subsection 2.5.2.

²⁰Thus “im Anfang war die Tat,” as Goethe declares in his *Faust* (1808; 1832).

²¹Here Dewey suspends judgment about *ontological* priority.

²²This point was also made by Heidegger ([1927] 1977a: §§ 12–13). Even Marx ([1844] 1968) seems to have such notion at certain places.

termination of the parts in general also applies to the determination of the agent in particular. Hence the identity of the agent is not a presupposition but a *result* of their interaction with their surroundings. The agent discovers themselves reflexively from phenomena, to the production of which they have contributed by their actions. Thus, by determining what nature is, we also determine who *we* are. By intra-acting with surroundings, native tendencies transform into a self. The nature of that self is discovered when it encounters resistance. (Dewey [1934] 1980: 281–282.) Error creates the sense of a non-ego, which suggests the postulate that there be an ego that can be in error (Peirce CP 2.176, 5.225–237; EP 1: 18–21). V. M. Colapietro (1997) explains how the agent acquires self-control in Peirce. Rehearsing possible experience in imagination gradually evolves into deliberation over possible courses of action, which the surrounding objects constrain, and taking responsibility of choices about them. Colapietro connects the emergence of self-control to Peirce’s semiotics.

V. Colapietro (2016: 307–311) explains the emergence of the autonomy of the agent. Consciousness is not necessarily reflexive. We gradually become aware of ourselves by becoming aware of an other, a non-ego. But the self is continuous with the environment of the organism: the habits involve both the organism and its environment of which it is a part. Becoming conscious and transforming our habits are two sides of the same phenomenon. When habitual action fails, we acquire a heightened consciousness of the situation. That provides the impulse to do something differently and therefore also the impulse to change habits deliberately. Self-control requires that the personality of the agent be integral. One may become aware of the disparity between their actual and aspirational selves. Now, our ideals and norms, willy-nilly, tend toward the integration of our habits. That, in turn, is the source of effective agency. In this sense, one becomes the master of one’s own conduct: one learns how to deliberately take (or abandon, for that matter) habits *and* to be conscious of their possession of such an ability. That requires, however, the support of the community. In this way, autonomy develops as a function of the interplay between awareness and habits, at various levels. According to Jung (2010: 155), Dewey’s (1922: 178–179, 182–183) account on agency is somewhat similar: “[h]abits and consciousness are seen not as opposites but as different, functionally coupled aspects of one and the same interaction cycle.” When habits change, there arises consciousness; and that happens, to a degree, all the time when we intra-act with our environment.

That makes the concept of nature ineliminably *political*. Nature is accessed through practice. Hence what it is to be natural is at stake in practices. What is considered “natural” or “unnatural” has normative significance and is sanctioned by society. Because nature is experienced as a field

of opportunities for action, much of our self-understanding arises from our understanding of nature. The counterfactuals that support causal claims depend on agency; and, conversely, our sense of agency depends on discovered causal relations. (Cf. Rouse 1987: 181–185; Lindholm 2023a: 21; 2023c: 100.)

Kant ([1781/7] 1956: B129–B169) may have been the first who had such notion.²³ In his 1787 “Transcendental Deduction of the Categories,” “Schematism,” “Refutation of Idealism,” and “Analogies of Experience,” he argued that the necessary unity of apperception must follow from concepts. That entails the objective validity of the categories. That, in turn, entails the existence of the transcendental ego.²⁴ Kant’s deduction is not impeccable, however. The transcendental ego must have an origin and a history of development, about which Kant says nothing.²⁵ Kant also does not take the bodily actions of the ego into account. Ihde ([1977] 2012: 11) points out that phenomenology has a similar, reflexive understanding of the “subject.” Rather than a presupposition, the “subject” is a *problem* for phenomenology.

Problematic situations call for epistemic activity, or *inquiry*. Dewey (1938: 104–105) defines *inquiry* operationally as “*the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole.*”²⁶ Problematic situations arise when habitual action fails.²⁷ Thus inquiry arises and acquires its meaning and significance from non-epistemic activities. To understand fully any scientific investigation, one must take account of the practices that frame the investigation (Tiles 2010: 109). A problematic situation is indeterminate: we do not know its meaning. The encountered phenomena might be new to us; or they might signify many different things, of which some may be even contradictory. Hence experience provides only *data*.

Dewey did not subscribe to sense-data theories. He argued that it requires skill (habit) to be able to determine what the data *are* in the first place. Data are not self-sufficient; on the contrary, they present *problems to be solved* (Dewey 1929b: 99–100, 103–104, 122–124, 133–134, 172–180, 189–191, 258–259). Hence, what he means here by “data” is that the agent needs

²³See also Fichte ([1794/5] 1997).

²⁴See also Guyer (2010: 129–150) and Emundts (2010).

²⁵According to Sami Pihlström, Kant was fully aware of the historicity of reason (private communication). Again, I have not found a passage in Kant’s primary works that confirms that.

²⁶See Subsection 2.5.2.

²⁷The failure of habitual action prompts an inquiry. I will present the *belief–doubt model of inquiry* in Section 4.3.

to take cognitive distance to direct experience in order to be able to relate critically to it rather than to be driven by it. Meanings (potential practical effects, or habits) allow cognitive distance. The introduction of criticism reduces direct experience into data. This notion is related to Dewey's (1896) criticism of the reflex arc: "stimulus" has no priority over "response" or *vice versa* because both occur simultaneously in the midst of an ongoing course of purposive behavior, in which the whole organism and its environment are implicated. In a sense, "stimulus" and "response" continually interpret each other. Stimulus is not always needed: the state of the organism may suffice to determine behavior. Thus the unit of analysis is a *sensorimotor circuit* rather than a unidirectional causal chain from stimulus to response. Perception and cognition do not "precede" action but constitute two of its essential components. That can be used to justify Dewey's operational definition of *experience*. Moreover, that annihilates the notion that contemplation be the default human activity from which action issues only when a "stimulus" is provided. (Jung 2010: 147–154; cf. Dewey 1910: ch. I; 1916b: 1–13.)

In a sense, data are "given": they are part of what the situation affords. But in inquiry there occurs a selection according to the relevance of data to the present problem. Data are *signs*: they suggest something not directly present: operations to be performed and their potential results. Some data are ambiguous. They need to be analyzed further. When data with unique meanings are found, only data capable of constructing a solution are selected; the rest is ignored. In this sense, the data to be used to construct a solution are "taken" rather than "given." Their status still remains hypothetical throughout inquiry. At any rate, knowledge just is not already there ready to be learned. It must be *produced* from what the situation affords. (Dewey 1929b: 178, 184; Tiles 2010: 105–106.)

Tiles (2010: 106–108) has crystallized Dewey's account on practical judgments into six points: (1) they involve "an incomplete situation," something objective that is lacking in a situation; (2) the judgment identifying what is to be done and how to go about it will be a factor in completing the situation; (3) of the possible ways of completing the situation, some are better than others and the judgment to be made will be "a factor in securing (as far as may be) the better"; (4) what is given (the incomplete situation) is not only to be treated as the judgment indicates, but admits of being so treated; (5) the judgment of what is to be done implies statements of fact about the situation, the course to be pursued and the means to be employed in the pursuit; (6) whether a practical judgment has been correctly made will be determined by trying the course of action indicated. (Dewey expresses this last point by saying "The event or issue of such action is the truth or falsity of the judgment.") Judgments of fact are located in this account under

the fifth item. Dewey put forward the hypothesis that all judgments of fact have a reference to a determination of courses of action to be tried and to the discovery of means for their realization. Reaching a practical judgment may require a judgment of value: what possible course of action is better than its alternatives. The traits of organism–environment intra-action that are relevant for evaluation exist independently of the judgment of value, but they acquire their status as valued through the function they perform in the determination of which proposed course of action is to be adopted. According to Tiles, Dewey wished to take some distance to James’s “will to believe” ([1897] 1907).

By definition, the problematic situation does not provide a solution by itself. But it may provide *resources* for us to construct a solution ourselves. That occasions an intensified awareness of the situation that leads to inquiry (which makes awareness physically effective rather than a mere epiphenomenon) (V. Colapietro 2016: 297–299; cf. Peirce CP 5.440, 5.493; EP 1: 361). Here “awareness” and “consciousness” denote a *function of habits* rather than an entity (Dewey 1922: 177; D. E. West 2014; D. West 2015a; 2015b; V. Colapietro 2016: 301–302, 301n7; cf. Peirce CP 8.279). In a sense, our consciousness is a product of obstructions of habitual action (V. Colapietro 2016: 303). By intelligently and creatively rearranging the resources that the situation affords, we can inquire what the data signify. That involves the generation of meaning by experiment.²⁸ The purpose of inquiry is to determine a unique meaning for each datum; in order to achieve that, parts must be analyzed into further parts until parts with unique meanings are found. These unique meanings, if adequate to resolve the problematic situation, refer to certain definite operations to be performed. The uniqueness of the meanings of data enables us to select the data that can be used to construct a solution-candidate to the problematic situation and ignore the rest. Then the solution-candidate must be tested; that is one more experiment to be conducted.

We may fail at any stage of inquiry. Therefore, inquiry always involves a risk. If a proposed solution succeeds, we can resume our prior activities. For such reasons, it is putting the cart before the horse to begin with parts, because the problem *is* how to determine the parts and their meaning in the first place. The parts cannot determine themselves; if they could, the problematic situation would not have arisen.

Purpose — the habitually projected end-in-view that maintains the coherence of the situation — acts as a filter. It enables us to select and attend to significant data (with regard to it) and ignore insignificant data (with re-

²⁸See Section 2.4.

gard to it). As V. Colapietro (2016: 300) explains, stimuli occur in the midst of, and acquire their meaning from, a course of behavior that is already going on, rather than initiate the course of behavior in question (cf. Dewey 1896). Without purpose, all data is equally significant or insignificant. We would have no rational basis to attend to something rather than something else, or to ignore something rather than something else. Then either our activity would be blind groping or we would be flooded by a massive amount of insignificant data. In the former case, success is accidental — though it can turn out to be serendipitous in future activities. Hence trial and error is not the opposite of method but the most basic method.²⁹ In the latter case, we simply could not cope with the situation.

As concerns trial and error, more developed methods are continuous with it because they are experimental; they always retain a degree of trial and error. We cannot possibly know in advance how to deal with the subject matter; otherwise there would not be a problematic situation in the first place. Therefore we must *experiment with method* simultaneously as we experiment with subject matter (cf. Dewey 1938: 13, 104). Thus, according to Chang (2022: 25), “[i]nquiry is a process of method-learning as well as content-learning.” Because of the experimental nature of method, *a priori* rules cannot be laid down for inquiry: the subject matter of inquiry determines what method will turn out best. Methods cannot be determined once and for all; they develop as inquirers (not necessarily scientists) invent better ways of reaching their ends-in-view. This process is radically unpredictable. Dewey (1916a: 194) defines *method* operationally as *the arrangement of subject matter which makes it most effective in use*, and *efficiency* as utilization of material with minimum waste of time and energy. For such reasons, method cannot be abstracted from its subject matter. In this sense, there is a “unity” of subject matter and method: subject matter cannot be distinguished from method except formally and nominally, because in the process of experience, what an individual does and what the environment does are united (Dewey 1916a: 195). Method must be adapted to each subject matter separately. Generalizations are often possible, but whether a given generalization holds for a given case must be tried out first. Hence method does not signify an independent, ready-made procedure to be followed to the letter. Such rejection of the *a priori* methodology implies *methodological pluralism*:

²⁹Dewey (1916a: 169–170) goes as far as to claim that *all* experience involves trial and error. The success of that method depends on circumstances and thus is generally ineffective. But eventually it will lead to rudimentary knowledge about causal relations. That will enable a higher-order control of conditions and thus refines the most basic method. That will lead to further discoveries. Then they can be used to refine the method even more, and so on.

no *a priori* restrictions can be laid down; in principle, to solve a problematic situation, one is epistemically entitled to do whatever it takes.³⁰

What attracts our attention is not necessarily significant for maintaining the ongoing course of action. Bright colors or loud voices might capture our attention but do not necessarily signify anything relevant for the purpose at hand. In order to discard the irrelevant, a prior habit that associates something else with its potential practical effects instead is needed.

Thus objectification is relative to purpose. Whether a thing, for instance a chair, is conceived as a whole or as an assemblage of parts depends on whether it is relevant to use it as a unit or as composite. The user has the former point of view, the carpenter the latter. Hence the determinacy of an object depends on purpose. Therefore it does not make sense to claim categorically that world consists of fully determinate objects. That would be a dogmatic metaphysical thesis. There are, or at least may be, things independently of us, but the only way for us to access them and to identify them depends on purpose. The world may be already parceled into determinate things, but *we cannot possibly know that*. (Dewey 1938: 67–68.)

Dewey argues that without an end in view, the brute sensations would bury us. Billions of sensations, as such, are equally unimportant. With our limited brainpower, we cannot cope with the situation without a purpose with regard to which most sensations are irrelevant and can be safely ignored. In order to make sense of sensations, we must be aware of a whole situation — including ourselves and our preferences — which structures sensations. On the other hand, if only the structure of perceptions is considered, we are led to ignore those experiences which do not fit the predetermined pattern, which may have catastrophic consequences. If the scheme is unsuitable for the problem in hand, precisely those sensations, which could convince us of the futility of the given approach and of the need of a new conceptualization of the situation, could be ignored. Thus the structure must also be relative to a purpose. A purpose is presupposed to make sensations and their structure act productively in concert. It selects and unifies the raw material of experience in order for us to be able to act intelligently, and the result is a holistic understanding of a situation which is *potentially* analyzable into constituents. (Dewey 1938: 70.)

Hence, if Dewey is right, the perception-first epistemology puts the cart before the horse. Contrary to the tradition, practice is epistemically prior to perception. Of course, sensations occur first temporally. But their *meaning* is derived from practice. Sensation, *qua* sensation, is no different from other

³⁰Dewey's pluralism is not necessarily very different from Feyerabend's ([1975] 2010) "anarchism."

sensations. Hence it cannot become an object of experience as such. But if it has meaning — if it means something else for a potential interpreter, if it has potential practical effects, if it suggests something that is absent at the moment —, it stands out and acquires the ability to guide the course of ongoing action.

According to Jung (2010), Dewey’s notion of action differs from both the traditional rational choice theory and the normative action theory. Dewey emphasizes the *creativity* of action. He also focuses on the development of the control of bodily movements, the ability to determine goals, and the degree of autonomy a person may have, rather than presupposes each of these. Dewey stresses the importance of sensitivity to *situation*, *corporeality*, and *sociality* of action. His notion of creativity is habit-based and embodied.

I have emphasized the irreducibility of intra-action between an organism and the environment of which it is a part. Arguably, that commits me to philosophically problematic higher-order logics: I am predicating things about *relations* between objects.³¹ That may be the case, but I am not interested in logical finesse. If our known logics make my position problematic, *so much worse for our known logics*. My position is confirmed by direct experience accessible in principle to everybody. If logic is unable to express a phenomenon, the fault is in logic, not the phenomenon. If our known logics are incapable of dealing with bidirectional intra-action, logicians are at liberty to introduce better logics.

3.2 Peirce’s Phenomenology

Like his younger contemporary Husserl, Peirce created a phenomenological theory of experience. It enriches the pragmatist account of experience by analyzing the contents of experience into three real (mind-independent) categories. I cite this analysis here briefly: both for its own sake and because Peirce applies it to his semiotics, into which I will delve in Chapter 5. That will be necessary for showing that knowledge is practice in Chapter 6. The phenomenological analysis of experience demonstrates three-category realism. That is a further argument against “idealism” and “subjectivism.”

In Subsection 3.2.1, I will justify the office of phenomenology. If phenomenology is the science of experience *qua* experience, and if *experience* is defined operationally as explained above, then phenomenology can be defended against charges of “idealism” and “subjectivism”: phenomenology studies *modes of organism–environment intra-action*. Thus phenomenology

³¹I thank Francesco Orsi for suggesting me the possibility of a version of this objection on his course in metaethics.

is not simply about what *appears*; it also encompasses what we can *make* appear. In the absence of division into experience and nature, the categories of *experience* are also the categories of *nature*.

In Subsection 3.2.2, I will introduce and explain Peirce's categories. In Subsection 3.2.3, I will show how Peirce arrived at them phenomenologically. Peirce argued that everything that can be present to experience can be analyzed into three independent categories: *firstness*, *secondness*, and *thirdness*. "Qualities of feeling"³² fall under firstness; the co-occurrence of effort and resistance, under secondness; and the establishment of habit,³³ under thirdness. I will describe how the categories are mutually related and implicated in Subsection 3.2.4.

I will continue the analysis of habit (practice) in Subsection 3.2.5 by applying the categories. In short, habits are universals and therefore fall under thirdness, and they determine particular actions that fall under secondness.

I will generalize the thesis of the potential theory-ladenness of observation into the thesis of the potential practice-ladenness of experience in Subsection 3.2.6. That involves another argument for the epistemic primacy of practice.

Peirce subscribed to objective idealism in the early-to-mid 1890s before his eventual conversion to three-category realism in 1897. In this period, he developed an evolutionary cosmology by applying his categories to ontology. His purpose was to explain natural laws by an evolutionary argument. I will cite this development cursorily in Subsection 3.2.7 in order to explain why it is not necessary to adopt objective idealism in this PhD thesis. In Peirce's case, objective idealism shades into scholastic realism: it is simply about the reality (mind-independence) of thirdness, the category of universals.

3.2.1 The Concept of Phenomenology

Johann Heinrich Lambert (1728–1777) coined the term "phenomenology"³⁴ to denote the scientific analysis of experience. Hegel famously used it in the title of his *Phänomenologie des Geistes* ([1807] 1970). Both Peirce and Husserl adopted it. Both gave an original meaning to the term in order to distinguish it from that of Hegel's. Peirce started to call phenomenology

³²Peirce does not define "qualities of feeling." Colloquially, they seem to mean how things *feel*. According to Jung (2010: 148–149, 158), Dewey considered such qualia as *adverbial aspects of behavior*.

³³For an analysis of the pragmatist notion of *habit*, see Section 2.3.

³⁴From *φαινόμενον*: "what appears"; and *λόγος*: "account," "field of study." The word *φαινόμενον* is the neuter middle-passive of *φαίνω*: "I make something appear."

*phaneroscopy*³⁵ in 1906 to emphasize that the meaning he gave to the term is original (Peirce EP 2: 389ff.). Peirce stated that “[t]he business of phenomenology is to draw up a catalogue of categories and prove its sufficiency and freedom from redundancies, to make out the characteristics of each category, and to show the relations of each to the others” (CP 5.43; EP 2: 148).

Peirce’s phenomenology brackets the question, whether what appears in experience is real (CP 1.186; EP 2: 259). In that respect, his method is parallel to Husserl’s. Peirce did not use the term “bracketing” himself, but the idea is there. He says that phenomenology treats the universal qualities of phenomena in their immediate phenomenal character, in themselves as phenomena (CP 5.122; EP 2: 197), and studies the categories in their forms of firstness³⁶ (EP 2: 272). This means that phenomena are taken regardless of how they are related to anything else. Thus Peirce too brackets the question, whether they “represent” anything beyond themselves.³⁷

This methodological move seems to presuppose that there be a “more real” reality beyond experience. Dewey (1929b: 295) and Määttänen (2015: ix) rejected this notion: the world as we experience it is already a real world. The quest for a “more real” reality is nonsensical: it leads to an infinite regress: the same question could be made about “still more real” reality, and so on, *ad infinitum*. Experience is fallible,³⁸ but that does not justify an ontological distinction between “experience” and “nature” (Dewey 1916b; 1920; [1925] 1929a). A false experience can be corrected by *another* experience (rather than Reason, with capital “R,” abstracted from experience). Experience, understood as organism–environment intra-action,³⁹ already takes place within nature. Hence the bracketing of “reality” seems superfluous.

On the other hand, when Peirce goes on to argue for the reality of his categories, it seems that the initial bracketing is only a methodological strategy to be relinquished at this point: the initial suspension of judgment about the reality of phenomena is only instrumental for establishing their reality later.

According to Peirce, the purpose of phenomenology is to study phenomena *qua* phenomena in their most general features⁴⁰ and thereby to derive

³⁵From φανερός: “apparent”; and σκοπέω: “I look at.” φανερός has the same root as φαίνομαι.

³⁶Firstness is one of Peirce’s three categories; see Subsection 3.2.3.

³⁷Husserl explains, what he means by “natural attitude” (*natürliche Einstellung*), “bracketing” (*Ausschaltung, Einklammerung*), ἐποχή, “phenomenological attitude” (*phänomenologische Einstellung*), and “phenomenological reduction” (*phänomenologische Reduktion*), in Husserl ([1913] 1976c: §§ 27–32, 50, 61–62).

³⁸For fallibilism, see Chapter 4.

³⁹See Section 3.1.

⁴⁰For Peirce, philosophy is *cenoscopy* (from κοινοσκοπία): the lookout upon the common,

his three categories. He emphasizes that experience sufficient to perform the phenomenological derivation of categories is, in principle, available to everybody, because each category is present to everyday experience. In order to discover the categories, one just needs to apply mathematics — the logic of relations in particular — for methodological reasons: mathematics is the only science that is more basic than phenomenology. (Peirce CP 5.37–43; EP 2: 143–144, 147–148.)

Because of Peirce’s own terminology, one might very well suspect that his categories only exist in the mind. On the other hand, Peirce (EP 2: 427–428) argued that to the three kinds of predicates there correspond three kinds of characters. That seems to imply that the structure that exists in the mind can also be found in nature. Moreover, in a Deweyan framework, phenomenology is *the study of the forms and modes of organism–environment intra-action*.⁴¹ As I have explained, Dewey’s notion of experience cuts across the subject–object dichotomy. Organism–environment intra-action is an impeccably natural process. Therefore phenomenology is not necessarily “subjectivist” or “idealist.” Because there is no split between experience and nature (Dewey [1925] 1929a), the categories of *experience* are simultaneously the categories of *being*.

Don Ihde has defended phenomenology against the same prejudices. He states that phenomenology accepts anything present to experience as data but relates to it critically without making presuppositions about its being self-evident or whether or not it is “within the mind.” Introspection is allowed⁴² but should be considered as only one method among others. Extrospection is allowed equally. Phenomenology counters accusations of subjectivism by distinguishing between introspection and reflection. The “subject” is a problem for phenomenology, not a presupposition; it is known reflexively from phenomena: what is present and how it is present. Phenomenology is not content with mere description and analysis in the ordinary sense: phenomenological analysis proper probes for what is discoverable and potentially there. (Ihde [1977] 2012: 10–13.) I contend that Ihde’s theses on phenomenology apply to Peirce’s version.

Peirce’s classification of the sciences is based on Auguste Comte’s (1798–

as distinct from special science or *idioscopy* (from ἰδίοσχοπία): the lookout upon the special. Special sciences presuppose everyday experience but also employ specific techniques and instruments. Peirce adopted the Greek terms from Jeremy Bentham.

⁴¹Peirce and Husserl might not have accepted this reinterpretation. It does not represent their view. Rather, my purpose is to dispense with certain prejudices about phenomenology as clearly as possible and to show that it does not necessarily contradict naturalism.

⁴²The young Peirce would have disagreed about the possibility of introspection (CP 5.244–249; EP 1: 22–23).

1857) principle: if a science presupposes the principles of another, but not *vice versa*, then the latter is more basic (CP 1.180; EP 2: 258). Peirce concluded that mathematics is the most basic science: it presupposes nothing, because it only derives consequences of certain hypotheses independently of whether they are true or not. In a word, it studies validity rather than truth. Hence mathematics has no real content and is ontologically innocuous.⁴³ It is a “negative” science, though Peirce believed that it is based on experimentation on diagrams — a method which he seems to have adapted from J. J. Sylvester (1814–1897) and which he developed further — and observing its results.⁴⁴ Mathematics, in Peirce’s sense, includes formal logic.⁴⁵ (Peirce CP 1.184–185, 1.247, 2.77, 2.782; EP 2: 259; cf. Vehkavaara 2007: 270.)

Philosophy is the second most basic class of sciences. It is the most basic positive science: it discovers truths, namely truths that are available for any kind of experience. Philosophy is subdivided into phenomenology, normative science, and metaphysics. Phenomenology presupposes only mathematics; normative science presupposes mathematics and phenomenology; and metaphysics presupposes mathematics, phenomenology and normative science. Normative science is subdivided into aesthetics, ethics, and logic insofar as it is not merely formal. Aesthetics presupposes mathematics and phenomenology; ethics presupposes mathematics, phenomenology and aesthetics; and logic presupposes mathematics, phenomenology, aesthetics and ethics. Special sciences, like physics and psychology, presuppose all of these. (Peirce CP 1.7, 1.247, 1.180–202, 2.77, 2.119, 2.197, 3.363, 3.427–429, 3.432, 3.641, 4.240, 4.531, 5.39–40, 5.108, 5.154, 5.161–162, 5.579, 5.581; EP 1: 227; EP 2: 35, 45, 47, 51, 144, 146, 188, 209–210, 212–213, 258–262, 458.)

Sonesson (2016: 293–294) argues that Peirce’s phenomenology can be understood as a special case of Husserl’s phenomenology. Sonesson believes that Peirce’s metalanguage seems to be insufficiently precise for accomplishing the task of phenomenology and that it should be supplemented by Husserl’s conceptual apparatus. I believe, however, that Peirce’s metalanguage is sufficient for my more limited purposes.

⁴³Something similar can be found in Descartes ([1641] 1692: 6–7; [1641] 1984: 14) and Kant ([1781/7] 1956: B146–147).

⁴⁴In this sense, mathematics is “synthetic.” Cf. Kant ([1781/7] 1956: B14–18, A23–25/B38–40, A712–738/B740–766; [1783] 1913: §§ 4, 6–13).

⁴⁵That makes Peirce an anti-logician, opposed to the doctrine of Gottlob Frege and Bertrand Russell.

3.2.2 Peirce's Categories

Peirce follows Aristotle (1962a), Kant ([1781/7] 1956), and Hegel ([1807] 1970; [1812–3] 1969a; [1816] 1969b) and understands categories as the *highest genera of being*. He derived a system of three categories — prosaically entitled as *firstness*, *secondness*, and *thirdness* — by several means (see, e.g., CP 1.300–353, 5.14–81, 5.88–212, 5.77n, 6.18–20; EP 1: 290–291; EP 2: 133–241). I will cite his phenomenological derivation, since everybody can empirically test it for themselves.

The central insight in Peirce's phenomenological derivation is the application of Augustus de Morgan's (1806–1871) logic of relations to experience (Peirce CP 1.562; EP 2: 425–426). That allowed Peirce to define simple concepts which would have been inexplicable and unanalyzable in syllogistic logic without relations (cf. Peirce CP 5.177, 5.207; EP 2: 219, 221, 239). Such advances in logic dispensed with references to intuition, which 19th-century neo-Kantians and neo-Hegelians resorted to.

The titles of the categories refer to the arity of the relations that compose each category: what is expressible by a unary relation (monadic predicate), falls under firstness; by a binary relation (dyadic predicate), under secondness; and by a tertiary relation (triadic predicate), under thirdness.

Peirce's own definitions of the categories are cryptic.⁴⁶ I am unable to make sense of them.⁴⁷ Hence I will give my own definitions on the basis of the discussion above:

Anything that can be expressed by a monadic predicate or a unary relation falls under firstness. A phenomenon that falls under firstness is called a *first*.

Anything that can be expressed by a dyadic predicate or a binary relation falls under secondness. A phenomenon that falls

⁴⁶Peirce derived the categories *a priori* in “On a New List of Categories” of 1867 (Peirce CP 1.545–559; EP 1: 1–10) by *prescission*, a method borrowed from medieval philosophy. He switched to an *a posteriori* method by the mid-1880s; see “One, Two, Three: Kantian Categories” (EP 1: 242–244), “A Guess at the Riddle” (CP 1.354–416; EP 1: 245–279), and “Trichotomic” (EP 1: 280–284). The categories reappear in his *evolutionary cosmology*, published in the “Metaphysical Series” in *The Monist* in 1891–3 (CP 6.7–65, 6.102–163, 6.238–271, 6.287–317; EP 1: 285–371). Peirce has retained the definitions roughly intact in his 1903 *Harvard Lectures on Pragmatism* (CP 5.66–67; EP 2: 160). However, in the 1903 *A Syllabus of Certain Topics of Logic* (EP 2: 267), he has reformulated the definitions again. See also Esposito (1980).

⁴⁷Bellucci's (2018: 106ff.) exposition of Peirce's algebra of relatives may shed some light on Peirce's definitions of the categories, especially that of thirdness. It seems that Peirce's pupil Oscar H. Mitchell was behind some of Peirce's discoveries, including quantifiers and their definition in the terms of the algebra of relations.

under secondness is called a *second*.

Anything that can be expressed by a triadic (or higher) predicate or a tertiary (or higher) relation falls under thirdness. A phenomenon that falls under thirdness is called a *third*.⁴⁸

The definitions are abstract and probably difficult to understand. Hence I will give phenomenological examples of the instantiations of the categories. First, a “quality of feeling” is a positive phenomenon that is not necessarily related to anything else. Hence it is a first. Second, the co-occurrence of effort and resistance involves two reacting, opposite positives but does not necessarily entail law. Hence it is a second. Third, the establishment of habit relates a sequence of past actions to the next. Hence (at least) three things are involved. Hence the establishment of habit is a third.

Because the categories of *experience* are also the categories of *being*, I will also give metaphysical examples of the instantiations of the categories. First, chance is, by definition, unrelated to anything else. Hence it is a first. Second, efficient causation involves two intra-acting positives. Hence it is a second. Third, a law relates a sequence of past events to the next. Hence (at least) three things are involved. Hence each law is a third.

The most significant category is thirdness — both for Peirce himself and for my purposes. I am arguing that *knowledge is practice*, or *intelligent habit*. A thing is known by subsuming it under a universal. Habits are universals: they determine actual and potential actions of a given kind. Universals are thirds: they determine actual and potential particulars of a given class. The establishment of habit falls under thirdness. Hence the acquisition of knowledge also falls under thirdness. This is one way in which the presence of thirdness to experience and nature renders the world knowable. In particular, laws make the world intelligible and rationally comprehensible.

This is not the only possible account on the categories. For instance, I agree with Ransdell (1989), but Sonesson (2016: 285–288) understands the categories differently. I do not believe that the difference between Sonesson and me is serious. If it turns out that his account is correct and mine incorrect, I believe that the rest of my thesis can accommodate that without further ado.

3.2.3 The Derivation of the Categories

I will cite Peirce’s phenomenological derivation of the categories, which everyone can do for themselves, at least in principle. In a nutshell, Peirce derives

⁴⁸Bellucci (2018: 113) suggests that “plural” be equivalent to “triadic” because higher relations can be reduced to complexes of thirds.

the categories simply by enumerating kinds of experience which manifest each category.

I have already said that “qualities of feeling” are firsts. The presence of firstness in experience can be discovered simply as *presentness* and *immediacy*. According to Peirce (CP 5.44; EP 2: 149–150), “[t]he present, being such as it is while utterly ignoring everything else, is *positively* such as it is.” The supreme instance of firstness is “any simple and positive quality of feeling.”⁴⁹ A “quality of feeling” is a predicate that is independent of all other predicates; it only refers to the subject in which it inheres (EP 2: 549–550; MS 318: 183–184); hence it falls under firstness.

Peirce (CP 1.357) claimed that firstness cannot be articulately thought and that every description of it must be false to it. According to Short (2007: 76), this claim must be understood so that Peirce denied that firstness could be thought or expressed by descriptions *alone*: there will always be a remainder. If Short is correct, language cannot express everything. Peirce (CP 2.197) himself seems to have meant that there are some aspects of the world which phenomenology cannot describe but can only point at for an unprejudiced observer to experience themselves in a given way.

I have also said that chance is a first. Random phenomena are not determined by previous events (at least completely). Hence, in metaphysics, chance is independent of everything else and falls under firstness. Firstness allows *novelty*. That makes Peirce an indeterminist.⁵⁰

I have, once again, said that the co-occurrence of effort and resistance is a second. The presence of secondness is manifest in *struggle* in the same phenomenon. In this sense, Peirce claims, there is no difference between agent and patient; that distinction would introduce thirdness to the experience. Thus action falls under secondness. In this sense, secondness allows *efficacy*. (CP 1.324, 5.45; EP 2: 150, 171, 268.)

Secondness is real in surprising experiences as well. According to Peirce (CP 5.51; EP 2: 154, 194), experience is our teacher whose pedagogic method is “practical jokes, mostly cruel.” When an expectation fails, a non-ego is forced upon experience (CP 5.52, 5.57–58; EP 2: 154, 194–195).

In short, secondness involves one thing brutally acting upon another. Hence, in metaphysics, efficient causation falls under secondness. But the idea of any *law* or *reason* involves thirdness. Accordingly, Peirce maintains

⁴⁹That does not necessarily mean that there be *qualia*, or mental entities.

⁵⁰Peirce’s indeterminism was influenced by Charles Darwin and James Clerk Maxwell. Darwin (1859; [1871] 1877) postulated that there occur random (unpredictable) variations in the genetic inheritance of any species. Maxwell introduced statistical thermodynamics which treats the behavior of gases in statistical rather than deterministic terms.

that “to exist” means *to act and to be acted upon*.⁵¹ Hence an individual thing cannot be pointed out merely by universals or descriptions, only by its effects. Individuality is therefore another species of secondness. Here Peirce has adopted Duns Scotus’s (c. 1265/66–1308) notion of *haecceitas* or “thisness.” (Peirce CP 1.405, 5.45, 6.318, 6.374.)

Firstness and secondness supply a direct access to the world. Thus they are simple and straightforward. Thirdness is more complex. It is also the most difficult to understand. It encompasses universals, laws of nature, habits, and sign-relations. Peirce’s own descriptions of thirdness are excessively technical. They might strike the reader as incomprehensible. I find them labyrinthine too. I have provided my own description in Lindholm (2023a: 29–30). I will restate it here in more detail.

A universal⁵² determines not only a class of actual particulars but also *potential* particulars (Peirce W 1: 263; cf. Bellucci 2018: 34). Potential particulars can differ in an uncountably infinite number of ways: all possible variations constitute a continuum. The cardinality of a continuum is strictly greater than that of a discrete series.⁵³ Hence no enumeration of particulars can exhaust a universal.⁵⁴ This proves scholastic realism, or the position that some universals are real (mind-independent), *a posteriori*. Peirce, influenced by Duns Scotus, had maintained this position from very early on.

Consider a stone. It is possible for us to imagine that a bigger or a smaller stone could be possible. But then a stone of *any* size between the bigger and the smaller stone seem possible too. However much bigger or smaller the imagined stones are, the size of a stone varies on a continuum, and the universal “stone” accounts for all possibilities on that continuum. This simple thought-experiment demonstrates that at least one universal is real. Similar thought-experiments can be devised for other universals (but not necessarily for all of them). Universals “mediate” known particulars and the next particular of the same class by varying on a continuum. The “opposition” of two different particulars makes sense if their difference obtains on a continuous

⁵¹Peirce distinguished between existence (causal activity) and reality (mind-independence). Everything that exists is real, but there are real things that do not exist. Nonexistent but real things include chance and law.

⁵²According to Aristotle, a universal can be predicated of many things (Aristotle 1962b: 17a35–b5).

⁵³Thus Peirce: “the idea of a general involves the idea of possible variations which no multitude of existing things could exhaust” (CP 5.103; cf. CP 5.467; EP 2: 183, 401–402). Hence “[t]rue generality is, in fact, nothing but a rudimentary form of true continuity” (CP 6.172; cf. EP 2: 183).

⁵⁴For instance, William Ockham (c. 1287–1347), an outstanding nominalist, believed that such enumeration be sufficient to account for a universal without remainder (cf. Kenny [2005] 2007: 143–150). If Peirce is right, then Ockham was mistaken.

medium or scale. Here “mediation” must be understood as *relating* known particulars to possible ones. (Cf. Santaella 2016: 165.)

One may ask, what it *means* for a universal to be in the mind. According to Stjernfelt (2016: 253), a universal is in the mind *habitualiter*, which means that the habit simply *is* the way that a universal is in the mind; it forms a part of the structure of the mind, also when it is not present to the mind. Thus we may be unaware of it. (Cf. Peirce CP 8.18; EP 1: 92.)

Peirce gives an analogous account on the reality of law. A law is a universal in the sense that it applies to many particular events. A law determines both actual and potential events. Potential events vary on a continuum, while any enumeration of actual events remains discrete. Hence no list of particular events can exhaust all potentialities that laws make possible. (Cf. CP 2.148, 5.103, 5.467; EP 2: 183, 401–402.) Laws are thirds, because they “mediate” previous events and the next event; laws *relate* previous events to the next one (cf. CP 1.409; EP 1: 277). Moreover, laws mediate between chance and mechanism (Peirce EP 1: 243; cf. Nöth 2016: 54).

Peirce also argues that we can at least sometimes form reliable expectations. Hence, there must be at least some laws in nature. David Hume ([1739–40] 1854a: bk. I, pt. III; [1748] 1854b: § 4) correctly pointed out that there is nothing necessary in a sequence of similar events: it cannot determine that the next event will turn out the same. Thus the problem of induction. But Peirce turns this observation into an argument for scholastic realism: precisely for that reason, the determination of the next case must be based on something else, something more general and more comprehensive than the sequence itself. Thus some laws must be real. Laws determine also *potential* events — a power that no collection of particulars has. Moreover, if there were no laws, all regularities in nature would be completely accidental. That is highly implausible: then the probability that things turn out in the same way would decrease exponentially as the number of instances increases. (Cf. CP 5.93–107; EP 2: 181–186.)

Habit is analogous to universals and laws. A habit is a universal in the sense that it determines many particular actions,⁵⁵ whether actual or potential (cf. Curley 1969). Possible actions vary on a continuum, while any sequence of actual actions remains discrete. Habits are thirds, because they “mediate” previous actions and the next action; habits *relate* previous actions to the next one. (Cf. Peirce CP 5.467, 5.510, 8.361; EP 2: 401–402, 487–488; cf. Stjernfelt 2016: 245.) Peirce’s understanding of the analogy between

⁵⁵According to Nöth (2016: 44), habits do not determine just actions but also unintentional experiences, if they occur repeatedly. He explains that for Peirce, the frequent experience of an event is a habit determined by the probability of its occurrence (cf. MS 671: 8–9).

habit and law was comprehensive; sometimes he called laws “habitudes of nature” (e.g., Peirce CP 5.587; EP 2: 53; cf. Määttä 2015: 34).

According to Nöth (2016: 49–52), a habit is a kind of law; habits are embodiments of laws; habits inherit from laws the characteristics of continuity, regularity, and *esse in futuro*; but unlike laws, habits have varying degrees of strength, which contributes to their plasticity (cf. Peirce CP 5.477). The plasticity of habits allows learning, on the one hand, and error, on the other (CP 6.86).⁵⁶

By analogy, sign-relations are akin to universals, laws, and habits. They determine actual and potential interpretants. (Peirce CP 5.97; EP 2: 181–182; cf. Short 2007: 87; Peirce EP 2: 303.) I will explain that notion in Chapter 5.

Against Locke, Peirce derived mind from signs rather than *vice versa* (Skagestad 2004). Concerning mental phenomena, Peirce also elaborated on the connection between continuity and thirdness in his 1892 “The Law of Mind” (CP 6.102–163; EP 1: 312–333). Hence, in metaphysics, mental phenomena fall under thirdness. Thirdness allows *knowledge* and *understanding*. Peirce took the liberty to call all thirds “mind” by analogy. That position crystallizes his objective idealism that is simultaneously part of his naturalism: mind is real, but it is part of nature rather than something distinct from, and opposed to, nature. It is not necessary for us to consider mind in this way.

Moreover, in metaphysics, evolution manifests thirdness (CP 6.32; EP 1: 297). A class (akin to a population of particulars) evolves at least potentially when novel particulars are included.

Firstnesses and secondnesses provide direct access to the world. But they cannot be understood save by a higher-order thirdness. Thirdness renders nature knowable: a thing is known by subsuming it under a universal. Short (2007: 86) argues that it is thirdness that helps an agent gain cognitive distance to the immediate situation; and, hence, because the presence of

⁵⁶Nöth (2016: 52–55) observes that Peirce uses the term “law” ambiguously: sometimes he speaks about “blind laws” that fall under secondness, or, more precisely, secondness in thirdness; sometimes he speaks about “intelligent laws” that fall under thirdness, or, more precisely, thirdness in thirdness. Laws of nature are a kind of “blind laws” because they are (relatively) fixed. Habits are a kind of “intelligent laws” due to their plasticity. Often it must be inferred from the context, in which sense he is using the term.

It seems incoherent that Peirce defines the laws of nature sometimes as habit-like and sometimes as blind. He may have changed his mind in 1891: before that, he considered laws of nature fixed, while after that, he considered them partly plastic. Another possible explanation is that his focus shifted from a synchronic perspective to an evolutionary one: synchronically viewed, a law of nature is fixed, but evolutionarily viewed, it is partly plastic.

thirdness in experience is responsible for such representation and mediation, it becomes possible for experience to have truth value and expectations to succeed or fail. Particulars can be known insofar as they manifest regularity.⁵⁷ Irregularities and idiosyncrasies can be real, but they remain unknowable.

Thirdness — intelligibility — is present to experience in the establishment of habit (EP 2: 269). Hence reasoning is part of experience, rather than something distinct from, or opposed to, experience. In short, reasoning operates upon habit (practice) (Peirce CP 2.176, 3.163, 6.86, 6.286, 6.481; EP 1: 202; EP 2: 447–448; Dewey 1916a: 39–40, 54–58, 62, 120, 153–154, 263–264, 319, 323, 400; 1922: 177; 1938: 3–6, 12; 1938: 4–6, 12; cf. Bisanz & Cunningham 2016: 402–411; Bellucci 2018: 102). According to Peirce, “[t]he third element of the phenomenon is that we perceive it to be intelligible, that is, to be subject to law, or capable of being represented by a general sign or Symbol” (CP 8.268). Short (2007: 85) explains this passage thus: “a distinct element of the phaneron⁵⁸ is the intelligible; the intelligible is the lawful; the lawful can be apprehended only in a symbol. A symbol is a sign that is a law determining what may count as its instances and also determining what they are to be interpreted as signifying.⁵⁹ The intelligible is therefore that which can be apprehended in a sign whose law mirrors its own law [...]” This is an important consequence of Peirce’s phenomenology. In particular, it follows that *semiosis takes place within the sphere of experience (the phenomenal world)*. Now, recall that experience — organism–environment intra-action — takes place within nature. Hence *there is no need to establish a connection between signs and nature: sign-processes are already part of nature*.

If reasoning is determined by habit (practice), it becomes easy to establish *ontological symmetry*: nature consists in processes, and a habit (practice) is a process within nature; the knower, the known, and knowledge itself are co-produced in our habitual intra-actions with our environment (Lindholm 2024b).

Stjernfelt (2014: 39n29, 43n34) argues that there is generality already in perception and action. They are wired together so that the general purposes of action select the general patterns constructed by perception. Thus inference is as basic as perception and action. Perception typically detects general action affordances. Relevant aspects of world structure impose themselves on the organism in perception–action cycles. Peirce himself says that third-

⁵⁷I thank Kirsi Liikkanen (private communication) for asking whether and how particulars can be known in pragmatist epistemology.

⁵⁸Phenomenon.

⁵⁹For the concept of symbol, see Subsection 5.5.1.

ness is directly perceived when we form perceptual judgments⁶⁰ that already contain “elements of generality” (EP 2: 223–224).

The whole of the 1903 *Harvard Lectures* (Peirce CP 1.314–316, 5.14–81, 5.88–212, 5.77n; EP 2: 133–241) is intended to demonstrate the reality — that is, mind-independence — of each category. Fisch (1986: 184–200) has described Peirce’s intellectual development into a three-category realist by 1897 (cf. Peirce CP 1.405, 6.318).

de Waal (2010: 10) summarizes Peirce’s derivation of categories as follows. Anything that can be distinctly thought about involves some *thing* positively, thus involving firstness. But being distinctly what it is, it is different from everything else. This negation introduces secondness. But opposition implies a medium: opposites must be opposed *in some certain respect* (possibly everything) for their mutual opposition to make sense. Hence the opposites have something in common. That brings in thirdness: a shared medium. Therefore, in order to think about anything articulately, it seems that all three categories are necessarily present. However, de Waal does not cite where this derivation can be found in primary literature.

Nominalism, or the position that only particulars can be real, would be a grave mistake. If universals only inhabited the human mind, but did not correspond to anything outside it, the result would be dualism. It would be difficult to explain the emergence of the human mind in evolutionary terms. (Stjernfelt 2016: 261.)

The categories are independent of each other. It is logically impossible to reduce a second into a complex of firsts; and it is logically impossible to reduce a third into a complex of firsts and seconds.

Peirce claimed, without proof,⁶¹ that any higher predicate or relation (fourthness and beyond) can be expressed as a complex of thirdnesses (EP 2:

⁶⁰See Section 3.3.

⁶¹He sketched a proof in “A Guess at the Riddle”: if a triadic relation is bound by a variable to another, together they yield a fourthness or a quaternary relation; and by mathematical induction, combining n thirdnesses in this way, a relation of arity $n + 2$ can be constructed. This process has a topological analogy in “branching” or “forking of roads”: if there is a crossroads where three roads meet, one of the roads can fork anew, and together these two crossroads yield a system where four roads meet. A system of n branches yields a system of $n + 2$ roads. (Peirce CP 1.371; cf. EP 2: 364; Peirce W 5: 455; cf. Bellucci 2018: 108–109.)

Another analogy comes from chemistry. Peirce was a chemist himself, and thus it is not surprising to find him analyzing categories in the terms of valency; see, e.g., Peirce (CP 1.289). But he does not explain how binding variables should be understood or even whether they exist.

Peirce (CP 1.337) also explains that “a fork in the road is a third, it supposes three ways: a straight road, considered merely as a connection between two places is second, but so far as it implies passing through intermediate places it is third.”

267). He does not deny the possibility of the presence of higher categories to experience; he merely claims that they can be reduced to thirdnesses. Robert Burch (1991) has suggested a rigorous proof. It seems to me that Peirce's algebra of relatives already contains the elements of the proof (Peirce W 4: 210–211; Bellucci 2018: 108ff.).

Peirce's architectonic is reminiscent of Kant's ([1781/7] 1956: A80/B106).⁶² But Kant's categories are allegedly *a priori*, necessary, categorical, and infallible; while Peirce's categories are emphatically *a posteriori*, contingent, hypothetical, and fallible.⁶³ Yet Peirce's categories are normative: what structures experience is derived from experience itself. (S. Rosenthal 1997.)

True, in his 1867 paper "On a New List of Categories" (CP 1.545–559; EP 1: 1–10), he attempted to demonstrate the necessity of his categories *a priori*. But his thought developed. Since the 1890s, he forswore any *a priori* demonstration of their necessity. (Short 2007: 31.) Around 1894 he wrote that "each category has to justify itself by an inductive examination which will result in assigning to it only a limited and approximate validity" (Peirce CP 1.301). In 1897 he wrote that demonstrative proof is not to be thought of anywhere in his philosophy (Peirce CP 1.7). (Cf. Robin 1997.) This should adequately reply to Rorty (1982: 161), who accuses Peirce of entertaining an ahistorical hierarchy of things which could be discovered by epistemology or semantics in the Kantian fashion.

3.2.4 The Mutual Relations between the Categories

Peirce's system of categories is holistic: each category makes sense only with reference to the other two.

First, thirdness requires firstness. Without possible random variations (firstness), all habits (thirdness) would be rigid. They could not evolve. People could not adapt their behavior to conditions. (Cf. Peirce CP 1.390, 6.59; EP 1: 308.)

Second, thirdness requires secondness. Without brute contact to mind-independent facts (secondness), the establishment of habits (thirdness) would be impossible: there would be nothing to adapt to. Moreover, ideas (thirdnesses) cannot be communicated unless incorporated in a physical medium (secondness) (Peirce EP 2: 326).

⁶²Peirce (CP 1.561, 6.9, 8.329; EP 1: 286; EP 2: 424) explicitly cited Kant as his inspiration.

⁶³In order to show an error in Peirce's categories, one has to demonstrate that at least one of them cannot be present to experience, or that something irreducibly quaternary or more complex can be present to experience.

Per impossibile, if thirdness could be real independently of the two other categories, it would be completely arbitrary: there would be no *reason* why lawlike phenomena occur in a certain way and not others (cf. Dewey 1922: 16). Thirdness being the very category of intelligibility, its arbitrariness would undermine its own justification. Hence real thirdness without real firstness and real secondness would be a *contradictio in adjecto* (cf. Santaella 2016).

Universals (thirdnesses) could hardly be universals of anything, if there were no particulars (secondnesses) and their properties (firstnesses) that would fall under them (Peirce CP 2.293; EP 2: 274).

Third, firstness requires secondness. Chance (firstness) cannot have effects without being causally connected (secondness).

Fourth, secondness requires firstness. A particular (secondness) could not be a particular without some unpredetermined traits (firstnesses) that make it different from other particulars of the same class.

The mutual independence of the categories does not mean that one category could be real without the others. Firstness and secondness are always accompanied by thirdness. But thirdness requires an independent firstness and an independent secondness to be manifest. (Peirce CP 5.90–91; EP 2: 177.) In particular, representation or signification cannot be reduced to firstness or secondness (CP 5.89; EP 2: 176).

Atã and Queiroz (2016) have argued that nature has at least three mutually intra-acting⁶⁴ levels: a micro-level, a focal level, and a macro-level. Events (seconds) take place at the focal level. The micro-level and the macro-level constrain the focal level: the micro-level involves contingent initial conditions (firsts); and the macro-level involves boundary conditions (thirds) that regulate the dynamics at the focal level.

3.2.5 Habit and Action

Habits are modes of thirdness⁶⁵ (Nöth 2016: 38), actions modes of secondness. Because thirdnesses do not reduce to secondnesses or *vice versa*, habits do not reduce to actions or *vice versa* (cf. CP 5.467; EP 2: 402). Peirce conceived habits as *rules of action* (CP 2.643, 5.397; EP 1: 129, 198).

⁶⁴I substitute Barad's (1996) concept of "intra-action" for "interaction" here.

⁶⁵Sometimes Peirce even defined *thirdness* as "the tendency to take habits" (CP 1.390, 6.32; EP 1: 243–244, 264–265, 296–297), which is itself a habit (CP 6.612).

On the other hand, Gorrée (2016) considers habits inferior to thirdness. I am unable to follow her argument. It seems to me that her interpretation wildly departs from the spirit of Peirce's primary works.

The categories can be applied to each other, which yields a more detailed subdivision of the concept of habit. According to Nöth (2016), habits of feeling, action, and thought exemplify how firstness, secondness, and thirdness, respectively, may be included in, subsumed under, or determined by a higher-order thirdness, namely habit. He maintains that there are habits of feeling, or “phenomena of thirdness of firstness”; habits of action, or “phenomena of thirdness of secondness”; and habits of thought, or (by analogy) phenomena of thirdness of thirdness (see CP 1.530 and MS 852: 8–9). Habits of thought include habits of feeling and action, whereas habits of feeling are possible without habits of thought and habits of action. Habits of feeling are established unreflectively, and they cannot be deliberately changed; whereas habits of thought and action include the habit of habit change (or “habituescence”) and thus can be deliberately modified. In what follows, when I speak about habits *simpliciter*, I will refer to habits of action unless indicated otherwise.

Määtänen (2015: 33–34, 38, 50) explains, what it means for a habit to be a universal. By the means of habits, a universal can be an object of experience, though not directly. If the world has regularities, action necessarily accommodates to them. When that occurs, the regularities become imprinted into the schematic structure of habits (cf. Piaget 1971). Now, to experience a habit, and with it the structure of regularities, is to act according to it. Habit-formation is thus a way to experience a universal effective in the world.⁶⁶

Hence, universals are not merely something that *can be predicated of many things*.⁶⁷ They can be *enacted in many situations* as well. Hence universals cannot be purely abstract.

Määtänen’s thesis that universals can be objects of experience — though only indirectly — flies in the face of the late medieval and early modern (nominalist or conceptualist) philosophy which takes the object of experience consist solely in particulars and universals to exist only in the mind at most.

Habits provide *a posteriori* evidence for the thesis that the world has a structure independently of us. D. E. West (2016) argues in her difficult article that indices⁶⁸ in secondness constitute the earliest and firmest foundation

⁶⁶Peirce might have thought along the same lines when he called laws “habitudes of nature” (Peirce CP 5.587; EP 2: 53; cf. Määtänen 2015: 34). He may have meant that regularities of action and regularities of nature are logically on a par: a habit determines all possible actions of a kind; and a law of nature determines all possible events of a kind.

⁶⁷Aristotle (1962b: 17a35–b5) famously defined *universal* as something that can be predicated of many things: “Ἐπεὶ δ’ ἐστὶ τὰ μὲν καθόλου τῶν πραγμάτων τὰ δὲ καθ’ ἕκαστον (λέγω δὲ καθόλου μὲν ὃ ἐπὶ πλείονων πέφυκε κατηγορεῖσθαι, καθ’ ἕκαστον δὲ ὃ μὴ, οἷον ἄνθρωπος μὲν τῶν καθόλου, Καλλίας δὲ τῶν καθ’ ἕκαστον).”

⁶⁸See Section 5.5.1.

for the establishment of habit, undergirded by habit-change and logical interpretants. Indices are the primary source to determine regularities in lived experience. Determinations, rather than resolutions, are the impetus for habit-change. West argues that the development of the cognitive capabilities of infants support her view: indexical relations, and logical interpretants⁶⁹ underpinning them, to the environment teach infants to negotiate their way through the world. The capacity for habit-change develops out of repeated purposive efforts. By “internalizing” dialogue (cf. e.g. Peirce & Welby SS: 195), one acquires the capacity to take or change virtual (imagined) habits. They can be subsequently realized “externally.” That is the beginning of the formation of determination by which we acquire the capacity of taking or changing habits proper. In dialogue, indices integrate logic with experience. Engaging in intra- or intersubjective dialogue demonstrates how indices are responsible for advances to higher levels of logical and semiotic functioning. (Cf. Bellucci 2014a: 536; Peirce MS 313: 32; MS 620: 24; NEM 4: 248; Vygotsky [1934] 1986.)

Kilpinen (2002) has claimed that the concept of action makes sense in the terms of practice, not the other way around. Hence a practice cannot be reduced to any number of actions.

However, analytic philosophy and Aristotelianism have focused on the analysis of actions. This gives more conceptual precision but results in triviality. On the other hand, praxis-based philosophy is apt to handle more complex cases but at the cost of precision. (Kilpinen 2002: 285–286.)

The problem with action-based theories can be illuminated using the Aristotelian practical syllogism as an example:

1. Agent *A* wants to bring about a state of affairs *p* in their environing reality.
2. *A* knows or believes that in order to bring about *p* they must do the action *q*.
3. Hence *A* proceeds to do *q*.

The structure of the syllogism presents the decision to do something as the final phase. However, according to non-Aristotelians, the decision is only the beginning. They want to know whether the decision affects anything and how and why. Thus, in Aristotelianism, the most interesting part of the action, the action itself, is removed from the picture. Moreover, the action is abstracted out of its historical context. Something always precedes the action and the agent, for the agent does also many other things than this

⁶⁹See Sections 5.6 and 5.13.

one single act, and these other things consist in practices. (Kilpinen 2002: 286.)

Kilpinen (2002: 287) argues that the intentionality of an agent can concern not only individual actions but whole practices. He uses a tennis player as an example in the manner of G. H. Mead and Pierre Bourdieu. A beginner in tennis can only attend to individual acts. But as their acquaintance with the game builds, they become able to attend to the whole game, while the intentionality of a single act begins to disappear from their individual strokes. Thus the sphere of intentionality is enlarged to encompass the game as a whole. After that, single acts may well become objects of intention, but their meaning is not *sui generis* but is acquired as a part of the whole game. (Cf. Määttänen 2015: 35.)

According to Kilpinen (2002: 289–290), Peirce seems to have held that the rationality of an individual act derives from that of a habit. Thus, Kilpinen concludes that practice is primary and individual acts are only secondary.

The universal character of a habit is not complete: it determines the general characteristics of actions, but details must be filled in creatively and *ad hoc* on the basis of the particular situation. Thus intelligent habits are not mechanical repetition but evolve and at least potentially engage intelligence.⁷⁰

V. Colapietro (2016: 304–305) seems to confirm Kilpinen’s account. As a habit is established, it tends to become automatic. That frees our cognitive powers to attend to the context more comprehensively. We act on habits but do not usually attend to them, save when we are learning them. This seems to be analogous with Heidegger’s ([1927] 1977a: §§ 15–16) famous “tool analysis.” According to Jung (2010), Dewey too maintains that a single action is a snapshot of a more comprehensive *agency* that gradually emerges from experience.

The regular component of habit clearly falls under thirdness, but according to M. Anderson (2016: 3), Peirce allowed habit to manifest itself also in firstness, shared with sensation and instinct, and in secondness, with sensation and “the ‘I will’ of volition” (cf. MS 930).

Kilpinen (2016) goes as far as to claim that the reality of habit does not depend on its empirical occurrences. In particular, he wishes to purge the concept of habit from its association with repetition. On the contrary, habit makes the emergence of mind possible. Thus reasoning takes place *within* the sphere of experience, namely, in the form of thirdness.⁷¹ Peirce emphasized that he means *voluntary* habit, habit *conscious* of the case of application,

⁷⁰See Subsection 2.3.2.

⁷¹See Subsection 3.2.3.

habit *under self-control* (EP 2: 549n49; cf. CP 8.304). Peirce did not reject repetition as such. He only subordinated it to the intellectual deliverances of habit-formation (cf. NEM 4: 71; James 1890: 1.122). Kilpinen argues that Peirce’s conception of habit is only superficially akin to Wittgenstein’s (e.g. [1953] 2009: § 219) notion of rule-following. According to Kilpinen, repetitive habit is oriented towards the past, while Peirce’s intelligent habit is emphatically oriented towards the future. Dewey’s distinction between *intelligent* and *unintelligent habit* is based on similar considerations.⁷²

Peirce does not mean that self-control reside in individual actions. He considers it an effect of *building up a character* (CP 4.611; cf. Dewey 1922: 19, 24, 38, 40, 43, 121, 136). In other words, the establishment of habit is logically prior to individual actions. (Kilpinen 2016: 210–211.)

He also believes that unlike some commentators have argued, the later Peirce did not eliminate the concept of action from his later “pragmatism.” On the contrary, the practical dimension of thinking *elevates* thought (rather than degrades it) (cf. Peirce CP 6.324). He simply did not wish to *reduce* life to action. Thus Peirce does not sever action and knowledge apart. (Kilpinen 2016: 205–206.)

3.2.6 The Practice-Ladenness of Experience

Habit, or, better, the *establishment* of habit, is a mode of thirdness. It bestows us with cognition. Firstness and secondness furnish us with a direct access to the world, but in order to understand them, a higher-order thirdness is needed. Thus all cognition is mediated by the “refractive medium” of habits (Dewey 1922: 32): the accumulation of prior experience affects the apprehension of the present at least potentially. In short, we form habits of observation, ways of seeing things (and the same applies to every sense). In this Subsection, I will explain what that means and why it is the case. I will call this explanation *the thesis that all experience is at least potentially practice-laden*. Because theorizing is one of scientific practices (Barad 1996: 166; Rouse 1996: 127), my thesis is a generalization of the better-known thesis that *observation is at least potentially theory-laden*. I have worked this generalization out in Lindholm (2024b: 57–58).

I have explained above that habits or practices associate the objects we encounter with their potential practical effects.⁷³ That makes it possible for us to project *expectations* and *ends-in-view*, or *purposes*.⁷⁴ I have also explained above that an ongoing course of purposive action maintains the

⁷²See Subsection 2.3.2.

⁷³See Sections 2.2 and 2.3.

⁷⁴See Subsection 2.3.4.

coherence and integrity of the situation in which experience, or organism–environment intra-action, takes place.⁷⁵ In this way, habit or practice is epistemically more basic than observation. Purpose constrains observation: we attend to the traits of the environment the potential practical effects of which are relevant for the purpose at hand. Thus the “same”⁷⁶ object can appear differently in different situations: it is related differently to different purposes. Purposes stem from habits or practices. Therefore *all experience is at least potentially habit- or practice-laden*. Given that theorizing is a practice, the thesis of the potential theory-ladenness of observation follows as a possible special case.

Thus habits “mediate” experience, but that must not be understood as habits intruding between us and the world. We retain *direct* access to the world via firstness and secondness. But habitual *expectations* magnify some traits of experience and diminish others.⁷⁷ Thanks to the gradually emerging thirdness, we become able to experience universal traits of our environment. In Peirce’s (CP 5.150; EP 2: 207) idiom, “Generality, Thirdness, pours in upon us in our very perceptual judgments, and all reasoning, so far as it depends on necessary reasoning, that is to say, mathematical reasoning, turns upon the perception of generality and continuity at every step.”⁷⁸

The thesis of the potential practice-ladenness of experience is Kantian in spirit: *cognition enters experience*. In this sense, neo-Kantians are correct in that all knowledge is interpreted. But they are wrong, if they insist that interpretation be necessarily linguistic. Recall that I have argued that there are *non-linguistic meanings* fit for *non-linguistic interpretation*.⁷⁹ A universal hermeneutics that studies practices and instruments is possible without the mediation of language.⁸⁰

3.2.7 Evolutionary Cosmology

Peirce subscribed to objective idealism in his mid-career before his 1897 development into a three-category realist. He created an *evolutionary cosmology* that already involves many elements incorporated in his later realism. It is

⁷⁵See Subsection 3.1.3.

⁷⁶Here I understand “sameness” *counterfactually*. Let us suppose practices *A* and *B*. Let us also suppose that practice *A* involves object *O*. Now, if an object is accessed in practice *B*, it *could* be identified as *O*, *if* practice *A* were engaged in the same situation instead and *O* functioned as it ought to function in practice *A*.

⁷⁷Thus I have previously used the term *expectation-ladenness* (Lindholm 2023b).

⁷⁸This statement must be understood in the context of Peirce’s 1903 *Harvard Lectures on Pragmatism* (CP 1.314–316, 5.14–81, 5.88–212, 5.77n; EP 2: 133–241)

⁷⁹See Section 2.2.3.

⁸⁰See Sections 2.7 and 2.8.

based on a metaphysical interpretation of his categories: chance falls under firstness, efficient causation under secondness, and the evolution of laws under thirdness. (CP 1.1–2, 1.354–368, 1.373–375, 1.379–416, 6.7–65, 6.102–163, 6.238–271, 6.287–317; EP 1: 242–371.) This relatively brief speculative turn in his philosophy might be related to his forced resignation from the US Coast and Geodetic Survey in 1891 (Brent 1993: 203–268; Goriée 2016: 21–22).

Usually science explains phenomena by laws of nature. The purpose of evolutionary cosmology is to scientifically explain *the laws of nature themselves*. Peirce argued that laws have evolved out of primordial randomness — not a far cry from contemporary experimental cosmology that studies quantum phenomena and cosmic background radiation and posits Heisenberg’s principle of indeterminacy, the big bang, and cosmic inflation. Unger and Smolin (2015) too have recently made the hypothesis that laws of nature evolve. According to Peirce, by the definition of firstness, the universe must have begun from chance, spontaneously, without being related to anything. By definition, secondness and thirdness cannot have been the origin of the universe, because they already involve a relation. They must have developed subsequently out of intra-actions between several random phenomena. Peirce’s view was simply “Darwinism analyzed, generalized, and brought into the realm of Ontology” (EP 1: 222). Greek and Roman mythologies have such notion of the emergence of κόσμος (ordered universe) from χάος (disorder) (cf. e.g. Hesiod 2006a; Publius Ovidius Naso 1786). For Anaxagoras (Diels & Kranz 1959: 59B12), the ordering principle was νοῦς.⁸¹ Plato’s *Timaeus* (1981), which also exhibits a similar myth, may also have influenced Peirce. Peirce’s hypothesis concerning the origin of the universe is audacious but *prima facie* sound. At any rate, we need not accept it; but it must be taken into account in order to understand the rest of his *oeuvre*.⁸²

Evolutionary cosmology incorporates three metaphysical doctrines: *tychism*,⁸³ or the reality of chance; *anankism*,⁸⁴ or the reality of necessity; and

⁸¹Greek for “mind,” “reason,” or “understanding.” Aristotle (1933: 984b) claims that Hermotimus of Clazomenae posited νοῦς in this sense first. Later it was invoked by Heraclitus and Parmenides.

⁸²For a contemporary account on evolutionary cosmology, see, for instance, Hausman (1993), Santaella (2001), Houser (2014), and Nöth (2016: 45–49).

⁸³From τύχη: “chance,” “luck.” Tychism is not a contradictory attempt to “explain” things by appealing to pure randomness; it only maintains that some events do not follow from previous ones by law (Peirce CP 1.161). Peirce states that he makes use of chance chiefly to make room for a principle of generalization, or tendency to form habits, which, he holds, has produced all regularities (CP 6.63; EP 1: 310). See also Andacht (2016: 354–355).

⁸⁴From ἀνάγκη: “force,” “constraint,” “necessity.”

synechism,⁸⁵ or the reality of continuity that entails universals, natural laws, habit-taking processes, semiosis, and evolution. Later he worked these ideas into his semiotics. They are not arbitrary: evolutionary cosmology is simply a consequence of the application of Augustus de Morgan's (1806–1871) logic of relations to ontology.

In the 1903 *Harvard Lectures on Pragmatism* (CP 1.314–316, 5.14–81, 5.88–212, 5.77n; EP 2: 133–241), Peirce aligns his theory of categories with pragmatism, now defining the latter as realism with regard to all three categories. He preserves what was fruitful in his earlier objective idealism as realism about thirdness. In short, real thirdness means simply that scholastic realism is true. Thirdness is the rational component of the universe, perhaps somewhat akin to Anaxagoras's νοῦς. Peirce might be projecting anthropomorphic properties to the universe, but we need not necessarily agree with him. The rationality of the universe can be taken to mean simply that *the universe is intelligible*.

Peirce's most convincing argument for evolutionary cosmology is abductive. He argues that there is chance, and there is law; and the only thing that can explain how law emerges from randomness is habit-taking. (Santaella 2016: 168–169; Peirce CP 6.263; EP 1: 346–347).

I suggest a quasi-Spinozist reading of Peirce's evolutionary cosmology. de Spinoza ([1677] 1905) famously argued that matter and mind are not substances but *attributes* of the sole substance, *Deus sive Natura*. Through habit-taking, matter interprets itself (Coletta 2016: 69–70); there emerges *physiosemosis* (Deely 2001). According to Skagestad (2004), that gives rise to mind. Thus, in Peirce's terms, one can take matter as secondness and habit-taking and mind as thirdness.⁸⁶ Secondness and thirdness are logically independent but parallel aspects of experience and nature. Thus both materialism and idealism are true, in a sense: matter is independent of mind, but mind exists “objectively” in nature and is part of its structure. But both matter and mind are perfectly natural phenomena, amenable to experimentation. One can accept this reading independently of Peirce's bold claim that matter be effete mind (CP 6.25; EP 1: 293). But Spinoza was a determinist. There is no room for chance or firstness in his metaphysics. Hence the prefix *quasi*.

⁸⁵From συνεχής: “continuous.” See also Dewey (1938: 18–19, 23–24), Gale (2010: 65–67), and Santaella (2016).

⁸⁶See Section 2.3 and Subsections 3.2.5 and 3.2.6.

3.3 Percept, Perceptual Judgment, and Perceptuum

In this Section, I will describe how semiosis, or the process of interpreting sign-vehicles,⁸⁷ starts. The origin of semiosis is the apprehension of a *percept*. We are unable to criticize it. Hence its epistemic status is problematic. That shows why observation provides *problems to be solved* rather than self-sufficient objects of knowledge, as I claimed above. Semiosis is the process of making sense of and solving these problems. According to Peirce's *belief-doubt model of inquiry*, the apperception of percepts and the making of perceptual judgments also take place in inquiry.⁸⁸

Peirce seems to have held throughout his career that all knowledge is derived from experience.⁸⁹ Hence he occasionally cited the *peripatetic axiom*: “Nothing is in the intellect that was not first in the senses.”⁹⁰ By the previous discussion,⁹¹ senses should be supplemented by actions and habits. Hence Peirce should have said that nothing is in the intellect that was not first in *practice*.⁹²

Peirce provided an account how experience acquires propositional content and thereby also truth-value. Three concepts are needed in the analysis: *percept*, *judgment*, and *perceptual judgment*.

A *percept* is “an image or moving picture or other exhibition” (Peirce CP 5.115; EP 2: 191). It is the positive (i.e. empirical), *sui generis* content of an experience: it contains “the qualities of feeling or sensation.”⁹³ It compels itself arationally upon the mind of the perceiver.⁹⁴ That distinguishes it from an axiom. It is strictly particular. It is undivided as such, though it can be analyzed into parts. It is not propositional. As such, it has no truth-value, because it does not represent anything. (Cf. Peirce CP 7.619–628.)

A *judgment* in general is “an act of formation of a mental proposition

⁸⁷I will explain the notions of *semiosis* and *sign-vehicle* in Chapter 5.

⁸⁸I will explain that notion in Section 4.3.

⁸⁹See, e.g., Peirce (CP 2.444; EP 2: 24), where he specifically speaks about observation.

⁹⁰*Nihil est in intellectu quod non sit prius in sensu* (Thomas Aquinas [1256–9] 1918: q. 2, a. 3, arg. 19). This doctrine has been derived from Aristotle (1960a: 100a–b).

⁹¹See Sections 3.1 and 3.2.

⁹²Thus, my revision of Aquinas reads *nihil est in intellectu quod non sit prius in praxi*. Leibniz's ([1704] 1921: 70) formula *[n]ihil est in intellectu quod non fuerit in sensu; excipe, nisi ipse intellectus* may be unsalvageable because he postulates a complete and self-sufficient intellect which is independent of practice.

⁹³This property of self-sufficiency falls under firstness; see Subsection 3.2.3. Again, it might seem that Peirce is positing *qualia*, or mental entities. That is not the case: firstnesses are predicates rather than substances.

⁹⁴This property of standing out falls under secondness; see Subsection 3.2.3.

combined with an adoption of it or act of assent to it” (Peirce CP 5.115; EP 2: 191). A *perceptual judgment* is “the first judgment of a person as to what is before his senses.” Alternatively, a *perceptual judgment* is a judgment absolutely forced upon one’s acceptance, by a process which they are utterly unable to control and consequently unable to criticize (CP 5.157; EP 2: 210). Our inability to criticize them does not mean that they be justified or true. Perceptual judgments, justified or not, true or false, are the first premises of all reasoning: all beliefs, justified or not, true or false, are derived from them. (Peirce CP 5.115; EP 2: 191.) Hence all knowledge is *a posteriori*.

A perceptual judgment professes to indexically⁹⁵ represent a percept (CP 7.628). A perceptual judgment asserts in propositional form what a character of a percept directly present to the mind is (CP 5.54; EP 2: 155). It represents something⁹⁶ (CP 7.630) and thus has a truth-value: “[i]n a perceptual judgment the mind professes to tell the mind’s future self what the character of the present percept is” (CP 7.630). This involves a distinction between sensation and perception: seeing involves a percept, but looking involves a perceptual judgment (CP 7.627). Perception involves generality: its predicate is universal⁹⁷ (CP 5.151; EP 2: 208). Thirdness, in this case a habit of observation,⁹⁸ contributes to the formation of the perceptual judgment by introducing generality: “Generality, Thirdness, pours in upon us in our very perceptual judgments, and all reasoning, so far as it depends on necessary reasoning, that is to say, mathematical reasoning, turns upon the perception of generality and continuity at every step” (CP 5.150; EP 2: 207). But interpretations of perceptual judgments can be criticized, and so can interpretations of such interpretations, etc., *ad infinitum* (CP 5.442; EP 2: 348). This is one possible way to reply to Rorty’s (1982: xlv n25) qualms about Peirce’s (CP 5.405–407; EP 1: 136–139) notion of truth.

According to Short (2007: 319n1), a percept, when interpreted in a perceptual judgment, becomes a *percipuum* (cf. Peirce CP 7.629). According to Hausman (1997: 188–189), a percipuum is the initial percept as immediately interpreted. It links brute percepts and conscious, discursive thought that is exemplified in perceptual judgment. A percipuum has a truth-value. When veracious, a percipuum *is* the perceived world our judgments represent, though only insofar as that world appears to us in the percept.⁹⁹ Hence

⁹⁵For the definition of index, see Subsection 5.5.1.

⁹⁶This property of representation falls under thirdness and thus implies mental activity; see Subsection 3.2.3.

⁹⁷Peirce cites Aristotle’s definition of *universal*: something that can be predicated of many things (Aristotle 1962b: 17a35–b5). See also Subsection 3.2.3.

⁹⁸See Subsection 3.2.6.

⁹⁹See also Dewey (1929b: 295) and Rouse (1987: 7–8).

Parmenides's influential distinction between "reality" and "appearance" is only relative: what appears is part of reality, rather than something distinct from, or opposed to, reality.

By "observation," Peirce means "the enforced element in the history of our lives"; and by "the act of observation," "the deliberate yielding of ourselves to that *force majeure*" (CP 5.581; EP 2: 47). In another passage, he defines "perception" as an event "wherein a positive qualitative content is forced upon one's acknowledgment without any reason or pretension to reason" (CP 7.623). Thus, observation or perception has a certain imperative force which is manifest in *percepts* and *perceptual judgments* which we cannot doubt or criticize even though they are fallible¹⁰⁰ (CP 5.55; EP 2: 155). They are simply forced upon the mind. But this does not entail skepticism: it is idle, or even nonsensical, to criticize anything over which one can exercise no sort of control (CP 5.55; EP 2: 155).

According to Short (2007: 347), Peirce held that percepts and perceptual judgments are not self-authenticating. Empirical knowledge, including science, has a beginning (namely percepts), but it is not a foundation, because it has initially no justification.¹⁰¹ Here Peirce departs from Kant. Peirce denied self-evident truths of experience already in his 1868 "Questions Concerning Certain Faculties Claimed for Man" (CP 5.213–263; EP 1: 11–27), which led to his doctrine that "all thought is in signs" (CP 5.253; EP 1: 24) — that is, all thought, including perceptual judgments, is mediated and hence in need of justification itself. However, the absence of *a priori* justification does not imply that science could not discover its own justification *a posteriori*. Backtracking experience only leads to an infinite regress. Hence the only possibility is that one must hope that a justification be discovered in the future.¹⁰²

According to Peirce (EP 2: 328), the object of knowledge has the nature of a sign. The objects of which ordinary general propositions have to be true are the body of future percepts. Percepts are signs, whether veracious or not.

Short (2007: 339–340) understands perceptual judgments *both* as refer-

¹⁰⁰For the concept of fallibilism, see Chapter 4.

¹⁰¹I will argue that any alleged epistemic foundation is useless in Section 4.3.

¹⁰²Reichenbach (1938a; 1938b) distinguished between "context of discovery," which needs no justification, and "context of justification," where the discoveries are given a rational reconstruction afterwards. But I reject Reichenbach's idea. I grant that justification is issued after an inquiry has reached a conclusion. But it is based on the *practices* which are part of the "context of discovery." Inquiry must be competently executed; otherwise it can be legitimately questioned. Hence at least a part of justification arises from the "context of discovery." Reichenbach's distinction might hold nominally but cannot possibly hold really. See Lindholm (2021: 12).

ring to particulars *and* as describing them.¹⁰³ He locates the nexus between observation and theory, or the particular and the general, there.

Stjernfelt (2014: 120–121) explains the presence of thirdness already in perception (cf. Peirce CP 5.157; EP 2: 211). Perception is geared from the outset for extracting general features of the environment. But this is not a higher-order cognitive achievement: reality has in itself general structures which perception is able to grasp. This is not to say that there be no higher-level processing. There will be, of course, also abstractions and generalizations. They will not remove the presence of generality already in perception. On the contrary, they will add to it.

Stjernfelt (2014: 138, 138n8) explains why true generality enters into simple perception–action loops. The simpler the organism is, the simpler its reactions to stimuli. And always reacting the same way to a given stimulus is quantifying universally. On the other hand, he argues that perceiving individual objects seems to be a late and sophisticated capacity.

According to Bellucci (2018: 87–91), Peirce had maintained that there is no clear difference between experience and inference at least since 1868. For the young Peirce, a sensation is only the material quality of a sign-vehicle, and our cognition processes sign-vehicles inferentially.¹⁰⁴ In particular, we perform abductions (see Lipton [1991] 2004; Niiniluoto 2018) when we identify objects by the sensations they effect. But there is still a subtle difference: inference proper is controlled activity, but sensation involves an uncontrollable element. Peirce restated this thesis in the 1903 *Harvard Lectures on Pragmatism*: perception and abduction shade into one another (CP 5.151–212; EP 2: 208–241).

3.4 Invariance

Eino Kaila (1939; 2014) argued that invariances are “the objective of knowledge.” He distinguished substantial invariances from relational invariances. The former were the objective of Aristotelianism; the latter, that of Galileanism. Kaila seems to have considered invariances as formal. I will argue here that they cannot be purely abstract, because they can become objects of experience. The discovery of invariances serves as an *a posteriori* proof of

¹⁰³In the mature Peirce’s idiom, perceptual judgments are propositions, or *dicisigns*. A *dicisign* is a symbol which contains an indexical subject which indicates an object and an iconic predicate which describes that object; see Subsection 5.5.1 and Section 5.10. A perceptual judgment is true, if the object indicated by the subject part exists and the predicate part describes it correctly; and false otherwise.

¹⁰⁴I will explain the concept of *sign-vehicle* in Chapter 5.

realism — also in the case that the predicate “real” (“mind-independent”) only applies to possible experience —: there are traits in experience that cannot be done away with by mere thinking.

The idea of substantial invariance tries to account for the permanence of a substrate (ὑποκείμενον) when the world appears to change. Aristotle argued that nature consists in primary and secondary *substances*. A primary substance is a particular thing, a union of matter (ὑλη) and form (μορφή). Universals constitute secondary substances. Aristotle posited that each primary substance has an immutable essence (οὐσία) which remains undisturbed when the accidents of the substance change.¹⁰⁵

Modern science has eschewed Aristotelianism in general and essentialism in particular. It has widely been considered unscientific to try to explain phenomena by citing unobservable substantial causes or teleological ends associated with them.¹⁰⁶ I have refuted essentialism as well.¹⁰⁷

The idea of relational invariance tries to capture the unchanging nature of mathematical laws of nature. The world appears to be in constant movement, but this movement is governed by (allegedly) unobservable, unchanging mathematical laws.¹⁰⁸ In order to discover such laws, one must infer abductively to the best explanation (Lipton [1991] 2004; Niiniluoto 2018). Once discovered, these laws can become an object of experience by the establishment of a habit (practice) — for instance, a way of making certain experiments in certain conditions. I have explained above that the establishment of a habit consists in the accommodation of behavior to the general traits of natural and social phenomena. The structure of the phenomena becomes the structure of the habit. Thereby these general traits become objects of experience by acting habitually. Thus laws of nature, or relational invariances, incorporate “concrete” traits and can be experienced.¹⁰⁹ Moreover, given that certain measurable quantities are isomorphic with certain geometrical quantities, laws of nature can indeed be *perceived* by plotting their trajectories on a graph in a coordinate system (cf. Ihde 1998: 151–169).

Invariances are universals almost by definition: they remain the same in different conditions. As universals, they fall under thirdness; hence they can be present to experience.¹¹⁰ Hence invariances cannot be purely formal

¹⁰⁵See Aristotle (1929; 1933; 1934; 1935a; 1962a).

¹⁰⁶There seems, however, to be some room for teleological ends, if Short (2007: chs. 4 and 5) and Salthe (2016) are right.

¹⁰⁷See Subsection 2.5.1.

¹⁰⁸In this respect, modern science revives the Pythagorean and Platonic notion that quantities explain nature, in opposition to the medieval, Aristotelian, qualitative physics.

¹⁰⁹See Subsection 3.2.5.

¹¹⁰See Subsection 3.2.3.

and abstract: they also incorporate something “material” and “concrete” in a broad sense of the terms, which might be better described as “content.” Moreover, thirdnesses can evolve at least potentially as they adapt to secondnesses. Hence, given that invariances fall under thirdness, they are not necessarily absolute but *approximate* and *relative* at least potentially. (Lindholm 2023a: 30–31; cf. Henning 1998.)

One is entitled to ask, how I can account for reality. I reply that *the (approximate and relative) invariances that appear in experience are real*. Their very (approximate and relative) invariance demonstrates their mind-independence — even if they are present to a mind. I have emphasized throughout this Chapter that one should not demarcate between “reality” and “experience.” On the contrary, experience is the way reality becomes manifest to us (Chang 2022: 142), and therefore the predicate “real” only makes sense within the phenomenal world. Hasok Chang’s *coherence theory of reality* (2022: ch. 3) captures my view. He argues that “*an entity is real to the extent that there are operationally coherent activities that can be performed by relying significantly on its existence and its properties*” (Chang 2022: 121). Here “coherence” does not denote (merely) a logical property but *aim-oriented coordination in activities*, a matter of doing what makes sense to do (Chang 2022: ch. 1). Chang’s (2022: 121–122) purpose is semantic: to explicitly make sense of what people *mean* by “real.” He argues that we use the term ‘real’ to *mean* having the capacity to support coherent activities: “we have firsthand knowledge that an entity is real if we (personally) know how to perform some operationally coherent activities that rely on its existence and its properties.” That can only mean (approximate and relative) invariance: if an object changes when in use, that may compromise the success of that use. According to Chang (2022: 142, 146–148), “reality” in this sense is domain-specific and comes in degrees. The (fallible) criterion of the reality of an entity is the support that that thing provides for a coherent activity (Chang 2022: 153). Different activities often have incompatible ontologies. Sometimes even the *same* activity involves incompatible ontologies. Chang maintains that that is unproblematic — even on critical scientific realist grounds — because science is not finished yet, and we do not know what the final ontology will be (if any). Science is not a teleological process driven by its yet unrealized terminus. Moreover, it is rare that incompatible ontologies *logically* contradict each other; and even if they do, semantic incommensurability prevents any direct contradiction. Thus we are at liberty to entertain *any* ontology that supports coherent activities. But that does not entail arbitrariness: it is not up to us to decide what practices will succeed. (Chang 2022: 153–155; Lewis [1929] 1956: 268.)

3.5 Cybernetic Epistemology

I have introduced cybernetic epistemology in Lindholm (2023a). It is based on the bidirectional intra-action between organism and environment; if the intra-action happens to be unidirectional, that follows as a special case. Its upshot is the necessity of action: in order to learn, one must *act*. The stabilization of conditions is necessary for invariances, or stationary states of organism–environment intra-action, to appear. That is a *control engineering problem*, which I will describe in Subsection 3.5.1. The result is *process epistemology*, according to which *knowledge evolves*. That suggests *process ontology*, according to which entities — and if Peirce is right, even laws of nature — evolve.

3.5.1 Knowledge as a Control Engineering Problem

Experience — bidirectional organism–environment intra-action — means *feedback*. Now, *cybernetics*¹¹¹ is the science of feedback systems. Wiener (1948) defines *cybernetics* as “control and communication in the animal and the machine.” Wiener’s cybernetics is a field of applied mathematics. In control engineering, a field of technics that borders on, and is based on, applied mathematics, the standard way to implement self-regulating control in a machine is feedback. In biology, there are several feedback mechanisms that maintain homeostasis in organisms and ecological systems. However, Wiener’s definition is too narrow by his own principles: the laws of control and communication apply to *entire systems* which may or may not include animals or machines.¹¹² An epistemology that adopts the bidirectional notion of experience is a *cybernetic epistemology*. Its unit of analysis is not an object or its properties, but the *intra-action* between an agent and an object (or several objects, possibly including instruments).¹¹³ (Lindholm 2023a: 7.)

I suggest that the pragmatist notion of *habit* and Rouse’s notion of *practice*¹¹⁴ can be defined with reference to rigorous cybernetic concepts. I will not explicitly use the mathematics of cybernetics here;¹¹⁵ I confine myself to

¹¹¹From κυβερνάω: “I steer,” “I navigate,” “I govern”; κυβερνητική: “governance”; κυβερνήτης: “helmsman”; and κυβέρνησις: “the process of governing something.”

¹¹²For instance, the climate of the earth is a cybernetic system independently of whether there are animals or machines.

¹¹³I will explain in Section 3.6 below what happens if instruments are included.

¹¹⁴See Section 2.3 and Subsection 3.2.5.

¹¹⁵The reader may consult an introduction to analog control engineering (Dorf & Bishop 2017); an introduction to digital control engineering (Åström & Wittenmark 2013); an introduction to system identification (Johansson 1993); an introduction to estimation and sensor fusion methods (Bar-Shalom, Li, & Kirubarajan 2001); introductions to advanced

briefly describing the philosophical import of cybernetic concepts.

I have suggested a definition of *habit* (or *practice*) as an (*approximately and relatively*) *invariant*¹¹⁶ *pattern of potential organism–environment intra-action*.¹¹⁷ In cybernetic terms, that is already concrete and practical enough: patterns of the exchange of causal signals in space and time between an organism and its environment can be empirically studied with pattern recognition methods. The development of computer science and technology has already made them feasible in the past decades. To my knowledge, pattern recognition techniques are usually akin to *observation* or *measurement* in their traditional senses and hence operate within the paradigm of unidirectional experience. But I am not aware of any reason that would make it impossible to generalize these techniques to the bidirectional paradigm, that would make them akin to *experiment*, that would enable an agent or a software to intra-act with an object and simultaneously to recognize patterns in this intra-action of which they themselves are part. (Lindholm 2023a: 33.)

By the previous considerations, it seems to me that *habit* (or *practice*) can also be defined as a *stable state of organism–environment intra-action* — that is, as a *dynamical equilibrium*. This definition is closer to the basic idea of cybernetics: control, or the autonomous guidance of a system to a desired state or trajectory. *Stability* means simply that deviations from the desired state or trajectory remain within certain acceptable bounds (perhaps converging to a certain value). *Autonomy* means that the system maintains its stability without relying on external input. The organism is, however, internal to the system. Hence the organism is often responsible for the stabilization of the system. That explains the importance of *closed systems* for natural science, and also the fact that closed systems are *constructs*. Usually stabilization is a matter of *skill*, which I have conceptualized as *habit* (or *practice*);¹¹⁸ sometimes the system happens to be stable without activity.¹¹⁹ I have explained above that a universal (e.g. a law of nature) can be experienced by acting habitually: with the establishment of habit, the

control engineering methods (Kirk 1970; Glad & Ljung 2014); an introduction to multivariable control (Maciejowski 1989); and introductions to adaptive control (Sastry & Bodson 1989; Åström & Wittenmark 1995).

¹¹⁶See Section 3.4.

¹¹⁷See Section 2.3.

¹¹⁸For instance, *closed systems* are relatively rare in nature (if they exist at all). Hence scientists usually (if not always) have to *construct* them in order to isolate certain phenomena from others. Learning *how* to construct them is not always straightforward. It may require years of trial and error and a deep acquaintance with the methods of the given science.

¹¹⁹For instance, if it rains, the system is stable already; and in order to experiment whether it rains, one just needs to be located and oriented accordingly.

structure of a process becomes the structure of the habit.¹²⁰ That accounts for the Galilean *relational invariances*.¹²¹ In this way, epistemology becomes a control engineering problem at least implicitly. The skillful stabilization of organism–environment intra-action allows things to appear as *stationary states of intra-action*. These states are what we usually call ‘objects.’ That accounts for the peripatetic *substantial invariances*¹²² but makes them only relative to practice. This notion suggests a generalization of object ontology, which I will proceed to explain next. It entails the primacy of practice: the practices that stabilize organism–environment intra-action are epistemically more basic than the “objects” (or agents) that appear in that intra-action; the identity and determinacy of “objects” (and agents) issues from their engagement in such practice.¹²³ (Lindholm 2023a: 33.)

3.5.2 Process Ontology

I have argued that cybernetic epistemology implies process ontology at least potentially (Lindholm 2023a: 34–35). Process ontology is a generalization of object ontology. It maintains that every “object” has a history: it is generated, it evolves, and it passes out of existence (cf. Dewey 1910: ch. I). Thus “objects” are not substances, i.e., self-sufficient entities: their existence has external conditions. In fact, what we usually call ‘objects’ are *processes in a stationary state*. Object ontology describes what *is*; process ontology describes what *happens*. Thus the latter analyzes *events* rather than entities. A process can be understood as an ordered sequence of events, whether continuous or discrete. In a geological scale, a mountain range is an event (Dewey [1925] 1929a: 70–71; 1929b: 128; 1938: 222–223, 248–249); and in an astronomical scale, the Milky Way is an event. The conservation laws of physics and Newton’s laws of motion, which I have already cited,¹²⁴ seem to imply process ontology: it seems impossible to intra-act without changing. Peirce’s *evolutionary cosmology* is a process philosophy: it considers even laws of nature as processes.¹²⁵ Rescher (1996; 2000) has defended a contemporary version of process philosophy. Seibt (2017) has provided an overview of process philosophy in general.

If process ontology is true, then to understand an “object” is to be able to manipulate the conditions of its occurrence: to be able to initiate, sustain,

¹²⁰See Subsection 3.2.5.

¹²¹See Section 3.4.

¹²²See Section 3.4.

¹²³I thank Heikki Hyötyniemi for inspiring me to develop this notion.

¹²⁴See Subsection 3.1.2.

¹²⁵See Subsection 3.2.7.

and terminate a process at will (Dewey [1925] 1929a: 428); to be able to stabilize certain intra-actions. Because of the processual nature of things, there is nothing more to be understood. Again, that is a matter of skill, or *habit* or *practice*. Marx ([1845] 1978: 7), Engels ([1886] 1962: 276–277), Kuusinen (1959: 98–99, 111) and Hacking ([1983] 2010: 22–24) have roughly similar notions. These are instances of the notion of *maker’s knowledge*: that the maker of an entity knows that entity — a notion that recurs in the history of philosophy (Hintikka 1969: 19–34). (Lindholm 2023a: 32.)

Process philosophy itself recurs in the history of philosophy. Siddhartha Gautama seems to have entertained a process ontology more than two millennia ago (Laumakis 2008: 13–14, chs. 6 and 7; Edelglass & Garfield 2009). Heraclitus’s notoriously difficult aphorisms arguably involve a process philosophy (cf. Plato 1893: 401d, 402a, 439d; Diogenes Laërtius 1905: 376–382; Diels & Kranz 1960: 22A, 22B). If essentialism is removed from Aristotle’s physics and metaphysics, they arguably become a process philosophy with their description of the generation and corruption of substances and their doctrine of the eternity of movement (Aristotle 1922; 1929; 1933; 1934; 1935a). Schelling’s (1800; 1803) and Hegel’s ([1807] 1970; [1812–3] 1969a; [1816] 1969b) absolute idealisms seem to be versions of process ontology. Whitehead ([1929] 1978) influentially developed process ontology on a scientific basis. Process ontology is also part of Marxism,¹²⁶ or at least Soviet Marxism (Kuusinen 1959: 24–25). If J. Pietarinen (2019) is correct, then de Spinoza ([1677] 1905) was a process theorist too. (cf. Lindholm 2023a: 35.)

Process ontology explains what object ontology simply presupposes: the determinacy of “objects.” *Contra* the modernist presupposition that “objects” be independently determinate, process ontology states the conditions under which they can be encountered as determinate — namely, when the intra-actions between processes attain a stationary state, either by nature or by experimental manipulation.¹²⁷ Usually, if not always, these conditions have to be *created* by agents. Hence, at least in some cases, *determinacy is constructed* and hence cannot be presupposed. This makes a case for the epistemic significance of skills, practices, and instruments. Experiment supersedes speculation; manipulation, production and creation supersede observation, definition and classification; τέχνη and ποίησις supersede θεωρία and νόησις; the *laboratory* supersedes the *observatory* as the paradigm scien-

¹²⁶I have not (yet) found explicit process ontology in Marx and Engels’s works, but Marx’s *Ökonomisch-philosophische Manuskripte aus dem Jahre 1844* ([1844] 1968) and *Grundrisse der Kritik der politischen Ökonomie* ([1857–8] 1983b) seem to implicitly involve one.

¹²⁷Aristotle (1933: 1032a12–b14) states that things come into existence either by nature (φύσει), artificially (τέχνη), or spontaneously (ἀπὸ ταῦτομάτου).

tific institution.¹²⁸ These arguments set the tone for the following Chapters.

3.6 Instrumentally Mediated Experience

Experience can be technologically mediated. Instruments are non-neutral: using them transforms experience.

From the cybernetic point of view, when using instruments, one or more processes are added to the intra-action loop between the agent and their environment. Instruments have feedback loops with the environment and the agent so that each process at least potentially intra-acts with the others. The agent retains direct intra-action with their environment even if they use an instrument.

From Peirce's point of view, instrumentality is a species of thirdness. He says that "in government¹²⁹ there is a third thing [besides two reacting things] which is a means to an end" (EP 2: 5). In that context, he also claims that such instrumentality or skill is the key to progressing from ignorance to knowledge.

In a sense, instrumentally mediated experience is an "artifact." But it is not true that it "feign" experience.¹³⁰ According to Dewey (1929b: 295), the world as we experience it is a real world. If all objects revealed by instruments were unreal, it would not make sense to use them, except for entertainment. Moreover, our sensory organs are already selective. Had evolution gone otherwise, it could have endowed us with organs which have the same effect on experience as our actual organs combined with technologies (cf. Psillos 1999: 192). The only difference between direct and technically mediated experience is in emphasis: naked-eye perceptions have access to certain properties of the object, while instrumentally mediated perceptions have access to certain other properties of the object. In principle, by making use of all causal connections between things, everything in nature can become an object of experience.

Of course, "artifacts" do occur sometimes in mediated observations. But the mere possibility of "artifacts" does not suffice to reject the epistemic

¹²⁸I owe this last notion to Don Ihde.

¹²⁹In this context, "government" means thought and learning about how to influence phenomena by doing acts which are means for achieving a result.

¹³⁰According to a legend, the accusation of "feigning" experience was cardinal Belarmine's response to Galileo's use of the telescope in order to observe heavenly bodies unobservable to the naked eye. Galileo replied that the telescope can be used to observe ordinary objects like distant ships, and by comparing to naked-eye observation, there is no difference.

value of instruments *in toto*. Moreover, the properties of an instrument can be improved by its manufacturer, if an artifact is produced and identified.

A. N. Whitehead understood an important truth about instrument-mediated experience:

The reason we are on a higher imaginative level is not because we have a finer imagination but because we have better instruments. In science, the most important thing that has happened in the last forty years is the advance in instrumental design [...] a fresh instrument serves the same purpose as foreign travel; it shows things in unusual combinations. The gain is more than a mere addition; it is a transformation. (Whitehead [1925] 1963: 107.)

As long as science was instrumentally disembodied, its successes remained modest. Scientific observations are not just any observations whatsoever which could be taken for granted as obvious or even trivial. They are emphatically instrumentally mediated observations. It goes without saying that this applies even more forcefully to the experimental manipulation of objects. Thus Ihde (1991) suggested a program called *instrumental realism* which takes the instrumentation of science into account.

Don Ihde, who has insightfully elaborated on Patrick Heelan's original idea (Ihde [1977] 2012: 100), has identified four principal kinds of instrument-mediated experience:

1. embodiment relations (Ihde 1974: 271–273; [1977] 2012: 100–103; 1979: 6–11; 1990: 31–34, 39–40, 47, 72–80, 86, 89; 1991: 29; 2009: 42; cf. Heidegger [1927] 1977a: §§ 15–16; Merleau-Ponty [1945] 2002: 165–166, 291);
2. hermeneutic relations (Ihde 1974: 275–276; [1977] 2012: 103–104; 1979: 11–13; 1990: 80–97; 2009: 43);
3. alterity relations (Ihde 1990: 97–108; 2009: 43); and
4. background relations (Ihde 1979: 13–14; 1990: 108–112; 2009: 43–44).

Ihde's *Technology and the Lifeworld* also features:

1. “horizontal phenomena,” or extreme background relations (1990: 112–115);
2. “Eve and the spaceship,” or the requirements of the maximization of technology (1990: 115–118); and
3. “dreams of totalization,” or the comparison between the strategy of adapting nature to man's will and that of adapting man to the demands of nature (1990: 118–123).

In short, human–technics relations are *multistable*: one can relate to the “same” technology in different ways: the “same” thing can sometimes be used in different ways, and it can mean different things.¹³¹ Ihde’s thesis that technics are multistable draws from Heidegger, but it is also a rejection of Heidegger’s ([1953] 2000a) notion of *Gestell*, his conception of the *unique transcendental essence* of technics that can be studied *a priori*. The multistability of technics implies non-essentialism. That, in turn, implies that different technics must be studied empirically in the concrete context of their use. The possibility of multistability can be utilized as a design strategy: objects can be manufactured precisely in order to be used for multiple purposes.

3.7 A Defense of Naïve Realism

What I have said about experience in this and the previous Chapter involves a defense of *naïve realism*, or the position that *the world as we experience it is a real world* (Dewey 1929b: 295). Dewey (1916b: ch. IX) has already given a defense, though it might have become obsolete. If he is correct, Parmenides’s influential distinction between “appearance” and “reality” (Diogenes Laërtius 1905: 384–385; Diels & Kranz 1960: 28A, B, C) is merely relative at most: “appearance” is an actually experienced part of the world, and “reality” is the totality of potentially experienceable parts of the world. Hence there is no difference in quality, only in degree. That position is implicit already in Dewey’s operational definition of *experience*.¹³² According to the pragmatic maxim, the very predicate *real* only applies to possible experience. But given Dewey’s definition, and given the possibility of instrumental media that can enlarge the domain of possible experience indefinitely,¹³³ that does not imply “subjectivism” or “idealism.” On the contrary, the domain of possible experience encompasses *nature in its entirety*.

The very word *naïve* has many negative connotations — most prominently “uncritical.” But I believe that naïve realism is compatible with criticism. Observations present *problems to be solved* rather than self-sufficient solutions. Thus I claim that nothing should be taken at the face value *even if everything is as it appears*: a future experience might show that a past experience was mistaken.¹³⁴ Thus, even if experience is *real*, that does not

¹³¹See also Section 2.8.

¹³²See Subsection 2.5.2 and Section 3.1.

¹³³See Section 3.6.

¹³⁴On the other hand, I will argue in Chapter 4 that we have no rational grounds for doubt *even if everything is problematic*. Insofar as we can carry on with our already

mean that experience be always *true*; false experiences are real too. What refutes a mistaken appearance is not something extra-empirical but *another* appearance. In a sense, reason (without capital “R”) can show that a given experience is false. But reasoning itself is part of experience: it falls under thirdness and operates upon habit (Peirce CP 2.176, 3.163, 6.86, 6.286, 6.481; EP 1: 202; EP 2: 447–448; Dewey 1916a: 39–40, 54–58, 62, 120, 153–154, 263–264, 319, 323, 400; 1922: 177; 1938: 3–6, 12; cf. Bisanz & Cunningham 2016: 402–411; Bellucci 2018: 102).¹³⁵ Mind cannot possibly be independent of habit (practice). It is already there in nature. It already has access to objects.

Like I already said, observations present *problems to be solved* rather than self-sufficient solutions. The construction of a solution is up to us. It consists in the transformation of a problematic situation into a resolved one. But such construction remains within the domain of experience. Hence in my sense, *naïveté* means that there is no qualitative difference between the experience of a problem and the experience of a solution; there is only a quantitative difference, namely, how minutely the matter has been studied. A past solution can become a future problem.

Somebody might argue that my position is *direct* realism.¹³⁶ Indeed, the difference between naïve and direct realism is unclear. But I believe that a difference can be made. It seems to me that naïve realism maintains that we have direct access to *phenomena*, while direct realism claims that we have direct access to *noumena* in Kant’s ([1781/7] 1956) sense. I have already refuted the latter position.¹³⁷

Somebody might also object that naïve realism be anthropomorphic or at least anthropocentric.¹³⁸ I reply that that is not the case. Dewey’s operational definition of *experience* allows *any* organism to have experience — even plants. Even if experience were restricted to humans, we could experiment how different organisms respond to certain kinds of situations.

I do not mean that experience be infallible; quite on the contrary. *Fallibilism* is one of the cornerstones of pragmatist epistemology. It is the position that *anything (but not everything at once) can be questioned, if positive grounds to do so arise*. That includes mathematics and logic. It must be

established habits, there is no need to question even problematic observations.

¹³⁵For a strictly empiricist account of reason, see Subsection 3.2.3. For Peirce’s account on how experience acquires propositional content, see Section 3.3.

¹³⁶I thank an unknown colleague at Eesti filosoofiaaastakonverents (EFAK) 2022 for suggesting this position to me.

¹³⁷See Subsection 2.5.5.

¹³⁸I thank another unknown colleague at Eesti filosoofiaaastakonverents (EFAK) 2022 for suggesting this objection to me.

borne in mind that “positive grounds” denotes *some other experiences* rather than something beyond experience. I will examine fallibilism in detail in Chapter 4.

Chapter 4

Fallibilism

In this Chapter, I will provide an empirically responsible theory of the acquisition of knowledge, or *inquiry*. It presupposes the pragmatist notions of *meaning* and *experience* outlined in Chapters 2 and 3, respectively. Its purpose is to refute *a priori* methodology.

In Section 4.1, I will briefly review the operational definitions of *belief* and *doubt*. They state what these concepts mean in practice. Hence their content and their criterion of ascription are public and empirical. In short, *belief* is *habit* and *doubt* is *privation of habit*.

In Section 4.2, I will explain the doctrine of *fallibilism*, or the position that anything (but not everything at once) can be questioned, if positive reasons to do so arise. It follows from the operational definitions examined in Section 4.1. Fallibilism rejects both global skepticism (à la Descartes ([1641] 1692; [1641] 1984); but see Haack (1997: 248)) and dogmatism (including *a priori* philosophy) but allows local skepticism, if it has meaningful grounds. I will argue that global skepticism is impossible; and even if it were possible, it would be nonsensical, because in order to be meaningful, doubt must have a particular reason. I will also argue that dogmatism, including *a priori* epistemology, is not viable, because all of our concepts arise from experience and are therefore fallible and revisable (see Chapter 2). We do not possess an organ for processing purely formal concepts (Lakoff & Johnson 1999). In principle, even mathematics and logic can be questioned, though that may require very strong grounds. Peirce argued that the necessity attributed to mathematics and logic issues from *experimenting* with diagrams and *observing* the soundness of the inference and its conclusion. In the previous Chapter, I already argued that reasoning is a possible part of experience and operates upon habit.¹ Hence mathematics and logic do not enjoy an epistem-

¹See especially Subsection 3.2.3.

ically privileged status: they are fields of empirical knowledge in the same sense as physics, military intelligence, or cooking — even if their justification is exceptionally strong. In the final analysis, even they have an empirical basis.

In Section 4.3, I will explain Peirce's *belief-doubt model of inquiry*. It crystallizes the epistemic import of Sections 4.1 and 4.2 into a simple, iterative schema. It dispenses with epistemic foundations. Epistemic justification arises from the *process* of self-correction, not from being derivable from a foundation.² Therefore it is irrelevant, from which premises one sets out when commencing inquiry. We can come as we are. The model also dispenses with epistemic ends. The purpose of inquiry is to *adapt to changing circumstances* rather than establish irrevocable truths. I will also argue that in the light of the model, mathematics and logic are not self-sufficient: their office is to serve a more comprehensive process of experimentation. Hence their significance derives from potential experiment, not *vice versa*.

Propositional knowledge is a special case. Peirce's quasi-behaviorist terminology dispenses with the theory of propositional attitudes: belief in a proposition is simply a habit to act upon that proposition. I will study propositional knowledge in Section 4.4. I will introduce *Agrippa's trilemma*, a well-known challenge to the justification of propositional knowledge. It presupposes that belief is justified by appealing to another, which is then justified by appealing to a third, and so on. The trilemma questions whether epistemic justification is possible at all. In mainstream analytic epistemology, there are three main responses to the trilemma: *foundationalism*, *coherentism*, and *infinetism*. According to foundationalism, epistemic justification terminates in a set of foundational beliefs that are considered self-evident or self-justifying; and epistemic justification issues from being derivable from the foundation. According to coherentism, epistemic justification issues from the structure of the web of mutually supported beliefs. According to infinitism, epistemic justification does not terminate: it will go on forever. I will argue that in the case of propositional knowledge, Peirce's belief-doubt model commits one to a version of infinitism which I call *indefinitism*. It maintains that epistemic justification will go on *indefinitely* (but not necessarily *infinitely*). I believe that indefinitism can also be considered as a variant of Pyrrhonic skepticism as Sextus Empiricus (1933) presents it. I also believe that moderate foundationalism, which maintains that epistemic foundations are defeasible at least in principle, is not foundationalism at all but boils down to indefinitism.

In Section 4.5, I will argue that mathematics and logic are *a posteriori* and

²In Chapter 5, I will argue that inquiry can be understood as *semiosis*.

hence fallible. The purpose of this Section is to refute *a priori* methodology.

4.1 Belief, Doubt, and Knowledge

Bennett and Hacker (2003) argue that the (fallible) criterion of the attribution of psychological predicates is *behavior*, including speech acts. Their claim can be derived by applying the pragmatic maxim³ to psychological predicates (Lindholm 2021: 4–5, 4n17; 2023a: 15, 31–32). The practical effects of a psychological phenomenon consist in behavior. It is patent nonsense to say that agent *A* is in a certain psychological state but never acts accordingly.⁴

The criterion is fallible; it is certainly possible that agent *A* actually is in that state without manifesting it. But even if a given psychological predication would be true of them, *we cannot intelligibly make it*, unless they give us reasons to do so. Nobody could possibly understand, what we mean by such expression; and without empirical grounds, it would be irrational of us to make it.⁵

Likewise, pragmatist epistemology involves a quasi-behaviorist terminology which dispenses with subjectivist interpretations of belief and doubt. Peirce (CP 1.635, 2.435, 2.643, 5.367, 5.417; EP 1: 112, 114, 198; EP 2: 19, 33, 336–337) defined *belief* as a *habit*⁶ and *doubt* as the *privation of habit*.⁷ Hence, *belief* denotes readiness to act in certain ways in certain situations; and *doubt* denotes uncertainty about what to do. Both can be intelligibly predicated only on the basis of observed behavior.⁸

This account of belief and knowledge is *empirically testable*: what a person believes or knows can be tested against their behavior. Such test is fallible: it is possible not to display belief or knowledge in behavior. In such case the attribution of belief or knowledge would be true, but it could not be meaningfully made in the absence of empirical grounds. It is patent nonsense to claim that *A* believes something but never behaves accordingly.

This account of belief is also *non-representationalist*: belief need not “represent” anything. Belief may or may not involve representation, but repre-

³See Section 2.2.

⁴This position does not entail behaviorism. Behaviorism would *reduce* the meaning of psychological predicates to behavior. Hence I prefer to call this position *quasi-behaviorism*.

⁵For instance, consider Putnam’s (1963) super-Spartans. They do feel pain but possess such self-discipline as to never manifest it. Hence pain would be true of them but could not be ascribed to them intelligibly. (Lindholm 2023a: 15n30.)

⁶See also how Peirce applies this notion in mathematics (CP 3.160–161; EP 1: 201–202).

⁷See Subsection 2.5.2.

⁸I will return to this issue in Chapter 6.

sensation alone is insufficient to constitute belief in the sense explained above. A representation can be a part of a system that believes *if it is a part of the problem-solving ability of that system*. For instance, a map which represents the terrain in an area is not a belief as such, but it can become a part of believing, if it is used in orienteering.⁹

4.2 An Outline of Fallibilism

Fallibilism is a response to dissatisfaction with the stringency of the traditional criteria of knowledge. Aristotle (1954: bk. VI; 1960a; 1962c) understood knowledge as certain, necessary, eternal, immutable, and demonstrable from first principles.¹⁰ The classical pragmatists considered that too demanding. They believed that it merely gives rise to the irresolvable opposition between skepticism and dogmatism. Hence especially Dewey (1929b) rejected what he called *the quest for certainty*. Perhaps unshakable certainty can be achieved in theory. But that provides little comfort. Hence practical certainty trumps theoretical certainty. Practical certainty can never achieve perfection, but it can be significantly increased technically — by inventing and creating better skills and instruments.

Peirce began with the observation that there are many beliefs which we cannot doubt — even if we wanted to.¹¹ Much of human cognition is subconscious and beyond volition. Moreover, we do not in fact doubt our habits when we act. That would be not only counterproductive but suicide. Recall Peirce's operational definitions of belief and doubt; an acting agent does not doubt their habits unless they fail.¹² Hence complete doubt cannot be

⁹According to Tiles (2010: 104), Dewey echoes a classical approach in this respect. He points out that Aristotle assigned both scientific knowledge (*ἐπιστήμη*) and skill or art (*τέχνη*) to the category of habit (*ἔξις*).

¹⁰Even Aristotle himself seems to have taken ideal certainty with a grain of salt, though. His method in the *Physics* (1929; 1934) and *On the Soul* (1935b) falls short of that ideal. In an important passage, he states that first principles cannot be known by demonstration but are discovered empirically (Aristotle 1960a: 100a–b). Hence he seems to implicitly accept fallibilism — the possibility of the failure and revision of first principles on empirical grounds.

¹¹Second-generation cognitive science supports Peirce's claim. According to Lakoff and Johnson (1999), much of our thought presupposes sensorimotor functions which are largely formed involuntarily and subconsciously and thus are unquestionable in practice — not because they be certain, but because we are unable to doubt them for neurophysiological reasons. Once we have learned a conceptual system, it is neurally instantiated in our brains, and we are no longer free to think just anything.

¹²This notion appears also in Marxism–Leninism. Kuusinen (1959: 98–99) dispels doubt by appealing to practice, technology and industry. Marx ([1845] 1978: §§ 2, 8) argues

the beginning of an inquiry. On the contrary, that would compromise the possibility of inquiry at the outset: we cannot proceed without some presuppositions, however tentative. Hence, in order for doubt to be meaningful, it must have grounds. But a grounded doubt concerns a *particular* belief, not all beliefs at once. Mere absence of proof is not sufficient. (Peirce CP 2.192, 5.265, 5.376; EP 1: 28–29, 115.)

Grounds for genuine doubt arise when habitual action fails. Such restricted doubt motivates inquiry. Its purpose is to revise the existing stock of habits to prevent foreseeable failures in the future. It terminates in the establishment of a new habit. (CP 5.374–376; EP 1: 114–115.) In inquiry, we must set out where we do in fact set out (CP 5.265, 5.416; EP 1: 28–29; EP 2: 336). There is no privileged point of view;¹³ or if there is one, we cannot identify it; or if we can identify it, we cannot attain it; or if we can attain it, we cannot justify it, because we do not possess a privileged criterion of a privileged point of view. We are always already committed. Hence it makes no sense to try to pretentiously create a privileged point of view by divesting ourselves of already formed beliefs. If our initial presuppositions turn out to be false, they must be corrected. But before that, we have absolutely no rational reason to do so. After all, we can judge, whether a given belief is prejudiced, only in the *conclusion* of an inquiry. Hence the correct method is not to divest oneself of all beliefs at the outset but to bring them all in as they are and put them all to test if needed. That defeats global skepticism (exemplified in Descartes’s *Meditations* ([1641] 1692; [1641] 1984); but see Haack (1997: 248)). In short, Peirce’s anti-skepticism can be crystallized in the colloquial slogan “if it ain’t broke don’t fix it.”

On the other hand, *any* one of our already existing beliefs can be doubted, if need be (CP 5.377–387; EP 1: 115–123). This includes mathematics and logic (CP 5.577, 5.582, 6.595; EP 2: 44, 47; cf. CP 6.595). Peirce concluded that positive certainty is beyond our ken (EP 2: 26), forswore all attempts at demonstrative proof in his philosophy (CP 1.7) and even defined *proof* operationally as mere removal of particular doubts rather than the establishment of an irrevocable truth (CP 3.432). The recognition of one’s ignorance is an important condition of learning (CP 7.322). We do not possess the criterion of infallible belief. Even if we have accidentally hit upon one, we could not possibly identify it. Thus Levi (2010: 84–85) points out that the goal of

that whether a conception is true is a practical problem; and that theoretical disputes are resolved by practice and the comprehension of that practice. Engels ([1886] 1962: 276–277) argues that our ability to produce a phenomenon ourselves confirms that our hypothesis about the phenomenon is at least approximately true. Thus “the criterion of truth is practice” (Критерий истины — это практика) (Kuusinen 1959: 111).

¹³As “epistemic sovereignty,” “God’s Eye point of view” or “Archimedean point.”

removing doubt needs the goal of avoiding error to complement it. Peirce's first rule of reason is that in order to learn, one must desire to learn; and therefore one must not block the way of inquiry (CP 1.135, 5.583–584; EP 2: 47–48). Dogmatism illegitimately blocks the way of inquiry by pronouncing some belief certain. Hence all beliefs must be judged tentative. Inquiry is condemned to go on and postpone final judgment about truth indefinitely (Short 2007: 331; cf. Peirce CP 7.77). That defeats dogmatism.

Peirce's dictum that the only motive for inquiry be the cessation of doubt (CP 5.375; EP 1: 114–115; cf. Kuhn [1962] 1996) does not seem to harmonize with his first rule of reason. Haack (1997: 246–248) explains that the method that leads to the greatest certainty in the long run is the scientific (fallibilist) method. Thus, in order to even have a chance at hitting upon the truth that is the best possible guarantee for the absence of doubt, one must withhold assent indefinitely. In this way, truth (or truthlikeness, or verisimilitude) and fallibilism are dialectically related. They form a kind of feedback system that tends towards homeostasis, perhaps akin to Mary Hesse's (1980: 125–128) learning machine (without commitment to the ubiquity of language). Thus epistemic justification arises from the *truth-seeking process*. Moreover, the mature Peirce advocated suspension of judgment in scientific and philosophical matters but trust in instinct in practical matters, though there seems to be interplay, or perhaps a continuum, between these epistemic strategies (D. R. Anderson 1997).

Our ignorance justifies the quest for useless truths (or truthlikenesses, or verisimilitudes): we do not know in advance the results of an inquiry, let alone whether the result will turn out to be useful some day. Moreover, even if the researcher, who follows the path of inquiry wherever it leads independently of prospects of utility, fails, their mistakes will be more fruitful. Thus one might expect that the researcher that is in for narrow, immediate utility can, and often is, less successful than the researcher that maintains openness for intellectually serendipitous possibilities. But motives other than truth can be effective in promoting truth. (Haack 1997: 250–253; cf. Peirce CP 1.75–76, 1.138, 1.644.)

To understand Peirce's rejection of global skepticism and dogmatism, one need not agree with him that the sole object of inquiry be the settlement of opinion (CP 5.375; EP 1: 114–115). Arguably, we can aspire for *truth*, or at least *truthlikeness*, or *verisimilitude* (Niiniluoto 1987). But the discovery of a truth is not the terminus of inquiry: we are not immaterial Cartesian souls who could just contemplate truths. We need to *act upon* our results. Hence the result of inquiry must be not only *true* but also *applicable*.

Fallibilism also applies to itself: it is not certain that certainty cannot

be achieved.¹⁴ Moreover, one can doubt even the justification of their doubt itself. This is why fallibilism dictates that all meaningful doubt must have positive grounds. Even doubt may have its limits. Global skepticism denies that, but that must be backed up by a proper argument.

Fallibilism is not so much a refutation of skepticism as a refutation of dogmatism. It cuts some slack for *local* skepticism by allowing particular doubts,¹⁵ but not all the way, because dogmatism looms in the other end too. Namely, global skepticism is just another form of dogmatism, because it presupposes the possibility of global doubt, which I have refuted above.

One is entitled to presuppose the results of a science without being a scientist in that field for two reasons. First, there is an academic division of labor. A division of labor is also a division of authority. Scientists belong to the most intelligent and capable people on this planet. They are specialists and hence authorities in their fields; likewise, a plumber is an authority in plumbing, a carpenter is an authority in carpentry, and a nurse is an authority in nursing. In order to question the results of science, one needs to show their credentials in the related field. Otherwise that merely manifests ignorance, arrogance, and irrationality. There are some exceptions, though: if science fails miserably, so that everybody can see the failure, doubt is legitimate. This can be the case when scientists are driven by ideology or funding, or when they apply unethical practices. Second, science is practice (Dewey [1925] 1929a: ch. IX; Lindholm 2021). Any practice that usually achieves results is at least *prima facie* justified; and the more it has amassed results, the more it enjoys inductive justification. There are legitimate doubts concerning new fields of inquiry, which is only natural, because they can barely demonstrate having achieved anything. But there are many well-established fields and well-established results. The conservation laws in physics and chemistry and the evolutionary theory in biology belong to them. Ultimately they can be errors, and novel research can refute them any time. But in the absence of refutation, one has all the reasons to accept these results.

¹⁴This statement is the missing link between fallibilism and Pyrrhonism. According to Sextus Empiricus (1933), a Pyrrhonist lives by appearances; suspends judgment about whether they are true or false; and also suspends judgment about whether this position itself be true or false. Hence, unlike an academic skeptic, a Pyrrhonist does not *deny* the possibility of truth but only suspends judgment about that. I thank Erik Ingberg for suggesting that fallibilism be Pyrrhonism.

¹⁵I thank Ave Mets for suggesting that fallibilism be a kind of skepticism.

4.3 The Belief–Doubt Model of Inquiry

On the basis of the previous notions, Peirce created a *belief–doubt model of inquiry*. It is common both to everyday and scientific problem-solving (Peirce CP 5.438–452, 5.494; EP 2: 346–354, 419–420; Dewey 1916a: 163–178, 237, 317–322; 1929b: 79–80, 84–85, 124, 199, 220, 240–242, 271, 295; 1938: ch. IV). It has four stages, and it can be iterated.

1. We begin with whatever beliefs or habits we already have. Insofar as they deliver their goods, they are at least *prima facie* justified; and the longer they have kept delivering their goods, the stronger is their inductive justification.
2. This justification is lost, if habitual action fails. That is a positive ground for doubt (cf. Wittgenstein 1969: §§ 115, 141, 150, and esp. 160). According to V. Colapietro (2016: 297), the failure intensifies our awareness about the situation. Thereby we acquire *percepts*. Then we form *perceptual judgments* from them.¹⁶
3. That prompts an inquiry, the purpose of which is the establishment of a new habit (cf. Aliseda 2016): we cannot resume our actions before we accommodate the failure and learn how to avoid it.
4. Inquiry terminates when a new habit has been formed. Then we can repeat (1). (Cf. Lindholm 2023a: 25.) Thus we learn by taking habits, and that takes place when habitual action fails (cf. Peirce NEM 4: 142; Kilpinen 2016: 207).¹⁷ Thus, if Colapietro (1989; 2016) is correct, awareness can be explained in the terms of inquiry and the subsequent change of habits.¹⁸

The third stage can be subdivided and iterated until a hypothesis that fulfills the conditions of solving the problem at hand is found (Peirce CP 2.619–644, 5.161–174, 6.469–473; EP 1: 186–199; EP 2: 212–218, 287–288, 440–442):

1. The establishment of a new habit begins with introducing a new hypothesis that accommodates the experienced failure that occasioned

¹⁶See Section 3.3.

¹⁷See Gale (2010: 68) for a Deweyan take on the belief–doubt model.

¹⁸According to Noddings (2010: 275), Dewey’s schema of inquiry was different: “(i) a felt difficulty; (ii) its location and definition; (iii) suggestion of possible solution; (iv) development by reasoning of the bearings of the suggestion; (v) further observation and experiment leading to its acceptance or rejection; that is, the conclusion of belief or disbelief.” Dewey ([1910] 1933: 107–115) enumerates the following five stages of reflective thought: (1) suggestion; (2) intellectualization; (3) a guiding idea, or hypothesis; (4) reasoning (in the narrower sense); and (5) testing the hypothesis.

- the inquiry. This stage is called *abduction*.¹⁹
2. The second stage consists in the application of the pragmatic maxim: the researchers derive some testable consequences of the hypothesis.²⁰ This stage is called *deduction*.
 3. The last stage consists in the experimental testing of whether the testable consequences of the hypothesis obtain. This stage is called *induction*.

Bellucci (2018: 31–36) shows how Peirce discovered the three types of inference (abduction, deduction, and induction) in the late 1860s in the terms of permutations of syllogism in Barbara. Peirce (CP 7.249) argues that the concepts of induction (ἐπαγωγὴ) and abduction (ἀπαγωγὴ) appear already in Aristotle’s *Prior Analytics* (cf. Aristotle 1962c: bk. II, sec. 25). Peirce revised his early account several times. Eventually he classified the three main kinds of inference according to their function in inquiry. Throughout his career, Peirce emphasized *creativity* in inquiry: we have formed all our ideas abductively, by introducing new hypotheses. But our creativity is constrained: we cannot unilaterally determine, whether a given hypothesis works.

According to Bellucci (2018: 81–86), Peirce regards his theory of *inquiry* as a consequence of his 1868–1869 conception of *reality*: what is fated to become what the final opinion of scientists and philosophers represents (CP 5.311; EP 1: 52). The purpose of inquiry is to settle belief; and nothing settles belief better than inquiry that is directed at discovering what is mind-independent, i.e., the scientific method, or reasoning from facts. The experiences of different people are different, but even different experiences lead to the same conclusion concerning an object, if there is a way things are independently of our experiences (cf. CP 5.384; EP 1: 120). Thus science is necessarily realist: the method of science is the only method that makes a difference between true and false beliefs. Peirce submits the concept of reality to logical analysis by means of the pragmatic maxim.²¹ Thus “[t]he opinion which is fated to be ultimately agreed to by all who investigate, is

¹⁹Peirce uses sometimes the near-equivalent term *retroduction*. He describes the experience of performing an abduction in Peirce (CP 2.643; EP 1: 199; EP 2: 531–532n12). The experience can be summarized as the discovery of unifying order in what previously seemed irregular — the coalescence of a manifold experience into a single one.

In philosophy of science, abduction is sometimes called *inference to the best explanation*. For discussion on Peirce’s theory of abduction, see Fann (1970). For contemporary accounts on abduction, see Lipton ([1991] 2004) and Niiniluoto (2018). See also Magnani et al. (2016: 374n16) for recent sources on abduction.

²⁰See Section 2.2.

²¹See Section 2.2.

what we mean by the truth, and the object represented in this opinion is the real” (CP 5.407; EP 1: 139). In this sense, reality is independent of *particular* minds, but not of *mind in general* (whatever that means). We need not follow Peirce that far.

Hasok Chang’s (2022: 208, 239–247) notion of *epistemic iteration* seems to me like a version of the model. He argues that later stages of inquiry are based on earlier stages but cannot be deduced from them. Yet later developments may correct and refine the presuppositions made in the earlier stages.

For instance, Houser (2016: 380–382) discusses the belief–doubt model. He points out that Peirce’s notion of *belief* concerns *dispositions of behavior* rather than *propositional attitudes*. He also emphasizes that Peirce’s notion of *habit* means a *rule* of action rather than *action itself*: being more general than a single action, it allows more leeway for abstract thought. The generality of habit allows the mind to rehearse possible courses of action in possible situations, thus liberating thought from the immediately present situation, thereby providing cognitive distance to it, allowing the mind to envisage something *not* present. In this sense, habit is the vehicle of cognition, as I have explained in the previous Chapter.²²

Induction consists in experimentation and fieldwork;²³ and abductive research is experimental.²⁴ (Cf. Lindholm 2023a: 26.)

Dewey ([1910] 1933: 100–101) adds that the conclusion of an inference is not the conclusion of the inquiry. Logic is not self-sufficient; rather, it is part of a more comprehensive practice of experimentation.²⁵ The inquiry concludes when a problematic situation is resolved. To do that, intellectual effort must surely be expended; but *conditions must be transformed too*. That a “solution” “exists” in theory is only a partial solution; somebody must also *enact* it.²⁶ Therefore the pragmatist theory of inquiry is *more*, not less, demanding than that of scientific realism: truth (or truthlikeness, or verisimilitude) is *a* goal of inquiry, but inquiry does not stop there; the truth must also be *applied* to resolve the problematic situation. We are not immaterial Cartesian souls who could settle with mere truth. Hence, as I

²²See especially Subsection 3.2.3.

²³Peirce emphasized the practicality of induction in several instances; see, e.g., Peirce (CP 5.145, 5.168, 5.170, 5.197, 5.579–584, 7.206, 7.218; EP 2: 45–48, 96–97, 106, 205, 216, 225, 234–235, 288).

²⁴Though Peirce states this only once (CP 5.581; EP 2: 46).

²⁵See also Peirce (CP 2.173).

²⁶There is a joke about a mathematician. They wake up in the night and see that their desk is on fire. They make some calculations. They conclude that a solution exists. Then they go back to sleep.

have already emphasized, the result of inquiry must be not only *true* but also *applicable*. These desiderata might be partially contradictory. Hence trade-offs are to be expected. Dewey (1929b: 221) adds that “[t]here are as many conceptions of knowledge as there are distinctive operations by which problematic situations are resolved.” (Cf. Lindholm 2023a: 26.)

This model is easily accommodated with a naturalist understanding of agents. We are biological and social organisms. Practice is the rule, contemplation the exception (namely, a highly specialized practice). Inquiry takes place within a biological (Dewey 1938: ch. II) and social (Dewey 1938: ch. III) matrix.²⁷ It is a mode of activity which makes sense only against the background of other activities. It has no privilege over them. Many of them are non-epistemic: for instance, conversation, the use and enjoyment of certain goods, routine work, or games. Inquiry arises from impediments in them and acquires its meaning, significance, purpose, and resources from such context. Hence cognition in the traditional sense is a derivative, highly specialized part of experience. (Dewey 1916b: 1–13; 1929b: 103–104, 189–191; 1938: ch. IV.)

This model dispenses with both epistemic foundations and epistemic ends. We need not begin with a self-justifying set of beliefs. To be sure, *it does not matter at all where we begin*. That is an argument for the method of my dissertation. Justification arises not from being derivable from individual beliefs but from the *process of self-correction*. (Peirce CP 5.416; EP 2: 336.) In a sense, *learning trumps believing*. According to V. Colapietro (2016: 304), “the more perfect our knowledge is, the *less* conscious it is.” That is one way to emphasize the connection of awareness with learning rather than with knowing. Simultaneously, there need not be a final set of truths to converge to. Like biological evolution, learning is adaptation to circumstances, and they may change drastically. Even if something remained eternally the same, we do not possess the criterion of an incorrigible truth. Peirce himself might not have accepted this consequence of his own epistemology, given his distaste for William James’s notion of “the mutability of truth” (e.g. Peirce CP 6.485; EP 2: 450, 457–458; James [1907] 1916: 27, 222–226, 241, 246–249, 255–258; 1909a: 59, 68–69, 80, 96–97, 155–160, 158n1). Hence inquiry must continue indefinitely (cf. Short 2007: 331) — even when it has accidentally stumbled upon a permanent truth. One could adapt Eduard Bernstein’s (1899: 169) political slogan “the movement is everything, and the final goal is nothing” to epistemology. (Lindholm 2023a: 26.)

D. E. West (2014: 125) argues that abductions may become habits when

²⁷Ave Mets (private communication) astutely pointed out that inquiry also takes place within a technological matrix. Dewey (1938: ch. III) subsumes it under the social matrix.

they represent the best explanation possible (cf. Cannizzaro & Anderson 2016: 328). Therefore I believe that the belief–doubt model describes adequately at least one possible mode of “habituescence,” or the deliberate habit of taking habits.

Dewey’s version of the belief–doubt model is different. He turns Peirce’s fixation of *belief* into the fixation of *situation* (J. E. Smith 1978: 98): what goes on in a person’s mind is insufficient for inquiry; the situation itself is indeterminate and requires inquiry to be transformed into a determinate one. (Levi 2010: 83–84; cf. Dewey 1916b; 1929b; 1938.) But given that belief (habit) presupposes both an organism and its environment, I believe that the accounts of Peirce and Dewey are not very different.

Levi (2010) is dissatisfied with Dewey’s account. Instead of considering transformations of situations, he suggests considering transformations of *commitments to points of view*. In doing so, he builds on another thesis of Dewey: the idea that attitudes are commitments characterized by the principles of logic.

On the other hand, Tiles (2010: 111) seems to confirm Dewey’s commitment to the belief–doubt model. In Dewey, either inquiry begins with genuine immediate experience, which is as likely as not to be a “nest of obscurities and ambiguities,” or “so variegated and complex” as to be worthless for careful inference; or it turns out on closer examination to be a refined product of experimental practice, far too laden with inference to count as a first principle for the foundationalist enterprise. We never have just a determinate and unproblematic datum in experience. We analyze the complex situation that is given and select what is relevant to our purposes. Thus an indeterminate amount of cognition has already entered experience before we will be able to identify something in its purview as “data.” We also might consider the results of previous inquiries as unproblematic. They qualify as *hypotheses to be tried*, “operationally *a priori*” (Cf. Dewey 1938: 17) rather than something settled once and for all. In short, only when used as a sign of something, does the presence of a datum constitute knowledge and the awareness of it constitute cognition.²⁸

V. M. Colapietro (1997: 270) believes that the belief–doubt model involves an implicit notion of autonomous agency. He does not justify this claim adequately. He does, however, offer a passage that indicates what he means: “Things are not necessarily the way we depict them; put another way, we ourselves are not necessarily disposed towards them in such a way as to fulfil our own desires or to facilitate our own motives” (V. M. Colapietro 1997: 270–271).

²⁸See Section 3.1.

4.4 Epistemic Justification

So far I have discussed beliefs in general. I have made no commitment to whether they are propositional or not. In this Section, I will outline what happens in the possible special case of representational belief. In short, by the operational definition of *belief*, the belief in a proposition is the habit of acting upon that proposition. Now the problem is, how is the belief in a proposition justified. In short, it is justified in the same way as other beliefs: by the *process* of self-correction as described by Peirce's belief-doubt model of inquiry. In this Section, I will study how this account can be stated in the terms of mainstream analytic epistemology. Mainstream analytic epistemology showcases three main theories of epistemic justification: *foundationalism*, *coherentism*, and *infinetism*. Foundationalism maintains that there is an epistemic foundation that consists in self-evident or self-justifying propositions; and epistemic justification consists in being derivable from this foundation. Coherentism maintains that epistemic justification results from the way beliefs hang together, the structure of the web of mutually supporting beliefs. Infinitism maintains that epistemic justification does not terminate but goes on infinitely long in the future. The result of my analysis is an epistemological position which I call *indefinitism*: the justification of the belief in a proposition is an indefinitely long process. This position is a more moderate version of infinitism.

I will begin with formulating the problem of epistemic justification by introducing *Agrippa's trilemma* in Subsection 4.4.1. The three main strands of mainstream analytic epistemology — foundationalism, coherentism, and infinitism — are responses to this trilemma. I cannot do much justice to these strands within the confines of my thesis. I will briefly explain them just to show how pragmatism has an affinity with infinitism. I will discuss foundationalism in Subsection 4.4.2; coherentism, in Subsection 4.4.3; and infinitism, in Subsection 4.4.4 simply in order to explain what the alternatives are. I will argue that Peirce's belief-doubt model of inquiry commits one to a version of infinitism, which I call *indefinitism*, in Subsection 4.4.5. In short, because we do not possess the criterion of an irrevocable truth, and because the world can change, we must keep updating our beliefs indefinitely in the future. The purpose of explaining indefinitism is to refute foundationalism. If there is no epistemic foundation, then, I believe, there is no room for *a priori* philosophy. That, in turn, vindicates empiricism.

There are two variants of foundationalism: radical and moderate. Radical foundationalism maintains that epistemic foundations are certain. Moderate foundationalism maintains that epistemic foundations are defeasible at least in principle. I will argue that radical foundationalism is a version of dogma-

tism and that moderate foundationalism is actually a version of indefinitism which I advocate.

It is important to bear in mind that Peirce conceived propositions in a sense different from the traditional one. Stjernfelt (2014) has provided an insightful account on Peirce's theory of propositions. Peirce understood propositions as a class of *sign-vehicles*, namely *dicisigns*. Peirce's theory of signs is functionalist. Hence propositions are not entities but multiply realizable *functions* which are realized if an object, a proposition, and a possible interpretant are related appropriately.²⁹

4.4.1 Agrippa's Trilemma

In the theory of the justification of propositional knowledge, a trilemma, attributed to the Pyrrhonian skeptic Agrippa (c. 100 CE), arises (Diogenes Laërtius 1905: 412–413).³⁰ Let us suppose that some belief, say p_0 , is being justified by an argumentation. Agrippa presupposes that the justification must be another proposition. If the belief that p_0 is to be justified by an appeal to the proposition p_1 , then p_1 must be justified by an appeal to the proposition p_2 , and so on. The argumentation can proceed in different ways. According to Sextus Empiricus (1933: 94ff.), Agrippa argued that it can have five “tropes” (τρόποι),³¹ in this context “outcomes,” which are:

1. discrepancy or dissent, or that the argumentation remains unresolved;
2. infinitism, or that the argumentation consists of an infinite number of propositions;
3. relativity, or that, changing the point of view, everything else changes;
4. hypothesis, or that the argumentation ends at an unsupported assumption; and
5. circularity, or that some argument is repeated, and it becomes impossible to break out of the ensuing circle.³²

Of these, the canonical form of Agrippa's trilemma contains (2), (4) and (5). Epistemologists usually drop (1) and (3) because they reduce them to the remaining options or simply consider them unacceptable. Either (2) the argumentation goes on *ad infinitum*, or (4) for some finite $n \in \mathbb{N}$, there will

²⁹I will discuss Peirce's semiotics in Chapter 5.

³⁰The trilemma has been accordingly called “Agrippa's trilemma,” or, in some texts, the “Münchhausen trilemma.”

³¹From τρέπος: “a turn,” “a change.” The term is derived from τρέπειν: “to turn,” “to direct,” “to alter,” or “to change.”

³²Usually epistemologists do not bother to cite the proper sources, as if it was generally known, where the trilemma comes from.

be some p_n at which the argumentation ends, or (5) the argumentation is circular.

In the skeptical tradition, each of these three horns is unacceptable. It is not *prima facie* obvious that argumentation can last forever. Hence (2) can be questioned. On the other hand, if the argumentation ends at p_n for some finite $n \in \mathbb{N}$, and presupposing that only a proposition can justify another proposition, no justification is given for the ultimate proposition. Thus we end up with dogmatism about an arbitrary proposition. Hence (4) can be questioned too. If some proposition p_k for some $k \in \mathbb{N}$ is allowed to be justified by an appeal to itself, then, on the same grounds, it seems that *anything* can be justified: for any proposition q , true or false, it holds that $q \rightarrow q$.³³ Hence (5) can be questioned as well. Thus, if Agrippa was right in that a proposition must be justified by another proposition, propositional knowledge cannot be justified. Arguably, this problem is so crucial that it can be considered as *the* problem of epistemology. Aristotle (1960a: bk. I, 3) tries to argue that this kind of regress argument demonstrates foundationalism.

Contemporary epistemologists have attempted to reply to Agrippa. The strategy has usually been simply to show that some horn of the trilemma is acceptable after all. *Infinitists* defend (2). *Foundationalists* argue for (4) (Hasan & Fumerton 2016). A third group of epistemologists is called *coherentists* (E. Olsson 2017), but whether they subscribe to (5) is debatable. The mainstream of analytic epistemology tries to refute skepticism in some of these three principal ways, but skepticism itself has also had proponents, e.g., Oakley (1976).

I will proceed to show how mainstream epistemologists reply to Agrippa. I will begin with foundationalism in Subsection 4.4.2, because it is the most popular option. Coherentism, which I will address in Subsection 4.4.3, is considerably less popular, but not rare. Infinitism, which I will discuss in Subsection 4.4.4, has only a few exponents.

4.4.2 Foundationalism

Foundationalists reply to Agrippa that epistemic justification will terminate in a finite number of steps. It terminates when foundational beliefs are discovered. They can be either self-evident or self-justifying. Hasan and Fumerton (2016) define *foundationalism* as the position that epistemic justification consists of a finite number of steps and terminates in a non-empty set of propositions which are justified non-inferentially.

I distinguish two variants of foundationalism. *Radical foundationalism*

³³This argument may be a slippery slope.

maintains that the justification of the foundation cannot be revoked; and *moderate foundationalism* holds that a foundation exists but its justification is merely tentative.

In modern philosophy, radical foundationalism has been the dominant epistemological position, in rationalism and empiricism alike.³⁴ Philosophers have been tempted by the notion of irrevocable certainty and attempted to establish infallible systems. Descartes founded his epistemology upon the *ego cogito, ergo sum* argument.³⁵ Classical empiricists like Locke ([1690] 1823a; [1690] 1823b; [1690] 1823c), Berkeley ([1709] 1871a; [1709] 1871b; [1710] 1871c; [1713] 1871d), and Hume ([1739–40] 1854a; [1739–40] 1826a; [1739–40] 1826b; [1748] 1854b) considered sensations as self-sufficient and indubitable. de Spinoza ([1677] 1905) and Leibniz ([1704] 1921) were arch-foundationalists about metaphysics, geometry, and logic. Kant ([1781/7] 1956) remained strictly within the Cartesian tradition and laid the foundations of knowledge upon the structure of experience issued by the transcendental ego.³⁶ Among the German idealists, Fichte ([1794/5] 1997) resorted to foundationalism.

The influence of foundationalism has continued up until recent days, both in analytic and in continental philosophy. In the analytic tradition, logical positivists and empiricists were foundationalist in their belief that all knowledge is founded upon self-sufficient sense-data and infallible axioms of logic (see, e.g., Frege 1884, Russell 1903; 1910–11; [1913] 1984; [1912] 1918, Carnap 1928³⁷ and Ayer [1936] 2001). Wittgenstein's *Tractatus* (1922) seems foundationalist in the Kantian sense that it involves a transcendental argument that there are necessary conditions for the possibility that an expression have meaning. In the continental tradition, Husserl resorted to the transcendental ego as the foundation of anti-psychologistic logic;³⁸ but, on the other hand, Sonesson (2016: 284) argues that Husserl's notion of *Evidenz* is fallibilistic.

³⁴Though the history of foundationalism may begin already with figures like Parmenides (cf. Diels & Kranz 1960: 28A, 28B) and his followers for whom knowledge is immutable and eternal, because its objects are immutable and eternal. Aristotle (1960a: bk. I, 3) seems to have argued for foundationalism by claiming that not all knowledge is demonstrative and that some knowledge must be independent of demonstration. Many medievals followed Aristotle and considered first principles as foundational.

³⁵This is how he revisited his argument in *Principia philosophiæ* (Descartes [1644] 1692: 2). Originally he wrote it in French in *Discours de la Méthode: ie pense, donc ie suis* (Descartes 1637: 33).

³⁶Again, Pihlström remarks that Kant ought not to be taken as a dogmatist (private communication). I agree that Kant indeed opposed dogmatism. But I also believe that he did not quite succeed: he was still a dogmatist about logic.

³⁷Carnap's *Aufbau* need not be understood as a phenomenalist tract but rather exemplifying his lifelong quest for a foundation in the intersubjective mathematical and logical structure of things. See Rouse (2002: ch. 1).

³⁸That notion persists in Husserl ([1936] 1976a) but is even clearer in his previous works.

Heidegger lays down a *fundamental ontology*, which he later abandoned, in his *Sein und Zeit* ([1927] 1977a).

More recently, foundationalism has been defended, for example, by Alston (1976a), Fumerton (1995), and McGrew (1995; 1998). Hasan and Fumerton (2016: § 3.4) point out that traditional foundationalism might lead to skepticism with respect to non-inferential knowledge; James Pryor’s “dogmatism” (2000) and Michael Huemer’s “conservatism” (2001; 2007; 2013) are responses which arguably preserve foundationalism but reform it into a more moderate cast which allows the defeasibility (i.e. fallibility) of *prima facie* justification. Alston (1976b) has also argued that there are two kinds of foundationalism.

Radical foundationalism is a species of dogmatism. It illegitimately blocks the way of inquiry by claiming certainty. But according to fallibilism, we do not know, by which criterion an unrevisable proposition could be identified. On the other hand, I will argue in Subsection 4.4.5 that moderate foundationalism is not a species of foundationalism at all but, rather, a species of infinitism.

4.4.3 Coherentism

Coherentists reply to Agrippa that epistemic justification terminates: not in the discovery of an epistemic foundation but in the formation of such a structure of the web of belief in which the beliefs support each other. According to E. Olsson (2017), coherentism is the doctrine that a belief is justified if it coheres with a set of beliefs, the set forms a coherent system, or some variation on these themes. That does not necessarily involve circularity. On the contrary, E. Olsson (2017: sec. 2) states that coherentists can indeed deny that circularity be what they were after. The problem they address is not non-circularity but a more general issue, the linearity of other theories of justification. Rather, the justification of a system of beliefs can arise from their being arranged in certain patterns or structures. Then the task of coherentists is to show that there are such patterns of beliefs which justify their constituents and why these patterns are able to issue justification. For example, Lewis (1946), BonJour (1978; 1985: esp. 97–9), Rescher (1973; 1979), Lycan (1988; 2012), Lehrer (1990; 1997; 2000; 2003), Thagard (2000; 2005; 2007), E. J. Olsson (2002; 2005), Bovens and Hartmann (2003), Fitelson (2003), Douven and Meijs (2007), Roche (2013) and Poston (2014) have constructed coherence in non-circular terms.

The standard criticism of coherentism is, how a “web of belief” accommodates new information. By definition, new information is not (yet) part of the “web of belief.” Then it is legitimate to ask, how it is possible in

principle that the “web of belief” assimilates something that is not already part of it and subsequently justifies it.

4.4.4 Infinitism

Infinitists reply to Agrippa that epistemic justification does not terminate. *Radical* infinitism maintains that it consists of *actually* infinite number of steps projected to the future. *Moderate* infinitism holds that it only consists of *potentially* infinite number of steps projected to the future.

Moderate infinitism has had a few proponents like Klein (1999; 2003a; 2003b; 2004; 2005a; 2005b; 2007), Fantl (2003), and S. F. Aikin (2010; 2011).³⁹

Aristotle (1960a: 83b6) and J. Williams (1981: 85) have argued against the possibility of infinite justification on the grounds that the human mind is finite. But if justification is conceived not as a psychological or a “subjective” event but as public action which is independent of particular agents, the finitude argument has no force. This claim is stronger in the case of moderate infinitism.

4.4.5 Indefinitism

My reply to Agrippa is different from foundationalism and coherentism but has an affinity with moderate infinitism. The belief–doubt model of inquiry makes pragmatist epistemology a version of moderate infinitism. It postpones the termination of epistemic justification indefinitely into the future (cf. Short 2007: 331). But for this very reason, I prefer to call it *indefinitism*. Instead of a potentially infinite number of iterations, the model posits only an *indefinite* number of iterations.

BonJour (1978: 3, 3n9) and Klein (1999: 306, 320n32) credit the early Peirce as a precursor of infinitism. In “Questions Concerning Certain Faculties Claimed for Man” (1868) (CP 5.213–224; EP 1: 11–18), Peirce argues that all cognitions are determined by previous cognitions. BonJour thinks that this argument is metaphorical. But I think that Peirce meant literally what he said. Moreover, Peirce indeed was an infinitist, but for different reasons. Peirce’s infinitism must be considered as a consequence of his fallibilism in general — and of the belief–doubt model of inquiry in particular. Because belief must *not* be fixed, anything can be called to question at any time, if an occasion arises. Because anything can have a meaning and therefore be a

³⁹For discussion, see Turri and Klein (2014), S. Aikin and Peijnenburg (2014), and Peijnenburg and Wenmackers (2014).

sign,⁴⁰ everything can be interpreted, and because every interpretation can be reinterpreted, there does not seem to be room for justification which could forever remain unchallenged. Hence *justification can go on indefinitely long*. In this way, of the three main theories of epistemic justification, Peirce's fallibilism is consistent with moderate infinitism. It may also coincide with Pyrrhonian skepticism as Sextus Empiricus (1933) presents it. Both the Pyrrhonists and Peirce encourage to keep searching for further justification⁴¹ — an indefinitely long quest.

I submit that moderate foundationalism is actually no species of foundationalism at all but a species of indefinitism. Moderate foundationalists assert that the justification of an identified foundation is only tentative. Hence they implicitly assert that justification will potentially continue. But we have no criterion to determine whether the ultimate foundation has been discovered. Hence we have to consider the justification of *any* foundation which we have discovered as tentative. But then whether justification terminates remains indefinite, and moderate foundationalism ultimately boils down to indefinitism.

4.5 Empiricist Mathematics and Logic

In this Section, I will argue that mathematics and logic are *a posteriori*. If Peirce is correct, formal logic is part of mathematics, and mathematics is based on experimentation on diagrams and observing the result: we literally *observe* the soundness (or the lack thereof) of a mathematical proof.

I do not mean that mathematics and logic have *no* justification. On the contrary, I maintain that they indeed *are* justified — perhaps orders of magnitude better justified than anything else — but this justification is qualitatively no different from positive sciences.

If mathematics and logic were *a priori*, they would be independent of experience and hence immune to empirical revision. That would make these fields dogmatic. That would illegitimately block the way of inquiry.

4.5.1 Peirce on Mathematics and Logic

Peirce (CP 1.247, 4.240) understood logic, insofar as it is purely formal, as part of mathematics. Thus he could be called an *anti-logicist* (see also, e.g.,

⁴⁰See Section 2.2 and Chapter 5.

⁴¹The very word “skepticism” is derived from σκέπτομαι: “I look for” or “I search.”

CP 2.191, 2.197).⁴² But he considered mathematics *empirical*. As I have pointed out, Peirce believed reasoning to be a possible part of experience.⁴³ He believed deduction to be *necessary*, but that does not make it *infallible* (CP 4.531): it is indeed possible that a necessary consequence of certain premises is false. Hence, if he was correct, mathematics, including formal logic, is fallible.⁴⁴ I will sketch his philosophy of mathematics and the related notion of *experience* below.

Let us begin with Peirce's notion of *proof*: “[p]roof does not consist in giving superfluous and superpossible certainty to that which nobody ever did or ever will doubt, but in removing doubts which do, or at least might at some time arise” (CP 3.432). He claimed that demonstrative proof is not to be thought of anywhere in his philosophy (CP 1.7). Thus Peirce forwent the *a priori* method and the semblance of certainty it appears to provide.

For Peirce, mathematics is *iconic*⁴⁵ (e.g. CP 3.363; EP 1: 227–228; W 5: 206; cf. Bellucci 2018: 117–123). According to Bellucci (2018: 119), “the way in which symbols are arranged in a formula is an icon of the form that those symbols must have in order to conform to the content of that formula.” Bellucci (2018: 120) continues that “*how* the state of things is, how it is ‘articulate,’ can only be shown by an icon [...] All formulas are icons [...] Logical constants are, in themselves, symbols, but their logical properties are expressed in logical icons [...] The whole procedure of algebraical reasoning consists in the observation of certain combinations (icons) of symbols and indices, and in the transformation of them into other combinations (icons) according to the rules expressed by logical icons.” Icons are needed to show the *syntax* of propositions, i.e., how symbols and indices are arranged.⁴⁶ Peirce believed that deduction consists in constructing and experimenting upon an icon or diagram,⁴⁷ which is analogical to the struc-

⁴²Peirce may have adopted anti-logicism from the algebraic tradition of 19th century mathematical logic introduced by George Boole and later heralded by, for instance, William Stanley Jevons, Ernst Schröder, Leopold Löwenheim, and Alfred Tarski (Hintikka 1997). But Peirce knew medieval philosophy quite well (Boler 2004). Thus he may also have adopted anti-logicism from R. Bacon ([1267] 1733: 60), according to whom *necesse est logicam a mathematicis dependere*.

⁴³See Subsection 3.2.3.

⁴⁴Peirce (CP 2.191–192) calls mathematical principles self-evident and beyond doubt but still fallible without explaining properly what he means.

⁴⁵For the definition of *icon*, see Subsection 5.5.1.

⁴⁶For the definitions of *symbol* and *index*, see Subsection 5.5.1.

⁴⁷Peirce's three systems of existential graphs (CP vol. 4, bk. II; cf. Peirce NEM) may be based on an observational or experimental notion of mathematics. Alpha graphs are isomorphic to propositional logic; beta graphs are isomorphic to quantified first-order predicate logic; and gamma graphs are isomorphic to modal logic (Dipert 2004: 310). According to Dipert (2004: 287), Peirce considered existential graphs as his *chef d'oeuvre*.

ture of the objects of reasoning, and observing the result (CP 2.77, 2.216, 3.363, 3.429, 3.641, 4.531, 5.161–162; EP 1: 227–228; EP 2: 47, 212–213; cf. Stjernfelt 2014: 205, 219). For Peirce (CP 5.579; EP 2: 45), observing and experimenting upon a diagram is no different from observing and experimenting upon ordinary objects.⁴⁸ By “observation,” in ordinary experience and in mathematics alike, Peirce means “the enforced element in the history of our lives”; and by “the act of observation,” “the deliberate yielding of ourselves to that *force majeure*” (CP 5.581; EP 2: 47). He thought that experimentation is part of reasoning (EP 2: 188), where “reasoning” has a normative, not descriptive, sense (cf. CP 5.108; EP 2: 188). He also says that experience is “that determination of belief and cognition generally which the course of life has forced upon a man” (CP 2.138). Thus we literally *observe* whether a conclusion of an inference is necessary or not: its necessity forces the conclusion upon our mind. (Cf. Peirce CP 3.363, 5.161–162, 5.194; EP 1: 227–228; EP 2: 212–213, 233; Stjernfelt 2014: 3, 264–268.)

For the young Peirce, logic was simply *substitution*. Namely, “[i]n substance, in hypothesis [abduction], we replace a conjunction of characters with a single term embodying (representing) them all; in induction we substitute a disjunction of subjects with a single term embracing (representing) them all; in deduction we replace a term with another term predicable of (representing) the former” (Bellucci 2018: 36–49).

In “Prolegomena to an Apology for Pragmatism” of 1906 (CP 4.530–572; 4.537n3), he begins to sketch a proof of pragmatism on the basis of his graphs. On the other hand, Dipert (2004: 312) considers it unclear, what exactly is iconic in the existential graphs and what advantage this iconicity confers upon diagrams.

What Peirce says about diagrams holds for any symbolic system: in order to compute, we need to construct and experiment upon *any* system of notation and observe the result. Chang (2022: 22) vividly captures the *skill* needed in doing mathematics:

What a great number of skills one needs to master in order to be able to *do* mathematics! Knowing how to multiply two large numbers is an ability, as is knowing how to solve a set of simultaneous equations, how to integrate a complicated function, or how to construct a proof. Some things in mathematics can be done by following an algorithm (if you know how to do *that*), but most mathematical work requires task-specific skills. Even if the tasks can be broken down to simpler ones, they will only bottom out in basic abilities like knowing how to count, which are not reducible to propositional knowledge.

⁴⁸Peirce seems to come close to Kant’s philosophy of mathematics in a respect. Kant ([1781/7] 1956: B14–18, A23–25/B38–40, A712–738/B740–766; [1783] 1913: §§ 4, 6–13) famously claimed that mathematical knowledge is based on construction and is therefore synthetic. Peirce claimed that it is based on the construction of or experimentation on a diagram.

Peirce argued that the inferential process involves the formation of a habit (CP 2.148). He held that what makes a reasoning sound is the existence of the proof of the soundness of the rules of transformation of his diagrammatic logic of existential graphs. Soundness is based on a property that is a common invariant of those rules of transformation upon which the inferential system of existential graphs is built. In a word, a reasoning is sound, when it is based on a system of transformations that never transforms a graph that is true in a certain state of things into a modified graph that is not true in that same state of things. The security of the truth of the conclusion is encapsulated in the truth of the premises. Further, an argument is valid if for any object that the sign-vehicles represent, the interpretant represents it as well.⁴⁹ Peirce's notion of soundness anticipated the later development of model theory and formal semantics. (A.-V. Pietarinen & Bellucci 2016: 273–274, 279–280; cf. Peirce W 1: 309; MS 448; MS 454; MS 484; MS 491; MS 810: 1; NEM 3: 886; EP 2: 234; Roberts 1973; A.-V. Pietarinen 2005a; 2005b; 2011.)

Bellucci (2018: 81–86) shows that Peirce put a lot of emphasis on the notion of the *leading principle* of inference. Peirce believed that an argument is valid if its leading principle is true. Therefore logic is a study of leading principles. An inference involves an argument. An argument is a sign-vehicle that explicitly purports to establish a certain interpretant belief.⁵⁰ The leading principle of an inference is “habit of mind” (CP 5.367; EP 1: 112). Given that beliefs are habits, it is a habit that determines other habits (W 3: 75), i.e., a *second-order habit*. Second-order habits that necessarily determine the determinations of beliefs are the proper object of logic. Since only reasoning from facts will be successful in fixing belief, and the determination of facts requires experiment, it follows that the *a priori* method is doomed.

Peirce knew the logic of relatives. Thus he ridiculed the notion of *the* conclusion of a notion. In axiomatic systems, there are typically *several* conclusions of different orders. (Peirce CP 5.579; cf. Stjernfelt 2016: 251–252.)

According to Peirce, the basis of all science is pure mathematics.⁵¹ His classification of sciences is based on Auguste Comte's notion that if a science depends on another, but not *vice versa*, the latter is more basic (CP 1.180, 2.119, 3.427; EP 2: 35, 258, 458). The most basic science is therefore mathematics which presupposes nothing: it only deals with hypothetical objects and makes no claim about what actually is the case. He called it “Condi-

⁴⁹For the definitions of *sign-vehicle* and *interpretant*, see Section 5.1.

⁵⁰I will explain the concepts of *sign-vehicle* and *interpretant* in Chapter 5.

⁵¹Two remarks may be helpful. First, Peirce speaks about science, not knowledge in general. He insisted that even mathematics presupposes common-sense knowledge. Second, for this reason, Peirce is not saying that mathematics be the *foundation* of all science.

tional or Hypothetical Science,” the only aim of which is to discover not how things actually are, but how they might be supposed without contradiction to be. In a word, mathematics studies *validity*, not *truth*. (CP 5.40; EP 2: 144; cf. Bellucci 2018: 22.) All other sciences are positive and depend on mathematics. The terms “conditional” and “hypothetical” are invoked to distinguish mathematics from positive science. Mathematical truths are expressed in conditional or hypothetical propositions, while positive sciences express their truths in categorical propositions (CP 5.39; EP 2: 144). Hence, if Peirce is correct, mathematical “objects” have merely conditional existence: mathematics considers them only as *hypothetical entities* from which conclusions are drawn; they are referred to in order to show what *would* follow *if* they existed. In other words, mathematics speaks about what *would* be true in case certain hypotheses *were* true, including hypotheses considering the existence of mathematical entities. It does not make a commitment that such hypotheses actually *be* true or that such entities actually *exist*, because the validity of a deductive argument does not depend on that. (CP 3.428, 5.154, 5.161–162; EP 2: 35, 51, 146, 209–210, 212–213, 458.) In a word, doing mathematics does not commit even mathematicians to the existence of a special kind of entities. Hence mathematics has no real content and is ontologically innocuous.⁵² Indeed, he claims that the truth or falsity of the premises of deductions has nothing to do with deductive reasoning, possibly meaning the *validity* of such operation; and that its conclusions are as ideal as its premises (CP 5.145; EP 2: 205). If Peirce is right, this refutes the Quine–Putnam indispensability thesis (see Quine 1951; 1964; H. Putnam 1971; 2012; Colyvan 2001). This apparently applies to all abstract entities which are cited to do something in practice.⁵³ (Cf. Stjernfelt 2014: 264–268.)

According to Vehkavaara (2007: 270), in Peirce’s philosophy of mathematics, pure mathematics is based on the observation of imagined objects without any guarantee of their application in the actual world. It is a pure science of hypotheses providing no positive information about the actual reality of our universe. As such it is the “negative” science.

Peirce’s logic is anti-psychologistic: it studies forms of thought independently of how they are manifested materially. He acquired this conviction very early on: already in 1867, he argued that the laws of logic apply to signs independently of whether a mind forms concepts of them or not; logic primarily analyzes *representations* rather than thoughts (CP 1.559; EP 1: 8; cf. Bellucci 2018: 18). Unlike Frege’s logic, Peirce’s logic includes not

⁵²Interestingly, something similar can be found in Descartes ([1641] 1692: 6–7; [1641] 1984: 14) and Kant ([1781/7] 1956: B146–147.)

⁵³Dewey developed similar ideas. I have discussed the notion that symbols, including the mathematical and logical ones, are proxies of concrete operations in Subsection 2.6.2.

only deduction but also abduction and induction. For Frege, legitimate inferences ought always to be truth-preserving. The young Peirce believed that abductive and inductive arguments can also be valid on the basis of formal considerations alone even though they are not truth preserving relative to the information available. Towards the turn of the 20th century, he came to the conclusion that how inferences are classified is based on the functions such inferences perform in the various tasks involved in inquiry. At least since 1902 he held that logic (insofar as it is not merely formal) is a normative science that includes an account of the goals of inquiry. He abandoned his earlier formal characterizations of induction and abduction in terms of permutations of syllogistic arguments as unsatisfactory. He began to conceive deduction, induction, and abduction as different types of methodological tasks involved in inquiry. (Levi 1997.)

On the basis of his classification of the sciences (CP 1.180–202; EP 2: 258–262), Peirce explains that metaphysics presupposes logic (as normative science); and all empirical sciences presuppose metaphysics and logic (as normative science). Logic (as normative science) presupposes mathematics (including formal logic), phenomenology, aesthetics, and ethics. He describes mathematics as “the art of reasoning” (CP 2.120) and constant self-criticism as “the very life of reasoning” (CP 2.123). Santaella (2016: 166–168) argues that aesthetics determines what is admirable; that determines the goal of ethics; and ethics determines the goal of logic, a species of self-controlled activity. Peirce concluded that the admirable coincides with the pragmatic ideal, or “the continued growth of the potential embodiment of the idea” — that is, change of habits, or simply *learning* (CP 1.135, 2.118, 5.433, 5.583–584; EP 2: 47–48, 343–344, 388; cf. Dewey 1916a: 54, 59–62, 142–145; 1920: 183–186; Dewey & Tufts [1908/32] 1959: 336–342), manifest in the *ultimate logical interpretant*, or habit-change.⁵⁴

The third chapter of Peirce’s *Minute Logic* (CP 2.119–218) is entitled “Why Study Logic.” Studying logic presupposes that there is a truth; that it can be discovered; some knowledge can be attained, and some of it by reasoning; that reasoning can deceive; that reasoning is superior to intuition; that the student of logic is conscious of reasoning; that they already have a logic; that they think that their logic is somehow mistaken; that such flaw can be corrected by reasoning; and that by improving their theory of reasoning they also improve their practice of reasoning. But each of these opinions needs revision. (Peirce CP 2.124–134.)

When it comes to truth and knowledge, Peirce considers their existence an empirical matter not amenable to *a priori* speculations. The determination

⁵⁴See Section 5.13.

of facts is largely a matter of secondness⁵⁵ — brute effort and resistance that cannot be altered or denied by thought. But being forced upon experience, they can be erroneous. Experience provides us with *percepts*. They constitute the material of (fallible) *perceptual facts* from which inference may proceed.⁵⁶ On the other hand, logic, or the criticism of reasoning as good or bad, is under our control. The trouble is that perceptual facts are particulars about the past, while reasoning is a general expectation about the future. An expectation is an inference; an inference involves the formation of a habit;⁵⁷ imagination is “an affection of consciousness which can be directly compared with a percept in some special feature, and be pronounced to accord or disaccord with it”; and habit is a “general law of action.”⁵⁸ Belief in reasoning involves a trust in the regularity of nature projected onto the future; and we may be mistaken in our understanding about natural laws. Thus the sole purpose of reasoning is to ascertain the mind-independent truth. But in logic, deference to a given treatise is altogether out of place, an injury and almost an insult to the author. The sole motive for reasoning is to discover mind-independent facts, because they determine the prospects for possible action and hence are the only *interesting* facts. Thus logic serves a purpose external to itself (cf. Dewey [1910] 1933: 100–101) and makes no sense if abstracted from that purpose (cf. Dewey 1916a: 169).⁵⁹ (Peirce CP 2.137–174.) In short, logic is normative but yet *instrumental* rather than final. Reason is habit, or adapting means to ends; and it can be a lot more fallible than instinct in terms of achieving these ends (CP 2.176). Hence reason seems inferior to instinct, and there seems to be no room for logic to improve reasoning in practical matters (CP 2.177). Instinct procures the bulk of our knowledge (CP 2.181). But instinct becomes inapplicable with invention and improvement; and that provides a chance for reason to demonstrate its value (CP 2.178). Logic is a study of the means of attaining the end of thought, but it cannot solve that problem until it clearly knows what that end is; and that presupposes ethical analysis of human practices; and that presupposes aesthetics in the sense of criticism of states of affairs independently of practice⁶⁰ (CP 2.198–199). Logic came about for the sake

⁵⁵See my discussion on Peirce’s categories in Section 3.2.

⁵⁶See Sections 3.3 and 3.7.

⁵⁷Inference creates a belief. A belief is a thing upon which people are ready to act, that is, a habit. A belief need not be conscious. An imaginary habit can influence actual conduct.

⁵⁸See Section 2.3 and Subsection 3.2.5.

⁵⁹According to Tiles (2010: 108), Dewey understood logic as *inquiry into inquiry*. Therefore it is a logical mistake to ignore the questions of practice that frame inquiries into fact.

⁶⁰I believe that Peirce is incoherent here. Practices are part of possible states of affairs.

of reasonableness, not reasonableness for the sake of logic (CP 2.195).

Against the notion that mathematics and logic be *a posteriori*, one is entitled to ask, for example, what conceivable experience would force us to give up the principle of *modus ponens* (cf. Tiles 2010: 113). I reply that *we do not know — yet*. If we did, we would have already abandoned *modus ponens*. The actual absence of such experience does not exclude its possibility.

Bellucci (2018) describes the evolution and the eventual coalescence of Peirce’s logical and semiotic thought.⁶¹ He argues that Peirce originally considered logic as part of semiotics in the latter half of the 1860s but converted to the opposite position by the turn of the century.

4.5.2 Dewey on Mathematics and Logic

I have already discussed Dewey’s notion of discourse, including mathematics and logic, above.⁶² I will continue here. For Dewey, logic is *naturalistic*. Dewey (1938: 19) means that “there is no breach of continuity between operations of inquiry and biological operations and physical operations. ‘Continuity,’ on the other side, means that rational operations grow out of organic activities, without being identical with that from which they emerge.” Dewey (1938: 21) continues that “thought” is synonymous with “inquiry,” including the practical operations that are required to resolve problematic situations. Thus logic is not confined to formal inference: it encompasses the entire theory of inquiry, including devising and running experiments. In this sense, thinking is value-laden and purposive. Cognition, which gives rise to logic, is a product of evolution; hence the mental, and *a fortiori* the logical, must be continuous with the material. Thus Dewey ([1925] 1929a: 276–277, 284–285) introduced the term *body-mind*. Thought arises from experience and thus is embodied. (Johnson 2010: 125–131.) Therefore Dewey seems to eliminate the notion of *necessity*, which would have demonstrated the distinction of the logical and the natural, altogether: things are “necessary” only with regard to a purpose; hence there are no categorical necessities — even in logic (Tiles 2010: 114–120).

Chang (2022: 66) argues that Dewey’s logical views might be ignored, because he was not a logician; but C. I. Lewis was, and his views were very similar to Dewey’s (cf. Lewis [1929] 1956: vii). Chang continues that the choice of a logical system must have pragmatic grounds, because appealing to the rules of logic in arguing for this choice would clearly be question-begging (cf. Lewis [1929] 1956: 300). Chang considers Dewey’s position vindicated

⁶¹For Peirce’s semiotics, see Chapter 5.

⁶²See Section 2.6.

by the proliferation of non-classical logics and the successful application of some of them in the design of intelligent systems. He claims that the spirit of Dewey’s work lives on in current work on “anti-exceptionalism” about logic. Thus Hjortland (2017: 631):

Logic isn’t special. Its theories are continuous with science; its method [is] continuous with scientific method. Logic isn’t a priori, nor are its truths analytic truths. Logical theories are revisable, and if they are revised, they are revised on the same grounds as scientific theories.

4.5.3 Discussion

A number of arguments can be marshaled against the notion that mathematics or logic be infallible:

1. As Peirce pointed out, mathematics and logic are *conditional*: their theorems are true only if their axioms are true and if their rules of inference are valid.
2. If the justification of axioms depends on what can be achieved with the theorems, then the usual order of justification is reversed. That is problematic in itself, because the same consequent may follow from several antecedents of which some may be incompatible. Also, what can be achieved with the theorems is an *a posteriori* matter. Moreover, a calculus may yield more theorems than another, but there is no intelligible sense in which to call the former “better” than the latter (or *vice versa*).
3. Set theory and first-order logic presuppose numerically identical and determinate objects that preserve their identity and determinacy independently of their arrangement into sets and of predicating something of them. I have argued in Chapter 3 that the determination of an object is a *problem*. Thus it is also a problem, *whether* set theory and first-order logic can be *used* productively. In real life, when combining elements, there may occur *intra-actions* between the parts that alter the identity and determinacy of the parts.
4. Likewise, determinate axioms and rules of inference presuppose what makes them determinate. They cannot make themselves determinate. Somebody must have performed some practical operations prior to their selection.
5. A proof may be unsound; it requires the proof of the proof, etc, *ad infinitum*, to exclude the possibility of error.

6. A real calculus is not an ideal calculus. A real calculus consists of the products of the living, historical practice of mathematicians and logicians. To say that mathematics and logic are never wrong is to appeal to an *ideal* mathematics or logic that is never wrong. We do not know, whether our mathematics or logic is ideal. The notion of ideal calculus is reminiscent of Thomas Aquinas's famous *argument from degree*: from the existence of degrees of goodness, one infers the existence of the perfect goodness. (Thomas Aquinas [1265–74] 1688: pt. 1, q. 2, a. 3.) But this argument is not cogent. Perfection can be imagined, but that does not demonstrate its actuality. There are flutists of different degrees of skill, but that hardly implies that there be a perfect flutist.⁶³ Moreover, the notion of ideal logic entails *the problem of evil*. The traditional theodicy concerns the existence of evil, when the world is thought to be created by a benevolent god (cf. Leibniz [1710] 1747). The existence of the logically bad (e.g. the contingent) in the presence of an ideal logic is an analogous case.
7. One cannot select a calculus on *a priori* grounds. Whether a calculus applies to a case is an *a posteriori* matter.
8. There are alternative logics (e.g. Vopěnka 1979; Skodo 2014; Hjortland 2017; Gottwald 2020). Something cannot be pronounced “incomprehensible” just because it cannot be represented in a calculus. That would illegitimately block the way of inquiry. The invention of non-Euclidean geometries has challenged Euclid's fifth postulate (1908: 155), which few doubted before the 19th century. There have been mathematicians who have doubted the intelligibility of negative numbers, irrational numbers, complex numbers, and different kinds of infinite cardinals. There may be very good reasons to believe in and use an axiom or a rule of inference, but that does not imply that its negation is not thinkable, possible, or useful; or, at least, its negation should not be ruled out *a priori* and without argument.
9. Lakoff and Johnson (1999: 128) deny that formal logic have resources for characterizing any of the aspects of human concepts and human reason if it is conceived as disembodied, literal, non-imaginistic, and non-metaphorical (see also Section 2.1). If they are correct, then any useful form of logic necessarily smuggles presuppositions about our embodiment and metaphorical and imaginative thinking into logical discourse. That means that logic is either useful or absolute, and that a useful logic is necessarily relative to the human perspective. That also

⁶³This argument may be due to Francisco Sanches's (c. 1550 – 1623) *Quod nihil scitur* ([1581] 1988).

means that logic presupposes everyday experience through which we acquire the power of reasoning.

10. We have not examined everything in the universe. Therefore we do not know whether any of our known logics is universal; and even if we did, the universe itself could change, rendering logic obsolete. We inhabit only a small corner of our solar system. It is precipitous and arrogant to claim that calculi of our own making apply universally.

Interestingly, the father of logic, Aristotle, argues in *Posterior Analytics* (1960a: 100a–b) for the thesis that first principles are not the foundation of knowledge. He posits that sense-perception gives rise to memory, repeated memories of the same thing give rise to experience, and experience provides the starting-point of art and science. Hence he concludes that there cannot be scientific knowledge of first principles, and hence science begins from intuition. Thus he cannot be taken as a forefather of the axiomatic–deductive conception of science or of foundationalism. Rather, it seems that his account is at least compatible with fallibilism. I agree with him that logical knowledge presupposes everyday experience.

I conclude that logic should be understood as an *instrument* — like the people who called Aristotle’s logical works *ὄργανον* probably did —: it acquires its meaning and significance from its use. But this use is an empirical enterprise and hence fallible. We may err in the selection of axioms and rules: they may be inappropriate to solve the problem at issue. There might not exist an all-purpose logical system which applies to *any* problem. And, like I said above, the fact that certain systems have certain axioms might result from the fact that the systems have proven applicable to important problems; that is, these axioms have been selected on the basis of what they can achieve in our contingent and fallible experience.

4.6 The Starting Point of Philosophy

On the one hand, we cannot begin inquiry with universal doubt: we could not know what to try next without *some* presuppositions, however tentative. Moreover, we cannot be sure that we have not unwittingly smuggled some prejudices into our inquiries. Alas, Descartes himself never doubts the intelligibility and significance of his very argument for systematic doubt! Only a *res cogitans*, cut off from *res extensa* (Descartes [1641] 1692: 10–12; [1644] 1692: 20; [1641] 1984: 18–21; [1644] 1985: 224), could survive systematic doubt; to presuppose its possibility is just another dogmatic tenet of rationalism. Living organisms cannot afford such luxury.

On the other hand, everything is fallible, including this sentence. Hence we just need to hope that we discover a justification for our presuppositions in the future. That suggests indefinitism, as I have argued. It has a lot in common with Pyrrhonian skepticism as explained by Sextus Empiricus (1933). The only significant difference I can discern is that Sextus is too easily given to Parmenides's influential distinction between "appearance" and "reality" (see Diels & Kranz 1960: 28A, B, C) — a position I have shown to be merely relative.⁶⁴

While trying to avoid *a priori* presuppositions, I am committed to a large number of *a posteriori* presuppositions: habits (practices), including those of other agents such as scientists. I would not be justified to question them. If propositional, these presuppositions may qualify as the "hinge propositions" of a form of life, or the form of life itself (cf. Wittgenstein 1969). Their justification is simply that they have not failed yet. But they are eminently fallible. Hence the starting point of my philosophy is contingent and, at least in a sense, arbitrary: were I born in another society, at another time, my habits would be different.⁶⁵ Being always already committed to contingent habits (practices), I am in no position to judge, which habits are better than others, save for their efficiency in solving the concrete problems, to which they are (fallible) solutions.⁶⁶ That would presuppose a God's Eye point of view somewhere outside practices, which is simply impossible for mere mortals. But the very fallibility of my habits is testament to the fact that *it is not important where I start*. What matters is whether I make corrections to my habits when needed.

Reliance on habit (practice) is a double-edged sword. On the one hand, it makes survival possible: I am able to accomplish ends-in-view.⁶⁷ On the other, deeply ingrained habits tend to become conservative, preventing me from adopting new information. Perhaps early modern philosophers, logical positivists, and the early Husserl believed that philosophy could be started anew, but that is not possible because of our already established habits. Hence I can but presuppose the Western tradition, including science. (Dewey 1922.)

⁶⁴See Section 3.7.

⁶⁵Rorty (1982: 166) says that "[t]o accept the contingency of starting-points is to accept our inheritance from, and our conversation with, our fellow-humans as our only source of guidance." He is correct that our inheritance from, and our conversation with, others is *a* source of guidance, but it is an obvious exaggeration to declare it the *only* one.

⁶⁶As a careful reader can see, I am not denying the possibility of comparing habits altogether: on the contrary, I am stating the very conditions by which that can be done. At least *technical norms* (see Subsection 2.5.2.) apply even if other norms do not.

⁶⁷See Subsection 2.3.4.

To consider everything fallible, including this sentence, is to consider everything as a sign. Everything is at least potentially *data* about something else not directly present but potentially significant for our ongoing course of action. In order to proceed, we must discover what the data represents. In short, experience provides *problems to be solved*, and the construction of a putative solution is up to us. Thus I will enter the study of semiotics, or the science of signs, in Chapter 5.

Chapter 5

Peirce's Theory of Signs

In this Chapter, I will explore Peirce's *semiotics*, including his theory of propositions. I largely rely on the work of my predecessors, most notably Short (2004; 2007), who has studied Peirce's theory of signs in general, and Stjernfelt (2014), who has developed Peirce's theory of propositions as *disigns*. Peirce's semiotics is based on his categories explained in Section 3.2. In short, Peirce's semiotics is the belief-doubt model of inquiry¹ applied to the concepts of meaning and knowledge themselves — recall that Peirce considered the determination of what a thing means an *experimental* issue (CP 5.465; EP 2: 400–401). Because experience provides problems to be solved, its epistemic status is problematic. Thus all objects we encounter must be interpreted in order to acquire knowledge about them. The origin of semiosis is a failure in habitual action which prompts an inquiry. The failure gives rise to a *percept* which develops into a *perceptual judgment* and further to *percipuum*.² The interpretation of percepts kicks off semiosis. Its purpose is to attain complete knowledge about the initially problematic object — an indefinitely long quest.

The purpose of this Chapter is to naturalize semiotics. The method of the determination of what a sign means is experimental: it consists in experimenting on the *dynamical object* of the sign and comparing the results with what deductions from the *immediate object* of the sign predict. Hence semiosis is perfectly legitimate in naturalist terms. That applies to types (legisigns) and propositions (disigns) in particular. That flies in the face of the tradition that conceives both as *abstract objects*. On the contrary, types and propositions are, like all signs, *concrete functions* amenable to experiment. They occur as subfunctions of the argument, the most complex sign, the origin of which can be traced back to the metabolism of the cell.

¹See Section 4.3.

²See Section 3.3.

The upshot of this review of Peirce's semiotics is the emphasis on knowledge: the purpose of interpretation is *learning*. When we interpret signs, we acquire knowledge about the object of the sign.

According to my reading of Peirce, the process of the interpretation of signs, or *semiosis*,³ is a teleological process:⁴ it tends to termination outside the domain of signs. This applies to propositions as well; for Peirce, propositions are sign-vehicles, namely *dicisigns*.⁵ The end of semiosis is the formation of what Peirce calls the *final logical interpretant*. He identifies it with *habit of action*.⁶ The purpose of this Chapter is to review Peirce's semiotic apparatus in order to be used to justify my thesis that knowledge is practice;⁷ to show how Peirce's theory of propositions provides an alternative to traditional theories; and to suggest that Peirce's semiotic proof of pragmatism remains inadequate. The latter result does not, however, make his semiotics as a whole inapplicable. Hence I am entitled to use it to prove my thesis.

I will begin in Section 5.1 by introducing basic definitions upon which the entire theory of interpretation is based: *sign-vehicle*, *interpretant*, and *sign-relation*. I will supplement and clarify Peirce's original account with

³See Section 5.3.

⁴Short (2007: chs. 4 and 5) has provided a naturalistic account on teleology. He contrasts teleological explanations with mechanistic ones. A mechanistic explanation of a particular, E (for effect), is *mechanistic* if and only if, by general laws or equations, deterministic or probabilistic, it relates E to particulars (forces, bodies, events, states, conditions, fields, or processes) that exist or occur or obtain not later than E. (Short 2007: 96). On the other hand, a teleological explanation is a species of explanation by type of outcome (Short 2007: 92, 110). Some natural processes, like evolution, biological function, or semiosis, can be explained only by referring to types of outcome. Types are general. Hence they cannot be explained mechanistically. A teleological explanation does not necessarily involve incomprehensible backward causation, because a final cause is a possibility, not an actuality (Short 2007: 104). It also does not necessarily involve occult extra processes running in parallel with mechanical processes (Short 2007: 132–133). All teleology is realized mechanistically, but its general features cannot be understood in purely mechanistic terms. There are no teleological laws (Short 2007: 107). Moreover, the purposes invoked are not “mental,” at least exclusively; “mental” events are particulars, while purposes are general (Short 2007: 93). Hence final causes do not imply personal decision-makers or gods (Short 2007: 110). Finally, the ascription of final causes is empirical and hence fallible (Short 2007: 152). See also Short (1983), Stjernfelt (2014: 257), Coletta (2016), and Salthe (2016).

⁵See Subsection 5.5.3 and Section 5.10.

⁶I have explained the pragmatist notion of *habit* in Section 2.3 and Subsection 3.2.5. In Chapter 4, I have argued that beliefs are habits. In Chapter 2, I have argued that meanings are habits as well. I have also suggested in Section 2.3.5 that Rouse's (1987: chs. 4 and 7; 1996: chs. 5–9; 2002: chs. 5–9) notion of *practice* is roughly synonymous and might capture better what the classical pragmatists tried to express with *habit*.

⁷See Chapter 6.

T. L. Short's precise interpretation in Section 5.2. Then I will be ready to analyze *semiosis*, or the process of interpreting sign-vehicles, in Section 5.3.

In Section 5.4, I will point out that Peirce's semiotics is *functionalist*: it treats sign-vehicles as *functions* that obtain when certain objects are appropriately related. This theory does not specify to which ontological class a sign-vehicle must belong. Thus it is ontologically innocuous.

The classes of sign-vehicles, interpretants, and objects can be subdivided. I will explain the subdivisions of sign-vehicles in Section 5.5; the subdivisions of interpretants, in Section 5.6; and the subdivisions of objects, in Section 5.7. The subdivisions are necessary for the semiotic analysis of propositions, or *dicisigns*.

The subdivisions of interpretants and objects are mutually related. I will explain these relations in Section 5.8.

I will scrutinize one of the subdivisions of sign-vehicles — that of *types*, *tokens*, and *tones* — in more detail in Section 5.9 in order to facilitate the semiotic analysis of propositions. That will follow in Section 5.10.

When I have reviewed the conceptual apparatus of Peirce's semiotics, I will be ready to reply to Horkheimer's criticism of the pragmatic maxim in Section 5.11. In short, I accept his criticism, but I turn it from an objection into an unproblematic description of semiosis.

I will briefly compare Peirce's semiotics with some of its most formidable rivals in Section 5.12.

I will critically reconstruct Peirce's semiotic proof of pragmatism in Section 5.13. I will argue that his argument remains inconclusive. That does not, however, falsify the rest of his semiotics. On the contrary, I will apply the theory of *types* and *tokens* to prove my own thesis in Chapter 6.

The whole of Peirce's philosophy can perhaps be best approached as a kind of theory of signs. Peirce himself has said that "it has never been in my power to study anything, — mathematics, ethics, metaphysics, gravitation, thermodynamics, optics, chemistry, comparative anatomy, astronomy, psychology, phonetics, economics, the history of science, whist, men and women, wine, metrology, except as a study of semiotic" (Peirce & Welby SS 85–86). V. M. Colapietro (1997: 271, 274–275) explains that *semiotics complements fallibilism*:⁸ if all our concepts are subject to possible error, then it seems to follow that they are *sign-vehicles*⁹ that indicate something external to them, about which they can be wrong, rather than something self-sufficient and given once and for all.

⁸See Chapter 4.

⁹See Section 5.1.

5.1 Basic Definitions

In this introductory Section, I will define the problem which semiotics addresses: how to make sense of signs, or representations of objects.

Peirce himself uses the term *sign* equivocally. I follow Short (2007) and distinguish between *sign-vehicle* and *sign-relation*, which I will define shortly below. Usually it can be seen from the context whether Peirce means sign-vehicle or sign-relation.

A *sign-relation* is a triadic relation between an *object*, a *sign-vehicle*, and a possible *interpretant*. An *interpretant* is “what the sign[-vehicle] in its significant function essentially determines in its interpreter” (EP 2: 409), or, in other words, “the total proper effect of the sign[-vehicle] taken by itself” (EP 2: 429).¹⁰ According to Short (2007: 18), an interpretant is a response to the sign-vehicle that the sign-vehicle elicits and in which that sign-vehicle is taken to be a sign-vehicle of an object. That accords the sign its significance. According to Atkin (2010: sec. 1), the interpretant is best thought of as the understanding that we have of the relation between the sign-vehicle and the object. Alternatively, he states that the interpretant may be more properly thought of as the *translation* or *development* of the original sign. Savan (1988: 41) has suggested that Peirce should have called it the *translatant*. In short, the interpretant is the total effect of the sign-vehicle upon an interpreter. At any rate, Santaella (2016: 160) argues that the interpretant should not be confused with the interpreter. Sometimes Peirce calls the sign-vehicle *representamen*. Sonesson (2016: 284) suggests that “medium” or “mediation” be used instead (cf. Peirce CP 4.3; MS 339: 526). In order for the sign-relation to function, the object and the sign-vehicle must be actual, but the interpretant can be either actual or potential: it is sufficient that the sign-vehicle be *interpretable*. Recall that potentiality, or chance, manifests real firstness.¹¹ (CP 2.242, 2.274; EP 2: 13, 272–273, 290–291, 409–410, 429.) According to Atã and Queiroz (2016: 113), the functions of the relata depend on context: a sign-vehicle can be an object or an interpretant in another context.¹²

The sign-vehicle can be *anything* that means something for a potential interpreter, that is, has potential practical effects; language is a special case.¹³

¹⁰For a very early definition of *interpretant*, see Peirce (W 1: 464–465). See also Bellucci (2018: 38–42), who points out the connection between Peirce’s early definition of *interpretant* and that of *information*.

¹¹See Section 3.2.

¹²See also Peirce’s 1873 definition of *sign*, according to which a sign functions as a sign only if it is capable of being identified as a sign (W 3: 63–67; cf. Bellucci 2018: 91–97).

¹³See Subsection 2.2.3.

Peirce (EP 2: 326) maintained that ideas cannot be communicated except through their physical effects.¹⁴ I understand this in the terms of Rouse (1996: ch. 8), who does not distinguish sign-vehicles ontologically from other objects or events: representations are precisely like any other objects or events. What makes an object or an event a sign-vehicle is its *function*: sign-vehicles are objects or events which just happen to *mean* something for a potential interpreter. Thus semiotics does not introduce new ontological categories. Hence the notion of *sign-vehicle* is ontologically innocuous.

There are different kinds of sign-vehicles, interpretants, and objects, as I will explain in Sections 5.5, 5.6, and 5.7, respectively. In particular, the “object,” which I have defined as one of the relata of a sign-relation, means *dynamical* object, which I will define in Section 5.7.

A sign-relation is irreducibly triadic, but the relata can be any category. The case of the sign-vehicle is proven by Peirce's inclusion of *qualisigns* (or *tones*), which are firsts, *sinsigns* (or *tokens*), which are seconds, and *legisigns* (or *types*), which are thirds.¹⁵ (Short 2007: 53, 209.)

The object *determines* the sign-vehicle and, the sign-vehicle, in turn, *determines* the interpretant. Peirce defined thereby *sign-vehicle* as a *medium*.¹⁶ (Peirce EP 2: 171, 477.) Peirce seems to understand “determination” as a kind of *formal causation*, perhaps in Aristotle's (1929: II, 3; 1933: V, 2) terms. Atkin (2010: subsec. 1.2) argues that the way in which the object determines the sign-vehicle is best understood as *placing of constraints* or *conditions* on successful signification, rather than the object *causing* or *generating* the sign-vehicle. The object and the sign-vehicle are relevant only in some respects to this constraining process. The way in which a sign-vehicle generates or determines an interpretant, in this case another sign-vehicle with the same object, of its object is by focusing our attention upon certain

¹⁴On the other hand, there are certain passages, which seem to contradict the necessity of the embodiment of the sign-vehicle — for example, in “New Elements” (1904?):

[...] a sign is not a real thing. It is of such a nature as to exist in *replicas*.
[...] A real thing does not so exist in replica. The being of a sign is merely *being represented*. Now *really being* and *being represented* are very different.
(Peirce EP 2: 303.)

I am unsure how to interpret this passage. Maybe “sign” denotes sign-relation here.

¹⁵See Subsection 5.5.2.

¹⁶This mediation need not involve a metaphysical interpretation in the vein of Locke ([1690] 1823a; [1690] 1823b; [1690] 1823c) or Kant ([1781/7] 1956). Our access to sign-vehicles does not differ from our access to objects (Rouse 1996: ch. 8). In this sense, sign-vehicles do not intrude between us and the world, screening the world, giving rise to skeptical scenarios. We can access the world directly, and sign-vehicles are objects or events in the world just like the objects or events they represent.

features of the signifying relation between the sign-vehicle and the object — say, like smoke, as a sign-vehicle of fire, helps us focus our attention on the physical connection between smoke and fire. Thus, in order to function as a sign of fire, there must be a prior habit of association which helps the smoke produce the interpreting thought. (Cf. Atkin 2010: subsec. 1.3.)

Sometimes the sign-vehicle can determine its object. Such is the case, for example, of a captain issuing commands to the rank of soldiers. (Peirce CP 8.178; EP 2: 493.) Here Peirce clearly anticipates the speech act theory of Austin (1962).

Peirce requires from the sign-relation that it be genuinely triadic, that is, not be decomposable into a complexus of dyads. Määttänen (2009: 126–127, 137) has argued that the triad which constitutes a sign-relation is realized in three dyadic relations between the relata which are present to experience. But these relations can only be cognized as constituents of a triad, since conscious thinking is possible only due to sign-relations and meanings. Even though there are three dyads, their functioning as such requires the simultaneous functioning of the other two. Thus the three dyads necessarily constitute a triad.

Vehkavaara (2007: 260) claims that the irreducibility of this triadic composition means that its three components have no identity as an object, sign-vehicle (representamen), and interpretant independently of the whole sign-relation they are part of.

According to Short (2007: 158, 171–172), the very concept of semiosis itself makes sense only if it has a purpose. Hence, in addition to the ordinary Peircean triad of the sign-vehicle, the object, and the interpretant, Short adds a fourth, namely, the purpose.¹⁷ Peirce himself seems to suggest that in the 1903 *Harvard Lectures on Pragmatism* (Peirce CP 5.175; EP 2: 218). Short (2007: 174) maintains that the teleology of semiosis explains the significance of signs; and that the requirement that there be ultimate logical interpretants is no more than a corollary of this.

Peirce believed at least since 1868 that thought takes place in signs (CP 5.250–253; EP 1: 23–24). According to Vehkavaara (2006; 2007: 273), Peirce claimed that the interpretant is produced as a means of grasping the true knowledge about the object of thought-sign; and because the interpretant is constructed by looking for truth about the object, the aim toward truth — the logical normativity — is already built in the construction of the triadic structure of sign. In this respect, semiosis coincides with the belief–

¹⁷This makes sign-relation a fourthness. Recall from Section 3.2 that Peirce did not deny the existence of higher categories. He merely claimed (and Burch (1991) may have proven) that higher categories can be reduced to complexes of thirdnesses.

doubt model of inquiry.¹⁸ But Short (2007: 32) considers it problematic that Vehkavaara's treatment seems to be dependent upon Peirce's deduction of the properties of sign in the 1867 "On A New List of Categories" (CP 1.545–559; EP 1: 1–10). Short warned not to trip upon that article. Peirce's later theory of signs is different. Hence Vehkavaara's grounds for the essential normativity of semiosis may be insufficient.

According to A.-V. Pietarinen and Bellucci (2016: 270), Peirce distinguished the fact that the sign determines an interpretant from the fact that the sign is represented by its interpretant as being related to its object (cf. MS 478; EP 2: 272–273).

Peirce (CP 4.536) associates *meaning* with the *immediate interpretant*, a subclass of interpretants.¹⁹ Elsewhere Peirce seems to consider interpretants in general as an umbrella term for meanings. Moreover, if meaning is habit, as Peirce stated in "How to Make Our Ideas Clear" (CP 5.400; EP 1: 131; cf. Section 2.2), then meanings appear to be associated with *final logical interpretants*.²⁰ Thus Määttä (2015: ch. 4), who otherwise understands Peirce's philosophy insightfully, is wrong when he confuses *meaning* with *sign-relation*.

5.2 Short on Signs and Interpretation

Short (2007: 158) provides a definition for the act of interpretation:

[Interpretant] R interprets X as a sign[-vehicle] of [object] O if and only if (a) R is or is a feature of a response to X for a purpose, P, (b) R is based on a relation, actual or past or apparent or supposed, of X to O or of things of X's type to things of O's type, and (c) O's obtaining has some positive bearing on R's appropriateness to P.

There is no implication that R's purpose will be achieved if O obtains. Moreover, the definition does not entail that there be an O even if X is taken to signify such a thing. If O does not obtain, X is nevertheless taken to signify it (cf. Short 2007: ch. 10). O is specific but not perfectly so, since other objects can replace the function of O in a sign-process in certain respects but need not do so in others. If O does not obtain, then R is mistaken: the relation on which R is based may be an actual but fallible relation of things

¹⁸See Section 4.3

¹⁹See Section 5.6.

²⁰See Sections 5.6 and 5.13.

of X's type to things of O's type; or the relation on which R is based may fail to be actual. (Short 2007: 158–159.) Again, Short's interpretation of Peirce is fallibilist. Thus, Short summarizes:

O is the object so far as it is determined by the relation on which R is based, given R's purpose, P (Short 2007: 159).

Justification is relative to purpose and to a complete set of purposes and of probable benefits weighed against probable costs. One and the same relation may be a basis for interpretation sometimes and not other times or for one creature and not another. (Short 2007: 160.)

Short defines *sign(-vehicle)* thus:

X is a sign[-vehicle], S, of O, if and only if X has such a relation to O, or things of X's type have such a relation to things of O's type, that, for a possible purpose, P, X could justifiably be interpreted on that basis as being a sign[-vehicle] of O (Short 2007: 160).

Short points out that there are differences between being a sign-vehicle and being interpreted as a sign-vehicle. This ensures that only a potential interpretant is required in order for the sign-relation to function.

This makes signhood to depend on an actual relation, not one that is past or apparent or supposed, merely. That is one difference between being a sign[-vehicle] and being interpreted as a sign[-vehicle]. A second difference is that a sign[-vehicle] does not have to be interpreted. Interpretability — a specific type of potential interpretant — suffices. This potential interpretant cannot be arbitrary: it must be one that could be justified given a purpose to which O is germane — that is, would be justified granted the right complex of additional purposes, abilities, external constraints. (Short 2007: 160.)

Significance is thus always relative to purpose. Reference to a particular interpretant, R, drops out of this definition, as there are many individual acts, thoughts, and so on, by which X may justifiably be interpreted as a sign of O, on one and the same basis. The conception of signhood is nonetheless triadic, as reference is made not only to the sign-vehicle and its object but also to a potential interpretant. That is what Peirce named the *immediate interpretant*, a subclass of interpretants.²¹ It is a *type* that may be realized

²¹See Subsection 5.6.

more than once and often in very different ways. By this definition, one and the same thing may function as many different sign-vehicles. X may be a sign-vehicle, S, of O and it may also be a sign-vehicle, S', of O', a sign-vehicle, S'', of O'', and so on. (Short 2007: 161.)

Whether semiotic or not, the relation that justifies an actual interpretant, R, is logically prior to R. It is a relation that the sign-vehicle X has to the object, O, or X's type has to O's type, independently of R. Significance in that sense is what makes a sign-vehicle a sign-vehicle, and it makes the sign-vehicle to be the sign-vehicle that it is, a sign-vehicle of O and not of something else. This significance consists in X's being justifiably interpretable as a sign-vehicle of O. What justifies such an interpretation, assuming some relevant purpose, is the prior relation of X to O. Hence Short defines *significance* as *grounded interpretability*. (Short 2007: 162.)

5.3 Semiosis

Peirce (CP 5.484; EP 2: 411) defines *semiosis* as “an action, or influence, which is, or involves, a cooperation of three subjects, such as a sign[-vehicle], its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs.” In short, it consists in the act of producing an interpretant.

Vehkavaara (2007: 263–264) describes semiosis as a self-normative process, where the continuous comparison of the changing sign-vehicles (representamens) with the object²² directs the sign-process internally without authority, normativity, or criterion external to the inquiry itself. Peirce modeled the prototype of semiosis as an inquiry or the scientific process of investigation²³ (Ransdell 1977), but it seems to apply more generally.

According to Hausman (1997: 185–186), the origin of semiosis is percepts.²⁴ He argues that there is a rudimentary interpretive experience present even in what seems to be pre-semiotic activity, for instance, sensation or brute feeling. If synechism²⁵ is true, then semiosis is continuous with, and takes place within, nature. Therefore it is useless to try to get to a “more real” world beyond semiosis.²⁶ It presupposes a dynamical object²⁷ which is, by

²² *Dynamical* object; see Section 5.7.

²³ Again, see Subsection 4.3.

²⁴ See Section 3.3.

²⁵ See Subsection 3.2.7.

²⁶ “To try to peel off signs & get down to the real thing is like trying to peel an onion and get down to onion itself, the onion *per se*, the onion *an sich*” (Peirce as quoted by Hausman 1997: 188).

²⁷ See Section 5.7.

definition, independent of semiosis. Instead of an explanation of semiosis that would enable deductive, accurate, and detailed predictions or placing semiosis into a larger theoretical scheme, Peirce offers “descriptions of major loci of activity that are assumed to be present when interpretation takes place” (Hausman 1997: 193–194).

Hausman (1997: 186–190, 196–199) continues that perception begins with percepts and is developed into perceptual judgments.²⁸ There are two kinds of percepts. Percepts in the first sense manifest firstness (qualities) and secondness (being forced upon experience) when abstracted (or “prescinded”) from the “thirdness of mediated interpretation.”²⁹ Perceptual judgment introduces critical control and serves as the beginning of *explicit* interpretation. It also introduces a degree of abduction: when forming a perceptual judgment, one infers abductively an *interpretive hypothesis* that allows us to recognize the object of perception *as* one of a kind. According to Peirce, all experience is interpreted in this way: “abductive inference shades into perceptual judgment without any sharp line of demarcation between them” (Peirce CP 5.181; EP 2: 227). Percepts in the first sense constrain such interpretation: they *direct* interpretation and *determine the aptness* of the resulting interpreting hypotheses. Thus they already involve a degree of semiosis — though not full-fledged triadic mediation, only a “weaker kind of interpretation.”³⁰ That is to be expected on the basis of synechism: interpretation is continuous. There is a continuum between percepts in both senses, percipua, and perceptual judgments. Hence they should be considered as *abstractions* or *ideal types* rather than distinct entities (cf. Peirce CP 6.102–163; EP 1: 312–333). On the other hand, prior acts of interpretation may influence the introduction of the interpreting hypothesis. Percepts in the second sense are the products of perceptual judgments. They manifest thirdness.

If Peirce is correct, then there is no pre-semiotic experience; the very apprehension of a percept already involves rudimentary interpretation. But there are pre-semiotic dynamical objects that constrain experience. That

²⁸See Section 3.3.

²⁹I am unable to explain what Hausman means by such a phrase. It seems to me that *all* interpretation is mediated — namely, by the sign-vehicle — and that that *necessarily* takes place in a triadic relation — namely, the sign-relation. If that is correct, then Hausman could just have used “sign-relation” instead of “thirdness of mediated interpretation” — but he did not.

³⁰Hausman does not explain, what this means. I believe, because of his reference to abduction, that he may have meant that our prior habits, which need not have anything to do with the currently ongoing semiosis, associate the percept with its potential practical effects. Thus thirdness (habit) is involved, but that does require that the percept mediate semiosis as a sign-vehicle. See Section 3.2.6.

avoids the extremes of both transcendent realism and semiotic idealism.

In Hausman's (1997: 188–190) reading, a real percept is a percept in the first sense (a “sciousnesses”³¹ as distinct from *consciousness*), a percept that is a sign-vehicle is a percept in the second sense. Being real, a “sciousness” is what constrains interpretation in the beginning of semiosis. A percept in the first sense brings with it a “double consciousness” of ego and non-ego (Peirce CP 5.53). The non-ego aspect of consciousness is “sciousness.” The ego aspect of consciousness points towards judgment and takes place at the first stages of the activation of consciousness. A percipuum mediates percepts in the first sense and the formation of an interpretive hypothesis that the perceptual judgment involves.

Hausman (1997: 190–191) explains that the absence of pre-semiotic elements in perception does not make Peirce a semiotic conceptualist or idealist, because the causal (dyadic) origin of percepts that “objectively” constrains the act of perception is a dynamical object,³² which is, by definition, independent of semiosis.

Hausman (1997: 192–193) applies these considerations to the concept of predication. Predication, or attributing a property to an object, requires a hypothetical act of abstracting a quality from the object and then applying it to the object. Then, in order for predication to occur, discrimination, or an act of focusing within experience, is necessary. Because the percipuum provides an immediate interpretation of the initiating percept, the percipuum should be thought of as requiring an act of attending that is prior to comparison and predication.

The origin of semiosis having been explained, it is natural to ask whether and how semiosis terminates. Peirce allows the interpretant to be another sign-vehicle with the same object.³³ Then the new sign-vehicle can elicit another interpretant, which can, again, be another sign-vehicle, and so on. Thus there may arise an indefinitely long procession of sign-vehicles interpreting previous sign-vehicles. (See, e.g., CP 4.536.)

If Peirce is correct, the purpose of semiosis is the formation of what he calls the *final logical interpretant*.³⁴ Then it remains for him to determine what the final logical interpretant is. He argues that it consists in the establishment of a *habit of action*.³⁵

³¹According to Hausman (1997: 188), a “sciousness” is “an object of consciousness that is prior to one’s explicit awareness of being conscious.”

³²See Section 5.7.

³³Again, *dynamical* object; see Section 5.7.

³⁴See Section 5.6.

³⁵See Section 5.13.

Peirce believed for a long time that semiosis does not terminate.³⁶ By 1906, he had eventually given up that idea: that the interpretant of a sign-vehicle must always be another sign-vehicle, and so on, *ad infinitum*. Now he allowed an emotion (“a quality of feeling”), an action (“exertion”), or a habit to be an interpretant (e.g., CP 4.536, 8.332). Short (2007: 201) has summarized the key motivation behind Peirce’s theory of the final logical interpretant: “It would be a mistake to suppose that interpretation must always be intellectual. If it were, we could never get from thought to action.” Peirce also considers the possibility that the essential function of a sign is to render inefficient relations efficient, — not to set them into action, but to establish a habit or general rule whereby they will act on occasion.

5.4 Functionalism and Language

It is important to note that Peirce does not confine his definition of the sign-vehicle to language and words and sentences. Peirce’s definition is *functionalist*³⁷ (cf. Stjernfelt 2014: 107): according to it, *anything* can be a sign-vehicle, provided that it *functions* as one.³⁸ The sign-vehicle *can* be conventional, like a spoken or printed word. But it can also be a percept.³⁹ Hence, language is but a special case, and not necessarily even the most important or fundamental one, of his more general theory of signs.

Peirce himself was aware that signification is not confined to language. In particular, to mention only *intentional* modes of non-verbal declaration, he enumerates algebra, arithmetical figures, emblems, gesture-language, man-

³⁶Peirce posited infinite progression and an infinite regression of signs in 1868 in “Questions Concerning Certain Faculties Claimed for Man” (CP 5.213–263; EP 1: 11–27) and “Some Consequences of Four Incapacities” (CP 5.264–317; EP 1: 28–55), if not earlier. Short (2004) has outlined, how he eventually abandoned the notion.

³⁷Peirce’s definitions of taxa of sign-vehicles can, perhaps, be best approached as “Car-nap sentences”: *if* there is something which fulfills the conditions of a given class of sign-vehicle, *then* it is such a sign-vehicle. These conditionals do not commit one to the existence of the defined things. Hence, his definitions are not “Ramsey sentences,” which assert that given kinds of sign-vehicles *do* exist.

³⁸Note that such functionalism cashes out Rouse’s (2002: ch. 3) interpretation of Quine’s thesis of the indeterminacy of translation. Rouse takes the thesis to entail that meanings do not exist. By their “non-existence,” he means that they do not constitute an ontological category or kind. Peirce’s functionalism seems to entail that too. Rouse also takes the thesis to imply that meaning pervades nature so that anything can be significant — again, just like Peirce’s functionalism entails. The difference is that Rouse spoke equivocally about *language*, whereas Peirce considers linguistic meaning only as a special case of his semiotics. Once Rouse’s account is salvaged accordingly, it becomes roughly identical with Peirce’s.

³⁹See Section 3.3.

ners, uniforms, and monuments. In the 1895 “Of Reasoning in General,” Peirce made a case for *speculative grammar*⁴⁰ which should study modes of signifying in general, beyond language. Peirce denied that speculative grammar could be based on linguistic analysis. (EP 2: 18–19, 221.)

If anything can be a sign-vehicle, then the thesis of the practice-ladenness of observation follows.⁴¹ Määttänen (2015: 43) explains:

Virtually anything observed may involve habits and, therefore, be a meaningful sign-vehicle. The only thing required is that it brings to mind, consciously or subconsciously, some habitual behaviour with anticipated consequences. This means that the experienced world is always interpreted with meanings. It is important to note here that language is not necessarily involved in this interpretation.

Everything that is perceived is at least potentially interpreted. Ultimately this involves the habits associated with the things in question. Such habits connect what is observed to what can be thereby expected. By creating expectations in this way, habits influence perception and action. However, this does not imply relativism, since habits cannot be completely arbitrary: they are adaptations to the objective constraints of the environment⁴² and can be formed only if they really (at least usually) fulfill the purpose for which they are formed. Language need not be involved in this interpretation. (See Määttänen 2009; 2015 and Subsections 2.2.3 and 2.2.12.)

5.5 Taxonomy of Sign-Vehicles

By 1908, Peirce had created a taxonomic system of ten trichotomies of definitions of different kinds of sign-vehicles. That would yield $3^{10} = 59\,049$ classes of sign-vehicles, if they were logically independent. Most of them are, however, logically impossible, since the complexity of one aspect of the sign-vehicle constrains others (Short 2007: 239; cf. Peirce CP 2.235–237; EP 2: 290, 481). Thus, Short (2007: 239) has argued that n trichotomies yield $\frac{1}{2}(n+1)(n+2)$ logically possible sign-vehicles. For the ten trichotomies Peirce

⁴⁰Peirce often credited Duns Scotus (c. 1265/6 –1308), his favorite medieval philosopher, for introducing speculative grammar. But his attribution is mistaken: after Peirce’s death, it was discovered that *Tractatus de modis significandi sive Grammatica Speculativa*, previously attributed to Scotus, has been authored by Thomas of Erfurt (ca. 14th century) instead (Copleston 1950: 478).

⁴¹See Subsection 3.2.6.

⁴²Peirce understood these objective constraints as secondnesses; see Section 3.2.

analyzed, the number of the possible classes of sign-vehicles would thus be 66. I will address only the most important divisions here in order to prepare way for Peirce's semiotic theory of propositions.⁴³

5.5.1 Icons, Indices, and Symbols

The trichotomy of *icons*, *indices*, and *symbols* is the one which Peirce applies most frequently. It is made on the basis of the application of his categories⁴⁴ to the relation of the sign-vehicle to the object⁴⁵ (Peirce CP 2.243, 8.344; EP 2: 291, 482–483).

An *icon* or a *likeness* is a sign-vehicle which signifies its object by resembling or imitating it, independently of any other connection between them. Its relation to its object is a first: isomorphism suggests the *possibility* of the object. Icons include images and diagrams. (Peirce CP 2.276; EP 2: 5–7, 273.)

An *index* (or an *indication* or a *seme*) is a sign-vehicle which signifies its object by a brute (e.g. causal) connection to it; here “brute” means simply that the relation is independent of reasoning. Its effect upon an interpreter is such as to catch attention. Its relation to its object is a second: there is an *actual*, *dyadic* connection between the sign-vehicle and the object. Indices include guideposts, which point down the road to be taken; relative pronouns, which are placed just after the name of the thing intended to be denoted; vocative exclamations, as “Hi! there,” which acts upon the nerves of the person addressed and forces their attention; weathercocks; and hygrometers. (Peirce CP 2.283; EP 2: 5, 7–8, 274.)

A *symbol* is a sign-vehicle which signifies its object by a lawlike connection to it. Such a connection can be established by custom or convention. Symbols include ordinary linguistic sign-vehicles, such as most words, phrases, speeches, books, and libraries.⁴⁶ (Peirce CP 2.297; EP 2: 5, 9.) Peirce said at least once that the representative character of a symbol consists in its being a rule that will determine its interpretant (CP 2.292; EP 2: 274). He also said at least once that a symbol is a law, or regularity of the indefinite future (CP 2.293; EP 2: 274). In another instance, Peirce characterized a symbol as a sign-vehicle which refers to the object that it denotes by virtue of a law, usually an association of general ideas, which operates to cause the symbol

⁴³Diagrams can be constructed for Peirce's sign-vehicles; see Farias and Queiroz (2003).

⁴⁴See Section 3.2.

⁴⁵Once again, *dynamical* object; see Section 5.7.

⁴⁶A library contains books; and each book contains symbols. A library is a collective symbol of these symbols.

to be interpreted as referring to that object (CP 2.249; EP 2: 292).⁴⁷ Peirce (CP 4.157) states that in the case of symbols, “it is not the resemblance that causes the association, but the association that constitutes the resemblance” (see also Sonesson 2016: 288, 288n1). Hence the relation of a symbol to its object is a third: there is a *lawlike* connection between them.

Peirce argued already in 1885 that in the case of a symbol (then called a “token”), a habit holds the sign-relation together. The object of a symbol is general, because the symbol represents *whatever* it is represented to represent. Here we encounter the notion of *second-order representation*. In the text cited, Peirce constructed indices and icons as two kinds of *degenerate symbols*, in which the notion of *degeneracy* is borrowed from the theory of conic sections. Because symbols are general, they are fit for reasoning. But they must involve indices, because the universe of discourse can only be indicated. They must also involve icons in order to be reasoned upon, because deduction is akin to observation and therefore iconic: the way the premises are related to their common terms can only be *shown*.⁴⁸ This notion is related to Peirce and Mitchell’s discovery of quantification. (Bellucci 2018: 113ff.; cf. Peirce CP 3.360, 3.393; EP 1: 225–228.)

For Peirce, as for William Ockham, any concept that we entertain is a symbol: it signifies by a rule. Concepts, or “internal” signs, are natural, while “external” symbols like words are conventional. They are equal in logical status. The difference between Peircean and Ockhamian symbols is priority: Ockham considered concepts as primary and external symbols secondary, while for Peirce the anti-psychologist the priority is reversed. (Bellucci 2018: 64–71.)

One can see why language is a proper subset of Peirce’s more general semiotics. Language consists for the greater part in symbols, but there are also icons and indices. Peirce (EP 2: 7) understood that mere combinations of words do not convey information. Self-sufficient discourse would be the acme of pointlessness. In order to refer beyond itself, discourse must rely on indices — that is, a class that includes a large number of non-linguistic sign-vehicles. Symbols denote *kinds* and hence cannot indicate particulars (EP 2: 9). That is the job of indices.

Icons and indices as such assert nothing. An index designates the universe of discourse within which signification makes sense, and an icon describes it. It requires a symbol to make an assertion. A symbol declares that the set of objects denoted by an index is represented by an icon; and such index and

⁴⁷Short (2007: 220–221) rejects this formulation as excessively concise and proposes an alternative: a symbol is a sign of that object that is assigned to it by a rule of interpretation.

⁴⁸See Subsection 4.5.1.

icon are associated with the symbol.⁴⁹ (Peirce CP 2.291, 2.295; EP 2: 16–17.) For instance, “this,” a pure denotation, is an index. It asserts nothing as such, because it only focuses attention on something. Likewise, “is heavy,” a pure description, is an icon. It asserts nothing as such, because it cannot single out an object. But when combined into the sentence “this is heavy,” one gets a symbol that makes an assertion that what is being indicated is like what is being described.

Atkin (2010: subsec. 3.2) argues that by 1903 Peirce was aware that it would be hard, if not impossible, to find any pure instances of icons and indices, and thus he began to suspect that icons and indices were always partly symbolic or conventional. The simple icon–index–symbol trichotomy seemed like an abstraction, and Peirce was aware that any single sign may display some combination of iconic, indexical and symbolic characteristics.

Hintikka (1997: 23) mistakenly conceives icons, indices, and symbols as vehicles of *linguistic* representation. When Peirce calls a piece of mimicry an icon (EP 2: 13), a weathercock an index (CP 2.286; EP 2: 14), and the whole universe a symbol (CP 5.119; EP 2: 193), it should be obvious that there is no essential connection to language.

It is possible that the very same sign-vehicle exhibits different functions in different contexts. For example, smoke can be an index of fire. But for an Native American it can be a symbol which another member of their tribe is trying to communicate. It can also be iconic by resembling other occurrences of smoke, fog, or of limiting visibility by a smoke screen, etc.

5.5.2 Qualisigns, Sinsigns, and Legisigns

The trichotomy of qualisigns, sinsigns, and legisigns is based on the application of Peirce's categories⁵⁰ to the nature of the sign-vehicle itself (Peirce CP 2.243, 8.344; EP 2: 291, 482–483).

A *Qualisign*⁵¹ is a quality which is a sign[-vehicle]. It cannot actually act as a sign[-vehicle] until it is embodied; but the embodiment has nothing to do with its character as a sign[-vehicle].

A *Sinsign*⁵² (where the syllable *sin* is taken as meaning ‘being only once,’ as in *single*, *simple*, Latin *semel*, etc.) is an actual

⁴⁹This is what Peirce means when he repeatedly says that a symbol contains an icon and an index. See also Bellucci (2018: 20ff.), according to whom Peirce discovered the dual nature of the symbol already in the late 1860s.

⁵⁰See Section 3.2.

⁵¹Peirce also uses the term *tone*.

⁵²Peirce also uses the term *token*.

existent thing or event which is a sign[-vehicle]. It can only be so through its qualities; so that it involves a qualisign, or rather, several qualisigns. But these qualisigns are of a peculiar kind and only form a sign[-vehicle] through being actually embodied.

A *Legisign*⁵³ is a law that is a sign[-vehicle]. This law is usually established by men. Every conventional sign[-vehicle] is a legisign. It is not a single object, but a general type which, it has been agreed, shall be significant. Every legisign signifies through an instance of its application, which may be termed a *Replica* of it. [...] The replica is a sinsign. Thus, every legisign requires sinsigns. But these are not ordinary sinsigns, such as are peculiar occurrences that are regarded as significant. Nor would the replica be significant if it were not for the law which renders it so. (Peirce CP 2.244–246; EP 2: 291.)

Now Peirce introduces the concept of *replica*: the legisign can signify only by being replicated in sinsigns. For instance, “bullfinch,” “Goudvink,” “domherre,” “punatulkku,” and “leevike,” uttered in a particular occasion, are sinsigns. They are replicas of the same universal concept, namely the concept of the species *pyrrhula pyrrhula*, which is a legisign. The concept is independent of the replicas, but it functions as a legisign only by being replicated.

Short (2007: 210) distinguishes between laws that are intentionally produced to serve as sign-vehicles, like linguistic conventions, and those that are not, like laws of nature. Hence he introduces the term “legisign(G)” to represent legisigns in the general sense which covers both cases and uses “legisign” *simpliciter* in the narrower sense, which covers only conventional laws that are sign-vehicles. Legisigns(G) may have instances, but these are not spoken of as replicas.

According to Short (2007: 210–211), the essential feature of legisigns and their replicas, distinguishing them from all other signs, is that they have a purpose which they have to signify, and that constitutes their significance. For instance, the legisign *bullfinch* and its replica “bullfinch” signify the purpose to refer to a member of a species of birds, or to the species itself; and without such purpose, using this word would not make sense at all.

Other kinds of sign-vehicles may be used or produced purposefully in order to signify, but their significance does not depend on that purpose. For instance, I may use a weathercock to indicate the direction of the wind, but it indicates the direction of wind independently of whether I intend so or not.

⁵³Peirce also uses the term *type*.

The difference is between purpose exploiting forms of significance that exist independently of that or any purpose and purpose constituting significance. The purpose to communicate the species of a bird constitutes the significance of the sinsign “bullfinch” (because it would be nonsensical otherwise); but the purpose to indicate the direction of the wind does not constitute the significance of the weathercock (because it does that independently of purpose). Hence Short (2007: 210–211) refutes the interpretation that causal laws be legisigns and that instances of causation be their replicas, as for example in the case of medical symptoms. Such law does not exist and the instance does not occur for the purpose of signifying. Moreover, he refutes the opposite interpretation that all legisigns be conventional. Peirce (CP 2.246; EP 2: 291) said that “every conventional sign is a legisign,” not that every legisign be conventional. Not all that exists for a purpose or is done for a purpose is created or is done with conscious intent, let alone by express agreement with others.

The replica must have common characteristics with a legisign. Hence it is an icon of that legisign in the sense of exemplifying it. But, in this case, it is not any icon whatever, since accidental conformity to a pattern is not replication. Hence, a genuine replica is related to the legisign replicated not only iconically but also indexically. For instance, the concept of *bullfinch* (a legisign) and the expression “bullfinch” (a sinsign) have the criteria of their application in common. The sameness of the criteria of application makes the legisign and the sinsign icons of each other; and the actual occurrence of these criteria makes the utterance of the sinsign a replica of the legisign. Exactness of replication is not important. It could, perhaps, be said that the replica signifies indexically the symbol. But Short maintains that it is better to say that it is the symbol itself that signifies, through its replica or in being replicated. Thus it is not the case that the sinsign “bullfinch” communicate the species of birds. Rather the legisign *bullfinch* itself communicates the species by being expressed by the sinsign “bullfinch.” (Short 2007: 212–213, 221; cf. Peirce CP 2.261; EP 2: 295.)

Moreover, Short (2007: 212–213) explains that a legisign is a union of two laws, one defining replicas and the other determining how they are to be interpreted. Thus a legisign presupposes a law of its interpretation. It would not make sense to cry “Bullfinch!” unless there are interpreters that understand the relation of such an utterance to the concept of the species. But once a legisign is established, the rule of its interpretation can change subsequently.

According to Short (2007: 221–222), all symbols are legisigns, that is, replicable types. They are laws that define what may count as their replicas. Other laws that determine how those replicas are to be interpreted are

associated with them. But not all legisigns are symbols. That follows from the difference between the general case of being interpretable by a rule and the special case of having an object assigned by that rule. If the rule is to attend to a specified iconic or indexical aspect of the replica, then it does not by itself determine the replica's object. One must attend to the specified aspect to discover what the object is. For instance, the demonstrative pronoun "that" is a legisign, being a general type, but not a symbol, since it does not signify a general concept (Peirce CP 2.261; EP 2: 295).

Symbols (which are legisigns) can only signify types, not individuals (cf. Peirce CP 2.249; EP 2: 292). Their replicas (which are sinsigns) can signify types only via the symbols they exemplify. A sinsign, merely as an individual thing, cannot directly signify anything general. (Short 2007: 222.)

5.5.3 Rhemata, Dicisigns, and Arguments

The trichotomy of rhemata, dicisigns, and arguments is based on the application of Peirce's categories⁵⁴ to the relation of the sign-vehicle to its interpretant (Peirce CP 2.243, 5.139, 8.344; EP 2: 204, 291, 482–483).

An *argument* (or a *suadisign*) is a sign-vehicle which separately shows what interpretant it is intended to determine. (Peirce CP 5.139; EP 2: 204, 275.) For instance, the following is an argument:

- | | |
|-------|------------------------------|
| (1) | All human beings are mortal. |
| (2) | Socrates is a human being. |
| | |
| ∴ (3) | Socrates is mortal. |

It intends to determine the interpretant that Socrates is mortal and separately shows it as the conclusion.

A *dicisign*⁵⁵ (or a *proposition*) is a sign-vehicle which is not an argument, but which separately indicates what object it is intended to represent. (*Ibid.*) For instance, "Socrates is mortal" is a proposition. It separately indicates Socrates.

A *rhema* (or a *sumisign*) is a simple sign-vehicle without such a separate part. (*Ibid.*) For instance, "Socrates" and "mortal" are rhemata.

The examples I have given are not intended to confine arguments, dicisigns and rhemata to language. I am abstracting from language to the conceptual level. Language is simply a common way to give particular expressions to concepts. They can be expressed in non-linguistic media as

⁵⁴See Section 3.2.

⁵⁵Peirce might have derived the term *dicisign* from the Latin *dicere*: "to say." A dicisign is a sign which conveys information — that is, *says* something.

well, such as by photographs or videos. The same argument, proposition and rhema can be expressed in different languages. For instance, “Snow is white,” “Schnee ist weiß,” “snö är vit,” “lumi on valkoista,” and “lumi on valge” are different expressions of the same proposition.

A.-V. Pietarinen and Bellucci (2016) explain that a sign-vehicle is a valid argument if for any object that the sign-vehicle represents, the interpretant, if it is another sign-vehicle, represents it as well. Consider, for example, the following argument:

- | | |
|------------------|----------------------------|
| (1) | All foxes are omnivorous. |
| (2) | This animal is a fox. |
| $\therefore$ (3) | This animal is omnivorous. |

Here the minor premise indicates the object, and the conclusion refers to it exclusively. Hence the argument is valid.

In order to understand Peirce's rhema–dicisign–argument trichotomy, it is necessary to consult his classification of the sciences again. Recall that he argued that philosophy is the second most basic science that presupposes only mathematics and is therefore the most basic positive science. Philosophy is subdivided into phenomenology, normative science, and metaphysics. Normative science is subdivided into aesthetics, ethics, and logic (insofar as it is not merely formal). Aesthetics presupposes only mathematics and phenomenology. The purpose of aesthetics is to discover what is admirable in general. Admirable conduct is a special case. Hence ethics presupposes aesthetics and its presuppositions. Further, sound reasoning is a species of admirable conduct. Hence logic (insofar as it is not merely formal) presupposes ethics and aesthetics and their presuppositions. Thus, Peirce conceived ethical conduct as self-controlled conduct and reasoning as its special case. In short, logic is ethics applied to thought. (Cf. e.g. Peirce CP 1.180–202; EP 2: 258–262.)

A.-V. Pietarinen and Bellucci (2016) present a semiotic analysis of the argument. Whenever one reasons, one has to reason according to some general principle of reasoning. Because logic is applied ethics, Pietarinen and Bellucci argue that principles of reasoning are habits of reasoning, a peculiar kind of self-controlled conduct: we are inclined to draw a conclusion from given premises because of a habit of reasoning that associates the conclusion with the premises. The drawing of a conclusion is an *action*, which requires *motivation*. A habit of reasoning supplies the motivation. The formal schematism of an inference alone is too abstract to provide the required motivation. Thus logic, in its most general sense, consists in an analysis and classification of habits of reasoning. Pietarinen and Bellucci conclude that

an argument is a sign-vehicle of its conclusion *and* an instance of the general rule according to which it represents that conclusion.

Pietarinen and Bellucci continue that an argument presents a law as a justification of the conclusion, whether abductively, deductively, or inductively. An abductive argument is an *icon* of its conclusion; a deductive argument is an *index* of its conclusion; and an inductive argument is a *symbol* of its conclusion.⁵⁶ Bellucci (2018: 42–49) shows how Peirce explained the threefold division of arguments by the concept of *substitution*, how each argument performs substitutions, and the logical principle *nota notae est nota rei ipsius* (cf. Peirce W 2: 446–447). According to Bellucci, substitution is a triadic process.

Bellucci (2018: 70) argues that an argument is a *representation of representation*: one premise represents that the other premise represents the conclusion.

5.5.4 The Primacy of the Argument

Peirce asserts that “of the two implications of pragmatism that concepts are purposive, and that their meaning lies in their conceivable practical bearings, the former is the more fundamental” (CP 8.322; cf. Bergman 2016: 178). Now, the argument is the only sign-vehicle that professes a definite purpose — namely, the articulation of the conclusion. In short, the meaning of an argument is explicit in its conclusion (CP 5.179; EP 2: 220). Thus Peirce (CP 5.175; EP 2: 218; cf. EP 2: 308) considered the argument as the most basic sign-vehicle. The difference between rhema (or sumisign, or term), proposition, and argument is between the purposes which they serve (CP 4.572). Bergman (2016: 180–181) argues that that seems to follow from the notion of necessary reasoning in Kant ([1781/7] 1956). If Bellucci (2018: 23) is right, then Peirce’s logic is primarily concerned with arguments. Other signs have logical relevance according to their contribution to the function of the argument.

Stjernfelt (2014: 4) argues that Peirce’s distinctions between kinds of sign-vehicle do not imply that there be so many independent species of sign-vehicles. His distinctions are rather nested so that the more complicated sign-vehicles contain, embed, or involve specimens of the simpler sign-vehicles. The subdivisions of sign-vehicles serve to describe the functioning of the most complex kind of sign-vehicle, the argument. According to Stjernfelt (2014: 9), the more complex sign-vehicles have not evolved from the simpler ones. On the contrary, the argument structure has always been there

⁵⁶See Subsection 5.5.1.

in simple perception–action loops. The simpler sign-vehicles that the argument employs have evolved into differentiated, specialized subdivisions in order to serve different functions. Stjernfelt (2014: 77–79) explains that arguments are not constructed of dicisigns and dicisigns are not constructed of rhemata. The system of existential graphs represents the relations of terms, propositions and arguments differently (cf. Peirce MS 295: 26ff.). The reasoning process displayed by the argument is primitive. Dicisigns are tools for the description of phases of reasoning and making explicit propositions in order to conduct arguments. Dicisigns and rhemata are unautonomous, truncated arguments: they can only appear in arguments. Thus Peirce (MS 295: 102): “[...] an Argument is no more built up of Propositions than a motion is built up of positions.” The process of inference is continuous, and the discrete propositions into which it can be analyzed are *entia rationis* that function as ideal types. Thus Stjernfelt (2014: 97) claims that assessing the meaning of *any* sign-vehicle is, in effect, conducting an argument.

Stjernfelt (2014: 142, 158) locates the beginning of semiosis in primitive metabolism. Parts of the metabolism may become relatively autonomous and form organs. Perception parts of metabolism may acquire their own parts, which gives rise to cognitive plasticity, memory, etc.; and action parts of metabolism may differentiate into motor limbs and tools. But the subdivision of functions only occurs as part of a metabolic unit. The primitive, metabolic inference connects a perception dicisign (e.g. “this is the direction of the sugar gradient”) with an action dicisign (e.g. “swim in the direction in which the sugar gradient increases”) to an argument which forms a subsection of the overall metabolism of the cell. Stjernfelt (2014: 161) argues that it can be called an argument because it has an ability to attain truth — and to err. Stjernfelt (2014: ch. 6) provides a host of biosemiotic⁵⁷ examples of Peircean (non-linguistic) arguments.

According to Stjernfelt (2014: 117–119), Peirce’s theory dispenses with consciousness as a defining feature in bringing about propositions: all reference to consciousness is bracketed instead. He takes every aspect of cognition to serve the inference chain from perception to action and inference to be seen under the headline of habits of action rather than the specific habit subtype of mental representation. Recall that habits are not exclusively mental in Peirce.⁵⁸ Thus the Peircean doctrine redefines *cognition* as any kind of sign-processing regardless of whether consciousness is involved. Thus Stjernfelt (2014: 159–160) concludes that *cognition has begun long before organisms with central nervous systems had evolved*. He warns about making neurocen-

⁵⁷For an introduction to biosemiotics, see, e.g., Barbieri (2007).

⁵⁸See Section 2.3.

tric or anthropocentric assumptions so as to deny cognition from creatures which certainly are apt to process signs but which lack nervous tissue: accidental properties of nervous tissue need not be characteristic of cognition as such. Rather, neurons and central nervous systems should be regarded as special adaptations to requirements of complicated cognitive processes.

Stjernfelt (2014: 143) continues that the icon–index–symbol trichotomy is not compositional but functional: pure icons, pure indices and pure symbols constitute rare limiting cases. Pure icons and pure indices cannot communicate anything; pure icons and pure symbols are not necessarily connected to any actual object. In order to convey information, all these three functions must be combined; that is, full *dicisign* structure is required.⁵⁹ As the argument structure has been there since the beginning, subdivisions have developed where a need for their introduction has arisen. Thus, semiotic compositionality forms an achievement in the evolution of signs rather than a starting principle (Stjernfelt 2014: 159).

Peirce states that he considers *illation*, expressed by *ergo*, as the primary and fundamental logical relation. This implies that a proposition (*dicisign*) is an argument deprived of its assertiveness, and a *rhema* is a proposition (*dicisign*) deprived of its subject or its predicate.⁶⁰ (Peirce CP 3.440.) According to Stjernfelt (2014: 76–79), this means that all propositions (*dicisigns*) are equivalent to conditionals.⁶¹

However, sometimes Peirce seems to have considered the *dicisign* as the primary sign-vehicle and other sign-vehicles as specializations of its sub-functions (e.g. CP 4.583).

Stjernfelt (2014: 169–173) argues that the capability to hypostatic abstraction⁶² promotes self-control, crucial for logic, a species of self-controlled behavior. Self-control comes gradually during evolution. Stjernfelt submits

⁵⁹I will explain the *dicisign* structure in Subsections 5.10.2 and 5.10.3.

⁶⁰Peirce also says in the same paragraph that every proposition (*dicisign*) is a conditional proposition at bottom. To my knowledge, this doctrine does not appear elsewhere in his large corpus and hence could have been a momentary idea to which he never reverted.

⁶¹All universally quantified propositions are equivalent to conditionals like (All humans are mortal $\rightarrow$ If x is a human, then x is mortal). Correspondingly, existentially quantified propositions are equivalent to conditionals like (Socrates is mortal $\rightarrow$ If there is an x such that the x is Socrates, then x is mortal). I suppose that Stjernfelt should have written (All humans are mortal $\leftrightarrow \forall x (x \text{ is a human} \rightarrow x \text{ is mortal})$) and (Socrates is mortal $\leftrightarrow \exists x (\text{the } x \text{ is Socrates} \rightarrow x \text{ is mortal})$).

Bellucci (2018: 24–31) shows how Peirce understood the isomorphism between valid syllogisms and conditional propositions. This notion rests on the distinction between *formal* and *material* principles of inference. Formal principles of inference cannot be eliminated from syllogisms by turning them into premises without creating redundancy.

⁶²See Subsection 2.5.1.

that this progress corresponds to the increase of articulation and segmentation of the perception–action loop into detailed argument structures. Relative autonomization of a part of that loop corresponds to an increase in self-control. By being able to articulate a part in the loop by hypostatic abstraction makes it possible for an organism to become more conscious of its function and thus gaining more control over its performance. This is prominent in human thought and language and is facilitated by human ability to think about signs *qua* signs. Thus, becoming able to meta-level thought, to think about thinking, is crucial in becoming able to control one's actions. But self-control is purely inhibitory and originates nothing. Self-control exercises a role reminiscent of natural selection in weeding out certain spontaneous ideas.

Bellucci (2018: 1–5) has argued that the primacy of the argument suggests that logic and semiotics are intimately related: both pertain to the analysis of different kinds of arguments and their subdivisions. But in fact, semiotics (speculative grammar) is subordinate to logic: logic consists in speculative grammar (the study and classification of the parts of arguments (propositions and terms) and of other logical forms that are needed in logical critics), logical critics (the study of arguments), and methodeutic (the study of the methods of scientific inquiry). Speculative grammar studies meaning, and logical critics studies truth. Therefore the latter presupposes the former.

5.6 Taxonomy of Interpretants

There are different kinds of interpretants defined by their functions: at least (1a) immediate, (1b) dynamic or dynamical, (1c) final, (2a) emotional, (2b) energetic, and (2c) logical interpretants. The divisions (1) and (2) are independent, and the subdivisions (a)–(c) are exclusive: any interpretant can be either (1) or (2) or both, and either (a), (b), or (c). (Peirce EP 2: 409, 430; Short 2007: ch. 7.)

Santaella (2016: 162) points out that Peirce has not left any mention about the overlap of the two triads, which has puzzled many commentators. She has suggested that the trichotomy of the emotional, energetic, and logical interpretants is an internal subdivision of the dynamical interpretant, a subdivision that can be coherently extended to the immediate and to the final interpretants. Because the logical interpretant acts as a rule of interpretation which is habitually actualized by the interpreter, the logical interpretant guarantees that the sign is converted into another sign. (Cf. Johansen 1985; 1993.) According to Kilpinen (2016: 209), the second subdivision of interpretants denote *possible modes of behavior* rather than kinds of things.

The varieties of interpretants constitute an umbrella term for meanings⁶³ — though Bergman (2016: 179–180) points out that sometimes Peirce seems to have distinguished between meaning and interpretant. This position seems controversial (Santaella 2016: 161).⁶⁴

The *immediate interpretant* is the interpretant represented or signified in the sign-vehicle. It is a *schema* in the interpreter's imagination, i.e., a vague image or what there is in common to the different images of its object. It consists in the quality of the impression that a sign-vehicle is fit to produce, not to any actual reaction. For instance, the immediate interpretant of the sentence "It is a stormy day" is a vague schema of what stormy days have in common. (CP 8.314–315, 8.343; EP 2: 482, 498, 500.) In "Prolegomena to an Apology for Pragmaticism," Peirce (CP 4.536) identifies *meaning* with the immediate interpretant.

The *dynamical interpretant* is whatever interpretation any mind actually makes of a sign, and it derives its character from secondness. In its active mode it means actions agitated by the sign. In its passive mode it means surprising experiences. Thus every *actual* interpretation is dyadic, and it terminates in action or a surprising experience. This leaves open the possibility that *potential* interpretation can be any category. For instance, the dynamical interpretant of the sentence "It is a stormy day" is whatever actual effect it at once has upon the interpreter, like disappointment. (Peirce CP 8.315, 8.343; EP 2: 482, 499.)

The *final interpretant* is "the manner in which the Sign[-vehicle] tends to represent itself to be related to its Object (Peirce CP 4.536), "that which would finally be decided to be the true interpretation if consideration of the matter were carried so far that an ultimate opinion were reached" (CP 8.184; EP 2: 496) and the "effect that would be produced on the mind by the sign[-vehicle] after sufficient development of thought" (CP 8.343; EP 2: 482). It does not consist in the way in which any mind does act but in the way in which every mind would act: it consists in a truth which might be expressed in a conditional proposition of this type: "If so and so were to happen to any mind, this sign-vehicle would determine that mind to such and such *conduct*." Hence, the final interpretant is essentially social, while the dynamical interpretant can be individual. (CP 8.315; EP 2: 499–500.) For instance, the final interpretant of the sentence "It is a stormy day" is the

⁶³For Peirce, *meaning* is, for instance, "the intended interpretant of a symbol" (CP 5.175; EP 2: 218).

⁶⁴See, e.g., Gorré (2016: 19), according to whom Peirce's classification of interpretants has provoked a controversy. She also seems to disagree on my interpretation of Peirce's theory of interpretants, but I am unable to follow her confusing argument. For discussion, see, e.g., Savan (1988: 40–72) and Johansen (1993: 145–185).

way in which interpreters tend to respond to such weather in the long run. According to Atkin (2010: subsubsec. 4.2.3), the final interpretant functions as a normative standard⁶⁵ by which we can judge our actual interpretative responses to the sign.⁶⁶ However, Peirce does not tell how this normative standard can be known in earlier stages of inquiry.

According to Santaella (2016: 161–162), the immediate interpretant falls under firstness, the dynamical interpretant under secondness, and the final interpretant under thirdness. The final interpretant is a limit concept: it is never actually attainable. Thus “any dynamical interpretant is always *in medias res* of the final interpretant which is permanently in a state of becoming.”

The emotional interpretant includes feelings. It is involved in all interpretation. Interpretation may also trigger an act. In these cases the emotional interpretant is accompanied with an energetic interpretant. Moreover, there might be thought involved in the interpretation. Then, besides the emotional and the possible energetic interpretants, there is also the possible logical interpretant. (Peirce EP 2: 409.)

Peirce (EP 2: 477–478) adds that the interpretant represents *both* the object *and* the sign-vehicle.

Jappy (2016) explains the function of the interpretants thus: In understanding or interpreting a sign-vehicle, we may feel things about it (the emotional interpretant), undertake actions that are rational in the light of the sign and the other information we possess (the dynamic interpretant), or an indefinite number of inferences may be drawn from it (the logical interpretant). Note that instead of *energetic* interpretant, he talks about *dynamic* interpretant, thus conflating Short's divisions (1) and (2).

Atkin (2010: subsec. 4.2) connects the division of interpretants with Peirce's 1878 paper “How To Make Our Ideas Clear” (CP 5.388–410; EP 1: 124–141), where Peirce introduces three grades of clarity, or levels of understanding. The first grade of clarity is to have an unreflective grasp of some concept in everyday experience. Peirce identified it with the dynamical interpretant. The second grade of clarity is to have, or be capable of providing, a general definition of that concept. Peirce identified it with the immediate interpretant. The third grade of clarity comes from the pragmatic maxim.⁶⁷ Peirce identified it with the logical interpretant: the logical interpretant is the potential practical effects of the sign-vehicle. Now his pragmatism was interwoven with his semiotics.

⁶⁵Peirce (CP 8.343; EP 2: 482) sometimes calls the final interpretant “normal interpretant,” which may refer to this normative function.

⁶⁶See also Ransdell (1977: 169–70) and Savan (1988: 62).

⁶⁷See Section 2.2.

Gorlée (2016: 25–27) seems to consider each interpretant as a kind of habit: emotional interpretants as emotional habits, energetic interpretants as habits of action, and logical interpretants as intellectual habits. She does not justify such interpretation.

5.7 Taxonomy of Objects

I will introduce Peirce's distinction between the *dynamical object* and the *immediate object* of a sign-vehicle in Subsection 5.7.1. In short, the dynamical object is the object as independent of signification; and the immediate object is the object as represented by the sign-vehicle. The immediate object indicates *collateral experience* by which the dynamical object can be discovered. The purpose of inquiry or semiosis is the discovery of the dynamical object. Hence the dynamical object provides a normative standard for the inquiry or semiosis independent of external authority. I will explain the concept of *collateral experience* in Subsection 5.7.2.

5.7.1 Dynamical and Immediate Object

Sign-vehicles cannot do by themselves everything that is required for knowledge. Their function is limited to providing clues, where to proceed. Peirce instituted a distinction of two kinds of objects to make sense of that function: the *dynamical* and the *immediate object* of the sign-vehicle.

In short, the *dynamical object* is the object of the sign-vehicle independent of how the sign-vehicle represents it; and the *immediate object* is the object of the sign-vehicle as represented by the sign-vehicle. (CP 2.310–311, 4.536; EP 2: 275, 407, 480–481). The mediate or dynamoid object determines the immediate object. The immediate object is a fallible approximation of the dynamical object and indicates how the rest of the dynamical object can be discovered by *collateral experience*⁶⁸ (Peirce CP 6.318, 6.338, 8.178–179, 8.183, 8.314; EP 2: 404–409, 429, 480, 493–498).

Peirce's terminology varied over the years; he has called the dynamical object “the primary object,” “the real object,” “the mediate object,” and “the dynamic object.” Likewise, he has called the immediate object “the secondary object.” Peirce eventually concluded that “dynamical object” conveys his intention best, because it takes into account the fact that the sign-vehicle may represent an object that may not exist (Peirce CP 8.183, 8.341; EP 2: 495–496, 498).

⁶⁸See Subsection 5.7.2.

The dynamical object and the immediate object are not like Kant's ([1781/7] 1956) *phenomena* and *noumena*. Both the dynamical and the immediate object are phenomena in Peirce's sense: reproducible patterns or configurations of nature (not of a "subject").⁶⁹ The immediate object is a fallible approximation of the dynamical object, and the latter can be completely known when the former coincides with it (Peirce CP 8.183; EP 2: 495).

According to Ransdell (1977: 169–170), the dynamical object is the "object as it really is"; the immediate object, "what we, at any time, suppose the object to be" and "the object as it appears at any point in the inquiry or semiotic process"; and the end of inquiry, where the dynamical object and the immediate object coincide. Hookway (1985: 139) describes the immediate object as "the object at the time it is first used and interpreted."

According to V. M. Colapietro (1997: 267–268), the notion of the dynamical object is *normative*, perhaps implicitly. It designates what has the capacity to exert a disrupting influence and, by virtue of that capacity, what would perform the role of a rectifying force — if the sign were being misinterpreted. Colapietro is, however, still committed to the subject–object dichotomy which I reject. For instance, he says "The notion of a determinate yet modifiable subjectivity is, in a sense, parallel to that of an independent yet accessible reality" (V. M. Colapietro 1997: 270).

According to Atkin (2010: subsec. 4.1), the dynamical object is, in some sense, the object that generates a chain of signs (i.e. semiosis); and the end of a succession of interpreting signs (i.e. semiosis) is to arrive at a full understanding of the dynamical object and so to assimilate it into the system of signs. Thus the dynamical object is the purpose of inquiry concerning the object or of the semiotic process determined by the object. He suggests that the dynamical object is the goal and end point that drives the semiotic process. Then the immediate object is our grasp of that object at any point in that process. The coincidence of the immediate object and the dynamical object represents the full assimilation or integration of the dynamic object into our system of signs. Then the final interpretant functions as an exemplar or normative standard by which we can judge our actual interpretative responses to the sign (cf. Savan 1988: 62).

The immediate object is defined in terms of representation and also as being dependent on the sign-vehicle, but it is important to note that the dependence of the immediate object on the sign-vehicle does not exclude the dependence of both upon the dynamical object (Stjernfelt 2014: 98n37).

Stjernfelt (2014: 97–101) explains that the dynamical object is the object

⁶⁹See Subsection 2.5.5.

including all of its aspects, such as potentially revealed by scientific investigation conducted ideally without a limit; and the immediate object is the claimed indexical connection of the sign-vehicle with its object. Neither the immediate nor the dynamical object is concerned with the description of the object; that is the office of the different interpretants, or *meaning*. Instead, the two objects deal with *reference*. Thus the immediate object is those parts of the dynamical object with which the sign-vehicle claims to stand in indexical connection including that very connection itself. This implies that the immediate object must leave certain aspects of the dynamical object unspecified.

It must be borne in mind that Peirce understood semiosis as inquiry. Thus the immediate object is how the dynamical object is understood at some given point in the semiosis; and the dynamical object is the object of the sign-vehicle as it is understood at the terminus of semiosis. The immediate object is the object as partially, or incompletely, or in some respects erroneously known; and the dynamical object is the object as completely known. In the terminus of semiosis, the immediate object coincides with the dynamical object: all possibilities for interpretation have been exhausted, and no further increase in knowledge about the dynamical object is possible. But we are fallible: it is possible that we never discover the dynamical object; and even if we succeed in that, the dynamical object can change. Hence we have to keep studying and reinterpreting it indefinitely.

5.7.2 Collateral Experience

Collateral experience or *observation* means previous acquaintance with the dynamical object that the sign-vehicle denotes. It is not part of the sign-vehicle nor the interpretant. Hence *semiosis is not self-sufficient*: it tends to the discovery of the dynamical object that is outside semiosis until the immediate object coincides with it. Thus, what is gained by studying the system of signs is not collateral. The interpreter's ability to associate the sign-vehicle with its object depends on a prior habit which has been established on the basis of collateral observation. In the absence of such habit, the sign-vehicle conveys no information at all. (Peirce CP 8.178–179; EP 2: 493–494.)

Peirce claims that no sign-vehicle, or at least proposition, can be understood unless the interpreter has collateral acquaintance with every object of it⁷⁰ (CP 8.183; EP 2: 496). According to Short (2007: 192–195), collateral experience consists in an interpretation of diverse sign-vehicles as being

⁷⁰I suspect that this requirement is too demanding. I suggest that it can be relaxed; perhaps one could say that collateral acquaintance with *sufficiently many* objects of the sign-vehicle are enough, where sufficiency is determined contextually.

sign-vehicles of the same object. Correction is possible because even a false description can contain enough truth to enable one to identify the object misdescribed, given that a place or direction is indicated. Collateral observation operates indexically in the domain of secondness but does not reduce to the individuals it contains. Stjernfelt (2014: 81–82) argues that this is related to Peirce's Kantian insistence that existence is no predicate: no amount of descriptions can single out a particular. That notion is also related to Peirce's (CP 6.318) appreciation of Duns Scotus's notion of *haecceitas* or "thisness."

Stjernfelt (2014: 80–82) explains that propositions (dicisigns)⁷¹ never occur as isolated entities but form a part of ongoing processes of inference. In order to assume their place in such processes, they must refer to objects already introduced earlier in the reasoning process. Even subtle aspects of the predicative part of the proposition may sufficiently perform the indexical function in order to convey information, if there is collateral experience. Even the most formalized scientific proposition can be understood only because of collateral experience. Stjernfelt (2014: 86) points out that it is not only the objects which the collateral information helps to know. Collateral information is also required for the characters and types of relations involved in the predicate.

A proposition (dicisign) has an indexical and an iconic part.⁷² The indexical part of the proposition is subject to interpretation with regard to the context of its utterance. In many cases, if there is enough collateral information, there is a tacit understanding which objects are indicated, and, thus, explicit reference to them by means of indices may be underdetermined. The iconic part of the proposition functions in order to invoke a general image of the property signified. (Stjernfelt 2014: 60–61.)

The sign-vehicle fulfills its function simply in describing or indicating the appropriate kind of observations which help the interpreter find the dynamical object of the sign-vehicle. Then it is up to the interpreter to empirically fill in the details which the sign leaves undetermined — in Peirce's (CP 2.302; EP 2: 10) idiom, make the "symbol grow" by enhancing its meaning.

The immediate object is a fallible interpretation of the sign-vehicle and an equally fallible approximation of its dynamical object. It reveals some but not necessarily all aspects of the dynamical object. Gathering collateral observations, perhaps by experiment, improves the interpretation and enhances the meaning of the sign. Thus the knowledge about the dynamical object increases potentially approaching completion. The scope of the immediate object can approach indefinitely the dynamical object as inquiry progresses.

⁷¹See Subsection 5.5.3.

⁷²I will explain this notion in depth in Section 5.10.

Hence the dynamical object is a limiting concept for inquiry.

5.8 Relations between Interpretants and Objects

There are connections between certain kinds of interpretants and objects. The emotional interpretant corresponds to the immediate object; and the energetic interpretant corresponds to the dynamical object.⁷³ But for the time being, no correlate is found for the logical interpretant. Peirce surmises that this is due to the difference between the natures of the interpretants and the objects: the dynamical object precedes the sign-vehicle, but the sign-vehicle precedes the interpretant. This leads Peirce to suggest that the logical interpretant exists in the future. (EP 2: 410.) The discovery of the nature of the logical interpretant is the task for Peirce's semiotic proof of pragmatism, reconstructed in Section 5.13.

The analysis of Atkin (2010: §§ 4.2.2–4.2.3) differs from Peirce's own referred to above. He claims that the dynamic interpretant is related to the immediate object, and that the final interpretant is related to the dynamical object. On the basis of the textual evidence cited above, he seems to be mistaken.

5.9 Types, Tokens, and Tones

I will cite Peirce's type–token–tone trichotomy in order to prepare way for a deeper semiotic analysis of propositions. According to Peirce's dicisign theory, propositions are a subclass of types.

5.9.1 Peirce on Types, Tokens, and Tones

The usual way to introduce students of philosophy to types and tokens is as follows. Every time the letter “k” is written, a new token is created. Every such token is an instance of a general type. The type retains its identity and unity independently of its replication in tokens. No matter how many “k”-tokens be produced, no new types are generated.

⁷³However, Peirce does not explicate what he means here by “correspondence.” Does he mean that the emotional interpretant is equal to the immediate object, and the energetic interpretant to the real object? Or does he mean that the emotional interpretant is produced by the immediate object, and the energetic interpretant by the real object? I leave this question open.

The type–token distinction was arguably first propounded by Peirce. He seems to use the terms in the 1906 “Prolegomena to an Apology for Pragmaticism” (CP 4.537ff.) for the first time. But he had entertained the idea earlier: previously, in the 1903 *Harvard Lectures on Pragmatism*, he had developed the notion of a kind of sign-vehicle which is capable of indefinite number of repetition and even claimed that such capability is natural to a sign-vehicle (CP 5.138; EP 2: 203).⁷⁴ In the 1903 *A Syllabus of Certain Topics of Logic*, what he called “legisigns” correspond to types; and what he called “sinsigns,” to tokens (CP 2.244–246; EP 2: 291). Peirce also added a third sign-vehicle, “tone,” which he used to call “qualisign” (CP 2.246; EP 2: 291, 480).⁷⁵ Thus it would be proper to speak about *type–token–tone trichotomy*.

A.-V. Pietarinen (2014: 302) associates Peirce’s concept of *tone* with *qualia*. We need not accept the *literal existence* of qualia here; what concerns us is whether something *functions as* a quale.

Types, tokens and tones can be present to experience in different ways: types are thirds, tokens are seconds, and tones are firsts.⁷⁶ Because of this possible presence to experience, these sign-vehicles are *concrete*. This flies in the face of tradition which has conceived especially types as *abstract entities*.

According to Wetzel (2006: sec. 5), there are two main kinds of theories on types and tokens. In Platonic type realism,⁷⁷ the type is an abstract object, not located anywhere in space-time, although its tokens are. In Aristotelian versions of exemplification,⁷⁸ the type has no independent existence apart from its tokens. Peirce’s types fall under the Aristotelian variant: in order for a thing to function as a type (legisign), it must be replicated in tokens (sinsigns) (see esp. Peirce CP 2.244–246; EP 2: 291).

5.9.2 An Evolutionary Theory of Types and Tokens

A naturalist cannot accept Platonic types. Hence I develop Peirce’s more Aristotelian view further and propose an evolutionary view on types in order to provide an alternative.

In order to exist, a biological species must be incorporated in a population.

⁷⁴Peirce’s example was that “Evil communications corrupt good manners” and “φθείρουσιν ἡθὴν χρῆσθ’ ὁμιλίαι κακῶν” are one and the same sign-vehicle. This involves the important notion associated with types that their content is independent of the manner of their expression; hence they can be expressed in several ways, media, and languages.

⁷⁵See Subsection 5.5.2.

⁷⁶See Section 3.2 and Subsection 5.5.2.

⁷⁷See, e.g., Bromberger and Halle (1989), Hale (1990), Katz (1981) and Wetzel (2002).

⁷⁸See, e.g., Wollheim (1968) and Armstrong (1978).

Likewise, a type must be replicated in a population of tokens. The tokens are ontologically primary, the type secondary. If the population or the tokens are annihilated, then the species and the type, respectively, are annihilated too. Perhaps it could be said that the type supervenes on its tokens.

The members of a biological species usually, if not always, display genotypic and phenotypic variation. Likewise, the tokens may exhibit variation. In order for the type to persist, its tokens must be capable of replication. In the act of replication, a new variation may occur. Thus the types evolve.

A type exists only insofar as the world preserves the capability of reproducing its tokens. Whether the tokens are able to reproduce themselves or some other process external to them reproduces them is irrelevant for my purpose. In biological evolution, it is not strictly true that a *population* reproduces itself. Reproduction is as much a matter of the environment as of the species itself. This might be even more true for tokens. Usually it is not the tokens that reproduce themselves; it is agents in the world. Peirce himself seems to have believed that the reproductive capacity is located in agents: "The word lives in the minds of those who use it" (CP 2.301; EP 2: 10).

Types are located within space–time. They have a beginning, they evolve, and they may pass out of existence. Types may evolve into other types when particular lines of tokens begin to branch out from the original population. Thus a type is neither eternal nor immutable. Rather, a type is a *concrete process*. It can become an object of experience. That refutes the traditional position, according to which types are *abstract entities*.

Take again the letter "k." It can be replicated in a continuum of ways — different styles of handwriting, different fonts, etc. —, but as long as it remains *topologically* the same figure, all these variations tokenize the same type. Some variations, however, may exhibit a movement into a topologically different figure — say, "x" — and thereby a new type evolves. However, it must be somehow taken into account that the Braille and Morse code of "k" do not have the same shape. (Wetzel 2006: § 4.2.3.)

Arguably, the reverse of my position holds: populations and individuals are already understood in the terms of types and tokens, rather than *vice versa*. If that is the case, then my argument is circular.⁷⁹ I reply that then one can ask whether the concept of *population* involves the concept of evolution. If it does, then I do not need a biological analogy whatsoever to establish the concreteness of types: by definition, a type intra-acts with the world (including humans) and therefore is concrete. If it does not, then my argument is not circular: my analogy introduces the concept of evolution to

⁷⁹I thank Eduardo Torres for this counterargument.

a concept that originally lacks it.

5.10 Propositions

In this Section, I will sketch Peirce's theory of propositions and explain why it matters. I will largely rely on Frederik Stjernfelt's (2014; 2016) authoritative interpretation.

I will begin by explaining why propositions are both important and problematic in Subsection 5.10.1. I will cite Peirce's deduction of the properties of propositions in Subsection 5.10.2. That prompts a semiotic analysis of propositions which I will perform in Subsection 5.10.3.

5.10.1 Why Propositions?

As I said in the Introduction,⁸⁰ propositions have several functions to perform: (1) they constitute the content of indicative sentences; (2) they are the primary bearers of truth-value; (3) they are bearers of modal attributes such as being possible, necessary and impossible; (4) they are the objects of propositional attitudes such as believing, doubting, assuming and suspecting; (5) they constitute the content of perceptual experiences — but this position is controversial; (6) the so-called possible worlds can be identified with complete, consistent sets of propositions; (7) they play a significant role in characterizing context and conversational record; (8) that-clauses designate propositions; (9) they account for the validity of inferences; (10) that-clauses designating propositions are used to attribute other properties to propositions; (11) sometimes propositions are designated by demonstratives; (12) certain expressions function like names of propositions, such as “Gödel's theorem,” “Goldbach's conjecture” and “logicism”; and (13) sometimes quantifiers range over propositions (J. C. King 2014d). Propositions are postulated to fulfill these functions. This argument is an abductive inference to the best explanation (IBE) (Lipton [1991] 2004; Niiniluoto 2018).

As regards the purpose of my thesis, propositions are understood as the *contents* or *information* of *propositional knowledge*. This notion falls under the functions (4) and (10). Roughly, propositional knowledge is knowledge which can be expressed in principle in a “that”-clause: for example, “I know that the speed of light in vacuum is constant,” and “I know that Socrates is wise.”⁸¹

⁸⁰See Section 1.1.

⁸¹In my opinion, English is not the best language to express propositions. Latin (or Greek, for that matter) is much better, because it employs the *accusativus cum infinitivo*

J. C. King, Soames, and Speaks (2014) consider traditional notions of proposition (for instance, a set of possible worlds (e.g. Adams 1974; 1981)) incomprehensible (see esp. Soames 2014d). They worry about *what* propositions actually *are* (Speaks 2014a). Moreover, since propositions are the *primary* bearers of intentionality, the intentionality and truth conditions of cognitive acts or states must be explained in terms of quasi-perceptual relations that we allegedly bear to propositions. Thus there arises the *problem of the unity of the proposition*: what propositions *are* in a way that makes clear how they can have the intentional properties that they do have. (Soames 2014d: 26.). It is deeply problematic, whether we indeed have such access. For Frege, the problem is that his theory fails to explain the nature of the proposition and is self-contradictory in certain respects (Soames 2014d: 30–32). For Russell, the problem is to determine a formal notion of predication (Soames 2014d: 26–30). For possible worlds theorists, there are two problems: (1) how sets represent the world and thereby have truth conditions *independently of what agents do*; agents are supposed to have a direct access to propositions and apprehend them *purely passively* and thereby acquire the power to represent the world by secondary means like beliefs and speech acts; and (2) how “worlds” and “truth values” can be taken as unexplained primitives from which the theory tries to construct properties and propositions, when in fact properties and propositions are needed to explain and illuminate both truth and worlds as world-states (Soames 2014d: 33–44). For King, Speaks and Soames, the problem is to explain the intentionality of propositions. However, they still continue the tradition by subsuming propositions under some definite ontological class: J. C. King (2014b), under facts; Speaks (2014b), under properties; and Soames (2014b), under cognitive event types.⁸²

Some philosophers have argued that propositions are not representational entities (Richard 2013; Speaks 2014c). This is a minority view.

(ACI) structure: *scio celeritatem lucis in vacuo constantem esse* and *scio Socratem sapientem esse* (cf. Peirce EP 2: 312). A corresponding structure exists in Finnish, though many consider it bookish: “tiedän valon nopeuden tyhjiössä olevan vakio” ja “tiedän Sokrateen olevan viisas.” Thus expressed, the propositional content of the clause, expressed by *celeritatem lucis in vacuo constantem esse* or *Socratem sapientem esse*, does not yet contain a truth claim in itself. The claim results from being embedded in the main clause which makes a judgment. The corresponding English, on the contrary, “that the speed of light in vacuum *is* constant” or “that Socrates *is* wise,” seems to already involve a truth claim. The Latin formulation is impartial about whether propositions are independent of whether they are judged true or not.

⁸²King, Speaks and Soames criticize each other in J. C. King (2014a); Speaks (2014c); Soames (2014c). They reply to their mutual criticisms in J. C. King (2014c); Speaks (2014d); Soames (2014a).

Peirce's semiotic account on propositions is more radical, as I will explain in more detail below: he argues that *whatever* functions like a proposition *is* a proposition. In general, Peirce's semiotics is *functionalist* in the sense that it does not specify the nature of the sign-vehicle (cf. Stjernfelt 2014: 107). Thus he is spared the trouble of arguing that a proposition be a specific kind of entity. That is consistent with the requirement that a proposition be independent of its expression: a proposition is multiply realizable; the same proposition can be expressed by different means. For example, the murder of J. F. Kennedy can be expressed by a sentence and a video tape without making the murder two distinct events.

Peirce's account solves the problem of the unity of the proposition neatly: the alleged "intentionality" of a proposition issues from its being potentially interpreted by a habit that associates it with its alleged "referent." Thus the agent is considered active and predication as a kind of action. Moreover, Peirce's account also explains our direct access to meanings (habits).⁸³ Thus, even if propositions are the primary bearers of *truth-value*, habits are the primary bearers of *intentionality*.

5.10.2 The Deduction of the Properties of the Proposition

In the 1903 *A Syllabus of Certain Topics of Logic*, Peirce (CP 2.309–312; EP 2: 275–277) performs a lengthy deduction of the character of the proposition (dicisign). He begins with Aristotle's definition of proposition as the primary bearer of truth-value.⁸⁴ I will cite an abridged version of Peirce's deduction.

According to Peirce, "a Dicisign is either true or false, but does not directly furnish reasons for its being so" (Peirce CP 2.310; EP 2: 275). For example, the proposition "Helsinki is north of Tartu" is true, and the proposition "Vilnius is north of Riga" is false, but the determination of the truth-values of these propositions is external to the propositions themselves. Therefore, because of this very externality, a dicisign must have an indexical connection,⁸⁵ which falls under secondness, to something independent of representation. Its very independence bestows the dicisign with truth-value. According to Stjernfelt (2014: 55–56), the function of expressing truth or falsity is possible only because the dicisign has a double structure, which I will explain shortly below. Further, therefore a dicisign necessarily repre-

⁸³I believe that Peirce's theory has an affinity to Soames's (2014b; 2014a) theory.

⁸⁴"We call propositions those only that have truth or falsity in them" (ἀποφαντικὸς δὲ οὐ πᾶς, ἀλλ' ἐν ᾧ τὸ ἀληθεύειν ἢ ψεύδεσθαι ὑπάρχει) (Aristotle 1962b: 17a1–5).

⁸⁵See Subsection 5.5.1.

sents itself to be a genuine index and nothing more. That entails that the relation between the *dicisign* and its object falls under secondness. Now, the interpretant of a sign-vehicle can represent no other object than that of the sign-vehicle itself. Hence this same relation must be another object of the *dicisign*. In short, a *dicisign* has two objects: the primary (dynamical) object that is independent of representation, and the secondary (immediate) object that concerns the representation itself.⁸⁶ For example, the proposition “Helsinki is north of Tartu” refers to the geographical relation (the primary or dynamical object) of the two cities *and* indicates that it refers to that relation (the secondary or immediate object). The secondary (immediate) object is simultaneously part of the primary (dynamical) object and of the interpretant of the *dicisign*. Now, an index can be its own object, but it cannot be its own interpretant. On the other hand, for an icon, and for an icon alone, the interpretant can be the object.⁸⁷ Therefore a *dicisign* must have two parts — an indexical part, or a *subject*, and an iconic part, or a *predicate* — and a connection, or a *copula*, between these parts. This is what Stjernfelt calls the “double structure” of the *dicisign*. For example, the subject part of the proposition “Helsinki is north of Tartu” is the ordered set (Helsinki, Tartu), the predicate part of the proposition is the relation “is north of,” and the copula consists in plugging the subject part to the blanks of the predicate part. In short, a *dicisign* can be defined as a sign-vehicle, the interpretant of which represents it as an index of its object. According to Stjernfelt (2014: 83), the index part is there in order to activate collateral knowledge;⁸⁸ and if this does not succeed, the sign-vehicle does not function as a *dicisign*.

Stjernfelt (2014: 68) explains that the interpretant of a *dicisign* is not merely its predicate but the claim, made possible by the syntax of a *dicisign*, that the predicate actually holds for an existing object. This existential relation between *dicisign* and object forms, in itself, part of the object of the *dicisign*. This means that a *dicisign* must be interpreted so that the relation of the *dicisign* to its object be conceived. This informs the interpreter that the *dicisign* is interpreted and its object individuated correctly. Not only must the object be referred to, but it also must be indicated *how* it is referred to. Stjernfelt (2014: 72) calls this property of the *dicisign* “the *dicisign*’s self-description.” According to Stjernfelt (2014: 68), this entails that a *dicisign* has *two* objects: a primary and a secondary object. The primary (dynamical) object is the object referred to. The secondary (immediate) object is the

⁸⁶See Section 5.7.

⁸⁷See Subsection 5.5.1.

⁸⁸See Subsection 5.7.2.

very reference relation which the dicisign claims to exist between itself and its object.

Peirce adds that every kind of proposition (dicisign) is either meaningless (because it is a tautology and therefore conveys no information) or its object is a second (CP 2.315; EP 2: 278–279). The subject of a proposition (dicisign) can be singular (or an ordered set of singulars,⁸⁹ that is, a collective singular), general, or abstract. It is singular if it indicates an otherwise known individual. It is general if it describes how an individual is to be selected. A general subject is either universal or particular (and indefinite). According to Peirce, a universal does not imply the existence of its subjects: it indicates that the proposition (dicisign) applies to *whatever* individual there is or may be in the universe of a general description without saying that there is any. A particular subject does not indicate what individual is intended further than to give a general description of it but professes to indicate an existent individual. (CP 2.324; EP 2: 284.) The subject of a proposition (dicisign) must be a percept,⁹⁰ an index (like the environment of the interlocutors, or something attracting attention in that environment, as the pointing finger of the speaker), or a subindex (like a proper name, personal pronoun, or demonstrative) (CP 2.330; EP 2: 286). A proposition (dicisign) has a syntax, which is represented as the index of those elements of the fact represented that correspond to the subject and predicate; the syntax as such is a fact and therefore a second; and the copula is a special case of syntax (CP 2.319–320; EP 2: 282). A proposition (dicisign) makes an assertion that the subject that the index denotes is like the predicate that the index describes. Therefore it involves a symbol. If it did not make an assertion (e.g. “a horse is bay”), it would be merely a compound general term (e.g. “a bay horse”), because it would fail to indicate a subject. Therefore its interpretant does not represent it as a genuine index. (CP 2.321; EP 2: 282–283.) Peirce remains, however, unsure about whether the definition of *dicisign* applies to all propositions (CP 2.322; EP 2: 283).

Stjernfelt (2014: 72–74, 236) holds that *facts* are the truth-makers of dicisigns, not the objects to which they refer. If a dicisign is true, the corresponding fact is the case. Thus the fact depicted by the dicisign is distin-

⁸⁹The order of the presentation of the subjects matters: $\forall s \exists w A(s, w)$ (e.g. “every Spaniard adores some woman”) is different from $\exists w \forall s A(s, w)$ (e.g. “some woman is adored by every Spaniard”). See also Bellucci (2018: 119–120).

⁹⁰A *percept* is a special case of symbol that operationally describes to the interpreter what is to be done in order to obtain an index of an individual (whether a unit or a single set of units) of which the proposition (dicisign) is represented as meant to be true, and assigns a designation to that individual, or, if it is a set, to each single unit of the set. See Subsection 2.5.2, Section 3.3, and Subsection 5.5.1.

guished from what the dicisign refers to. This allows an easy explanation for the existence of false dicisigns. For Peirce, facts are certain simple states of things, but “simplicity” is a comparative matter (cf. Peirce CP 5.549–550; EP 2: 378). However, the objects and properties singled out by a proposition need not be simple in any absolute sense, for, in Peirce, states-of-things or facts are structures, not subsets, of reality. Thus Peirce’s realism depends on the power of dicisigns to depict extracted, structured aspects of reality.

Peirce (MS 599: 5–7) adds that the proposition (dicisign) is independent of its means of presentation — an issue to which I will return in the following Subsection. That means that language does not have a monopoly: it is indeed *one* way to present a proposition (dicisign), but there are (better or worse) alternatives. According to Stjernfelt (2014: 54), the dicisign structure appears first in nature, and language has to adapt to it in order to express propositions. For instance, a picture or video footage can express a proposition. If McLuhan’s ([1962] 1967; [1964] 2003) media philosophy is correct, then, I believe, more alternatives can be suggested. The independence of a proposition (dicisign) from its means of presentation entails that it retains its identity independently of whether it is expressed, entertained, assented, believed, or judged true or false.

A Peircean proposition is a *legisign*, that is, a *type*. Some contemporary philosophers consider propositions as types, the tokens of which are mental or linguistic acts or events, though not in Peirce’s semiotic sense (Dummett 1996; Hanks 2011; 2015; Soames 2010; 2014b; 2015). That introduces the problem, whether there are true or false propositions which have never been entertained. Hanks replies that the truth-conditions can be taken counterfactually: such a proposition *would* be true, *were* there somebody to make a predication. This response, however, leaves us with the question of truths for which there are not even any merely possible tokens. (Cf. McGrath & Frank 2018: subsec. 7.4.) A Peircean can reply that if an (alleged) “type” has no tokens, it fails to be a type at all.⁹¹

Bellucci (2018: 38) shows that Peirce was interested in the nature of propositions from very early on. Already in the 1867 “On a New List of Categories,” he defines: “[s]ymbols which also independently determine their *objects* by means of other term or terms, and thus, expressing their own objective validity, become capable of truth or falsehood, that is, are *propositions*” (CP 1.559; EP 1: 8).

According to Bellucci (2018: 95–97), Peirce had realized the dual nature of the proposition already in his 1873 *Logic*. Interestingly, he suggested that the argument has a dual nature too: one part is the premise (or copulate

⁹¹See Subsection 5.5.2.

premises), while the other is the conclusion. “An argument separately represents both the object and the further representation of the object to which it gives rise (interpretant); a proposition separately represents the object but not the interpretant; a term separately represents neither” (Bellucci 2018: 96).

5.10.3 A Semiotic Analysis of Propositions

As I said in Subsection 5.5.3, Peirce understood propositions as sign-vehicles — that is, ordinary objects which happen to *mean* something, or have potential practical effects, for a potential interpreter. He called them *dicisigns*. Hence, if he is right, everything that he has said about sign-vehicles in general applies to propositions (dicisigns) in particular. Since sign-vehicles are simply ordinary objects which have a specific function — to determine an interpretant —, they can be present to experience, which makes them *concrete*. This flies in the face of the tradition which conceives propositions as abstract entities.

Stjernfelt (2014: 51–52) argues that Peirce’s dicisign theory has the following merits:

1. it allows for the consideration of the role played by dicisigns in pre-human cognition and communication in biology;
2. it allows for the investigation of a broad range of human dicisigns which involve little or no language;
3. it connects propositions closely to perception (cf. perceptual judgments);
4. Peirce’s functional definition of dicisigns liberates them from the idea that conscious intentions, “propositional stances”, and the like form an indispensable presupposition for propositions;
5. it embeds dicisigns and their development in a social setting.

Thus, as I have already indicated, propositions are *legisigns* and hence independent of the tokens, or *sinsigns*, that express them.⁹² Hence they are more general than language. The two parts of the proposition, the subject and the predicate, are more general than language as well. I will explain that below.

According to Peirce, a proposition (dicisign) is a compound sign-vehicle. It has a subject part, a predicate part, and a copula. The subject part is an index, the predicate part is an icon, and the copula is a symbol.⁹³ The index

⁹²See Subsection 5.5.2.

⁹³See Subsection 5.5.1.

denotes an object. The icon *describes* or *signifies* it. The symbol *asserts* that the icon and the index have the same (dynamical) object; that is, the index singles out a (dynamical) object and the icon describes it (cf. Stjernfelt 2014: 56). The proposition (dicisign) composed in this way is true, if the object denoted by the index exists and the icon correctly describes it. It is false otherwise. (Peirce CP 2.436–438; EP 2: 20, 172; MS 284: 43; Stjernfelt 2014: 58.) Thus a proposition (dicisign) conveys *information*. According to Stjernfelt (2014: 57–58, 66–67), the predicate includes all that is not immediately indexical, including the syntax and the copula. Co-localization forms a primitive, pre-linguistic syntax which connects the subject and predicate tokens as a sign of the combination of the subject and the predicate themselves in a proposition. This allows to include a variety of types of expression under the predicate: not only linguistic expressions but also pictures, images, diagrams, gestures, etc. The predicate depicts not only certain characters of the object but also the dicisign claiming those characters to pertain to the object. Thus the predicate functions on two levels simultaneously: on the object language level and the metalanguage level. Stjernfelt (2014: 69) also holds that the co-localization of predicate and subject tokens in the expression of a proposition also functions as a representation of the indexical relation between the sign and the object (cf. Peirce EP 2: 277). (Cf. Peirce CP 2.316, 2.318; EP 2: 279, 281.)

According to Stjernfelt (2014: 68), the predicative part describes some character of the primary object *and* depicts the indexical relation which the dicisign claims to hold between itself and its object. He suggests that *this* is the truth claim of the proposition: that the dicisign says that there really exists an indexical connection between itself and its object.

Stjernfelt (2014: 60) points out that Peirce did not require that the subject always be an index. It suffices that the subject be a percept which specifies conditions for identifying an index. (Cf. Peirce EP 2: 168.)

The distinction between the subject and the predicate part of the proposition is also context-relative, which means that what is contained in the sign and what is collateral is subject to the possibility of reinterpretation; and this reinterpretability pertains to both the primary (dynamical) and the secondary (immediate) object of the sign. The reinterpretability includes the possibility of completely inverting the subject and the predicate. (Stjernfelt 2014: 83–85.) Stjernfelt (2014: 85n32) connects the reinterpretability of the dicisign and its functions to Jaakko Hintikka's division of twentieth-century philosophy into algebraic or model-theoretic and universalist schools: Peirce had no problem with reinterpretation since, according to Hintikka, he was a member of the algebraic school which accepts a plurality of media which can express properties of each other. This suggests the possibility of the semiotic

analysis of McLuhan's ([1962] 1967; [1964] 2003) media philosophy.

According to Stjernfelt (2014: 124–125, 128), the primate brain has two information streams: the dorsal and the ventral: the dorsal stream produces subject information and the ventral stream produces predicate information. He suggests that either this split is evolutionarily very basic and thus a result of an early adaptation at the level of a common ancestor, or it is a fundamental propositional precondition in order for any sensory apparatus to be able to express true facts. These alternatives are not exclusive.

In propositions, the index part points out the “extension” or “breadth” of the proposition, the icon part the “intension” or “depth” of the proposition. Together the “breadth” and the “depth” of the proposition constitute the information given by the proposition: *information* is defined as the “product” (i.e. “area”) of the two. (Peirce CP 2.407n; Stjernfelt 2014: 235–236.)

Stjernfelt (2014: 90–91) argues that Peirce requires two arguments to establish the unity of propositions. One is the deduction of the subject–predicate structure from the proposition's truth claim,⁹⁴ the other is an argument, presented in a letter to Lady Welby in 1908, from continuous predicates for the unity of the relational predicate. The former is centered upon the predicate part being an icon of the dicisign itself, which presupposes the principle of throwing the whole analysis of the dicisign into the predicate. The latter is centered upon the predicate part as depicting possible object relations outside of the sign, which presupposes the abstraction of all non-logical content away from the predicate into the subject. Both arguments prove a unity of the proposition, but the unities are not the same. The former addresses the conditions of possibility of there being truth-claiming signs. The latter pertains to relations as such and grants the possibility of there being references for polyadic predicates. Stjernfelt considers the arguments as independent of but completing each other.

Short (2007: 227) states that a compound sign such as a proposition (dicisign) is more than a sum of its parts. Rather, a compound is a sign distinct from its component signs. It signifies how the whole is to be interpreted.

Stjernfelt (2016: 241) locates the connection between dicisigns and habits in the passage: “A *belief* in a proposition is a controlled and contented habit of acting in ways that will be productive of desired results only if the proposition is true” (Peirce EP 2: 312). According to Stjernfelt (2016: 242), most genuine propositions are symbols, and Peircean symbols are defined by their object connection relying on a habit, as the following passage reveals: “A Symbol incorporates a habit, and is indispensable to the application of any intellectual habit, at least” (Peirce CP 4.531).

⁹⁴See Subsection 5.10.2.

Stjernfelt (2016: 242–243) points out that symbols involve *two* sets of habits: those of the sign itself, as a rule-bound legisign capable of repetition, namely, the habit which governs the production of still new replicas of the symbol sign itself, and those of the purported behavior of the object referred to by the symbol, namely, the habit claimed to govern the behavior of the object referred to by that symbol (cf. Peirce CP 2.292; EP 2: 274). I am unsure about how to understand the use of the term “habit” in this case.

According to Stjernfelt (2016: 245–246, 252, 261), general predicates express habits: the only way of presenting a habit is by predicatively describing the general behavior sequence common to each of its instantiations (cf. Peirce CP 2.666). He argues that habits share the subject–predicate structure with propositions but are *not* propositions themselves. Thus propositions can be implicit and unarticulated: habit seems propositional “all the way down to biology.”⁹⁵ In a word, beliefs are not habits that are propositions; they are, rather, habit propositions subjected to control. He concludes that the particular occasion that calls into action the general habit acts like the object of the proposition, and that the ensuing volitional act appears as an inference from that proposition (cf. Peirce CP 2.711). Therefore habits can be expressed as general conditionals ($p \rightarrow q$); a particular percept can instantiate the antecedent (p); then the resulting action instantiates the consequent (q). Thus action can be modeled as a syllogism in Barbara (cf. Peirce EP 2: 457). I surmise that Dewey (1896) would have qualified this claim: percepts and actions occur during, and acquire their meaning from, an ongoing course of action. Thus the former two are not basic.⁹⁶

Stjernfelt (2016: 247–248) believes that one can have a habit in mind, but the idea of a habit is not fully determinate (cf. Peirce CP 5.371).

5.11 Reply to Horkheimer

Recall that Horkheimer ([1947] 2004: 33) argued that the pragmatic maxim leads to an infinite *progressus*.⁹⁷ I have replied to him in Lindholm (2023b; 2023c). Having explained Peirce’s semiotic apparatus, I can proceed to restate my defense here. In short, my reply is that an infinite sequence of sign-vehicles interpreting previous sign-vehicles can arise, but that is unproblematic; I turn Horkheimer’s objection into a fallibilist⁹⁸ description of

⁹⁵It is not clear to me how Stjernfelt can maintain *both* that habits are not propositions *and* that habits seem propositional all the way to biology.

⁹⁶See Chapter 3.

⁹⁷See Subsection 2.2.13.

⁹⁸See Chapter 4.

semiosis.

I have said that the interpretant of a sign-vehicle (e.g., a conception, as stated in the pragmatic maxim)⁹⁹ can be another sign-vehicle (e.g., a conception). Then the new sign-vehicle can elicit another interpretant, and so on, possibly *ad infinitum*. This process is *semiosis*.¹⁰⁰

But semiosis is goal-oriented: it is a self-normative process that tends to termination (Short 2007: chs. 4–5, pp. 158, 171–174; Vehkavaara 2007: 263–264, 273). Semiosis will eventually terminate, if the dynamical object is completely known: no further increase of knowledge is possible. In the terminus of semiosis, the immediate object coincides with the dynamical object; i.e., the dynamical object is completely known in all its aspects, and all possibilities for its interpretation, i.e. habitual encounters with it, have been exhausted.¹⁰¹

We are in direct contact with the dynamical object in the terms of firstness and secondness.¹⁰² As our direct experience accumulates, we can perform an induction that consists in the formation of the habits of dealing with the dynamical object (cf. Peirce CP 2.643, 5.297, 6.145, 7.580; EP 1: 46–47, 198–199, 327–328) — in Peirce's idiom, the formation of the *final logical interpretant*. When a dynamical object is completely known, we possess all possible habits of dealing with it.

The terminus of semiosis can also be a “quality of feeling” or an “exertion” (i.e., an action) (Peirce CP 4.536, 8.332; MS 318). Hence interpretation need not be intellectual; otherwise we could never get from thought to action (Short 2007: 201). But in order to *know* and *understand* the dynamical object, habit is needed (Peirce CP 6.481; EP 2: 447–448).

In short, by the consideration of Peirce's semiotics, an infinite *progressus* — semiosis — is indeed possible; but it tends to termination by its own norms that arise from the concept of idealized inquiry.

Peirce is not saying that real inquiry be ideal. It is possible that real inquiry never succeeds in discovering the dynamical object; and even if it did, we might not know that, because we do not possess the criterion of perfect knowledge. Moreover, the dynamical object can change. Hence we must keep updating our conceptions indefinitely. Belief must *not* be fixed; final conclusion about anything must be postponed indefinitely (cf. Short 2007: 331). This notion connects semiotics to fallibilism.¹⁰³

Thus Horkheimer's objection ceases to be an objection and becomes a

⁹⁹See Subsection 2.2.1.

¹⁰⁰See Section 5.3.

¹⁰¹For the definitions of the dynamical and the immediate object, see Section 5.7.

¹⁰²See Section 3.2.

¹⁰³See Chapter 4.

description of the increase of knowledge in an experimental inquiry.

5.12 Criticism

There are other naturalist theories of meaning: inferential role semantics, causal theories of meaning, success semantics, and teleosemantics. However, A.-V. Pietarinen (2014: 297–299) finds these approaches as wanting when compared with Peirce's account on *dicisigns* (propositions). Inferential role semantics resembles the “object-free” structuralist accounts of signs. Causal theories seem to falter when faced with the problem of misrepresentation. Success semantics and teleosemantic theories appear to be directly congenial to what Peirce's maxim of pragmatism captures, as they appreciate the consequences of representations; but sometimes they rest content with singular and therefore psychological accounts of desire satisfactions without paying attention to the generality of habitual action.

One can ask, why almost all of Peirce's divisions of the aspects of sign are triadic.¹⁰⁴ Peirce was dissatisfied with this result himself (CP 8.328) and expressed doubts about it (EP 2: 483). But recall that the triadic divisions result from applying his categories consistently to all aspects of the sign-relation (CP 2.243; EP 2: 291): if the application of each of them is justified, then the triadicity of the divisions should be justified too. There are also some dyadic divisions, like that between the immediate and the dynamic object. Recall also that Peirce did not deny the existence of fourthnesses or higher categories; he only denied their being irreducible to thirdnesses.¹⁰⁵ Hence his theory allows other subclasses of signs to exist which are based on quaternary or higher relations. In principle, an inventive semiotician can discover them and incorporate them into Peirce's system without contradiction. Note also that Short (2007: 158) inserted purpose as a fourth relatum into the sign-relation. Thus Peirce can dodge the accusation that he merely have a fixation with the number three.

Rorty (1982: xlvii n52, 161) seems to understand Peirce's semiotics as a theory of the ubiquity of *language*, as theoretical hermeneutics in Rouse's (1987: ch. 3) sense, and as implying that interpretation has no limit. However, Rorty fails to see that language is but a special case of Peirce's theory of signs. He also ignores the later Peirce's various proofs of pragmatism which profess to demonstrate that interpretation tends to termination. Hence, Peirce's semiotics is a theory of a *potential* ubiquity of *signs in gen-*

¹⁰⁴The divisions between the immediate and the dynamical object is dyadic; see Section 5.7.

¹⁰⁵See Section 3.2.

eral, where signs may or may not be linguistic. Hence practical hermeneutics in Rouse's (1987: ch. 3) sense comes closer.¹⁰⁶

Peirce's theory of signs is functionalist (Stjernfelt 2014: 107). Therefore sign-vehicles need not have a common essence. This is compatible with Rorty's (1982: 162) (and Wittgenstein's ([1953] 2009)) thesis that language has no essence. It also successfully accommodates Rouse's (1996: ch. 8) take on Donald Davidson's non-representationalist philosophy of language. Davidsonians point out that representationalist accounts on language tacitly presuppose that our access to representations be unproblematic, while our access to the world can be questioned. The problem is that this presupposition is unjustified. Rouse rightfully considers that a vestige of Cartesianism. But if sign-vehicles are accessed in the very same way as any object on the world, this problem evaporates.

According to Rouse (2002: ch. 3), Quine's (1951; 1960) thesis of the indeterminacy of translation makes language potentially ubiquitous — in a very broad notion of *language*. But not everything that he calls “language” actually *is* language. Language is a conventional institution, and not all meanings are conventional.¹⁰⁷ Hence I substitute Peirce's “sign-vehicle” for Rouse's “language.” It is *sign-vehicles* that are potentially ubiquitous. Language is a special case. Thus it seems that Peirce's functionalist theory of signs merges with the thesis of the indeterminacy of translation effortlessly.

5.13 Peirce's Semiotic Proof of Pragmatism

Peirce intended to prove pragmatism (which he renamed “pragmaticism” in 1906 in order to take distance to William James and F. C. S. Schiller) by several means: an argument from phenomenology (CP 1.317–321; EP 2: 360–370), an argument from normative science (CP 1.573–574, 5.448n, 5.549–554; EP 2: 371–397), and an argument from semiotics (CP 1.560–562, 5.11–15, 5.464–496; EP 2: 398–433; MS 318). The semiotic proof is the most successful.

According to Peirce, “the essential function of a sign[-vehicle] is to render inefficient relations efficient, — not to set them into action, but to establish a habit or general rule whereby they will act on occasion” (SS 31). According to Bergman (2016: 182–183), the end of logical interpretation is the *generation* of a habit-interpretant, in the production of which the function of the sign can be said to be exhausted (cf. Peirce MS 339: 287). Thus the interpretant of a sign *can* be a feeling (a “quality”) or an action (a “deed”), but that of an

¹⁰⁶For the concepts of theoretical and practical hermeneutics, see Section 2.7.

¹⁰⁷See Chapter 2.

intellectual sign-vehicle (i.e. a sign-vehicle that increases our understanding) is manifest in *character* (MS 298: 11*bis*). This proposition is what Peirce sought to prove.

According to Bergman (2016: 186–196, 186n5), interpretation has stages, represented by three different logical interpretants. The first logical interpretant is relatively more abductive, the second deductive, and the third inductive in character. They may overlap. A habit-change can result from reactions and actions, but that is not sufficient for understanding. Understanding begins at forming conjectures, or first logical interpretants (Peirce CP 5.480, 5.546). They are akin to abduction. These conjectures or abductions suggest voluntary actions in imaginary situations, or lower second logical interpretants (CP 5.481). They may lead to modification of the first logical interpretants. They enable us to observe relations between the revised conjectures and to take note of delimited but apparently stable characteristics of the modifications themselves. Generalization and abstraction from particular content leads to the formation of higher second logical interpretants (MS 318: 45). Thereby even more complex abstractions become possible, giving rise to higher-order logical thought by which we can make thought experiments. They make us aware of our processes of symbolisation themselves. That can lead to habituation. This is where pragmatic clarification (the application of the pragmatic maxim) takes place. As a result of thought experiments, possible mistakes in our concepts can be discovered. Thus doubt can set in. That potentially improve our habits, introducing an active and creative element to interpretation (MS 596: 22). This creative element introduces imaginary, but not arbitrary, constructions not present at the outset of reasoning. These constructions must remain within the sphere of possible experience. The creative element is akin to *theorematic* deduction, as distinct from merely *corollarial* deduction (MS 318: 55; NEM 4: 49). It allows us to go beyond already established habits of *action* by already established habits of *thought*. That involves an ethical dimension (CP 5.8; MS 620: 24, 27). If rehearsal in thought develops into rehearsal in action, or experiment proper, there arises the third logical interpretant that completes interpretation (MS 318: 46–47). The second logical interpretant already suggests the possibility of the third. Experimentation proper may lead to self-controlled habit-change. In it, reasoning is united with bodily action. The result can be the confirmation of a previous habit, the formation of a new habit, or dissociation (cf. NEM 4: 142; CP 6.86). Thus, in short, to determine what a thing (possibly a speech act) means is to experiment on how other things respond to it (possibly another speech act) (CP 5.465; EP 2: 400–401). This is also how a person can achieve control over themselves and others (cf. CP 5.402n3).

I have reconstructed Peirce's semiotic proof of pragmatism as the following concatenation of several arguments:

- (1) In order for anything to qualify as a sign-vehicle, it must have a potential interpretant.
- (2) The interpretant of a sign-vehicle can be another sign-vehicle (e.g. CP 4.536, 8.332).
- (3) If the interpretant of a sign-vehicle is another sign-vehicle, it can be interpreted further (it will itself have a potential interpretant).
- (4) This process of the formation of successive interpretants, or semiosis, is teleological (cf. MS 318; Short 2007: 172–174, 201; Hookway & Legg 2019: subsec. 4.4); the end of semiosis is to increase knowledge and understanding (e.g. CP 1.615, 5.433; EP 2: 388).¹⁰⁸
- (5) If semiosis fulfills its purpose, then it terminates.
- (6) If semiosis terminates, then it has a final interpretant.

- ∴ (7) By (3), a final interpretant is not a sign-vehicle; the increase in knowledge and understanding must take place outside the domain of signs in order to be effective (EP 2: 430–431).
- (8) If semiosis fulfills its purpose, then its final interpretant qualifies as knowledge; that is, it must have a logical or general nature; and therefore it must fall under the category of thirdness.¹⁰⁹
- (9) If the final interpretant qualifies as knowledge, then it is also a logical interpretant.
- (10) A final interpretant can be an emotion, an action, or a habit (CP 8.332).
- (11) An emotion cannot be a logical interpretant, because it falls under firstness; and an action cannot be a logical interpretant, because it falls under secondness.¹¹⁰

- ∴ (12) By (11), only a habit increases knowledge and understanding and hence can be the final logical interpretant.
- (13) On the other hand, a logical interpretant can be a definition, a concept, a proposition, an argument, or a habit (CP 5.491; EP 2: 418, 430–431), which all fall under thirdness.
- (14) A definition, a concept, a proposition, and an argument are sign-vehicles.

- ∴ (15) By (3), a definition, a concept, a proposition, and an argument can be interpreted further.

-
- ∴ (16) By (7) and (15), a definition, a concept, a proposition, and an argument cannot be a final interpretant.
-
- ∴ (17) By (16), only a habit can be the final interpretant (CP 5.491; EP 2: 418, 430–1).
- (18) Moreover, conceptions, desires (including hopes, fears, etc.), expectations, and habits are mental facts.
- (19) Conceptions, desires, and expectations do not have general reference (and hence do not fall under thirdness).
-
- ∴ (20) By (19), only a habit can be the logical interpretant (CP 5.486; EP 2: 412).
-
- ∴ (21) By (12), (17), and (20), pragmatism is globally true: if semiosis meets its purpose, then the interpretation of a sign-vehicle ultimately terminates in the establishment of a habit; that is, what a thing ultimately means is what habits it involves (cf. CP 5.400; EP 1: 131).

The import of the semiotic proof is that a habit is required to associate a sign-vehicle or representamen with an object; the sign-vehicle is merely a physical object or event like any other and has merely physical properties and hence it cannot refer outside itself and thus associate itself with an object.¹¹¹ That connection cannot be provided by the object either, for the same reason. Hence the only option is that the association is established by the *interpretant*. Literally speaking, there is no reference. There are only acts of interpretation. They give rise to a final logical interpretant, a habit. Thereby the interpreter learns to associate the sign-vehicle with its object. This is the *pragmatist principle of association*. (Määttänen 2009: 90–102, 126–129.)

Peirce envisaged a progressive development of interpretants from emotional, via energetic, to logical interpretants. The “feeling of recognizing the sign as such” (emotional interpretant) “provokes efforts [...] against resistance, or of resisting a force [...]” (energetic interpretants) (Peirce MS 318: 36). Peirce gives two different accounts on habits. First, habit is determined as a logical interpretant to offer “mental fact” and “general reference” to the

¹⁰⁸Hence scientific inquiry can be modeled as a special case of semiosis.

¹⁰⁹See Section 3.2.

¹¹⁰See Section 3.2. Thus one can see that interpretation is not always “intellectual” (Short 2007: 201; cf. CP 5.489; EP 2: 414): if semiosis terminates only in an emotion or in an action, it does not increase knowledge.

¹¹¹Wheeler’s (1991: 200) criticism of what he calls “magic language” seems to be similarly motivated.

emotional and energetic interpretants. In this sense, habits arise from rehearsing possible actions in imagination. The purpose of semiosis is to make signs effective, not as singular acts but as general habits that determine a class of singular acts¹¹² (Peirce CP 8.332, 8.335). Second, habit is determined as akin to a law of nature, “selected” like genes in biological evolution (Darwin 1859; [1871] 1877), and providing opportunities for self-improvement (progression from emotion, via action, to habit or habit-change).¹¹³ Now the focus shifts from a singular habit to an organic ensemble of habits, or “habituescence” (Peirce MS 930: 18; cf. D. E. West 2014; 2016). According to Gorrée, “[h]abituescence consists in the multilogue of natural reasoning showing itself in the routine of the mental procedure in professional habit” (cf. Peirce MS 930: 19). (Gorrée 2016: 25–31.) According to D. E. West (2016), habituescence consists in the conscious awareness of taking a habit.

According to Savan (1988: 43–44),

The Logical Interpretant is a Dynamic Interpretant in so far as the rule or habit is instantiated in a particular set of actions within a limited period of time. These particular sets of actions are energetic interpretants; but as exemplifying an indefinite repeatable habit, they also replicate logical interpretants. Note also that whereas emotional and energetic interpretants have a finite termination, the logical interpretant is always potentially repeatable without termination.

Sometimes Peirce mentions the *ultimate* logical interpretant that consists in *habit-change* rather than habit (e.g. Peirce CP 5.476). This notion suggests that the final interpretant has an evolving nature. Habit-change is what produces the constant shifting of the dynamical interpretants towards the final interpretant, a limit concept that can be approached indefinitely but never completely realized. (Cf. Santaella 2016: 166–168.)

Peirce’s semiotic proof of pragmatism depends on the completeness of his enumeration of possible candidates for the final logical interpretant: definition, concept, proposition, argument, or habit. He has not specified in sufficient detail, on what principles or criteria these items have been included on his list, and he has not shown that nothing else could possibly fulfill these principles or criteria.¹¹⁴ The only criterion he discloses is the functional definition of final logical interpretant. Hence Peirce’s induction by enumeration

¹¹²See Section 3.2.

¹¹³I believe that this last characterization of habit is what Peirce was after in “A Neglected Argument for the Reality of God” (CP P 6.452–491; EP 2: 434–450).

¹¹⁴Santaella (2016: 165), however, argues that nothing fulfills the office of logical interpretant better than habit.

remains inconclusive. We may have a rational ground to believe that semiosis tends to termination;¹¹⁵ but we seem to have insufficient rational grounds to believe that the final logical interpretant be a habit.¹¹⁶

This result is disconcerting indeed. Perhaps hopes for a conclusive argument for pragmatism should be forgone. This seems to be a trivial consequence of fallibilism: it applies, and indeed *must* be applied, to pragmatism itself. Robin (1997: 150–151) went as far as to claim that pragmatism has no basis. Its “proof” is in what can be achieved by its application. William James seems to have realized that and suggested a proof of pragmatism by living by it (Rydenfelt 2009: 48). Such notion can be found in Peirce’s unpublished manuscripts too (MS 300). It is also implicit in the pragmatic maxim itself: by applying it (again) to itself, the meaning of the pragmatic maxim turns out to be *its* potential practical effects. Thus it would violate pragmatism itself to attempt to derive an *a priori* proof. The truth of pragmatism is an experimental matter.¹¹⁷

According to Robin (1997: 139), Peirce’s proof implicates the whole of his philosophy, because “it has that special character related to a coherentist¹¹⁸ defence, which in itself is a reflection of an underlying architectonic conception of philosophy.” He suggests that Peirce began to realize the problem that if the pragmatic maxim is a logical principle, then it cannot be based on psychology: the claims that meaning equals behavior and that the sole motivation for inquiry is to dispel doubt. This problem results from underlying nominalist and individualist notions which Peirce later recognized and criticized (cf. CP 5.4, 5.457, 8.208).

Robin (1997: 144) continues: “Critical common-sensism effectively establishes the boundary conditions for all serious discussion, including pragmatism’s defence.” That means that pragmatism cannot begin as if there was a God’s Eye point of view, or an epistemic Archimedean point, from which to judge all knowledge. If pragmatism insists that knowledge be situated, it must prove that by the means that are available for situated knowledge, not by the means that would be available for an ideal inquirer. (Cf. Lindholm 2023a.)

¹¹⁵My negative result does not threaten my reply to Horkheimer. For that purpose, it is sufficient that semiosis involves the norm of the convergence. The (fallible) criterion of convergence is that the immediate object *improves* at each successive interpretation. The (fallible) criterion of improvement is *more successful practice* that involves the dynamic object (cf. Kuusinen 1959: 111). See Section 5.11.

¹¹⁶However, for a defense of Peirce’s proof, see Fitzgerald (1966).

¹¹⁷This possible reply echoes Marx’s second thesis on Feuerbach ([1845] 1978).

¹¹⁸See Subsection 4.4.3.

Robin's (1997: 144–149) solution is coherentism about justification¹¹⁹ (not about truth). Peirce's "critical common-sensism" is the union of *cenoscopia* and *idioscopia*,¹²⁰ of which the latter was supposed to provide the critical element: theory must be judged by experiment, not *vice versa*.¹²¹ Pragmatism is supported from above by acquiring its justification from aesthetics and from principles more general than the ones it provides as it dictates to the sciences that stand beneath it; and simultaneously from below by that reasonableness that impresses itself via a logic that works itself through the special sciences, each of which has its own wellspring and whose conclusions represent the nearest one gets to the truth about real objects. Thus pragmatism is supported by a whole network, in this case represented by the classificatory scheme of the sciences (Peirce CP 1.180–202; EP 2: 258–262). The problem, which universals are real, must be left to science to determine.

I believe that Robin is mistaken here. Peirce's philosophy as a whole does indeed involve a coherentist character, but ultimately it becomes a species of infinitism which I call *indefinitism*.¹²² The problem, how our "web of belief" assimilates novel information, that haunts coherentism, does not arise in Peirce's philosophy precisely because of its indefinitist nature. The belief–doubt model of inquiry implies indefinitism. Experience teaches us by "practical jokes, mostly cruel" (CP 5.51; EP 2: 154, 194), when habitual action fails. Thereby we acquire *percepts*. Then we form *perceptual judgments* from them.¹²³

This strategy is insufficient to convince *a priori* philosophers about pragmatism, whatever its extent. *A priori* philosophers can claim that this argument begs the question by providing a number of *a posteriori* proofs on *a posteriori* grounds. But pragmatists can reply that *a priori* philosophers also beg the question by requiring an *a priori* proof on *a priori* grounds. Thus there remains the possibility that neither group of philosophers can convince the other. This stalemate resurrects the traditional opposition between "empiricists" (pragmatists) and "rationalists" (*a priori* philosophers).

This reformulated opposition between "empiricism" and "rationalism" is too large an issue to be resolved in this thesis. But I can hint at a possible

¹¹⁹See Subsection 4.4.3.

¹²⁰From *κοινοςκοπία*: the lookout upon the common; and from *ιδιοςκοπία*: the lookout upon the special. These are Peirce's terms for philosophy and special sciences, respectively. Peirce borrowed these terms from Jeremy Bentham. See Peirce (CP 8.199, 8.201–202, 8.342–343; EP 2: 146, 372ff., 458–460, 481–482).

¹²¹Again, Marx ([1845] 1978: § 2) would have considered the opposite a *scholastic* problem.

¹²²See Subsection 4.4.5.

¹²³See SAaction 3.3.

resolution: what I have said about experience and fallibilism in general¹²⁴ — and the belief-doubt model of inquiry in particular¹²⁵ — suggests that “rationalism” is untenable. Our experience goes on and accumulates, willy-nilly. It is possible that *a priori* philosophers have discovered truths by *a priori* methods, but *the world can change*, and the possibility of a change of the world cannot be excluded — least of all by an *a priori* metaphysical fiat. Hence what is considered a truth today can become a falsehood tomorrow. Hence justification cannot be established once and for all but issues from the *process* of updating our beliefs experimentally. *A priori* philosophy necessarily pronounces some beliefs infallible. Thus it illegitimately blocks the way of inquiry. Science has no room for such an attitude: in order to emancipate humanity from ignorance and tyranny, *everything* must yield to scientific research, *including science itself*. Otherwise we will be left with an unanalyzable mystery which we simply have to accept dogmatically. Questions about truth are therefore ultimately *practical*; otherwise they would have no significance; for what could “truth” *mean* without potential practical effects?¹²⁶ Maybe an immaterial Cartesian soul could be happy with truths that have absolutely nothing to do with practice, but living organisms simply cannot.¹²⁷ And with practical relevance, there enters the possibility of error and empirical revisability.

It is important to emphasize that the failure of Peirce's semiotic proof of pragmatism is not a failure of Peirce's semiotics in general. In the following Chapter, I will apply Peirce's semiotics to show that knowledge is practice in another way. Perhaps it is possible to preserve the notion that semiosis is teleological but consider its terminus differently. For instance, the end can be defined in the terms of the dynamical object itself: the end of semiosis is *complete knowledge about the dynamical object*. That does not require the specification of the nature of the final logical interpretant. Then Peirce's proof could be completed by showing that knowledge be intelligent habit or practice. That is what I am going to do in the next Chapter.

¹²⁴See Chapters 3 and 4.

¹²⁵See Section 4.3.

¹²⁶Once more, Marx ([1845] 1978: § 2) says the same thing.

¹²⁷See Section 2.1.

Chapter 6

Knowledge

In this Chapter, I will apply pragmatist philosophy as a whole, as described in the four preceding Chapters, in order to demonstrate that knowledge is practice. I have already defended this thesis in Lindholm (2021; 2023a). I will improve upon my earlier argument here with reference to Peirce’s logic of abduction and semiotics.

I will begin in Section 6.1 by explaining how habit can be attributed to a person on the basis of their actions. Then I will explain by analogy how knowledge can be attributed to a person in Section 6.2. I will also make some brief remarks about Dewey’s thesis that science is art and art is practice (Dewey [1925] 1929a: ch. IX) in Section 6.3.

6.1 The Criterion of the Attribution of Habit

In Peirce’s idiom, habit falls under thirdness; action, under secondness.¹ A habit is a law of action and therefore a *legisign*.² It is embodied in *particular actions, including speech acts*, which qualify as its *sinsigns*.³ Being a legisign, a habit *determines* actual and potential actions. The relation of determination makes actual actions *indirect evidence* for the existence⁴ of the habit. Thus we can attribute a habit to a person on the basis of their behavior. That consists in an abductive inference⁵ (Lipton [1991] 2004; Niiniluoto

¹See Section 3.2.

²See Subsection 5.5.2.

³See Subsection 5.5.2.

⁴Maybe it would be more appropriate to speak about the *reality* rather than the *existence* of a habit, given that habits are generals (Pihlström, private communication). I am unsure about whether that is correct, because generals *can* be objects of experience.

⁵Peirce was a pioneer of abductive logic. Abduction is the process of forming and choosing an explanatory, testable, and economic hypothesis (cf. Aliseda 2016). It consists

2018) from particular actions, including speech acts, to a general habit: that there is a law that determines both the actually committed actions and potential actions of the same kind. Such hypothesis is eminently fallible but can be tested. We can make conditional predictions: *if* the attributee really has the habit of a given kind, *then* they can be expected to behave in a certain way in certain situations. If the predictions match actual actions, and if we can exclude alternative explanations, e.g. by changing the conditions of action and testing how the results change, then we have a fallible reason to believe that our hypothesis is at least approximately correct.

It must be emphasized that *speech acts are evidence*. The attributee can verbally tell others that the attributee has the habit of the given kind. But it must also be emphasized that the attributee themselves can be wrong or lie. Hence the abduction is fallible even in this case.

Without such behavioral evidence, a habit cannot be intelligibly ascribed to a person. *They may still actually have the habit in question*; others are just logically unable to attribute it to them intelligibly. Even if such attribution were *true*, it cannot *mean* anything. To say that an attributee be in the habit of performing certain actions but has never done anything that supports this conclusion, including speech acts, is utter nonsense — even if the attributee *really is* in the habit of performing the actions in question.

Circumstances can intervene. It is possible that the attributee really has a given habit but never has occasion to act accordingly. In that case, there is no evidence to support an abduction to the habit, and performing such abduction would be nonsensical. On the contrary, others might have evidence to make an abduction to *another, logically incompatible habit* instead. For instance, a person can be generous but too poor to donate money. Then others may falsely, but fallibly, consider them miserly. But then the attributee might, perhaps, *explain verbally* why they have behaved in ways contrary to

in studying facts and devising a theory to explain them. It needs no justification, because it is just guesswork; but it seems to have *some* justification, because it is the only kind of reasoning that introduces new ideas. I maintain that any explanatory, testable, and economic hypothesis is justified to be considered a candidate to be tested. By being tested, it acquires epistemic justification by induction. We have acquired all our concepts by abduction. In a word, abduction seeks a *theory*; induction seeks *facts*. Peirce maintains that all experience involves abductive interpretations. He goes as far as to call pragmatism *the logic of abduction*. (See CP 1.354, 1.559, 1.630, 2.619–644, 5.60, 5.161, 5.171, 5.181, 5.186, 5.189–200, 5.212, 5.272–274, 5.276–280, 5.282, 5.288–292, 5.345–352, 5.579, 5.581, 5.589, 6.40, 6.144–146, 6.469–477, 7.202–207, 7.218–231; EP 1: 9, 32–38, 40–44, 76–80, 186–199, 245, 300, 327–329; EP 2: 32, 44–47, 53–54, 73–74, 94–97, 106–114, 139, 156, 205, 212–213, 216, 224–225, 227–236, 241, 287–288, 440–445). Fann (1970) has documented the history of Peirce’s theory of abduction. Popper expressed roughly similar ideas by formulating the hypothetico–deductive method that seems astonishingly successful in science.

the habit in question. That qualifies as legitimate evidence for the habit but remains defeasible.

In a word, the *fallible* criterion of the *hypothetical* attribution of habit to a person is the observed behavior of that person.

6.2 The Criterion of the Attribution of Knowledge

The argument in the previous Section can be applied to justify the thesis of Bennett and Hacker (2003): that the (fallible) *criterion* of the attribution of psychological predicates is *behavior*, including speech acts (cf. Peirce CP 5.249; CP 1: 23; James 1909a: ch. I). I have previously derived this thesis directly from the pragmatic maxim (Lindholm 2021: 4–5, 4n17; 2023a: 15). The argument in the previous Section shows how to derive it indirectly from phenomenology⁶ and semiotics⁷ — both independent of the pragmatic maxim. Thus, even if the pragmatic maxim fails, phenomenology and semiotics support the thesis independently.

Unlike behaviorists, Bennett and Hacker do not *reduce* the meaning of psychological predicates to behavior.

In order for the attribution of a psychological predicate to be intelligible, the attributee must give evidence: they must behave appropriately. Otherwise nobody else could understand, what is meant by the attribution — even if it were true. Consider, for instance, Putnam’s (1963) super-Spartans.⁸ They do feel pain, but they also have such self-discipline that they never manifest it. Hence the predicate “pain” would be true of them; but in the absence of public evidence, nobody could understand, what it *means* to say that they feel pain. (Cf. Lindholm 2021; 2023a; 2023b.)

By analogy with the argument in the previous Section, one might defend Bennett and Hacker as follows. Psychological predicates describe psychological phenomena. They are universal legisigns (thirds). But actions are particular sinsigns (seconds).⁹ Psychological phenomena (partially) determine actions. This relation of determination makes particular actions *evidence* for being in a certain psychological state. Hence we can make a (fallible)

⁶See Section 3.2.

⁷See Chapter 5.

⁸Putnam intended the thought experiment of super-Spartans as a counterexample to behaviorism. Here I apply it for a different purpose: to illustrate the key motivation behind Bennett and Hacker’s thesis.

⁹For the definitions of legisign and sinsign, see Subsection 5.5.2. For Peirce’s categories, see Section 3.2.

abductive inference (Lipton [1991] 2004; Niiniluoto 2018) from the particular actions of a person to that person being in a certain psychological state. Because that psychological state is a universal, it can be manifest in different ways in different situations. Hence it (partially) determines potential actions as well as actual actions. That makes the ascription of the predicate experimentally testable: one can study how the attributee behaves in different situations. Such experimentation (fallibly) justifies the attribution of a psychological predicate.

Knowledge and *understanding* are psychological predicates. Hence, in order to ascribe such predicates intelligibly to an agent, the agent must act appropriately: in a way that manifests unequivocally the kind of knowledge or understanding in question.

There are two kinds of skill that one can manifest: ability to *manipulate* subject matter, and ability to *describe* the manipulation of subject matter. Hence I have discerned two senses for these psychological predicates: a strong and a weak one. The attribution of *knowledge* in the strong sense requires permanent ability to successfully perform certain kinds of actions — that is, a practice (habit) that is more general than particular actions. That may involve permanent ability to describe or explain, why certain actions and not others are done, in what order. The attribution of *knowledge* in the weak sense only requires permanent ability to give an adequate verbal account of how it is to practice, maybe with reference to a reliable source, as in a school exam or a research article. Knowledge in the traditional (representationalist) sense is a possible subspecies of weak knowledge. This thesis itself consists in weak knowledge. The weak sense is derivative: the criterion of the adequacy of the verbal account is the *practice (habit) itself*, or knowledge and understanding in the strong sense. Strong knowledge requires first-person expertise. Weak knowledge only requires reliable testimony.

In order for the predicate “knowledge” to be applicable in the strong sense, there must be a competently conducted practice. But then, by Ockham’s razor, “knowledge” refers to *this practice itself* (rather than to something *beyond* the practice): it would be nonsensical to postulate a non-empirical entity the purpose of which is just to describe the empirical phenomenon in different terms.¹⁰ The predication of practice already goes beyond particular performances. (Cf. Lindholm 2021: 4–5; 2023a: 31–32.) In short, *knowledge in the strong sense is practice*. According to Chang (2022: 253), “[k]nowledge is knowing how to do things.” That is the case, if knowledge is understood in my strong sense.

Knowledge in both senses comes in degrees. In the case of the strong

¹⁰See Subsection 2.5.1.

sense, the reliability of practical operations can be measured with a ratio of success. In the case of the weak sense, the “sufficiency” of the verbal report depends on context.

Recall that belief is habit (practice), operationally speaking.¹¹ If knowledge is a species of belief, then, *a fortiori*, it must be habit (practice) as well.

Peirce (CP 4.531) identified knowledge with habit, though only once, and only as if in passing. I have now provided a defense for that claim.

Consider a putative counterexample.¹² Let us suppose that an agent takes an exam about a given practice but does not perform the related procedures themselves. Then one is entitled to ask, whether the agent *knows* about the related procedures and, further, whether there are rational grounds to *evaluate* the exam answers. I reply that speech acts, including examinations, do constitute evidence for knowledge — in this case, *weak* knowledge. The criterion of evaluation is the practice itself. That does not require the agent to perform the related procedures themselves; it is sufficient that *somebody* does and that *somebody* (possibly the same person) can compare the performance with the exam answers. Moreover, if the agent has shown to possess *weak* knowledge, that does not mean that they could not have *strong* knowledge besides. I have explained in previous Chapters that Peirce’s notion of *habituescence*, the habit of deliberate habit-change, allows one to take a habit (practice) by rehearsing the related activity in imagination, at least in principle. Hence weak knowledge can evolve into strong knowledge, at least in principle. In practice, the agent needs experience to supply missing *ad hoc* details.

Recall from Sections 3.1 and 3.5 that the determinacy of an object presupposes practice. In order for an object to stand out as a determinate, numerically identical unit, organism–environment intra-action must be stabilized. The stabilization of such intra-action is a matter of skill. In order to identify the object, the stabilization of the intra-action must be repeatable. Hence the appropriate skill is a matter of an established practice (habit). This notion contrasts with Aristotle’s, who argues that one must begin inquiry from what is fixed, such as the movements of heavenly bodies (1935a: 1063a10–20). The trouble with Aristotle is that fixing something is an epistemic *problem*. The fixation of an object is a possible *result* of inquiry. It is a *teleological fallacy* to presuppose that as the default state of affairs. Hence one must set out by *learning the skill of stabilizing the situation*. In some cases, that is simple: one just needs to be located and oriented appropriately.

¹¹See Section 4.2.

¹²I thank Ave Mets (private communication) for this objection.

For instance, in order to determine whether it rains, one just needs to look out of the window or be located outside.

Knowledge evolves. Since knowledge is universal and hence falls under thirdness, it is prone to variations in individual cases. Thus historical drift is to be expected. That can be seen from the *belief-doubt model of inquiry*.¹³ Given that knowledge is a species of belief, *a fortiori*, the model applies to knowledge. Knowledge evolves by error.

Thus *knowledge is practice* — ability to cope with the world. Its criterion is *the ratio of success and failure* — the ratio of attainment and non-attainment of specified ends-in-view.¹⁴

In this sense, *knowledge is freedom*. Necessity and freedom are not opposed but dialectically related. Dewey ([1910] 1933: 87–88) argued that the meaning of freedom is to discipline oneself to acquire the skill to overcome obstacles without external tutelage. Likewise, Hegel ([1830] 1986a: § 147) claimed that freedom consists in the realization of necessity; and, according to Engels ([1877–8] 1975: 106–107) and Kuusinen (1959: 116–117), that should be understood in the sense that freedom consists in our ability to discover laws of nature and to put them to human use.¹⁵ Thus freedom is essentially positive for Hegel, Marx, Engels and Dewey alike.

Moreover, in this sense, *knowledge is happiness*. There is no genuine, sustainable happiness without success; and success consists in the process of learning to overcome obstacles. (Dewey 1920: 177–180.)

There remains the problem, whether and how representations are related to knowledge. I submit that knowledge may, and often does, involve the *use* of representations; but representations as such cannot possibly constitute knowledge; and even their representational function is derived from their being usable in a practice. Dewey (1896) rejected the reflex arc concept in psychology: experience involves a feedback¹⁶ rather than a linear progression from stimulus via internal representation to response. *External* representations such as maps, diagrams, pictures, models, etc. do have an epistemic function: they are emphatically designed to be used in practices. But ab-

¹³See Section 4.3.

¹⁴See Subsection 2.3.4. In my previous publications, I have simply considered *success and failure as such*. I have come to the conclusion that that is too simple a criterion. A practice (habit) is more general than an enumeration of actions. Therefore a practice (habit) does not have to be abandoned if one failure occurs. How many failures it takes to refute a practice (habit) depends on its importance: if the stakes are high, a single failure might be enough to consider alternative ways of acting; but in most affairs, a relatively large number of failures can be tolerated.

¹⁵*Veritas liberat* is the official motto of Juniata College. Pragmatists might change that into *experimentum liberat*.

¹⁶See Chapter 3 and Lindholm (2023a).

stracted from use, they are just things; they do not qualify as knowledge; that would require behavior, possibly including speech acts. Consider aliens visiting our planet. Suppose they initially have a map but end up losing it. Then suppose that an earthling finds that map. Because the map is designed to align with alien practices, the earthling could not possibly use it — or even identify it as a *map* in the first place. The reference of the map to a given location does not exist without an interpretant; the alien has habits that associate the map with an environment, while the earthling has not. Hence it cannot qualify as knowledge when abstracted from use. Moreover, if all habit-taking creatures were removed from the universe, but our external representations remained, it would require more than stretching the concept to claim that these representations constitute *knowledge*. *Whose* knowledge? For what *purpose*?

One may object that a person can imagine an object and that the object imagined is an internal representation. I do not deny the possibility of imagining things. But our *imagining* things must be understood as a *gerund* rather than as a noun: it designates *activity* rather than entities; it designates what we *do* rather than something that *exists*; *representing* is a purposive activity in which a phenomenal entity is taken to *stand for* another (cf. Giere 2004: 743; van Fraassen 2008: 23, 249; Chang 2022: 111–114). Likewise, I can run, but then I *am running*; literally speaking, there is no object called a *run*. The languages that I happen to know have many abstract nouns that denote activities or events, but their grammatical form suggests entities: “a choice,” “a use,” “no regrets,” “labor,” “a judgment,” “a campaign,” “destruction,” “sight,” “a stroll,” “an operation,” and the like. It seems to me that the whole notion of internal representations commits the fallacy of reifying some aspects of mental activity. Hence one ought to relate critically to the method of introspection — especially in the matters of metaphysics. Perhaps there is a sense in which activity can be hypostatized into a four-dimensional “entity,” time being one dimension, given my inclination towards process ontology. But I still believe that in order to understand such “entity,” the activity of a living organism must be taken into account. The activity in question is “real” in the sense that it accomplishes real results (and hence ontologically symmetrical and hence natural; see Lindholm (2024b: 39, 42, 45–47, 56, 59–60)), but “unreal” in the sense that it is profoundly mind-dependent. Therefore one should use caution when hypostatizing activities.

One might be inclined to call this account on knowledge “behaviorist.” Therefore I must point out one crucial difference between behaviorism and my epistemology: behaviorism would *reduce* psychological predicates to behavior, while I do not. I follow Bennett and Hacker and consider behavior

the *criterion* of the attribution of psychological predicates. That move is *semantic* rather than ontological.

When it comes to the special case of knowledge, one might still argue that I am *de facto* reducing the predicate *knowledge* to behavior, even if I do not thus reduce other psychological predicates. I do indeed go farther than Bennett and Hacker in the case of knowledge. But my further argument relies on *Ockham's razor* rather than behaviorist methods *per se*. Therefore my account may *incidentally coincide* with behaviorism, but my grounds are non-behaviorist.

6.3 Science and Art

Dewey ([1925] 1929a: ch. IX) argued that science is art and art is practice.¹⁷ He also argued that knowledge is a “kind of action” (1929b: 83–88, 102–103, 167, 193), which I take to mean *habit (skill, practice)*. I have defended his thesis in Lindholm (2021) and summarized my defense in Lindholm (2023b). I will restate my argument here.

If science is *not* understood as practice, then two problems follow: (1) if scientific discourse is abstracted from its experimental context, it becomes meaningless; and (2) that if the existence of theories is taken as the default state of affairs, that leaves it unexplained, how these theories were created in the first place.

On the other hand, if science is understood as practice like Dewey did, these problems can be solved: (1) if symbols are understood as proxies for concrete operations, then scientific discourse retains its significance;¹⁸ and (2) the experimental process which aims (among other things) at the formulation of a theory is not random groping but is guided by previous knowledge which is incorporated in laboratory and fieldwork practice.¹⁹

Dewey does not mean that science be imaginary creation. Science does involve imagination and creativity when devising solutions to problematic situations, but the solutions are not imaginary in the sense of “arbitrary.” They are causal agencies, and they must pass the test of success or failure. Dewey ([1925] 1929a: 426) was emphatic that we understand a phenomenon insofar as we are able to initiate, sustain, and terminate it at will.²⁰

Moreover, if knowledge is practice, if science is the perfection of knowledge, and if art is the perfection of practice, then it seems to follow that

¹⁷Dewey's account on fine art is different in his *Art as Experience* ([1934] 1980).

¹⁸See Section 2.6.

¹⁹See Sections 3.1, 6.1 and 6.2.

²⁰See also Lindholm (2023a: 32).

science is art (Lindholm 2023a: 32).

It must be borne in mind that before Alexander Gottlieb Baumgarten and Immanuel Kant, art (in the sense of the Greek τέχνη and the Latin *ars*) was not confined to *fine* art. Aesthetics was not an independent discipline but, rather, part of philosophical psychology.²¹ In a renaissance *Kunstammer*, mechanical inventions and paintings were equally present. When Dewey says that science is art, he means *both* fine *and* useful art at once.²² If Dewey is correct, then knowledge (ἐπιστήμη) and skill or art (τέχνη) are not distinct.

²¹The term “aesthetics” is derived from αἰσθάνομαι: “I sense,” “I perceive”; and from αἰσθησις: “sensation,” “perception.” Hence its purview has included all experience in the traditional sense. It has not been confined to the experience of works of art.

²²Dewey did, in fact, reject the distinction between useful and fine; see Lindholm (2023b).

Chapter 7

Conclusion

7.1 Summary of the Thesis

I have argued that knowledge is practice. I will summarize here, how I have come to that conclusion.

First, recall my definition of *experience*: *organism–environment intra-action*, a specific kind of feedback mechanism in which the organism and the environment exchange causal signals.¹ Experience can be analyzed into three real and mutually independent categories: *firstness*, manifest in “qualities of feeling,” *secondness*, manifest in the co-occurrence of effort and resistance, and *thirdness*, manifest in the establishment of habit.² Then recall my definition of *habit*: an (*approximately and relatively*) *invariant pattern of potential organism–environment intra-action*. This definition is independent of the success or failure of the pragmatic maxim.³ Also recall my suggestion that Dewey’s notion of *habit* is roughly synonymous with Rouse’s notion of *practice*. Moreover, recall that the concept of *habit* cuts across the subject–object dichotomy: a habit involves the cooperation of an organism and its environment, without reducing to either. Once more, recall that a habit is a universal that determines a class of actual and potential actions, without reducing to an enumeration of such actions.⁴ All experience is experimental: each situation is new to a degree; hence all our beliefs (habits) are at test all the time; habitual action can fail at any moment. In the rest of this summary, when I refer to habit, I mean *intelligent* habit.⁵

Second, we begin inquiry from whatever habits we happen to have, whether

¹See Sections 3.1 and 3.5.

²See Section 3.2.

³See Section 2.2.

⁴See Section 2.3 and Subsection 3.2.5.

⁵See Subsection 2.3.2.

innate or learned (cf. Stjernfelt 2016: 248–252), in the double sense of *habit*: as *meaning*⁶ and as *belief*,⁷ in science and everyday problem-solving alike. We are epistemically justified in doing so for the following reason. We are active creatures by nature: action is the rule and contemplation the exception. Action takes place in a *situation*; the ongoing course of purposive action maintains the integrity and coherence of the situation; the purpose enables us to focus on relevant experiences and ignore the rest.⁸ Most of our endeavors are non-epistemic. They consist in habitual action. Sometimes habitual action fails. Then the situation becomes *problematic*. That prompts an inquiry: we cannot resume our actions before we accommodate the failure and learn how to avoid it. Thus epistemic activity acquires its meaning, significance, purpose, and resources from background practices. A problematic situation is resolved according to the *belief–doubt model of inquiry*.⁹ Inquiry consists in the formation of a new belief (habit, practice). The formation of a new belief (habit, practice) consists in *abduction* (the introduction of a new hypothesis that accommodates the failure), *deduction* (the derivation of certain testable consequences of the hypothesis), and *induction* (experimentation, whether these consequences of the hypothesis obtain). Experimentation follows the schema of the generation of meaning.¹⁰ We keep researching until we discover a hypothesis that resolves the problematic situation. If we discover a satisfactory hypothesis, we can resume our activities. Epistemic justification arises from this *process* of revising the existing stock of habits (beliefs, meanings) rather than from beginning from a self-justifying or obvious epistemic foundation. That suggests epistemological infinitism — or epistemological indefinitism. Hence it makes little difference from which habits we set out. The purpose of the complete discovery of the dynamical object¹¹ sets the standards of a successful inquiry and semiosis. The existence of such standards dictate that inquiry and semiosis tend to this terminus. Our knowledge about the dynamical object is manifest in our habits of responding to it. Because we do not possess the criterion of permanent truth (at best, we can only say that we have not failed yet), and because the dynamical object can change, we still must keep studying the dynamical object indefinitely. Arguably, the “same” object can be encountered in an indefinite number of practices; moreover, new practices can always be introduced; therefore there is an indefinite number of possible interpretants associated with the

⁶See Section 2.2.

⁷See Sections 4.1 and 4.2.

⁸See Subsection 3.1.3.

⁹See Section 4.3.

¹⁰See Section 2.4.

¹¹See Section 5.7.

object that may never be exhausted. Our epistemic norms keep us on the right track (the complete discovery of the dynamic object, or an exhaustive stock of habits of response), but for practical reasons, we may (and often do) have to settle for *sufficient* knowledge (a sufficiently large stock habits of response).

Third, the criterion of the attribution of knowledge must be empirical. The habits (practices) that we happen to have already incorporate knowledge, even in non-epistemic activities: they enable us to cope with the world, to solve problems that occur in the course of experience, when we have purposes but the world does not fulfill them without our skilled intervention. Habits (practices) being legisigns, and actions determined by them being sinsigns,¹² the observation of habitual action in a variety of situations justifies abduction to habit (practice). Thus the postulation of habit is *prima facie* justified by observed action. It can acquire inductive confirmation in addition, as experience accumulates.¹³ Likewise, the observation of skilled action in a variety of situations justifies abduction to knowledge. Thus the postulation of knowledge is *prima facie* justified by observed action. It can acquire inductive confirmation in addition, as experience accumulates.¹⁴ Knowledge is a species of belief; and belief is habit.¹⁵ Hence the criterion of the attribution of knowledge coincides with the criterion of the attribution of habit. Skill comes in degrees. Hence the difference between knowledge and habit is relative: a pattern of behavior manifests habit, and the more skilled the manifestation, the more there are grounds for the attribution of knowledge. Thus the criterion of knowledge is *the rates of success and failure*. Habits are thirds, and conditions are seconds.¹⁶ Habits are established, if they determine a class of actions that deliver their goods sufficiently often. That is the case, if they adapt to conditions. Hence the knowledge they manifest is about a “real” (i.e. mind-independent) world: habits adapt to something that is at least to a large degree independent of them. They cannot form in vacuum. Therefore *any* habit involves a degree of knowledge: it could not have been established, if it did not determine successful actions in sufficient degree, where what “sufficient” means depends on context and purpose. The abduction and its inductive confirmation are defeasible: observed action is the criterion of *meaningful attribution*, not of truth. Thus one can introduce statistical measures for the correctness of the induction: a certain proportion of actions is habitual, or manifests knowledge, with a certain variance,

¹²See Subsection 5.5.2.

¹³See Section 6.1.

¹⁴See Section 6.2.

¹⁵See Sections 2.3, 4.1 and 4.2.

¹⁶See Section 3.2.

etc. We understand a phenomenon insofar as we are able to initiate, sustain and terminate it at will (Dewey [1925] 1929a: 428). The logic is the same as in abduction to law from the observation of events in a variety of situations (Lipton [1991] 2004; Niiniluoto 2018), and the inductive confirmation of that law. Any law posited on empirical grounds can be defeated in principle. This account involves a species of non-representational realism (or, perhaps, quasi-realism) without the problematic God’s Eye point of view, or an Archimedean point: all knowledge (practice) manifests (not to say “represents”) a largely (not to say “completely”) mind-independent world to which it is accustomed, precisely because it is so accustomed; the degree of its adaptation can be measured in the degree of its success or failure; but it applies only locally, only in a class of situations that exhibit a degree of invariance.¹⁷ Whether a given situation belongs to that class is an experimental problem and cannot be presupposed. Practice “manifests” the largely mind-independent world by embodying the structure of the latter in its own.

By Ockham’s razor, it makes no sense to look for non-empirical representational causes beyond behavior. Such alleged causes simply restate the experienced behavior in different terms at the cost of positing unexperienceable entities. Hence they are uninformative and empirically irresponsible in general and dogmatic in particular.¹⁸

The theory that knowledge is habit is superior to the theory that knowledge is representation. The former can be experimentally tested, the latter cannot. If knowledge is representation (e.g. true justified (un-Gettiered) belief), we can observe the actions of an alleged knower, but none of that can possibly be evidence of their having or lacking representational knowledge. According to that theory, an agent can have representational knowledge and fail in their actions for many independent reasons; and an agent can lack representational knowledge and succeed in their actions by accident. But if knowledge is practice, then the rates of success and failure themselves are the criterion of knowledge. It is *logically* difficult (if not impossible) not to attribute knowledge to an agent who succeeds often enough; and it is *logically* difficult (if not impossible) to attribute knowledge to an agent who fails often enough; what “often enough” means depends on context and purpose.

This holds for knowledge in the strong sense. Knowledge in the weak sense, which can be acquired by testimony, might be representational. But if that is the case, then its representational character is accidental; it cannot be pronounced the hallmark of knowledge *simpliciter*. A representation

¹⁷See Section 3.4.

¹⁸See Subsection 2.5.1.

is insufficient for knowledge by itself; it acquires its representative capacity from being incorporated in a practice. Moreover, knowledge in the weak sense presupposes knowledge in the strong sense: in order to identify weak knowledge *qua* knowledge and to attribute it to somebody, its criterion is that it adequately matches manifestations of strong knowledge, where what “adequately” means depends on context and purpose. Hence knowledge in the strong sense is more basic. However, the knower in the weak sense need not be the knower in the strong sense. *That* makes room for the possibility of representation: arguably, knowledge in the weak sense “represents” knowledge in the strong sense, whatever the medium and form of “representation.” Therefore knowledge in the weak sense acquires a degree of independence from the knower in the strong sense: knowledge in the weak sense only implies that *somebody* knows in the strong sense. But ultimately there must be somebody; knowledge in the weak sense cannot possibly qualify as knowledge in the absence of knowledge in the strong sense. Somebody might make a true claim about a state of affairs; but it has no epistemic authority unless really derived from practice. Knowledge in the strong sense may *use* representations like maps and diagrams; but they do not constitute knowledge as such, abstracted from use. If an alien with non-human communicative practices visited earth and lost their map, and if a human being found that map, they could not possibly identify it as a map. Hence the map as such could not possibly qualify as knowledge. It can only become part of an act of knowing when used.¹⁹

In short, my epistemology is thoroughly *technical*. Knowledge in the strong sense is practice (habit), or active means. A practice (habit) involves the cooperation of an organism and its environment. The environment potentially involves instruments, or passive means. Much of our knowledge is embodied in our technics and their active, skilled use (Baird 2004; Giere 2006). In a sense, that makes the acquisition of knowledge a *control engineering problem*.²⁰ (Cf. Dewey 1922: 25–26.)

My epistemology is also thoroughly *naturalist*: knowledge in general and propositional knowledge in particular is amenable to experiment.

Habit (practice) involves the cooperation of the organism and its environment. Hence by studying nature we also study *ourselves*: we gain understanding about who we are reflexively, by acting in the world. Bruce Lee said once in an interview that “all knowledge ultimately means self-knowledge.” He was correct in the sense that all knowledge ultimately *involves* self-knowledge.

¹⁹See Section 6.2.

²⁰See Section 3.5.

All knowledge is interpreted: the object of our knowledge makes sense only because we are able to habitually associate it with its possible practical effects. Habits (practices) function as vehicles of interpretation. Therefore interpretation need not be linguistic. There is a large domain of non-linguistic meanings, including aposematism, perceptual and motor functions of cognition, and cause–effect relations.²¹ According to Määttänen (2009; 2015), non-linguistic meanings are more basic than linguistic meanings. They are also largely non-conventional because adapted to largely mind-independent regularities in the world. Hence non-linguistic interpretation is not arbitrary, though it involves some degrees of freedom.

I wish to emphasize the role of *creativity* in inquiry. Peirce put a lot of emphasis on abduction, or the generation of hypotheses, in his theory of inquiry; the 1903 *Harvard Lectures on Pragmatism* (CP 1.314–316, 5.14–81, 5.88–212, 5.77n; EP 2: 133–241) are an extended argument that purports to demonstrate that pragmatism is the logic of abduction. According to Peirce, abduction is the only kind of inference that produces new ideas. There are no *a priori* constraints for abduction, except perhaps non-contradiction; the viability of a hypothesis is an *a posteriori* (experimental and inductive) issue. Hence all knowledge is ultimately hypothetical and a product of our creativity. In this respect too, science is art.

7.2 Criticism

I have argued that belief is habit (practice). I have also argued that knowledge is a subspecies of belief. That seems to suggest immediately that then knowledge is habit (practice). Then I could have dispensed with Chapters 5 and 6 altogether. I reply that that is not quite the case. One must make a difference between *subsumption* and *definition*. The subsumption of *A* under *B* makes it possible to predicate a property of *B* of *A*, but that does not exclude the possibility that *A* could necessarily have other properties as well. Hence subsumption falls short of definition. In this case, the inference

$$\begin{array}{l} (1) \text{ Knowledge is belief.} \\ (2) \text{ Belief is habit (practice).} \\ \hline \therefore (3) \text{ Knowledge is habit (practice).} \end{array}$$

does not *define* knowledge. It *subsumes* knowledge under belief (habit, practice). Hence the inference shows that knowledge has *at least* the characteristics of habit (practice) *but may also have other characteristics besides*. In

²¹See Section 2.2.3.

order to be able to *define* knowledge as habit (practice), a further argument is needed to show that knowledge has *exactly* the characteristics of habit (practice) and no more.

I have overlooked many differences between Peirce and Dewey. In particular, it is not obvious, whether they understand the pivotal concept *habit* in the same sense.²² Peirce, especially in his mid-career, invests the concept with cosmological overtones, while Dewey seems to restrict it to organisms.²³ Hence my syncretistic method deserves criticism. To my knowledge, possible differences in Peirce and Dewey do not influence my argument, given that I apply my own definition of *habit*, but I could be wrong.

Bennett and Hacker's (2003) thesis is that the (fallible) criterion of the attribution of psychological predicates, including knowledge, is *behavior*, including speech acts. I have explained how this thesis can be derived directly from the pragmatic maxim and indirectly from phenomenology and semiotics. If the pragmatic maxim fails, my thesis that knowledge is practice retains the support of phenomenology and semiotics. Now, an astute critic can point out that I have applied the pragmatic maxim in defining phenomenology. Hence, if the pragmatic maxim fails, so does phenomenology. My reply is complex. First, I have indeed defined *experience* operationally (that is, by applying the pragmatic maxim) as *organism–environment intra-action*. Second, I have indeed defined *phenomenology* accordingly, as *the science of experience qua experience*. But the objection is a *non sequitur*. There is no reason, why these definitions could not be made *without the pragmatic maxim*. Then I would simply have to discover other principles to justify the definition as non-arbitrary.

I have argued that the criterion of knowledge in the strong sense is *the rates of success and failure*. The purpose of this criterion is to exclude success by accident by statistical means. The required rate of success depends on context: with regard to the usual skills like cooking, the required rate can be very high, but there may be some extraordinary skills that succeed only very rarely; hence, if there are no better ways to achieve the goal, even a very small success rate suffices for them to qualify as knowledge, because the practice in question may be the only chance of succeeding at all in the enterprise. But Snowdon (2004: 18) points out that “[n]o one would affirm that, because I can bleed or digest a three course meal, these are things I know how to do” (cf. Chang 2022: 23). Thus I need a non-arbitrary criterion

²²D. E. West and Anderson (2016) have examined Peirce's notion of habit. Dewey explores the notion of habit in his (1916a: 54–58) and (1922: 14–88). My definition of *habit* — (approximately and relatively) invariant pattern of organism–environment intra-action (see Section 2.3) — purports to capture the gist of both.

²³I thank Stephen Houchins for pointing that out.

to distinguish between knowledge in the strong sense and mere physiological function. I reply that there is a continuum between these two. Even the strongest knowledge relies on physiological functions. What we have learned to do depends on what our body does and how it functions automatically without conscious intervention. Thus it does not make sense to distinguish sharply between knowledge and physiological function.²⁴

Chang (2022: 109) has questioned the appeal to success with regard to scientific theories:

1. It is actually dubious just how successful even our best scientific theories are.
2. There is no clear agreed sense of what we mean by ‘success.’ (One popular idea is that novel predictions are the best measure of success, but there is no consensus on that, either.)
3. There is no clear threshold of success (and its duration) beyond which the demand for explanation should be triggered.
4. When we have a successful theory, we are not aware of all possible alternative theories that would do the same job.
5. It is not clear what philosophical theory of explanation we are relying on in the argument from success. None of the usual ones (D–N, causal, intentional, etc.) would be suitable for this purpose.
6. There is only a very loose logical connection between the success and the correspondence-truth of a theory, due to the need to employ numerous auxiliary hypotheses to apply or test the theory empirically.

Thus it might seem that one can apply these arguments against my criterion of knowledge. But that is not the case. Chang discusses the success of *theories* in the terms of *the correspondence theory of truth*. I, on the other hand, discuss the success of *practices*: how often we succeed in producing the desired result. Thus Chang’s criticism does not apply to my argument.

According to R. A. Putnam (2010: 49), it is beyond dispute that the pragmatic maxim is too simple an account of the meaning of scientific concepts. She does not, however, indicate any sources that refute it.

In my criticism of mainstream analytic philosophy of language, I have relied on a single source (Lakoff & Johnson 1999).²⁵ That deserves criticism. The only defense I can give is that at least the claims of Lakoff and Johnson

²⁴Chang’s (2022: 23ff.) solution is different. He appeals to the notion of *understanding*. He argues that it is manifest in *operational coherence*, or the *coordination* of activities so that they work for a common goal. “It is a matter of *doing what makes sense to do*” (Chang 2022: 24). See also Thagard (2000).

²⁵See Section 2.1.

are empirically grounded and hence can be retested if need be; the same cannot be said about mainstream analytic philosophy of language; according to empiricist principles, mainstream analytic philosophy of language is simply unacceptable. Then, experiments can show that I am wrong; but that is better than what my opponents can achieve even at their best; their position cannot even be tested experimentally. I am not qualified in cognitive science, but it seems to me that empirical results that support Lakoff and Johnson have increased. Hence, I believe, one could cite any number of sources in more recent cognitive science in general and in the 4E theories of cognition²⁶ in particular.

Hence, I may lose the entitlement to use a single source to justify my selection of the pragmatist theory of meaning. In that case, my thesis becomes conditional: *if* the pragmatist theory of meaning is sound, *then* some of my conclusions follow. However, my main thesis follows from phenomenology and semiotics, which can have a justification different from the pragmatic maxim.

A.-V. Pietarinen and Bellucci (2016) argue that a habit is not a sign-vehicle. That threatens my argument that habits be legisigns and actions their sinsign replicas. I reply that the habit to which a particular sign-process converges is not the sign-vehicle of the process, but because anything can be a sign-vehicle, then the habit in question *can* be a sign-vehicle, namely a legisign, of another sign-process, which terminates in the establishment of some other habit. It would be strange if habits could not be interpreted when everything else can.

Gale (2010: 62) contends that Dewey's notion of *experience*²⁷ is difficult because it is simply a reformulation of Hegel's Absolute Mind. Because the notion is "mystical," he claims, nobody has understood it. I disagree. I do not know which text Gale is referring to, but he could have described, which of the words "organism," "environment," and "interaction" he considers "mystical."

Noddings (2010: 277–278) argues that Dewey's notion of experience may be too narrow. She wants to take women's experiences into account. Thus inquiry may commence not only when we stumble upon a problem; we can also proactively *look for* problems. Moreover, the agent of inquiry may be a group, and the consequences of inquiry for other groups must be taken into account. She is correct, but I believe that Dewey's notion of inquiry can accommodate these improvements without too much trouble. The no-

²⁶4E theories of cognition maintain that cognition is embodied, embedded, enacted, and extended; see, for instance, Menary (2010) and Newen et al. (2018). See also Rowlands (2010).

²⁷See Chapter 3.

tion of organism–environment intra-action is by no means incompatible with them. It seems to me that I can just add the active search for problems, collective agency, and sensitivity to the interests of other groups to Peirce’s belief–doubt model of inquiry²⁸ and leave the rest intact. Peirce discussed the social dimension of knowledge when he compared methods of fixing belief (CP 5.377–387; EP 1: 115–123). Houser (2016: 386–397) argues that Peirce’s functionalist theory of the mind allows the mind to be embodied in several individual organisms, institutions, cultural practices, traditions, and even artifacts. Houser continues that semiosis is a dialogue: all mind is structured to function in a social context; parts of the minds of the utterer and the interpreter fuse into a single mind, or “commens” (cf. Peirce EP 2: 478; Peirce & Welby SS 197). He conjectures that a collective mind evolves according to the belief–doubt model and has two kinds of belief: “natural” and “theoretical” in the same way as individual minds do. Science itself is “the quintessential communal enterprise” in which an unaided individual can achieve barely anything (cf. Peirce CP 5.311; EP 1: 52). He even suggests that the social mind can have a distinct personality.²⁹ For Peirce (e.g. CP 4.551, 5.604, 7.364, 7.558; EP 2: 24), indeed, “mind” was an “external” phenomenon, including institutions: “mind” is equivalent to thirdness manifest in nature and society, and “thought” consists in semiosis. The individual’s mind emerges as an adaptation to thirds in the environment. He even said that “just as we say that a body is in motion, and not that motion is in a body we ought to say that we are in thought and not that thoughts are in us” (CP 5.289n1; EP 1: 42n). The value of the individual is “to step out of the mainstream and introduce something novel and unexpected to confront old ideas” (Houser 2016: 397). Moreover, sometimes Peirce went looking for problems (CP 5.394; EP 1: 128; cf. V. Colapietro 2016). Dewey’s (1916a; 1922) conception of *experience* is emphatically social: habits mediate between individuals, including their minds, and their environment, including other individuals.

Dewey — especially as portrayed by Hickman ([1990] 1992) — seems to be one-sidedly optimistic about technology: the increased control over circumstances. Technologies often have adverse consequences. Pollution and the depletion and degradation of natural resources are cases in point. That does not even require industrial society (cf. Ihde 1993a: 52, 88). Control over environment may — and sometimes does — develop into control over other people. Surveillance technologies are a case in point. Sometimes Dewey does,

²⁸See Section 4.3.

²⁹This is, of course, just a corollary of synechism: mind is continuous with inanimate nature, and the individual organism is continuous with its environment, including other organisms. For the definition of *synechism*, see Subsection 3.2.7.

however, lament technical progress as merely technical rather than morally and humanely significant and educative (1916a: 10–11, 244, 261–263, 273–274, 300, 321–322, 336–337, 359–360, 363, 367, 369, 371, 374, 413). Moreover, regulation of the environment comes with a cost, as every control engineer knows. It is no use regulating the environment unless the benefits at least cover the costs in some sense. (Lindholm 2023b.)

A Cartesian could object that I have accepted the existence of an “external” world too lightly. I agree with the Cartesian that I have not given an *a priori* argument for the “external” world. But I contend that its existence is an *a posteriori* matter. I believe that it cannot even be demonstrated *a priori*.³⁰ My experimental proof of the “external” world relies on the notion of experience that includes action:³¹ the “external” world is manifest in *the co-occurrence of effort and resistance*: the encountered resistance cannot be eliminated by thought and hence is mind-independent.³² Everybody can try that out. More generally, reality is manifest in (*approximate and relative*) *invariances*: some things (e.g. laws of nature) remain (approximately and relatively) the same regardless of what we do. Invariances are a species of thirdness possibly present to experience.³³ Moreover, “the real world” is ambiguous, as Chang (2022: 70ff.) argues. Not being mind-independent can mean either *mind-control* and *mind-framing*. Chang argues that the latter is almost tautologically unproblematic: we can think or talk about the world only by our concepts that frame the world. If one wants to avoid the possibility of wishful thinking, then the issue is about the former. But the former does not follow from the latter. Thus one can defend realism by rejecting the former while simultaneously endorsing the latter. In short, realities (real entities) are mind-framed yet not mind-controlled. It may well be the case that much of the debate between realists and anti-realists turns on the conflation of the two senses Chang has disambiguated.

Fallibilism seems to imply that there might not be a final logical interpretant; or even if it exists, we cannot identify it. This prompts the question: what if it is not the *final* interpretant that matters? what if it is *semiosis itself* that bestows meaning and significance to the things interpreted? Thus the case would be analogical to epistemic justification: it arises from the *process* of self-correction.³⁴ I believe that this question does make sense. At

³⁰Arguably, it can even be shown *a priori* that the existence of an “external” world is an *a posteriori* matter: *the very concept* of an “external” world itself makes experience indispensable for a proof.

³¹See Section 3.1.

³²See Section 3.2.

³³See Section 3.4.

³⁴See Chapter 4.

the current state of research, I am unable to take sides, but I can make a suggestion. Namely, I suspect that the final logical interpretant is not necessary for semiosis to converge. The continual comparison of the immediate object with the dynamical object seems to be sufficient: if inquiry is ideal, the approximation (the immediate object) tends to perfection (the dynamical object). Thus inquiry would have no external authority: all its norms are internal and arise from the concepts of the immediate and the dynamical object. If real inquiry does conform to these norms, that would secure the reality (mind-independence) of the result of inquiry.

Arguably, the pragmatic maxim involves a commitment to instrumentalism. If the meaning of a theory consists in its potential practical effects, then anti-realism about unobservables seems to follow. Alas, Dewey himself is known for his explicit commitment to what he actually called “instrumentalism.”³⁵ I reply that that is not the case. “Instrumentalism” in Dewey’s sense is completely different from the traditional account (Dewey 1946: 291, 291n3; cf. Hickman [1990] 1992: xii). Observability is neither necessary nor sufficient for potential practical effects: certain epiphenomena are observations that have no potential practical effects; and as Hacking ([1983] 2010: 22–24) argues, electrons have potential (and indeed actual!) practical effects even though they cannot be “observed” in the literal sense of the word. *Manipulability* or *interactionability* is paramount instead (Määttänen 2015: 80; Chang 2022: 146ff.). Manipulability necessarily involves encountering the dynamical object brutally as a matter of effort and resistance (secondness); and it may involve mediation by habit (thirdness) in the degree that the dynamical object is already understood. If we are able to experimentally produce a phenomenon, then it simply does not make sense to deny the status of reality from what is being manipulated (cf. Dewey [1925] 1929a: 428). If everyday objects are real, then it follows from the concept of *constituent* that elementary particles, whatever their nature, are equally real. To my knowledge, Dewey never rejected the existence of unobservables like electrons or genes, and he never denied literal truth from theories about them. (Henne 2023; Lindholm 2023b; cf. Gale 2010: 56–57.)

Peirce’s later distinction between science and action needs some attention. Peirce identified science with the living practice of scientists at least once in 1902 (CP 1.232–5; EP 2: 129–131). On the other hand, he had said in 1898 that “pure science has nothing at all to do with *action*” (CP 1.635; EP 2: 33). What could a practice that has nothing at all to do with action look like?

³⁵Traditionally, *instrumentalism* has been understood as the position that scientific theories about unobservables are not literally true but only serve as “useful fictions” or conceptual shorthands which systematize observation reports; and thus their purpose is to promote “economy of thought.”

Houser (2016: 382–384) argues that even science must take action into account but does not *aim* at it; its purpose is intellectual. Thus he distinguishes between “natural belief,” upon which people act in real life, and “theoretical belief,” which are little more than hypotheses and from which scientists are supposed to be critically disengaged. I believe that Peirce was justified in defending science and philosophy from authoritarianism and narrowing them down for short-sighted practical ends, but he concluded somewhat naïvely that science and philosophy be purely theoretical and hence distinct from action. In this sense, his defense of the autonomy of inquiry went too far. Indeed, not all action is short-sighted or directed at immediate utility. (Cf. D. R. Anderson 1997.)

I have cited Dewey’s criticism of the Greek notion of knowledge, which would be compromised by experiment.³⁶ It may be objected that experimental manipulation indeed *does* sometimes compromise the possibility of knowledge at the outset after all. Take historical sciences, or forensic science. Tampering with evidence would, the argument could go, lead to false conclusions. That would put all historical knowledge into question. That would be disastrous in the case of forensic science: in the worst case, an innocent person would be convicted and the real culprit would walk free. I reply that such possibility must always be taken into account. But experiments do not consist of feigning evidence. Rather, experimental procedures are needed in order to *secure* that evidence be intact when it is extracted from a source, or, at least sometimes, to *enhance* its evidential capacity in the case that it has degraded. Often, if not always, intervention is needed to eliminate or compensate the effect of the environment in order to cleanse the sample and let it present the object as authentically as possible.³⁷ Take DNA samples. An experiment is needed to extract it in an informative form. In historical sciences, an excavation is an experiment, and care is required in order to preserve unearthed artifacts unbroken. At the very least, the scientists in question need to know where to look for, and that is the beginning of an experiment.

I have argued that knowledge issues inductively from repeated experiment, gradually becoming an (approximately and relatively) stable practice.³⁸ On the other hand, it is true that we can acquire knowledge about celestial bodies even if we do not manipulate them.³⁹ But the planetary and galactic conditions of our observing these bodies do affect them. We are located at a certain place and at a certain time period in the universe. The

³⁶See Section 1.1.

³⁷See Section 3.1.

³⁸See Chapters 3, 4, and 6.

³⁹I thank Ave Mets and Sergey Sazonov who astutely pointed that out.

universe being arranged in a certain way, making possible our being located in this way, has effects upon the observation of celestial bodies. These observations would be different, were universe differently organized, and were we differently situated. It is sufficient that the input of the surrounding universe be known; it is not necessary (even if it were desirable) that *we* introduce the changes ourselves. (Cf. Chang 2022: 123–124.)

I have also said that our own contribution is epistemically necessary for us to attend to the consequences of our actions. Action is necessarily selective. Without acting, all events within the field of experience are equally interesting or uninteresting. But action makes certain events — the putative results of our actions — more interesting than everything else.⁴⁰ That seems to threaten my previous reply: that our input be not necessary. But now we are talking about science. We are *already interested* in the cosmic events; hence we do not need to create the interest in a selected class of events ourselves.

Moreover, celestial bodies communicate their existence by exchanging causal signals with their environment. They necessarily change by the same token. According to Dewey (1929b: 84), while we are unable to change the celestial bodies themselves, we can change the *conditions of observation* by building lens systems, observatories, radio telescopes, satellites and probes. To be precise, it may be a *flux of photons* or *gravitational waves* that is our *direct* object of observation and manipulation; and, by such operations, we *indirectly* derive knowledge about where these photons or waves are coming from.

I have suggested that all experience, including knowledge, is interpreted.⁴¹ A critic might argue that if science is made a matter of interpretation, its objectivity is compromised. I have replied to this line of criticism in Lindholm (2023c: 110).⁴² In short, interpretation is not arbitrary.

A single object may have several interpretations, but some of them will be better, some worse. Whether an interpretation is apt can be determined with reference to the object itself about which it is made and to the purpose for which it is made. Whether the purpose is attained is an objective matter of *success or failure*, which, in turn, depends objectively on the properties of the object and its relations to its environment. In this way, the object itself, the purpose of interpretation, and the environment do *constrain* interpretation, but that does not necessarily mean *uniquely determining* it.

For instance, a bicycle, cultivating vegetables, or the duck–rabbit (cf.

⁴⁰See Subsection 3.1.3.

⁴¹See Sections 2.7, 2.8, and Hausman (1997).

⁴²See also Ihde (1998: 197–198), on whose reply I am elaborating.

Wittgenstein [1953] 2009: §§ 118–157, 201–217) might be interpretable in a number of ways. A bicycle can indeed be taken as a muscle- or electricity-powered means of transportation along the surface of the earth or an article to be sold; cultivating vegetables as producing food or as a means of relaxation; and the duck–rabbit as a duck or a rabbit. But it does not seem that somebody could plausibly interpret a bicycle as a spacecraft; cultivating vegetables as playing rugby; or the duck–rabbit as a portrait of J. V. Snellman. Perhaps that could be done satirically, for child’s play, or for some other such activity for which correctness of representation can be largely or completely irrelevant; but such use is derivative.

A critic might also target the implication of my thesis that makes knowledge historically relative. Practices, and the technics involved, change. Hence our access to phenomena changes too. Now, according to the pragmatic maxim, these different practices will have different meanings. Hence concepts and theories are incommensurable between different historical epochs (cf. Kuhn [1962] 1996; Rouse 1987; 1996). That makes knowledge historically relative, at least to a degree. I have replied to this line of criticism in Lindholm (2023c: 110–111).

I will bite the bullet here and concede that there is some room for historicism. This kind of historicism may be troublesome for representationalist epistemology that conceives truth as accurate representation and progress as improvement in accuracy. But that is not the case with a pragmatic epistemology that identifies knowledge with practice or the ability to solve problems.

If truth is understood as *accurate representation*, then progress could be understood as *improvement in accuracy*. But if knowledge is *practice* instead, progress must be conceived in another way: for instance, in *increase of efficiency (how much resources it takes to solve a problem) or effectiveness (how many problems can be solved)*. The notion of the accuracy of representation may retain some relevance but it ceases to be the measure of goodness. Accuracy does matter in many, if not all, problems. But it is an empirical matter, how accurate is *accurate enough* in order to solve a given problem. A perfectly accurate representation is just a copy of the world, with all its indefinitely minute detail. It is practically impossible to re-create all the detail of a situation. Even if possible, it would be just useless to add detail when it no longer contributes to solving the problem. Accuracy of representation has relevance only insofar as it contributes to either efficiency or effectiveness. (Cf. Chang 2022: ch. 5.)

Appeal to rigid designators will not solve the problem of historicism. A rigid designator *allegedly* designates the same object in all possible worlds. But nothing determines that our semantic choices about reference will be the

same in other possible worlds (Chang 2022: 98–100).

I have argued that knowledge is practice. I have also cited Rouse (1996), who has argued that “knowledge” does not denote a coherent kind that could be fixed by necessary and sufficient conditions. That appears to contradict my thesis: I have given a definition of *knowledge*. But that is not the case. “Practice” also does not denote a coherent kind that could be fixed by necessary and sufficient conditions. On the contrary, practices only manifest a *family resemblance* (cf. Wittgenstein [1953] 2009: §§ 65–71).

I have defended Dewey’s ([1925] 1929a: ch. IX) claim that science is art and art is practice. Many an analytic philosopher might be offended by the notion that that would make science a matter of free creativity — and hence, in a sense, arbitrary — rather than a matter of sober and rigorous experimentation, analysis, and inference. But this notion of art is mistaken. In fact, it is a romantic notion and hence historically idiosyncratic.

The roots of the romantic notion of art are in the work of Alexander Gottlieb Baumgarten, Immanuel Kant, and certain others who founded aesthetics as an independent discipline in the 18th century. They argued that the object of aesthetics is disinterested beauty. They introduced the distinction between art and technics, or *fine* art and *useful* art: useful art (technics) is valuable for something else, but fine art is valuable in itself (and hence allegedly “higher” in philosophical status). Not much later, romanticists added the “subjective” notions of free creation and expression of profound emotions.

But before the 18th century, art and technics were not separate. Witness the Greek τέχνη and the Latin *ars*, which equally refer to both. In a renaissance *Kunstammer*, say, paintings and mechanical inventions were showcased alike.

In the ancient sense of *art*, there is no special emphasis on free creation. On the contrary, it seems that the artists who were considered greatest were those who followed tradition most faithfully rather than those who introduced novelties.

Whatever the degree of creativity in fine art, it has significantly less leeway in useful art. We cannot unilaterally determine what will succeed. Useful art is based on cause–effect relations, and by the definition of *causality*, they are everything but arbitrary. There is some room for creativity, however: cause–effect relations may be difficult to discover; it may require creativity to come up with a method of discovery. I believe that Dewey understood science in this sense, though he rejected the distinction between useful and fine (Dewey 1916a: 119–120, 278–279, 284; 1922: 34–37, 223–237; [1925] 1929a: 364–365, 392; 1929b: 151; [1934] 1980: 80; cf. Lindholm 2023b). For instance, R. A. Putnam (2010: 36) argues that Dewey considered action and thought, practice and theory, so interdependent that the question of the value

of either in isolation makes no sense. Moreover, even if art be free creation, it does not follow that “anything goes.” Different media have different qualities and relations to their environments. An artist must understand how the raw materials of their creations behave, both as raw materials as such and in intra-action with the audience, to achieve anything (Dewey [1934] 1980: 48, 61–64, 74–75, 107–109, 113–114, 130–131, 144, 173, 226–229).

7.3 Prospects for Future Inquiry

My thesis affords ample opportunities for further research. Most of them are philosophical, but some are empirical and belong to the jurisdiction of special sciences.

7.3.1 Philosophy of Technics

My thesis falls under philosophy of technics in many significant ways. One of them is *methodological*: if knowledge is practice, then, *a fortiori*, philosophical knowledge is practice too. Another is *metaphilosophical*: philosophy of technics can also be understood as a way of doing philosophy. I believe that both notions can be explored in more depth. I am personally interested in metaphilosophical philosophy of technics — approaching philosophical problems from the standpoint of technics and its philosophy.

My own primary interest is in the further development of the philosophy of technics from the standpoint I will suggest in this thesis. If knowledge is practice, then the philosophy of technics is not just an arcane field in applied philosophy but a *way of doing philosophy in general*, or, better, a *method* of philosophy. Dewey (1946: 291, 291n3) seems to have had something similar in mind: he came to believe that he should have called his method “technology” rather than “instrumentalism” to be understood correctly. The impending ecological catastrophe which I mentioned earlier merely increases the importance of the philosophy of technics.

7.3.2 Analytic Epistemology

I began from the observation that a great majority of analytic epistemologists still subscribe to the classical definition of knowledge, refining it only slightly to thwart the possibility of Gettiering. If I am correct and knowledge is practice, that suggests the need of a radical reform in analytic epistemology.

The virtue epistemology of Lorraine Code (1987), James Montmarquet (1987; 1993), Ernest Sosa (1991; 1993; 2001; 2003; 2007; 2010; 2015b),

Jonathan Kvanvig (1992; 2011), John Greco (1993; 2001; 2002; 2007; 2009; 2010; 2012), Linda Zagzebski (1996; 1997), and others seems closest to my position, though they do not usually address the practice of experimentation. Chang (2022: 19) argues that virtue epistemology has unrealized potential. I believe that there is room for fruitful debate between us. We have a lot of common ground, if competently conducted experimental practice is defined as an epistemic virtue at least in the ideal case. There is, however, an important difference: many, if not all, virtue epistemologists subscribe to representationalism, which I find too restrictive.

The weight of the tradition is immense, and I believe that analytic epistemologists will not easily give up a notion that has a history of more than two millennia and has been developed by some of the most talented people in the whole Western culture. However, opposition is not merely negative; it also provides an opportunity to refine my thesis.

7.3.3 Epistemological Behaviorism

I have significant disagreements with Richard Rorty though he is a professed pragmatist. But his *epistemological behaviorism* (e.g. Rorty [1979] 2009), if I may call it so, does not seem a far cry from my thesis. We have enough common ground, if behavior is understood in the terms of habits and practices: (approximately and relatively) invariant patterns of possible organism–environment intra-action rather than something that reduces to the organism or its brain (or to the environment, for that matter).

7.3.4 Know-How and Propositional Knowledge

A practical epistemologist can engage in the debate between intellectualists and anti-intellectualists with a novel point of view.

Gilbert Ryle ([1949] 1951: ch. 2; 1971) introduced the distinction between knowing how and knowing that (propositional knowledge). He defined *intellectualism* as the position that all knowledge be propositional knowledge. He argued instead that knowing how be distinct from, and more basic than, propositional knowledge. That position is, correspondingly, *anti-intellectualism*.

Soon thereafter, Polanyi ([1958] 1962; [1966] 1983) introduced the notion of *tacit knowledge*: knowledge that is implicit in practices and is difficult to communicate in language.

Chang (2022: 13) argues that much of what is prized as knowledge in science is in the realm of knowing how to do something. He believes that

such knowledge how is not easy to accommodate within the propositional view. Thus Chang seems to side with Ryle and Polanyi.

Not everybody has agreed with Ryle. Ginet (1975) was an early critic of his. More recently, Stanley and Williamson (2001) and Stanley (2011) have given careful and well-founded arguments for intellectualism.⁴³

Arthur ([2009] 2010: esp. 159–165) has argued that scientific knowledge ultimately stems from practice. He calls this kind of knowledge *deep craft*. Deep craft is difficult, if not impossible, to present in a form independent of location and culture (cf. Rouse 1987). He maintains that that explains, why certain fields of knowledge are concentrated at certain localities (e.g. Silicon Valley). If he is correct, then know-how is not propositional; propositions are independent of location and culture. His account of the nature of technology is empirically well-founded but not philosophically sophisticated. Defending his thesis is one possible direction for future inquiry.

I suppose that much of the debate between intellectualists and anti-intellectualists turns on the fact that English, French, Dutch, and Latin do not have a specific verb to translate the Finnish *osata* or the Estonian *oskama*. They have to use the (from the Finno-Ugric perspective awkward) expressions “know how,” “savoir faire,” “weten hoe,” and “scire facere.” The German *können*, the Swedish *kunna*, the Russian *уметь*, the Ukrainian *вміти* and the Polish *umieć* come a lot closer to these Finno-Ugric words. The Greek *ἐπίσταμαι* covers both the Finnish “tietää” (know) and “osata” (know how) and the Estonian “teada” (know) and “oskama” (know how). Hasok Chang (2022: 18) makes the difference between “I know how X is done” and “I know how to do X,” which coincides with the difference between the Finnish verbs “tietää” and “osata” and the Estonian verbs “teada” and “oskama.” (Cf. Niiniluoto 1992: 54–55.)

I suggest that *know how* has the structure of an argument, namely, a version of the Aristotelian *practical syllogism* (cf. Aristotle 1935b: 434a15–20; 1954: 1147a25–30). It begins with a percept⁴⁴ and concludes by rule in an action. With reference to Ryle, I call this position *hyper-intellectualism*. Peirce (CP 5.367–369; EP 1: 112–113) defines the *guiding principle of inference*, which leads us to make a conclusion from given premises, as a *habit of mind*. If Stjernfelt (2014) is correct, the argument is the most basic sign-vehicle, and all subdivisions of sign-vehicles have evolved from it because of the gradual specialization of its functions (cf. Peirce CP 3.440, 5.119, 5.194; EP 2: 193–194, 233; MS 295: 26ff., 102). In other words, the proposition is a truncated

⁴³For an overview of the debate between intellectualists and anti-intellectualists, see Pavese (2021).

⁴⁴See Section 3.3.

argument, and the rheme is a truncated proposition. He argues that the general structure of logic is part of nature; the argument structure is manifest already in the metabolism of the cell. Here Stjernfelt emphasizes that the argument is a type logically independent of its tokens: hence language is only one of the possible manifestations of an argument. In other words, the argument is more general than its particular expressions; it does not need language to function *qua* argument. That relinquishes anthropomorphism.

7.3.5 Scientific Realism

The notion that knowledge be practice also bears on the problem of realism in the philosophy of science. Standard scientific realism involves the following five theses (Niiniluoto 1999; Psillos 1999; Chang 2022: 69; cf. Vihalemm 2012: 10; Vihalemm 2015a: 100):

1. *ontological realism*: there is a mind-independent world;
2. *semantic realism*: truth, as the correspondence between mind-independent world and its accurate representation, is central for semantics;
3. *epistemic realism*: knowledge about the mind-independent world is possible; and
4. *methodological realism*: truth is an essential aim of inquiry.
5. Modern science has been largely successful in this aim.⁴⁵

I have suggested that a Deweyan analysis of scientific practices problematizes the first four theses in Lindholm (2023b):

1. mind is part of nature,⁴⁶ which problematizes ontological realism;
2. meaning is habit and language is communication rather than representation,⁴⁷ which problematizes semantic realism;
3. knowledge is practice rather than representation,⁴⁸ which problematizes epistemic realism; and
4. the primary purpose of inquiry is the transformation of a problematic situation into a resolved one,⁴⁹ which problematizes methodological realism.

⁴⁵I have derived this list mainly from Chang (2022: 69).

⁴⁶See, e.g., Dewey (1916a: 39–40, 120, 135, 153–158, 194, 315, 344, 392–393; [1925] 1929a: chs. VI and VII). Mind falls under Peirce’s third category, which is part of nature (see Section 3.2).

⁴⁷See Chapter 2.

⁴⁸This is the main thesis of this dissertation.

⁴⁹See Chapters 3 and 4.

I deliberately use the term *problematize* rather than *refute*. I believe that scientific realism can accommodate these issues in one way or another, though that may require dispensing with a lot of metaphysics. I have doubted semantic realism always since I began studying philosophy; I was happy to read Chang (2022) who gave an expression to and justified my unarticulated suspicion. I am personally inclined towards Don Ihde’s *instrumental realism* (1991), Karen Barad’s *agential realism* (1996), George Lakoff and Mark Johnson’s *embodied realism* (1999), and Hasok Chang’s *activist realism* (2022). Rein Vihalemm’s *practical realism* (2001; 2011; 2012; 2013; 2015a; 2016) or Sami Pihlström’s *pragmatic realism* (which improves on certain traits of Vihalemm’s position) (e.g. 2024) seem viable options as well; I have analyzed the former from a Deweyan perspective in Lindholm (2024a; 2024b).

I am not sure about whether Hacking’s “entity realism” ultimately boils down to a version of standard scientific realism. Namely, if the entities of physics are real, we can only identify them with regard to a theory (or several theories): no entity can identify itself.⁵⁰ But I believe that his conclusion that engineering, not theorizing, is the best proof of scientific realism about entities (Hacking [1983] 2010: 274) is sound.

Dewey’s epistemology is a version of *constructivism*. But it does not reject realism *per se*. He does grant with the realists that we do not begin inquiry from naught: there is, and has been, a largely (not to say “completely”) mind-independent world. But he disagrees with them about the determinacy of objects: it cannot be presupposed that the objects of knowledge be already determinate independently of our practices. On the contrary, we *make* objects determinate by incorporating them into our practices. Thus Dewey’s position could be called *constructive realism*.

7.3.6 Naturalism

I believe that I have expounded my thesis in impeccably naturalist terms. But I have not explained, how I understand *naturalism itself*. My notion of naturalism is *experimentalist*: everything legitimate must be experimentally accessible. Peirce’s pragmatic maxim⁵¹ and Dewey’s notion of *experience*⁵² seem to secure that requirement. A natural follow-up is to defend my naturalism against anti-naturalists; I believe there are plenty of them in mainstream analytic philosophy.

⁵⁰On the other hand, see Chang (2022: 130).

⁵¹See Section 2.2.

⁵²See Section 3.1.

7.3.7 “Materialist” Philosophy of the Mind

The classical pragmatists anticipated some central notions in second-generation cognitive science — in particular, the notion that cognition is embodied. In the light of empirical research, it seems highly unlikely that cognition could be purely formal; it seems almost necessary that it is at least based on material processes (Lakoff & Johnson 1999). According to Johnson (2010: 123–124), Dewey’s theory of cognition is naturalistic, non-reductive, and process-oriented.

But the environment must not be ignored. What qualifies as “cognition” in one environment might not do so in another: consider, for instance, taking an IQ test in the middle of a battle or a natural disaster. Hence cognition is not only embodied but also extended: a part of cognition takes place outside the skull. Dewey’s emphasis on the intra-action between organism and environment already suggests extended cognition. Arguably, Peirce’s anti-Lockean method of deriving mind from signs (and not *vice versa*) (Skagestad 2004) seems another instance of a theory of extended cognition in classical pragmatism.

Neural processes are indeed important: they are *causal conditions* of cognition. But it is a lot more to claim that cognition *reduce* to neural processes. I believe that such reduction is radically impossible: we cannot possibly determine, what a neural process *actually does* without correlating it with overt behavior, including speech acts (Bennett & Hacker 2003). It seems that all our knowledge about neural mechanisms depends on behavior. And behavior is a matter of a whole, integral organism *and* its whole, integral environment. A brain that is cut off from the living organism does not “think” in any intelligible sense (cf. Määtänen 2009; 2015).

Moreover, I do not consider it necessary that nerve cells be the sole vehicle of cognition. One can have a “materialist” theory of cognition with other material media as well; I see no contradiction in that. There seems to be no qualitative difference between matter inside the skull and matter outside the skull; the matter inside the skull is just more highly organized. Hence it seems at least possible conceptually that cognition have other material vehicles. Consider, for instance, silicon- or arsenic-based anatomy (rather than the ordinary carbon-based anatomy): on another planet, conditions of life might be radically different, and evolution might produce completely different media of cognition.

In particular, I suggest the hypothesis that *practices*, including speech acts, be material vehicles of cognition. If that is the case, that would explain how we are able to intelligibly attribute cognition to people without examining their brain.

Thus epistemology must take the 4E theories of cognition into account. Hence epistemology cannot be purely formal and *a priori* even if it is considered as a normative science; special sciences must be taken seriously in order to determine *what* is (or can be) normatively evaluated. The era of armchair speculation seems to be over in epistemology. That naturalizes epistemology in a way reminiscent of what Lammenranta (1992b) has suggested over three decades ago.⁵³

7.3.8 Philosophy of Education

For Dewey (1916a: 54, 59–62, 142–145; 1920: 183–186) and Dewey and Tufts ([1908/32] 1959: 336–342), *summum bonum* is *growth*.⁵⁴ Dewey (1916a: 217) advocated *learning by doing*. He distinguished between the relatively shallow *formal education* and the deeper and more lasting *informal education*. The latter means *how the world educates us*. We understand the world in the dual sense of *habit*: as *meaning* and as *belief*. Now, according to Dewey (1916a: 163–178, 237, 317–322; [1925] 1929a: 70), all experience is experimental. I have explained how meaning emerges from experiment. That explains informal education, or how the world educates us.

Gale (2010: 72) conceives Dewey’s hierarchy of values as a pyramid. Its summit is growth, supported by inquiry immediately below. The second highest stratum is supported by moral democracy that allows the highest possible development of talent to everybody. The bottom is education that trains people into effective inquirers. According to Gale, such a notion subsumes the good and the true under the beautiful — not unlike Peirce’s classification of the normative sciences, in which aesthetics takes precedence over ethics and logic (e.g. CP 1.191; EP 2: 260).

A more detailed account on that is one possible direction for future inquiry.

7.3.9 Social, Moral, and Political Philosophy

If knowledge is practice, it necessarily is also social, moral and political. Practice pertains to *agency*, and agency pertains to *habits* (cf. Peirce CP 7.512ff.; V. Colapietro 2016: 302–303). Agency is not social, moral and political only externally (in terms of its conditions and consequences) but pertains to the very *identity, character, learning, growth* and possible *moral autonomy* of the agent. Its intimate connection to practice makes it also

⁵³See Section 1.2.

⁵⁴Arguably, this notion appears already in Peirce (CP 1.135, 2.118, 5.433, 5.583–584; EP 2: 47–48, 343–344, 388), garbed in his idiosyncratic terminology. See also Haack (1997).

highly relevant for knowledge: without genuine agency, knowledge might become warped.

Basic civil liberties are presently under the threat of authoritarianism across the world. I believe that they are worth fighting for; without them, agency is compromised. That would pervert practices and therefore also knowledge.

I profess a version of “liberalism” that disavows the excesses of Locke’s armchair liberalism; my points of departure are Marcus Tullius Cicero (1827; 1871), Kant (1784; [1785] 1838; [1788] 1913; 1795), J. S. Mill (1859; 1863), Dewey⁵⁵ (1916a; 1920: chs. VII and VIII; 1922; [1925] 1929a: ch. X; 1929b: ch. X), Dewey and Tufts ([1908/32] 1959: pts. II and III), Arendt ([1951] 1973; [1958] 1998; 1963) and Judith Shklar (cf. Müller 2019). I am not defending civil liberties because people be rational, well-informed and good by nature. On the contrary, I am defending them in order to secure that irrational, ill-informed and evil people do as little damage as possible if they somehow succeed in seizing power. Every time somebody suggests expanding the jurisdiction of the state to do good, they ought to consider whether they would allow the same rights to their political opponents. I subscribe to negative liberties and Mill’s harm principle, but I am also open to positive liberties in addition, provided that they do not pervert incentives (cf. Berlin [1969] 2002). I believe that my thesis provides important conceptual tools for this “liberal” project. I am especially concerned about surveillance and control technics.

I have emphasized *agency*, but the concept itself is problematic. According to Peirce, our agency is located in the ongoing formation of our characters — *a process of growth* rather than an entity or its properties or relations (Peirce CP 4.611, 5.440, 5.533, 6.289; V. M. Colapietro 1997: 275; cf. de Spinoza [1677] 1905; Dewey [1910] 1933; 1916a; 1916b: 364–365; 1922). Thus there is no need to posit the freedom of the will.

I have emphasized the continuity between science and everyday experience also for political reasons. The rejection of a transcendent reality to which only scientists have access serves as an argument against scientistic paternalism. The counterargument is analogous to that of Enlightenment philosophers against theocracy. If there was a group that had monopolized access to an allegedly independent “reality,” whether that of God or of the so-called “unobservables,” everybody else could but accept its authority. Moreover, in the absence of an independent check of such authority, there would be ample opportunities for the misuse of power. On the other hand, if science

⁵⁵Dewey is known for his support of democracy, but he was not entirely consistent. Some of his political theses border on technocratic totalitarianism; see, e.g., Dewey (1931).

is continuous with everyday experience, there is no transcendence, and there is an independent check. Hence the epistemic authority of scientists can be challenged, if a positive reason to do so arises.

On the other hand, the present ecological problems — overpopulation, climate change, pollution, the degradation and depletion of natural resources and mass extinction — force “liberals” of all stripes to reconsider our position. There is no plan(et) B, goes the powerful slogan. Endless growth might be possible in theory, but that cannot possibly mean endless resources. The limits of the ecology of the earth must be urgently taken into account. That involves the re-evaluation of civil liberties. (Cf. e.g. Kyllönen & Oksanen 2020.)

Recall what I said about *summum bonum* above. Peirce also presents his conception of *summum bonum*. He argues that the interpretation of signs necessarily tends to embodiment in something other than signs, namely feeling, action, or habit. He concludes that the continual increase of such embodiment of the idea-potentiality is *summum bonum*. In effect, he is saying that learning how to cope with the world is the highest good. (Peirce EP 2: 388; cf. CP 2.118, 5.433; EP 2: 343–344.) Recall also how he invoked “the will to learn” in distinction from William James’s “will to believe” (CP 1.135, 5.583–584; EP 2: 47–48). Dewey (1916a: 54, 59–62, 142–145; 1920: 183–186) and Dewey and Tufts ([1908/32] 1959: 336–342) have a roughly similar notion of *summum bonum*: it consists in *education* — learning and growth in the widest possible sense. The body of possible solutions of problematic situations is composed of causal knowledge; and if meaning equals such knowledge, it constitutes the meaning of the world. We understand the world by coping with it. With each solution, our life becomes more meaningful and significant. (Cf. e.g. Dewey [1910] 1933: 18–21; 1916a: 89–92; 1929b: 124–135.) Arguably, *summum bonum* and *flourishing*⁵⁶ can be achieved only if society provides enough liberty: especially access to knowledge must not be restricted in order to allow as broad opportunities as possible for the spontaneous development of talent. Not only will that reward the person in question but, by David Ricardo’s principle of comparative advantage, it will also benefit the whole society.⁵⁷ Not only does each new skill make life more

⁵⁶Greek: εὐδαιμονία. See Aristotle (1954; 1959).

⁵⁷Adam Smith’s “invisible hand” ([1776] 1812: 352–354) need not be supposed save in the sense of comparative advantage which I will explain in the following. Even if *A* is the best at everything, they cannot have comparative advantage in everything. *A* can specialize in what they do best. The increase of *A*’s expertise in that field benefits *B* as well. *B* need not acquire the same kind of expertise, because *A* and *B* can divide labor. *A* will do tasks that belong to the domain of their expertise more efficiently, and *B* will do something else for *A* where *A* does not have comparative advantage. When *A* is freed

meaningful,⁵⁸ but it will also enrich others. Learning is a plus sum game (cf. von Herten 2003).

If knowledge is practice, then moral knowledge seems to be moral practice. That position seems initially problematic: Socrates believed that moral knowledge implies moral practice, but Aristotle (1954: bk. VII) argued that lack of self-control⁵⁹ is possible. If Aristotle is correct, it is possible to know what is good or right but still behave differently. But it might be that that is possible only if Aristotle's notion of knowledge is presupposed. If knowledge is not contemplation of a universal but practice, then a person who "knows" what is good or right but behaves differently does not *literally know* what is good or right; they have not reformed themselves to believe genuinely. Thus my position suggests a return to Socratic ethics.

7.3.10 Philosophy of Economics

At least since J. Mill (1821), economics has been divided into production, distribution, exchange, and consumption. Production is emphatically an affair of technics.⁶⁰ That makes the philosophy of economics and the philosophy of technics relevant for each other. A technically informed philosophy of economics is an obvious opportunity for further research.

7.3.11 Philosophy of Religion

A quick look at the pragmatic maxim suggests that pragmatism considers religion as nonsense. That is not quite the case. As I have already explained, pragmatism allows belief as habit (practice).⁶¹ On the other hand, that seems to naturalize religion: the pragmatic maxim dispenses with the supernatural: to be meaningful is to be causally active;⁶² to be causally active is to be experimentally discoverable and explainable; and to be experimentally discoverable and explainable is a criterion of the natural. Thus there is a tension

from other activities to do what they are best at, they are able to produce more value than otherwise. (The transaction between *A* and *B* need not be mediated by money. The introduction of money merely makes it more flexible. Anyway, both exchange each other's labor.) A surplus value is created in terms of opportunity cost: *A* achieves more and *B* saves resources to be used elsewhere. Then they can agree how it will be distributed. Hence there are also economic incentives for cultivating talent.

⁵⁸See Sections 2.4 and 2.6.

⁵⁹Greek: ἀρρασία.

⁶⁰Marx ([1857] 1983a) seems to consider production the most basic economic category. See also Musto (2008).

⁶¹See Section 4.1.

⁶²See Sections 2.2 and 2.4.

between religious (Peirce, James, Royce) and atheist (Rorty) pragmatisms (the case of Dewey is unclear; see Dewey (1934)).

de Spinoza ([1677] 1905) argues that nature itself is God. If he is correct, religion itself can be naturalized and secularized.

For many people, an insight of being one with the world is a powerful religious experience. A naturalist can contend that there is no specific need to establish the oneness of a person and the world: *materiality* secures that already (cf. Kuusinen 1959: 24). A Peircean can appeal to *synechism*⁶³ (Peirce CP 1.90, 7.572; EP 2: 3). But the *experience of realizing it suddenly* may still be remarkable.

Yet, according to Haack (1997: 244–245, 259n9), theology is furthest removed from the scientific attitude that especially Peirce advocates. If Haack is right, it violates the first rule of reason and displays “sham reasoning” (cf. Peirce CP 1.57, 6.3; D. R. Anderson 1997).

But if Houser (2016: 395) is correct, then it is largely beside the point to apply the criteria of science to religion: their purposes are worlds apart. Truth and validity are within the purview of science; the propagation of life-enhancing institutions is the business of religion. Religion cultivates practical intelligence, while science fosters theoretical intelligence. Peirce himself suggested that the office of religion is to transcend the individual, and it is to be *lived* rather than said or thought (CP 6.271, 6.439, 6.449, 6.451; EP 1: 350).

If Buddhādāsa Bhikkhu’s (2017) version of Buddhism is sound, then Buddhism is a kind of metaphysical and ethical naturalism that recommends a way of life that is harmonious with the laws of nature (not unlike Stoicism). It considers *nirvāṇa* or the end of suffering, realizable in life, as the ultimate reality. A religion can be *spiritual* only if it becomes part of living first-person experience and practice rather than an external doctrine. Buddhādāsa Bhikkhu’s Buddhism is anti-authoritarian, anti-dogmatic, liberationist, experimentalist, fallibilist, meliorist (oriented towards improvement), and eudaimonist⁶⁴ (oriented towards flourishing). It is oriented towards solving problems by thoroughly studying causes and conditions; in this respect, it is no different from science (Buddhādāsa Bhikkhu 2017: esp. 14–15). It has a lot in common with Deweyan pragmatism. But it also has striking differences: Dewey’s ethics is enlightened hedonism, but Buddhādāsa Bhikkhu’s Buddhism strives beyond pleasure and pain; Dewey believes in technical progress, but Buddhādāsa Bhikkhu scoffs at the artificial needs the creation of which often accompanies technical progress (cf. Marcuse 1964). It seems to me that Buddhādāsa Bhikkhu’s Buddhism maintains that one needs to

⁶³See Section 3.2.7.

⁶⁴From εὐδαιμονία: “happiness,” “well-being.”

extinguish their self in order to be able to access nature as it really is. Thus achieving nirvāṇa would be a condition of naturalism.

The relation between pragmatism and Buddhism is an especially interesting possible direction for future inquiry. According to the *Kalama Sutta*, Siddhartha Gautama was a fallibilist (see also Laumakis 2008: xiv, 263). The soteriological aims of Buddhist philosophy can be introduced to Westerners by applying Peirce’s fallibilist *belief–doubt model of inquiry*.⁶⁵ learning can — and indeed does — go on even in the absence of the ultimate truth; it is useless to try to find one. In this sense, fallibilism liberates one from the quest for ultimate truth. To state this like Gorgias: there is no ultimate truth, or essence of things — least of all beyond possible experience —; even if there is, we cannot attain it; even if we can, we cannot identify it; and even if we can, we cannot communicate it. What matters is *experience itself*: concrete, local organism–environment intra-action. The point is not naïveté or shallowness; on the contrary, one must learn to savor what appears *in its full depth* in order to *mindfully dwell in it*. The lesson about ultimate truth is that there is neither a lesson nor ultimate truth.⁶⁶ Therefore empiricist non-essentialism,⁶⁷ or “void,” is the way; the way is empiricist non-essentialism, or “void.”⁶⁸

7.3.12 The Popularization of Philosophy

I mentioned in Section 1.1 that I consider philosophy a public matter — that it ought not to retreat to an ivory tower but, on the contrary, manifest itself in public at the ἀγορά. I have argued that science is continuous with everyday experience. Arguably, the same holds for philosophy as well: if

⁶⁵See Section 4.3.

⁶⁶The anticlimax of *Dark City*, a 1998 sci-fi flick that ironically retells Plato’s allegory of the cave (1980: 514a–520a), conveys the epiphany that there is no hope for an ultimate truth. The protagonist, John Murdoch, discovers that there is a “more real” reality behind appearances, but eventually that “more real” reality turns out to be just another appearance. Moreover, Murdoch becomes like Plato’s demiurge (1981: 28a ff.) and learns to fashion the newly discovered reality. But rather than create a “really real” world, he produces one after his false memories, thus feigning the world even more deeply.

Chang (2022: 82) illustrates his notion of reality by changing Plato’s allegory: when we exit the cave, we enter *another* cave. The new cave may be better than the old one, but only relatively.

⁶⁷See Subsection 2.5.1.

⁶⁸I have adapted these two theses from (the Finnish translation of) Miyamoto Musashi’s *The Book of Five Rings* (1983: 103). By “void,” he seems to mean the Buddhist doctrine of *śūnyatā*. That notion does not mean *ontological nihilism*, or the position that nothing exists. It means that appearances do exist, but they have no stable essence and hence continually transform into other appearances.

each activity involves a critical insight to its conditions and consequences, and if philosophy is criticism of criticism, then there is also a continuum between everyday activities and philosophy (Dewey [1925] 1929a: ch. X). In this way, practice-based philosophy seems to provide a possible way to popularize philosophy.

7.3.13 Postphenomenology

I said in Section 1.1 that I consider my thesis as a contribution to postphenomenology. I suggest one way to deepen the connection between pragmatism and Ihde's philosophical program. Ihde developed the notion of *multistability* (see esp. Ihde [1977] 2012) from Husserl's notion of *phenomenological variations*. A phenomenon is multistable if it can be experienced in several ways. On the other hand, I have explained the expectation-ladenness of experience in Lindholm (2023b) and the potential practice-ladenness of experience in Subsection 3.2.6: people with different habits can observe different patterns in the same phenomenon. That suggests that multistabilities could be explained in the terms of habit: a phenomenon is multistable if a person has acquired different habits of dealing with it.

7.3.14 Systems Theory

In Chapter 3, I have explained *cybernetic epistemology*, which I have introduced in Lindholm (2023a). The application of systems theory in general and cybernetics in particular allows one to define epistemic concepts with mathematical rigor. I have only shown how it *can* be done. A natural opportunity for further study is to do that *actually*.

The systems-theoretic point of view also suggests further prospects of study: the theory of cellular automata and self-replicating processes, developed by John von Neumann and others; and the theory of self-organizing systems, developed by Ilya Prigogine and others.

Lagerspetz (2001) has studied how Jakob von Uexküll's (1864–1944) early biosemiotics has inspired cybernetics. Von Uexküll adopted the subject–object distinction but already points beyond it. He introduced the concept of *Umwelt*, which might be conceptualized as the *field of opportunities for action*, or *affordances* (Gibson 1979). In effect, Merleau-Ponty ([1945] 2002: 291) describes affordances thus in the terms of the experience of being embodied:

What counts for the orientation of the spectacle is not my body as it in fact is, as a thing in objective space, but as a system

of possible actions, a virtual body with its phenomenal ‘place’ defined by its task and situation. My body is wherever there is something to be done.

The actor–network theory (ANT) of Michel Callon and Bruno Latour (e.g. Latour 1987) can be understood as systems theory as well. Ihde (2015: xv–xvi) argues that ANT resembles postphenomenology in three respects: (1) both involve interrelational ontologies; (2) both are materially oriented; and (3) both reject the subject–object division. There are differences too: the starting point of ANT is semiotics, while postphenomenology sets out from phenomenology.

7.3.15 Process Philosophy

Cybernetic epistemology indirectly suggests *process ontology*. Substance ontology considers the stationary as basic and tries to explain change by such basis. Process ontology, on the contrary, considers change as basic and tries to explain stationary states by such basis. (Bickhard 2011: 5; Atã & Queiroz 2016: 113.) In other words, substance ontology studies what *is*, while process ontology studies what *happens*.

Atã and Queiroz (2016) argue that a process metaphysics underlies semiosis. The interpretant is not a single event but an ongoing process of making sense of the sign-vehicle (and, consequently, of the object) — the establishment of habit. Habit provides macro-level boundary conditions for events at the focal level. Interpretation becomes cognitive niche construction (in terms of theories on extended cognition; see, e.g., Clark (2006; 2008)). The construction of a cognitive niche consists in shaping the environment so that a part of our problem-solving ability is externalized in it. It thereby becomes a form of evolution with a non-genetic system of externalized inheritance that shapes selective pressures creating a feedback loop between organisms and niches. External instruments mediate our habits of action within cognitive niches. Habit functions as an explanatory component for the co-evolution of environment and cognition. This provides one more interesting field of study.

7.3.16 Praxis Philosophy

The praxis philosophy I am putting forward has interesting similarities with other schools too: political economy, German idealism, Marxism, certain strands of phenomenology (including the early Heidegger ([1927] 1977a), the later Husserl ([1936] 1976a; [1939] 1976b), and Merleau-Ponty ([1942] 1967; [1945] 2002)), the later Wittgenstein ([1953] 2009; 1969), Ryle ([1949] 1951;

1971) and Polanyi ([1958] 1962; [1966] 1983) — not to mention practice-based philosophy of science which I cited above. Again, there remains room for fruitful discussion.

7.3.17 Artificial Intelligence and Artificial Agency

One more possible direction for future research is the paradigm shift from artificial *intelligence* (AI) to artificial *agency* (AA). Dreyfus ([1972] 1979; 1992) and Dreyfus and Dreyfus (1986) have criticized AI. Their arguments turned on the nature of *expertise*. They denied that skill could be made fully explicit.⁶⁹ If they are correct, computers cannot meet human capacities irrespective of their computational power. The current deep learning paradigm may sufficiently respond to that problem by compromising explicitness, but to reproduce human senses seems at least economically unsustainable: there are billions of nerve endings in our skin that make it possible for us to grasp objects firmly (Wahlström 2021). The next step would naturally be an artificial *agent* — not necessarily an anthropomorphic robot (cyborg) but a system that observes, makes decisions and acts autonomously, that is, without human intervention.

This creates an interesting possibility for a paradigm shift in AI industry. If I am correct, intelligence is not the ability to perform computations as effectively as possible, but to *make relevant decisions — including decisions about what is relevant — and put them effectively into practice*. Intelligence is measured in the terms of *intelligible responses to situations*. Hence the concept of AI, conceived in the traditional sense, might not be very fruitful. But if the notion of *intelligence* is redefined in the way I suggest, then AI becomes AA. It is not important what happens between the perception of a situation and a behavioral response. It is the *behavior itself* that matters.

7.3.18 Ecological Issues

According to Mitcham (1994), there are, roughly, two traditions in the philosophy of technics: technopessimistic humanists and techno-optimistic engineers.⁷⁰ Technopessimism has good grounds — the world wars, pollution, nuclear accidents, climate change —, but I still believe that technics is not simply evil. Consider, for instance, medical technics. An invention as simple as painkillers is a great achievement in the history of technics *and* the history of human development. Moreover, it does not take an industrial society to

⁶⁹See also Subsection 7.3.4.

⁷⁰This division brings C. P. Snow's ([1959] 2012) parallel split between scientists and “literary intellectuals” to mind.

cause ecological catastrophes: deforestation and degradation of arable soil took place already in the ancient Mediterranean basin, and certain prehistoric peoples hunted certain species to extinction (cf. Ihde 1993a: 52, 88).

There is a lot to blame upon technics. But we can save that judgment for later. There are more urgent issues which might need technics. Technics is certainly one of the most important factors that have caused ecological problems. But we need to consider what we can *do* about them. And by technical means, we may be able to do *more* and *better*. An empirical study of greentech might change the public opinion about the ecological impact of technics.

Ecological issues are relatively new to philosophy in general and the philosophy of technics in particular. But the distrust in technics is ancient. The myth of Prometheus (Hesiod 2006a: 507–616; 2006b: 42–105; Aeschylus 1922; Ovid 1786: I, 78ff.; cf. Plato 1952b; Mary Shelley 1818; Percy Shelley 1820) is a case in point. Rousseau ([1750] 1831a; [1754] 1831b) called for a return to nature, making him an odd bird among mostly techno-optimistic Enlightenment thinkers. Many romantic poets, including E. T. A. Hoffmann ([1817] 1872) and Johann Wolfgang von Goethe ([1797] 1827) questioned technical progress and its possible dangers. Many English romanticists, including William Blake, Lord Byron, Samuel Taylor Coleridge, John Keats, Percy Shelley and William Wordsworth, deified pristine nature and denigrated technics. The first industrial revolution had barely begun when the Luddites started to destroy machines. Truth that is better left unknown is a recurring theme in H. P. Lovecraft’s works (2014). Aldous Huxley’s *Brave New World* (1932; 1958) is a powerful criticism of shallow utilitarianism and its overconfidence in technical progress. Horkheimer ([1947] 2004: ch. III) was early to suggest the possibility of the revolt of nature. The philosophy of technics of the later Heidegger ([1953] 2000a; [1955] 2000b) has included an ecological background at least since the 1950s. Rachel Carson popularized environmentalism with her *Silent Spring* ([1962] 2002) in the early 1960s. Ehrlich (1968) popularized the notion of population explosion — a theme that ultimately stems from Thomas Malthus. The Club of Rome published *The Limits of Growth* (1972); and the first oil crisis followed thereafter. Ever since, environmentalism has become mainstream at least in Northern Europe and widely known in many other postindustrial societies. Since the late 1970s and early 1980s, technopessimism has been a common trope in cinema: witness, for instance, *Alien* (1979), *Blade Runner* (1982), *Terminator* (1984), *The Toxic Avenger* (1984), *Robocop* (1987), *Matrix* (1999) and *Mission: Impossible — Dead Reckoning Part 1* (2023) and *Part 2* (2025). Environmentalism has also been present in some children’s cartoons like *Teenage Mutant Ninja Turtles* (1987–) and especially *Captain*

Planet and the Planeteers (1990–).

Cybernetic epistemology, based on Dewey's notion of *experience* and Karen Barad's notion of *intra-action*, bear on philosophical anthropology: habits include both the organism and the environment of which it is a part. That can be generalized to the concepts of *species*, *environment* and *climate*. Lindberg (2020) has argued that there are continental philosophers that understand human beings and other animals relationally, partly in terms of their environment and climate. That notion seems to provide a metaphysics and epistemology for an ecological philosophy. This notion stems from Jakob von Uexküll, the founder of biosemiotics,⁷¹ if not earlier. His ecological cybernetics inspired Heidegger, whose philosophy already seems to have ecological themes; and Heidegger inspired Hans Jonas, whose philosophy is largely ecological.

There is a broad consensus that certain human activities (the combustion of fossil fuels in particular) produce too much CO₂, which is a greenhouse gas: CO₂ emissions largely create the climate change.

Traffic and logistics are an important source of CO₂. It seems that fossil fuels can largely be replaced, relatively straightforwardly, with green hydrogen, methanol, ethanol, ammonia or electricity. Lappeenranta University of Technology has developed an affordable biofuel from byproducts of pulp and paper industry (e.g. Mäki, Saastamoinen, Melin, Matschegg, & Pihkola 2021). There is a relatively well-tested alternative; now the trouble is to build a suitable infrastructure to support it. But electrification requires batteries, circuits and cables; and these things require minerals. Thus electrification may have anti-ecological side effects. On the other hand, energy can be saved in CO₂- or sand-based batteries. Phase transition-based methods of storing energy have been studied as well.

According to Wahlström (2021), information technology, the internet of things (IoT) and especially artificial intelligence (AI) can aid in reducing the ecological footprint of the global economy. In particular, AI can be used to intelligently and more economically coordinate human behavior. Improvements are possible in traffic, logistics, recycling and circular economy. Such coordination requires sharing information between intelligent machines via the IoT. There are at least four industries, in which AI and the IoT can reduce the expenditure of natural resources: (1) autonomous vehicles, (2) seafaring, (3) drones and (4) manufacturing. If vehicles are autonomous, they can be shared or leased more flexibly, and they can be adapted for different needs. Ships can share information with logistics centers in order to optimize routes and velocities and to decrease congestions. Drones can develop logis-

⁷¹For an introduction to biosemiotics, see, e.g., Barbieri (2007).

tics further, if they are integrated with households. Manufacturing can be integrated more tightly with circular economy in order to prolong the life cycle of products and to decrease waste. Autonomous logistics seems to require reorganization of public and private space. Public spaces are usually open, complex and varying, which makes them difficult to navigate for a machine. The same holds for many private spaces too. It might be necessary to aid navigation by reserving some routes exclusively for autonomous vehicles and placing beacons at certain spots for their positioning. Some restricted spaces need to be enclosed and simplified in order to create a safe, predictable and controllable operating environment for specialized robots and humans alike. If the same space is open for both humans and machines, safety is an issue. Legislation is needed to regulate the use of machines and human behavior in such places.

Steel production is one of the greatest sources of CO₂. Even if fossil fuels can be replaced, steel cannot, if we want to preserve civilized society. Fortunately steel need not be replaced; only the method of its production can. The steel manufacturer SSAB has introduced fossil-free steel (e.g. Krüger, Andersson, Grönkvist, & Cornell 2020; Pei, Petäjämäki, Regnell, & Wijk 2021). Now the trouble is no longer the absence of an alternative but the economic sustainability of the process involved and the sufficient increase of the produced quantities so that it can substitute carbon-based processes.

Cement production is another great source of CO₂. VTT has studied fossil-free cement (e.g. Tsupari 2021).

There are also techniques for CO₂ capture and storage. There are some prospects for manufacturing CO₂-based plastic. The problem with them is economic sustainability.

Nature itself can be instrumental in mitigating the ecological footprint of humankind. Certain micro-organisms which feed on synthetic plastics can be used to degrade plastic waste, and certain micro-organisms can be used to produce bioplastics (e.g. Eggins & Mills 1971; Trivedi et al. 2016; Iram, a Riaz, & Iqbal 2019). In principle, certain microalgae can produce biofuels, but such use is expensive and difficult.

Biomimetics can be applied more extensively to discover economical design opportunities for vehicles and machines. It can also aid in designing and manufacturing prostheses.

Disposable plastic packages and synthetic fibers can be replaced with more ecologically sustainable materials. Cellulose fiber can be used as a replacement for plastic and cotton in the manufacture of textiles (e.g. Guan, Yang, Han, Ling, & Yu 2020; Jiang et al. 2020).

The breadth of recyclable materials can be increased. Metals and rare earths can be captured from sewage and electronic waste. Textile waste fibers

can be chemically recycled.

Agriculture, especially animal husbandry, is a significant source of CO₂ emissions. By changing culinary habits from meat to its replacements (e.g. pulled oat), the ecological footprint of food can be reduced to a large extent.

Veolia is planning to refine byproducts of pulp into biomethanol at a pulp plant in Äänekoski.

The excessive use of antibiotics has given rise to the evolution of superbacteria that are immune to antibiotics. Bacteriophages can be used to combat them.

The world has recently encountered serious crises. Many of them are related to technics — whether positively or negatively. Alas, non-technical environments are an endangered species. Modern (or postmodern) life is submerged in technics. Hence I believe that the philosophy of technics is urgently needed — not least in determining what is important in a life that is almost completely technically textured. I also believe that my criticism of the concept of knowledge has provided adequate conceptual resources for the application of the philosophy of technics to present issues.

7.3.19 Philosophy of Games

According to Nguyen (2020: 13), games are “the crystallization of practicality.” Ordinary problem-solving has aesthetic qualities, and games concentrate, intensify and refine them. The common artistic medium of aesthetic striving games are the goals, the rules, and the environment that these various parts animate into a system of constraints: in short, the medium of the game designer is *agency* (Nguyen 2020: 17). Many games train strategic thinking: what decisions to make in order to achieve goals most efficiently. Further research in the aesthetics of agency and practice would be very interesting. It may even have anthropological significance, given that Huizinga ([1938] 1949) considers the human being as *homo ludens*. I believe that Nguyen’s (2020: ch. 4) notion of *mode of agency* comes close to the pragmatist notion of *habit*; and his notion of *switching between* modes of agency comes close to Nöth’s (2016) notion of *habit of habit change*. Nguyen argues that playing games appropriately cultivates modes of agency and thereby increases the autonomy of the agent. Hence his argument has ramifications also in the philosophy of education, ethics and politics.

7.3.20 Philosophy of Horror Literature

Kilpeläinen (2015) has studied the tense relationship between the real and horror. Horror tests our notion of the real: it shows that what we con-

sider “real” is a construct, the failure of which produces the experience of horror. Monsters need not be supernatural; they are encountered in impeccably natural terms. But they arouse horror by cutting across our conceptual categories. Likewise, Peirce said about secondness that it teaches us with “practical jokes, mostly cruel” (CP 5.51; EP 2: 154, 194). That suggests a theme for an inquiry in more applied philosophy.

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Teadmine ja praktika: epistemoloogia kriitika. Kokkuvõte

Platoni kuulus *teadmise* definitsioon on 'õigustatud tõene uskumus.' Seda definitsiooni tavaliselt peavoolu analüütilises filosoofia kahtluse alla ei seata, kuigi Platon seda ise ei aktsepteerinud. Traditsiooniline definitsioon jätab lahtiseks küsimuse, kuidas saaks arusaadaval viisil teadmist isikule omistada: paistab, et on võimalik evida uskumust, ilma, et see kuidagi avalduks, ning samuti paistab, et saab avaldada uskumust, mida ei evita. Seega on raske kindlaks määrata, kas keegi üldse midagi teab.

Enamgi veel—peavoolu analüütilised teadmisteoreetikud tavaliselt võtavad omaks kitsa, vaesestatud *kogemuse* mõiste, mis haarab üksnes vaatlust, või, hullemgi veel—nagu Quine—stiimulit. See mõiste näib tähendavat passiivset, pelgal vastuvõtmisel tuginevat kogemuse mõistet, mida Dewey nimetas "teadmise vaatleja-teooriaks." Tegevust ja harjumuse kujunemist eiratakse põhjendamatult. Ka traditsiooniline *teadmise* definitsioon eirab neid. Seega on peavoolu analüütiline teadmisteooria täiesti võimetu haarama eksperimentaalse praktika tähtsust.

Oma doktoritöös ma väidan, et teadmine on praktika. See ei tähenda üheselt traditsioonilise definitsiooni *tagasilükkamist*; seda võib käsitleda kui traditsioonilise definitsiooni *operatsioonilist analüüsi*. Mõistet võib defineerida operatsiooniliselt, rakendades sellele Peirce'i *pragmaatilist maksimi*. Operatsiooniline definitsioon ütleb, mida mõiste tähendab praktikas. Pragmatilise maksimi kohaselt, mida miski (võib-olla kõneakt) tähendab, on tema *võimalikud praktilised tagajärjed* (mis võib olla ka teine kõneakt) või selle asjaga seotud harjumused. Klassikalised pragmatistid kasutavad terminit *harjumus* tehnilises tähenduses, mis ületab traditsioonilise subjekti-objekti dihhotoomia.

Ma eristan "teadmise" kaht tähendust: *tugev* ja *nõrk*. Teadmine tugevas tähenduses seisneb *oskuslikus praktikas* ning tema kriteerium on *edu ja läbi-*

kukkumiste määrad. Üksnes antud kunsti või oskustöö vallas tegutsejal on tugev teadmine. Kontekstist sõltub, kui suur peab olema edu määr, et oskus kvalifitseeruks teadmisenä. Teadmine nõrgas tähenduses seisneb tunnistuses ning tema kriteerium on vastavus tugevale teadmisele ehk oskuslikule praktikale. Vähemalt teadmist tugevas tähenduses ei saa taandada representatsioonile, saati siis sellisele, mis ei sõltuks orgaanilisest tegevusest, kuna ta on orgaaniline tegevus. Ma pean teoretiseerimist iseäraseks praktikaks muude praktikate hulgas.

Mu teesi järelmiks on, et *teadus on kunst*. Kui teadmine on praktika, kui teadus on teadmise täius, ja kui kunst on praktika täius, siis järeldub, et teadus on kunst.

Mul on kolm kindlat metodoloogilist eeldust: (1) empirism, (2) küberneetika ja (3) traditsioonilise subjekt–objekt–dihhotoomia hülgameine.

Ma pean empirismi aprioorse tugitoolifilosoofia hülgameiseks. Definitiooni kohaselt ideed, mis on “tõene” pelgalt formaalsetest kaalutlustest tulenevalt, ei saa eksperimentaalselt testida. Ma hülgan sellise “teadmise” idee. Seepärast ma olen pingutanud, et teha oma filosoofia tervenisti eksperimentaalseks, defineerides kõik oma metodoloogilised mõisted operatsiooniliselt.

Ma viitan küberneetikale kui kahesuunalise kogemuse mõiste metateooriale: Dewey järgi on kogemus kahesuunaline *organismi–keskkonna vastastikmõju*: nii organism kui ka tema keskkond mõjutavad teineteist vastastikku. Ma järgin Baradi (1996) eeskuju ja asendan “vastastikmõju” “sisemõjuga.” See idee haarab *tagasisidet* organismi ja keskkonna vahel. Küberneetika on teadus tagasisidesüsteemidest. Teadmisteooria, mis peab empiirilist teadmist sellise tagasiside tulemuseks, on küberneetiline teadmisteooria.

Ma hülgan traditsioonilise subjekt–objekt–dihhotoomia, kuna kõik, mis on oluline, on ühtaegu nii “subjektiivne” kui ka “objektiivne.” Ta ei saaks meile korda minna, kui ta poleks “subjektiivne”; ja tal ei saaks olla tagajärgi looduses ja ühiskonnas, olemata “objektiivne.” Eriti *tähendus*, *kogemus*, *harjumus*, *praktika*, *nähtus* ja *olukord* on mõisted, mis sel viisil vastustavad subjekti–objekti–dihhotoomiat.

Ma kohandan oma meetodi varase Markus Lammenranta voorusepistemoloogiast ja Sami Pihlströmi kantiaanlikust pragmatismist. Pihlströmi järgi peab teadmisteooria rakenduma iseendale, et ennast õigustada. Kui ta selles ebaõnnestub, õõnestab ta iseenda õigustatust. Seepärast ma rõhutan enesekohasust.

Õigupoolest on mu tees Charles S. Peirce'i ja John Dewey filosoofiate rekonstruktsioon. Ma siiski ei ürita pakkuda tõetruud tõlgendust; ma lahknen mõlemast teatud punktides. Ma pigem kasutan nende filosoofiaid omaenda teesi õigustamiseks.

Ma alustan 2. peatükis semantika naturaliseerimisega, tegemaks oma

metodoloogilisi mõisteid eksperimentaalselt testitavaks, pidades silmas 3. peatükki, kus ma analüüsin mõisteid kogemus ja empirism. See kindlustab mu meetodi rakenduvuse iseendale ja sellega õigustab iseend. Kõigepealt pean ma kõrvaldama tohutu takistuse: aprioorse keelefilosoofia, mida eelistatakse peavoolu analüütilises filosoofias. Ma lükkan ta ümber, viidates teise põlvkonna kognitiivteadusele, mille kohaselt tähendus ei saa kuidagi olla puhtalt “formaalne” ja “objektiivne.” Seejärel ma toon sisse pragmaatilise maksiimi. Teise põlvkonna kognitiivteadus toetab seda. Pragmaatiline maksiim kõrvaldab diskursusest asjad iseeneses. See ei ohusta teadmise “objektiivsust”: nähtused on ühtaegu nii “subjektiivsed” kui “objektiivsed.” Peirce mõistis neid kui efekte nagu väljendites “Zeemani efekt” ja “Halli efekt.” Ma selgitan pragmatistlikku *harjumuse* mõistet operatsiooniliselt kui *võimaliku organismi ja keskkonna sisemõju (ligilähedaselt ja suhteliselt) muutumatut mustrit*. Organism ja tema keskkond vahetavad põhjuslikke signaale (k.a. vaatlused ja toimingud) ning korduvad mustrid selles vahetuses moodustavad harjumused. Ma pean klassikaliste pragmatistide *harjumuse* mõistet ja Rouse’i (1987; 1996; 2002) *praktika* mõistet vähemalt üldjoontes samasteks. Dewey järgi tekitab eksperiment tähenduse. Viies ellu toiminguid, kogedes nende arvatavaid tulemusi ja seostades oma toiminguid nende arvatavate tulemustega, seame sisse harjumuse, mis seob meie toimingud nende arvatavate tulemustega. Seejuures saavad nad märkideks teineteisest. Harjumus paneb aluse eesmärgile. Seostades objekte nende võimalike praktiliste efektidega, annavad harjumused meile võime kavandada ettenähtavaid eesmäärke kohatavate objektide põhjal. Põhimõtteliselt võib *kõike* tõlgendada; kõigel võib olla võimalikke praktilisi efekte. See vihjab *universaalsele hermeneutikale*. Ma viitan lühidalt Joseph Rouse’i *praktilisele hermeneutikale* ja Don Ihde *visualismile* ja selle näidetele.

Kolmandas peatükis analüüsin operatsiooniliselt *kogemuse* ja *empirismi* mõisteid. Dewey defineeris kogemuse operatsiooniliselt kui *organismi–keskkonna–vastastikmõju*. Ma asendan “vastastikmõju” Karen Baradi uudissõnaga “sise-mõju” –juhaks, kui toimijad peaksid oma identiteedi ja määratuse saavutama pigem nende vastastikustest toimetest kui enesesiseselt. See mõiste haarab *kahesuunalist* kogemuse ideed: organism ja tema keskkond mõjutavad teineteist. Kogemus toimub *olukorras*, mis kaasab nii organismi koos kõigi tema praktiliste ja mõisteliste oskustega kui ka tema keskkonda. Eesmärgipärase tegevuse jätkuv kulgemine säilitab olukorra sidususe. Seega *kogemuse* ja *olukorra* mõisted vastustavad subjekti–objekti-dihhotoomiat. See *kogemuse* mõiste ei näita mingit lõhet kogemuse ja looduse vahel. Seega kui fenomenoloogia on teadus kogemusest *kui* kogemusest, siis fenomenoloogia on laitmatult naturalistlik ettevõtmine, mis ei taandu “subjektivismile” ega “idealismile.” Peirce’i järgi saab kogu kogemust analüüsida kolme reaalsesse

(st mõistusest sõltumatusse) ja üksteisest sõltumatusse kategooriasse: *esmasus*, *teisesus* ja *kolmandus*. Kategooriate pealkirjad viitavad ariteedile: kõik, mis on väljendatav unaarse predikaadiga (monaadiline suhe), kuulub esmasuse alla; binaarse predikaadiga (diaadiline suhe) teisesuse alla; ja kolmese predikaadiga (triaadiline suhe) kolmanduse alla. Fenomenoloogiliselt on “tundekvaliteet” esimene, pingutuse ja vastupanu koosesinemine teine ja harjumuse sisseseadmine kolmas. Universaalid, looduseadused ja märgiprotsessid (semioosid) kuuluvad samuti kolmanduse alla. Kuna kogemuse ja looduse vahel puudub lõhe, siis on *kogemuse* kategooriad ühtlasi ka *olemise* kategooriad. Peirce'i kategooriad on tema semiootika aluseks, mida käsitlen 5. peatükis. Ma defineerin *pertsepti*, *tajuotsust* ja *tajusisu*, et näidata, kuidas kogemus omandab propositsioonilise sisu. Pertseptisioon käivitab märkide tõlgendamise protsessi (st semioosi), mida selgitan 5. peatükis. Vaatlen Eino Kaila *invariantsuse* mõistet ja väidan, et invariandid ei saa olla puhtalt “formaalsed” ja “abstraktsed”: nad kuuluvad kolmanduse alla ja võivad seega olla kogemuses olemas. Toon sisse *küberneetilise teadmisteooria*: teadmine tuleneb piiritletud objektide tekkimisest organismi–keskkonna-sisetoime stabiliseerimise kaudu. Seega saab sellest *juhtimistehnika probleem*. Arutan Ihde instrumentaalse vahendatud kogemust ehk *instrumentaalset fenomenoloogiat* oma teooria laiendusena. Kokkuvõtteks kaitsen naiivset empirismi, mis implitsiitselt on juba eelpool öeldus. Kogemus pole eneseküllane: ta ainult pakub *probleeme*, mida lahendada. Lahenduse kujundamine on meie ülesanne. Lühidalt: kõik on episteemiliselt probleemne. Seega on kõik eksimisvõimeline; kõike tuleb käsitleda kui millegi muu märki. See on vastavalt 4. ja 5. peatüki sisu.

Neljandas peatükis selgitan ma fallibilismi. Fallibilismi kohaselt võib kahtluse alla seada ükskõik millise uskumuse, kui selleks tekib positiivne põhjus, kuid mitte kõiki korraga. See kehtib ka matemaatika ja loogika kohta. Fallibilism lükkab tagasi nii dogmatismi kui ka globaalse skeptitsismi, nagu Descartes'i “Meditatsioonides esimesest filosoofiast.” Selleks, et õppida, peavad meil olema mingisugusedki eeldused, kui tahes esialgsed; kuid me võime lõpuks avastada, et need eeldused ei olnud üldse põhjendatud. Peirce määratles *uskumise* operatsiooniliselt kui *harjumuse* ja *kahtluse* kui *harjumuse puudumise*. Seega on nii *tähendus* kui ka *uskumus* defineeritud kui harjumus. Need definitsioonid viitavad *uurimise uskumuse–kahtluse mudelile*: me tegutseme uskumuse (harjumuse), harjumuspärase tegevuse ebaõnnestumise, uurimise ja uue uskumuse (harjumuse) kehtestamise tsükli-tes. Kolmas etapp, uurimine, koosneb *abduktsiooni*, *deduktsiooni* ja *induktsiooni* tsüklitest. See mudel saab hakkama ilma episteemiliste aluste ja episteemiliste eesmärkideta. Episteemiline õigustus tekib eesmärgipärase käitumise kohandamise *protsessist* muutuvate tingimustega. Kuna meil puudub

tühistamatu tõe kriteerium, peab uurimine jätkuma lõputult. Seega, mis puudutab propositsioonilist teadmist, siis oli Peirce episteemilise õigustatuse osas indefinitist. Tsiteerin ka Peirce'i ja Dewey käsitlusi matemaatika ja loogika kohta, et näidata, et kumbki distsipliin ei ole eksimatu. Fallibilism õigustab uurimise alustamist *mis tahes* eeldustest, tingimusest, et ollakse vajadusel valmis revideerima mis tahes uskumust. Kuna teadmine on uskumise liik, siis uurimise uskumise–kahtlemise mudel rakendub ka teadmisele.

Kuna kõik on ekslik, siis on kõik vähemalt potentsiaalselt märk millestki muust. Peirce'i märkide teooriat uurin 5. peatükis, pöörates erilist tähelepanu tüüpidele (reeglmärkidele) ja propositsioonidele (nendingutele). Peirce'i semiootika eeldab tema fenomenoloogiat, eriti tema kategooriate teooriat, ja uskumuse–kahtluse uurimismudelit. Peirce defineeris *märgisuhte* kui triaadilise suhte *dünaamilise objekti*, *märgikandja* ja võimaliku *tõlgenduse* vahel. Dünaamiline objekt on objekt sellisena, nagu ta on representatsioonist sõltumatult. Selle vaste on vahetu objekt, mis on objekt sellisena, nagu seda representeerib märgikandja. See moodustab meie teadmised dünaamilisest objektist tõlgendamise antud etapis. Dünaamiline objekt ja vahetu objekt ei ole nagu Kanti nähtused ja asjad iseeneses: dünaamiline objekt on täielikult tunnetatav. Meie teadmine dünaamilisest objektist seisneb meie harjumustes sellega tegelemisel: tõlgendades märk-vahendeid, võtame harjumuse dünaamilise objektiga vahetult sisetoimida. Tõlgendus on, umbkaudselt öeldes, märgikandja mõju tõlgendajale. See võib olla uus märgikandja, millel on sama dünaamiline objekt. Sel viisil võivad ilmuda eelmisi märgikandjaid tõlgendavad märgikandjate jada. Selle protsessi käigus kujuneb vahetu objekt. Semioos ehk märgikandjate tõlgendamise protsess vastab uskumus–kahtlus-uurimismudelile. Seega määratakse eksperimentaalselt kindlaks, mida mingi asi tähendab, uurides, kuidas sellele vastata. Tõlgendamine lõpeb siis, kui vahetu objekt langeb kokku dünaamilise objektiga, st dünaamiline objekt on täielikult teada, kõik võimalikud seda puudutavad harjumused on omaks võetud ja edasine teadmiste kasv ei ole võimalik. Aga kuna meil puudub kriteerium, mis võiks määrata, millal me oleme selle punkti saavutanud, peab uurimine jätkuma lõputult. Pealegi võib maailm, kaasa arvatud dünaamiline objekt, muutuda. Iga märgikandja tüüp on mitmeselt realiseeritav funktsioon: kui miski *toimib* märgikandjana, siis ta *on* märgikandja. Seega ei postuleeri semiootika täiendavaid ontoloogilisi klasse. Põhimõtteliselt võib *mis tahes asi* olla märgikandja. See viitab jällegi *universaalsele hermeneutikale*. Peirce tõi sisse tüübi–instanti–tooni trihhotoomia ja reema–propositsiooni–argumendi trihhotoomia. Tüübid (reeglmärgid) tähistavad tokeniseerimise (instantiks muutmise) kaudu, st selle kaudu, et nad on kehastunud oma instantside jälgendites. Propositsioonid (nendingud) on tüüpide alamklass. Seega tähistavad ka nemad läbi jälgendamise ehk neis sisalduva teabe tege-

liku kehastamise. Propositsioon on mitmeselt realiseeritav erinevates meediumides: keel, pildid, videomaterjalid jne. Peirce'i tüübi- ja propositsiooni-teooria on aristotelistlik *in rebus* sordist (erinevalt platoonilisest *ante rem* sordist). Ma olen välja töötanud *evolutsioonilise tüübiteooria*, selgitamaks, kuidas tokeniseerimine loob instantside populatsiooni, mis areneb ruumis ja ajas nii kaua, kui maailm on võimeline neid taastootma.

Kuuendas peatükis rakendan semiootikat teadmiste mõistele. Harjumused, olles toimingute reeglid, on *reegelmärgid* (tüübid); ja konkreetsed tegevused on nende *üksikmärkide* instantsid. See õigustab esmapilgul abduktiivset järeldust soorituselt harjumusele. Bennetti ja Hackeri sõnul on psühholoogiliste predikaatide tähendusliku omistamise (eksimisvõimeliseks) kriteeriumiks *käitumine*, kaasa arvatud kõneaktid. Käitumusliku asitõendi puudumisel ei saa keegi aru, mida tähendab psühholoogilise predikaadi omistamine toimijale. Psühholoogiline predikaat on universaal (ja seega *reegelmärk*), mis määrab käitumise (selle *üksikmärgid*). Seega on käitumine (eksimisvõimeline) tõend selle kohta, et ollakse antud psühholoogilises seisundis. *Teadmine* on psühholoogiline predikaat. *Oskuslik tegevus* kujutab endast käitumist, mis kvalifitseerub teadmise tõendiks. Analoogselt on harjumuse puhul, mis esmapilgul õigustab abduktiivset järeldust oskuslikust sooritusest teadmiste. Oskusi on kahte liiki: *manipuleerimine* ja ainese *kirjeldamine*. Need vastavad kahele minu poolt eristatavale teadmiste liigile: *tugevale* ja *nõrgale*.

Mu väitekirj pakub ulatuslikult võimalusi edasiseks uurimiseks. Ma pean selleks tehnikafilosoofiat ning poliitika- ja moraalifilosoofiaid olulisimateks valdkondadeks.

Knowledge and Practice: A Criticism of Epistemology.

Summary

Plato famously defined *knowledge* as *justified true belief*. This definition usually goes unquestioned in mainstream analytic philosophy, though Plato did not accept it himself. The traditional definition leaves it problematic, how knowledge can be intelligibly ascribed to a person: it seems that one can have a belief without manifesting it, and it also seems that one can manifest a belief without having it. Thus it is difficult to determine whether anybody knows anything.

Moreover, mainstream analytic epistemologists usually subscribe to a narrow, impoverished notion of *experience* that only encompasses observation—or, even worse, like Quine, stimulus. This notion seems to entail a passive, receptive notion of experience, which Dewey called “the spectator theory of knowledge.” Action and the establishment of habit are ignored without justification. The traditional definition of *knowledge* ignores them too. Thus mainstream analytic epistemology is utterly unable to capture the importance of experimental practice.

In my PhD thesis, I argue that *knowledge is practice*. That is not necessarily a *rejection* of the traditional definition; it can be considered an *operational analysis* of the traditional definition. One can define a concept operationally by applying Peirce’s *pragmatic maxim* to it. An operational definition states what a concept means in practice. According to the pragmatic maxim, what a thing (possibly a speech act) means is the *potential practical effects* of that thing (possibly another speech act), or the *habits* pertaining to that thing. The classical pragmatists use the term *habit* in a technical sense that overcomes the traditional subject–object dichotomy.

I discern two senses of “knowledge”: *strong* and *weak*. Knowledge in the strong sense consists in skilled practice, and its criterion is the *rates of success and failure*. Only the practitioners of a given art or craft have strong

knowledge. It depends on context, how great the rate of success must be in order for a skill to qualify as knowledge. Knowledge in the weak sense consists in testimony, and its criterion is its agreement with strong knowledge, or skilled practice. At least in the strong sense, knowledge cannot be reduced to representation, let alone representation that is independent of organic activity, because it *is* organic activity. I consider theorizing as a peculiar practice among other practices.

My thesis has the corollary that *science is art*. If knowledge is practice, if science is the perfection of knowledge, and if art is the perfection of practice, then it follows that science is art.

I make three methodological commitments: (1) empiricism, (2) cybernetics, and (3) the rejection of the traditional subject—object dichotomy.

I consider empiricism as the rejection of *a priori* armchair philosophy. By definition, a notion that is “true” merely on formal considerations cannot be tested experimentally. I reject such notion of “knowledge.” Therefore I have taken pains to make my philosophy entirely experimental by defining all my methodological concepts operationally.

I cite cybernetics as a metatheory of a bidirectional notion of experience: according to Dewey, experience is bidirectional *organism–environment interaction*: both the organism and its environment affect each other mutually. I follow Barad (1996) and replace “interaction” with “intra-action.” Now, this notion entails a *feedback* between the organism and its environment. Cybernetics is the science of feedback systems. An epistemology that considers empirical knowledge as a product of this kind of feedback is a cybernetic epistemology.

I reject the traditional subject–object dichotomy because everything important is both “subjective” and “objective” at once. It could not appeal to us without being “subjective”; and it could not have effects in nature and society without being “objective.” In particular, *meaning*, *experience*, *habit*, *practice*, *phenomenon*, and *situation* are concepts that cut across the subject–object dichotomy in this way.

I have adopted my method from the reliabilist virtue epistemology of the early Markus Lammenranta and the Kantian pragmatism of Sami Pihlström. According to Pihlström, epistemology must apply to itself to justify itself. If it fails to do so, it undermines its own justification. Hence I emphasize reflexivity.

In effect, my thesis is a reconstruction of the philosophies of Charles S. Peirce and John Dewey. I am not, however, trying to make a faithful interpretation; I disagree with both in certain points. Rather, I am simply using their philosophies as a justification for my thesis.

I begin by naturalizing semantics in Chapter 2 in order to make my

methodological concepts testable experimentally in anticipation of the results of Chapter 3 in which I analyze the concepts of *experience* and *empiricism*. That secures that my method applies to itself and thereby justifies itself. First I have to remove a formidable obstacle: the *a priori* philosophy of language that is prevalent in mainstream analytic philosophy. I refute it by citing second-generation cognitive science, according to which meaning cannot possibly be purely “formal” and “objective.” Then I introduce the pragmatic maxim. Second-generation cognitive science supports it. The pragmatic maxim eliminates noumena from discourse. That does not threaten the “objectivity” of knowledge: phenomena are both “subjective” and “objective” at once. Peirce understood them as “effects” as in “the Zeeman effect” and “the Hall effect.” I explain the pragmatist notion of *habit* operationally as (*approximately and relatively*) *invariant pattern of potential organism–environment intra-action*. The organism and its environment exchange causal signals (including observations and actions), and recurring patterns in this exchange constitute habits. I consider the classical pragmatists’ notion of *habit* and Rouse’s (1987; 1996; 2002) notion of *practice* at least roughly synonymous. According to Dewey, experiment gives rise to meaning. By committing actions, undergoing their putative results, and correlating our actions with their putative results, we establish a habit that associates our actions with their putative results. Thereby they become signs of each other. Habit gives rise to purpose. By associating objects with their potential practical effects, habits bestow us with the capacity to project *ends-in-view*, or *purposes*, on the basis of objects encountered. In principle, *anything* can be interpreted: anything can have potential practical effects. That suggests *universal hermeneutics*. I briefly cite Joseph Rouse’s *practical hermeneutics* and Don Ihde’s *visualism* as its instances.

In Chapter 3, I analyze operationally the concepts of *experience* and *empiricism*. Dewey defined *experience* operationally as *organism–environment interaction*. I substitute “interaction” with Karen Barad’s neologism “intra-action” in order to allow for the possibility that the actants acquire their identity and determinacy from their mutual relations rather than intrinsically. This notion involves a *bidirectional* notion of experience: the organism and its environment affect each other. Experience takes place in a *situation* that involves both the organism with all its practical and conceptual skills and its environment. An ongoing course of purposive action maintains the coherence of the situation. Hence the concepts of *experience* and *situation* cut across the subject–object dichotomy. This notion of *experience* exhibits no split between experience and nature. Hence, if phenomenology is the science of experience *qua* experience, then phenomenology is an impeccably naturalist enterprise, not reducible to “subjectivism” or “ideal-

ism.” According to Peirce, all experience can be analyzed into three real (i.e. mind-independent) and mutually independent categories: *firstness*, *secondness*, and *thirdness*. The titles of the categories refer to arity: whatever is expressible by a unary predicate (monadic relation), falls under firstness; by a binary predicate (dyadic relation), under secondness; and by a tertiary predicate (triadic relation), under thirdness. Phenomenologically, a “quality of feeling” is a first, the co-occurrence of effort and resistance is a second, and the establishment of a habit is a third. Universals, laws of nature, and sign-processes (semioses) also fall under thirdness. Because there is no split between experience and nature, the categories of *experience* are simultaneously the categories of *being*. Peirce’s categories are the basis of his semiotics, which I discuss in Chapter 5. I define *percept*, *perceptual judgment*, and *perceptuum* in order to show how experience acquires propositional content. A percept kicks off the process of interpreting signs (i.e. semiosis), which I explain in Chapter 5. I review Eino Kaila’s notion of *invariance* and argue that invariances cannot be purely “formal” and “abstract”: they fall under thirdness and hence can be present to experience. I introduce *cybernetic epistemology*: knowledge results from the emergence of determinate objects by stabilizing organism–environment intra-action. Thus it becomes a *control engineering problem*. I discuss Ihde’s theory of instrumentally mediated experience, or *instrumental phenomenology*, as an extension of my theory. I will conclude with a defense of naïve empiricism that is implicit in what I have said before. Experience is not self-sufficient: it only supplies *problems to be solved*. The construction of a solution is up to us. In short, everything is epistemically problematic. Therefore everything is fallible; everything must be considered as a sign of something else. That is the subject matter of Chapters 4 and 5, respectively.

In Chapter 4, I explain fallibilism. According to fallibilism, any single belief, but not all of them at once, can be questioned, if there arises a positive reason to do so. That applies to mathematics and logic as well. Fallibilism rejects both dogmatism and global skepticism, as in Descartes’s *Meditations on First Philosophy*. In order to learn, we must have *some* presuppositions, however tentative; but we may end up discovering that these presuppositions were not justified at all. Peirce defined *belief* operationally as *habit* and *doubt* as the *privation of habit*. Thus both *meaning* and *belief* are defined as *habit*. These definitions imply the *belief–doubt model of inquiry*: we act in cycles of belief (habit), the failure of habitual action, inquiry, and the establishment of a new belief (habit). The third stage, inquiry, consists in cycles of *abduction*, *deduction*, and *induction*. The model dispenses with epistemic foundations and epistemic ends. Epistemic justification arises from the *process* of adapting purposive behavior to changing conditions. Because

we do not possess the criterion of irrevocable truth, inquiry must go on indefinitely. Therefore, as concerns propositional knowledge, Peirce was an indefinitist about epistemic justification. I also cite Peirce's and Dewey's accounts on mathematics and logic to show that neither discipline is infallible. Fallibilism justifies beginning inquiry from *any* presuppositions, provided that one is committed to revising any belief if need be. Knowledge being a species of belief, the belief-doubt model of inquiry applies to knowledge as well.

Because everything is fallible, everything is a sign of something else at least potentially. I study Peirce's theory of signs in Chapter 5 with special emphasis on types (legisigns) and propositions (dicisigns). Peirce's semiotics presupposes his phenomenology, especially his theory of categories, and the belief-doubt model of inquiry. Peirce defined *sign-relation* as a triadic relation between a *dynamical object*, a *sign-vehicle*, and a potential *interpretant*. The dynamical object is an object as it is independently of representation. Its counterpart is the *immediate object*, which is the object as represented by the sign-vehicle. It constitutes our knowledge of the dynamical object at a given stage of interpretation. The dynamical object and the immediate object are not like Kant's phenomena and noumena: the dynamical object is completely knowable. Our knowledge of the dynamical object consists in our habits of dealing with it: by interpreting sign-vehicles, we take a habit by directly intra-acting with the dynamical object. The interpretant is, roughly, the effect of the sign-vehicle upon an interpreter. It can be a new sign-vehicle that has the same dynamical object. In this way, there may occur sequences of sign-vehicles interpreting previous sign-vehicles. In this process, the immediate object develops. Semiosis, or the process of interpreting sign-vehicles, conforms to the belief-doubt model of inquiry. Thus what a thing means is determined experimentally by studying how one can respond to it. Interpretation terminates when the immediate object coincides with the dynamical object, i.e., the dynamical object is completely known, all possible habits pertaining to it have been adopted, and no further increase of knowledge is possible. But because we have no criterion that could determine when we have reached that point, inquiry must go on indefinitely. Moreover, the world, including the dynamical object, can change. Each type of sign-vehicle is a multiply realizable function: if something *functions* as a sign-vehicle, then it *is* a sign-vehicle. Hence semiotics does not postulate extra ontological classes. In principle, *anything* can be a sign-vehicle. Again, that suggests *universal hermeneutics*. Peirce introduced the type-token-tone trichotomy and the rhema-proposition-argument trichotomy. Types (legisigns) signify through tokenization, i.e., through being embodied in their token replicas. Propositions (dicisigns) are a subclass of types. Hence they too signify through

replication, or the actual instantiation of the information they contain. The proposition is multiply realizable in different media: language, pictures, video footage, etc. Peirce's theory of types and propositions is of the Aristotelian *in rebus* variety (as opposed to the Platonic *ante rem* variety). I have devised an *evolutionary theory of types* to explain how tokenization creates a population of tokens that evolves in space and time as long as the world retains the capacity to reproduce them.

In Chapter 6, I apply semiotics to the concept of knowledge. Habits, being rules of action, are *legisigns (types)*; and particular actions are their *sinsign tokens*. That *prima facie* justifies the abductive inference from performance to habit. Now, according to Bennett and Hacker, the (fallible) criterion of the meaningful attribution of psychological predicates is *behavior, including speech acts*. In the absence of behavioral evidence, nobody can possibly understand what the attribution of a psychological predicate to an agent *means*. A psychological predicate is a universal (and hence a legisign) that determines behavior (its sinsign tokens). Thus behavior is (fallible) evidence for being in a given psychological state. *Knowledge* is a psychological predicate. *Skilled performance* constitutes the behavior that qualifies as evidence for knowledge. Analogously with the case of habit, that *prima facie* justifies the abductive inference from skilled performance to knowledge. There are two kinds of skills: *manipulation* and *description* of subject matter. These correspond to the two kinds of knowledge I discern: *strong* and *weak*.

My thesis provides ample opportunities for further research. I consider the philosophy of technics and moral and political philosophy as the most important fields.

Curriculum Vitae (eesti)

I. Üldandmed

1. Ees- ja perekonnanimi: Juho Kaarlo Sakari Lindholm
2. Sünniaeg: 17. detsember, 1985
3. E-post: juho.lindholm@gmail.com
4. Haridus (õppeasutus, lõpetamise aeg, kvalifikatsioon (kraad)): MSc (tehnoloogia) (Helsinki Tehnikaülikool, 15. veebruar 2010); MA (teoreetiline filosoofia) (Helsinki Ülikool, 22. detsember 2015)
5. Teenistuskäik:
 - Konecranes oyj: praktika, täiskohaga, 2. juuni, 2008 – 25. august 2008
 - Konecranes oyj: praktika, osalise ajaga, 4. september 2008 – 24. mai, 2009
 - Konecranes oyj: diplomitöö töötaja, 25. mai – 31. detsember, 2009
 - Aalto University: uurija (elektriamid), 4. jaanuar, 2010 – 31. august, 2011
 - Aalto University: assistent (juhtimistehnika), 1. september, 2011 – 31. detsember, 2015
 - Metropolia: lektor (juhtimistehnika), 10. oktoober, 2013 — 31. mai, 2014
 - Vabakutseline kitarriõpetaja, märts 2024–

II. Teaduslik ja arendustegevus

1. Peamised uurimisvaldkonnad: pragmatism, naturalism, tehnikafilosoofia, postfenomenoloogia
2. Publikatsioonide loetelu (vastavalt teadustööde loetelu jaotusele)
 - Lindholm, Juho (2022): “The Pragmatist Basis of Material Hermeneutics.” *World Academy of Science, Engineering and Technology International Journal of Humanities and Social Sciences* 16(11): 687–695.

<https://publications.waset.org/10012795/pdf>

- Lindholm, Juho (2023a): “Cybernetic Epistemology.” *Acta Baltica Historiae et Philosophiae Scientiarum* 11(1): 3–51.
<https://doi.org/10.11590/abhps.2023.1.01>
 - Lindholm, Juho (2023b): “Scientific Practices as Social Knowledge.” *International Studies in the Philosophy of Science* 35(3–4): 223–242. <https://doi.org/10.1080/02698595.2023.2196930>
 - Lindholm, Juho (2023c): “Technics as Hermeneutics.” *InfTars—Információs Társadalom* XXIII(2): 95–116.
<https://dx.doi.org/10.22503/inftars.XXIII.2023.2.6>
 - Lindholm, Juho (2024a): “John Dewey as a Precursor of Rein Vihailemm.” Kogumikus Ave Mets, Endla Lõhkivi, Peeter Mürsepp ja Jaana Eigi-Watkin (Toim.), *Practical Realist Philosophy of Science: Reflecting on Rein Vihailemm’s Ideas* (lk. 19–42). Lanham, MD: Lexington.
 - Lindholm, Juho (2024b): “The Problem of Realism in Vihailemm.” *Acta Baltica Historiae et Philosophiae Scientiarum* 12(1): 37–71.
 - Lindholm, Juho (ilmumas): “Human–Technics Intra-Action.” *InfTars—Információs Társadalom*.
3. Saadud uurimistoetused ja stipendiumid: DoRa Pluss 4-aastane stipendium
 4. Muu teaduslik organisatsiooniline ja erialane tegevus (konverentside korraldamine, osavõtt toimetuskolleegiumide tööst, osalemine erinevates nõukogudes, erialastes seltsides, seadusloome, ekspertkomisjonide töö jms.): eelretsensioonid järgmistele väljaannetele: (i) *Topoi* (2023); (ii) Ave Mets, Endla Lõhkivi, Peeter Mürsepp ja Jaana Eigi-Watkin (Toim.), *Practical Realist Philosophy of Science: Reflecting on Rein Vihailemm’s Ideas* (2024).

Allkiri: Juho Kaarlo Sakari Lindholm

Kuupäev: 21. juunil Martinkyläs, Soomes

Teadustööde loetelu

I. Monograafiad või nende osad
puuduvad

II. Teaduslikud artiklid rahvusvahelise levikuga väljaannetes

- Lindholm, Juho (2022): “The Pragmatist Basis of Material Hermeneutics.” *World Academy of Science, Engineering and Technology Inter-*

- national Journal of Humanities and Social Sciences* 16(11): 687–695.
<https://publications.waset.org/10012795/pdf>
- Lindholm, Juho (2023a): “Cybernetic Epistemology.” *Acta Baltica Historiae et Philosophiae Scientiarum* 11(1): 3–51.
<https://doi.org/10.11590/abhps.2023.1.01>
 - Lindholm, Juho (2023b): “Scientific Practices as Social Knowledge.” *International Studies in the Philosophy of Science* 35(3–4): 223–242.
<https://doi.org/10.1080/02698595.2023.2196930>
 - Lindholm, Juho (2023c): “Technics as Hermeneutics.” *InfTars—Információs Társadalom* XXIII(2): 95–116.
<https://dx.doi.org/10.22503/inftars.XXIII.2023.2.6>
 - Lindholm, Juho (2024a): “John Dewey as a Precursor of Rein Vi-
 halem.” Kogumikus Ave Mets, Endla Lõhkivi, Peeter Mürsepp ja
 Jaana Eigi-Watkin (Toim.), *Practical Realist Philosophy of Science:
 Reflecting on Rein Vihelemm’s Ideas* (lk. 19–42). Lanham, MD: Lex-
 ington.
 - Lindholm, Juho (2024b): “The Problem of Realism in Vihelem.”
Acta Baltica Historiae et Philosophiae Scientiarum 12(1): 37–71.
 - Lindholm, Juho (ilmumas): “Human–Technics Intra-Action.” *InfTars—
 Információs Társadalom*.

III. Muud teaduslikud artiklid

- Lindholm, Juho (2021): “Science as Art: A Deweyan Perspective.”
 Kogumikus Cara Nine (Toim.), *Yearbook of the Irish Philosophical Soci-
 ety 2019–2020. Special Issue: Science and Politics*. [http://www.irish-
 philosophical-society.ie/wp-content/uploads/2021/06/Lindholm_Science-
 as-Art_IPS-2021-Final.pdf](http://www.irish-philosophical-society.ie/wp-content/uploads/2021/06/Lindholm_Science-as-Art_IPS-2021-Final.pdf)

IV. Konverentside teesid

- Lindholm, Juho (2019a): “John Dewey as a Precursor of Rein Vi-
 halem.” Esitatud konverentsil *From ϕ -science to practical realism:
 an international conference in honour of Rein Vihelemm (1938–2015)*
 Tartus 13. augustil 2019.
- Lindholm, Juho (2019b): “Rein Vihelemm as a Deweyan Pragmatist.”
 Esitatud *Eesti filosoofia XV aastakonverentsil* Tallinnas 30.–31. Au-
 gustil 2019.
- Lindholm, Juho (2019c): “Science as Art: A Deweyan Perspective.”
 Esitatud konverentsil *Irish Philosophical Society Annual Conference*
 Corkis 6. detsembril 2019.

- Lindholm, Juho (2020a): “A Comparison of John Dewey and Joseph Rouse.” Esitamiseks konverentsil *HOPOS2020* Singapuris 23.–26. juunil, 2020. Tühistati COVID-19 pandeemia tõttu.
- Lindholm, Juho (2020b): “Habits as Social Knowledge.” Esitamiseks konverentsil *The Second International Congress of Russian Society for History and Philosophy of Science: Science as a Public Good* St. Petersburgis 27.–29. novembril 2020. Tühistati COVID-19 pandeemia tõttu.
- Lindholm, Juho (2020c): “The Phenomenology of Charles S. Peirce.” Esitamiseks konverentsil *The NUI Annual International Graduate Conference* Galways 23. aprillil 2020. Tühistati COVID-19 pandeemia tõttu.
- Lindholm, Juho (2021a): “Cybernetic Epistemology.” Esitatud *Eesti filosoofia XVI aastakonverentsil* Tartus 23. septembril 2021.
- Lindholm, Juho (2021b): “Practices as Social Knowledge.” Esitatud konverentsil *The Third Conference of East European Network for Philosophy of Science* Belgradil 10. juunil 2021.
- Lindholm, Juho (2021c): “Skeptical and Anti-Skeptical Themes in Peirce’s Early Pragmatism.” Esitatud konverentsil *LVI Reuniones filosóficas “The Varieties of Anti-Skepticism”* Pamplonas 17. septembril 2021.
- Lindholm, Juho (2021d): “Technics as Hermeneutics.” Esitatud konverentsil *BudPT21: Budapest Workshop on Philosophy and Technology 2021* Budapestis 10. detsembril 2021.
- Lindholm, Juho (2022a): “A Defense of Naïve Realism.” Esitatud *Eesti filosoofia XVII aastakonverentsil* 26. augustil 2022.
- Lindholm, Juho (2022b): “Philosophy in Action.” Esitatud konverentsil *The Irish Philosophical Society Annual Conference* Dublinis 22. oktoobril 2022.
- Lindholm, Juho (2023a): “The Experimental Method: How the World Educates Us.” Esitatud konverentsil *DEWEY2023: John Dewey and His Legacy for Education* Carbondale’is 12. oktoobril 2023.
- Lindholm, Juho (2023b): “Human–Technics Intra-Action.” Esitatud konverentsil *BudPT23: Budapest Workshop on Philosophy and Technology 2023* Budapestis 30. novembril 2023.
- Lindholm, Juho (2023c): “Moral Development and Moral Failure in Pragmatism.” Esitatud konverentsil *The Irish Philosophical Society Annual Conference* Limerickis 20. oktoobril 2023.
- Lindholm, Juho (2024a): “A Comparison of John Dewey and Joseph Rouse.” Esitatud konverentsil *HOPOS2024* Viinis 9.–12. juulil 2024.
- Lindholm, Juho (2024b): “An Evolutionary Theory of Types and To-

- kens.” Esitatud XIX Eesti filosoofiaaastakonverentsil Tartus 29. augustil 2024.
- Lindholm, Juho (2024c): “From Theory-Ladenness to Practice-Ladenness.” Esitatud konverentsil *Pragmatist Trends in Philosophy of Science and Mathematics* Norwichis 3. juunil 2024.
 - Lindholm, Juho (2024d): “Scientific Instruments and Dewey’s Instrumentalism.” Esitatud konverentsil *XXXI Baltic Conference on the History and Philosophy of Science* Tartus 14. juunil 2024. Lindholm, Juho (2024e): “Technics—A Philosophical Method.” Esitatud konverentsil *The XXV World Congress of Philosophy* Roomas 2.–8. augustil 2024.
 - Lindholm, Juho (ilmumas): “The Argumentative Structure of Know-How.” Esitamiseks konverentsil *Forum on Philosophy, Engineering, and Technology* Karlsruhes 17.–19. septembril 2024.

V. Muud publikatsioonid

- Lindholm, Juho (2022a): “Kuinka paljon työntekijän kuuluu ansaita?” (“Kui palju peaks töötaja teenima?”). *Libera.fi* 29. novembril 2022. <https://www.libera.fi/2022/11/29/kuinka-paljon-tyontekijan-kuuluu-ansaita/>
- Lindholm, Juho (2022b): “Vaikeat valinnat edessä: Globalisaatio tienhaarassa” (“Ees ootavad keerulised valikud: Globaliseerumine ristteel”). *Libera.fi* 3. novembril 2022. <https://www.libera.fi/2022/11/03/vaikeat-valinnat-edessa-globalisaatio-tienhaarassa/>

Curriculum Vitae (English)

I. General Information

1. Given names and surname: Juho Kaarlo Sakari Lindholm
2. Date of birth: December 17, 1985
3. Email: juho.lindholm@gmail.com
4. Education (institution, date of completion, qualification (grade)): MSc (technology) (Helsinki University of Technology, February 15, 2010); MA (theoretical philosophy) (University of Helsinki, December 22, 2015)
5. Work experience:
 - Konecranes oyj: internship, full time, June 2, 2008 – August 25, 2008
 - Konecranes oyj: internship, part time, September 4, 2008 – May 24, 2009
 - Konecranes oyj: diploma thesis worker, May 25 – December 31, 2009
 - Aalto University: researcher (electric drives), January 4, 2010 – August 31, 2011
 - Aalto University: assistant (control engineering), September 1, 2011 – December 31, 2015
 - Metropolia: lecturer (control engineering), October 10, 2013 – May 31, 2014
 - Self-employed guitar teacher, March 2024–

II. Scientific and Research Activities

1. Main research areas: pragmatism, naturalism, philosophy of technology, postphenomenology
2. List of publications (corresponding to the distribution of the list of research papers) and patents
 - Lindholm, Juho (2022): “The Pragmatist Basis of Material Hermeneutics.” *World Academy of Science, Engineering and Technology*

- International Journal of Humanities and Social Sciences* 16(11): 687–695. <https://publications.waset.org/10012795/pdf>
- Lindholm, Juho (2023a): “Cybernetic Epistemology.” *Acta Baltica Historiae et Philosophiae Scientiarum* 11(1): 3–51. <https://doi.org/10.11590/abhps.2023.1.01>
 - Lindholm, Juho (2023b): “Scientific Practices as Social Knowledge.” *International Studies in the Philosophy of Science* 35(3–4): 223–242. <https://doi.org/10.1080/02698595.2023.2196930>
 - Lindholm, Juho (2023c): “Technics as Hermeneutics.” *InfTars—Információs Társadalom* XXIII(2): 95–116. <https://dx.doi.org/10.22503/inftars.XXIII.2023.2.6>
 - Lindholm, Juho (2024a): “John Dewey as a Precursor of Rein Vihailemm.” Kogumikus Ave Mets, Endla Lõhkivi, Peeter Müürsepp ja Jaana Eigi-Watkin (Toim.), *Practical Realist Philosophy of Science: Reflecting on Rein Vihailemm’s Ideas* (lk. 19–42). Lanham, MD: Lexington.
 - Lindholm, Juho (2024b): “The Problem of Realism in Vihailemm.” *Acta Baltica Historiae et Philosophiae Scientiarum* 12(1): 37–71.
 - Lindholm, Juho (forthcoming): “Human–Technics Intra-Action.” *InfTars—Információs Társadalom*.
3. Received research grants and scholarships: DoRa Plus 4-year stipend
 4. Other scientific organizational and professional activities (organization of conferences, participation in the work of editorial boards, participation in various councils, professional societies, law-making, work of expert committees, etc.): preliminary reviews of the following publications: (i) *Topoi* (2023); (ii) Ave Mets, Endla Lõhkivi, Peeter Müürsepp ja Jaana Eigi-Watkin (Toim.), *Practical Realist Philosophy of Science: Reflecting on Rein Vihailemm’s Ideas* (2024).

Signature: Juho Kaarlo Sakari Lindholm

Date: June 21 in Martinkylä, Finland

List of Research Papers

I. Monographs or parts thereof

none

II. Scientific articles in publications with international circulation

- Lindholm, Juho (2022): “The Pragmatist Basis of Material Hermeneutics.” *World Academy of Science, Engineering and Technology Inter-*

- national Journal of Humanities and Social Sciences* 16(11): 687–695.
<https://publications.waset.org/10012795/pdf>
- Lindholm, Juho (2023a): “Cybernetic Epistemology.” *Acta Baltica Historiae et Philosophiae Scientiarum* 11(1): 3–51.
<https://doi.org/10.11590/abhps.2023.1.01>
 - Lindholm, Juho (2023b): “Scientific Practices as Social Knowledge.” *International Studies in the Philosophy of Science* 35(3–4): 223–242.
<https://doi.org/10.1080/02698595.2023.2196930>
 - Lindholm, Juho (2023c): “Technics as Hermeneutics.” *InfTars—Információs Társadalom* XXIII(2): 95–116.
<https://dx.doi.org/10.22503/inftars.XXIII.2023.2.6>
 - Lindholm, Juho (2024a): “John Dewey as a Precursor of Rein Vi-
 halem.” Kogumikus Ave Mets, Endla Lõhkivi, Peeter Mürsepp ja
 Jaana Eigi-Watkin (Toim.), *Practical Realist Philosophy of Science:
 Reflecting on Rein Vihailemm’s Ideas* (lk. 19–42). Lanham, MD: Lex-
 ington.
 - Lindholm, Juho (2024b): “The Problem of Realism in Vihailemm.”
Acta Baltica Historiae et Philosophiae Scientiarum 12(1): 37–71.
 - Lindholm, Juho (forthcoming): “Human–Technics Intra-Action.”
InfTars—Információs Társadalom.

III. Other scientific articles

- Lindholm, Juho (2021): “Science as Art: A Deweyan Perspective.”
 Kogumikus Cara Nine (Toim.), *Yearbook of the Irish Philosophical Soci-
 ety 2019–2020. Special Issue: Science and Politics*. [http://www.irish-
 philosophical-society.ie/wp-content/uploads/2021/06/Lindholm_Science-
 as-Art_IPS-2021-Final.pdf](http://www.irish-philosophical-society.ie/wp-content/uploads/2021/06/Lindholm_Science-as-Art_IPS-2021-Final.pdf)

IV. Conference papers

- Lindholm, Juho (2019a): “John Dewey as a Precursor of Rein Vi-
 halem.” Delivered at *From ϕ -science to practical realism: an inter-
 national conference in honour of Rein Vihailemm (1938–2015)* in Tartu
 on August 13, 2019.
- Lindholm, Juho (2019b): “Rein Vihailemm as a Deweyan Pragmatist.”
 Delivered at the *Eesti filosoofia XV aastakonverentsil* conference in
 Tallinn on August 30–31, 2019.
- Lindholm, Juho (2019c): “Science as Art: A Deweyan Perspective.”
 Delivered at the *Irish Philosophical Society Annual Conference* in Cork
 on December 6, 2019.

- Lindholm, Juho (2020a): “A Comparison of John Dewey and Joseph Rouse.” To be delivered at the *HOPOS2020* conference in Singapore on June 23–26, 2020. Canceled due to the COVID-19 pandemic.
- Lindholm, Juho (2020b): “Habits as Social Knowledge.” To be delivered at *The Second International Congress of Russian Society for History and Philosophy of Science: Science as a Public Good* in St. Petersburg on 27–29 November, 2020. Canceled due to the COVID-19 pandemic.
- Lindholm, Juho (2020c): “The Phenomenology of Charles S. Peirce.” To be delivered at *The NUI Annual International Graduate Conference* in Galway on April 23, 2020. Canceled due to the COVID-19 pandemic.
- Lindholm, Juho (2021a): “Cybernetic Epistemology.” Delivered at the *Eesti filosoofia XVI aastakonverentsil* in Tartu on September 23, 2021.
- Lindholm, Juho (2021b): “Practices as Social Knowledge.” Delivered at *The Third Conference of East European Network for Philosophy of Science* in Belgrade on June 10, 2021.
- Lindholm, Juho (2021c): “Skeptical and Anti-Skeptical Themes in Peirce’s Early Pragmatism.” Delivered at the *LVI Reuniones filosóficas “The Varieties of Anti-Skepticism”* conference in Pamplona on September 17, 2021.
- Lindholm, Juho (2021d): “Technics as Hermeneutics.” Delivered at the *BudPT21: Budapest Workshop on Philosophy and Technology 2021* in Budapest on December 10, 2021.
- Lindholm, Juho (2022a): “A Defense of Naïve Realism.” Delivered at the *Eesti filosoofia XVII aastakonverentsil* on August 26, 2022.
- Lindholm, Juho (2022b): “Philosophy in Action.” Delivered at *The Irish Philosophical Society Annual Conference* in Dublin on October 22, 2022.
- Lindholm, Juho (2023a): “The Experimental Method: How the World Educates Us.” Delivered at the conference *DEWEY2023: John Dewey and His Legacy for Education* in Carbondale on October 12, 2023.
- Lindholm, Juho (2023b): “Human–Technics Intra-Action.” Delivered at the *BudPT23: Budapest Workshop on Philosophy and Technology 2023* in Budapest on November 30, 2023.
- Lindholm, Juho (2023c): “Moral Development and Moral Failure in Pragmatism.” Delivered at *The Irish Philosophical Society Annual Conference* in Limerick on October 20, 2023.
- Lindholm, Juho (2024a): “A Comparison of John Dewey and Joseph Rouse.” Delivered at the *HOPOS2024* conference in Vienna on July 9–12, 2024.
- Lindholm, Juho (2024b): “An Evolutionary Theory of Types and To-

kens.” Delivered at the XIX Eesti filosoofiaaastakonverents in Tartu on August 29, 2024.

- Lindholm, Juho (2024c): “From Theory-Ladenness to Practice-Ladenness.” Delivered at the *Pragmatist Trends in Philosophy of Science and Mathematics* conference in Norwich on June 3, 2024.
- Lindholm, Juho (2024d): “Scientific Instruments and Dewey’s Instrumentalism.” Delivered at the *XXXI Baltic Conference on the History and Philosophy of Science* in Tartu on June 14, 2024.
- Lindholm, Juho (2024e): “Technics—A Philosophical Method.” Delivered at *The XXV World Congress of Philosophy* in Rome on August 2–8, 2024.
- Lindholm, Juho (forthcoming 1): “The Argumentative Structure of Know-How.” To be delivered at the *Forum on Philosophy, Engineering, and Technology* in Karlsruhe on September 17–19, 2024.

V. Muud publikatsioonid

- Lindholm, Juho (2022a): “Kuinka paljon työntekijän kuuluu ansaita?” (“How Much Ought a Worker to Earn?”). *Libera.fi* on November 29, 2022. <https://www.libera.fi/2022/11/29/kuinka-paljon-tyontekijan-kuuluu-ansaita/>
- Lindholm, Juho (2022b): “Vaikeat valinnat edessä: Globalisaatio tienhaarassa” (“Difficult Choices Ahead: Globalization at Crossroads”). *Libera.fi* on November 3, 2022. <https://www.libera.fi/2022/11/03/vaikeat-valinnat-edessa-globalisaatio-tienhaarassa/>

DISSERTATIONES PHILOSOPHICAE UNIVERSITATIS TARTUENSIS

1. **Jüri Eintalu.** The problem of induction: the presuppositions revisited. Tartu, 2001.
2. **Roomet Jakapi.** Berkeley, mysteries, and meaning: a critique of the non-cognitivist interpretation. Tartu, 2002.
3. **Endla Lõhkivi.** The sociology of scientific knowledge: a philosophical perspective. Tartu, 2002.
4. **Kadri Simm.** Benefit-sharing: an inquiry into justification. Tartu, 2005.
5. **Marek Volt.** The epistemic and logical role of definition in the evaluation of art. Tartu, 2007.
6. **Aive Pevkur.** Professional ethics: philosophy and practice. Tartu, 2011.
7. **Toomas Lott.** Plato on Belief (*doxa*) *Theaetetus* 184B–187A. Tartu, 2012, 208 p.
8. **Jaanus Sooväli.** Decision as Heresy. Tartu, 2013, 153 p.
9. **Ave Mets.** Normativity of scientific laws. Tartu, 2013, 217 p.
10. **Vivian Bohl.** How do we understand others? Beyond theories of mind-reading and interactionism. Tartu, 2014, 184 p.
11. **Uku Tooming.** The Communicative Significance of Beliefs and Desires. Tartu, 2014, 208 p.
12. **Andrus Tool.** Objektiivsuse teema Wilhelm Dilthey vaimuteadustefilosoofias. Tartu, 2014, 329 p.
13. **Janar Mikhelsaar.** Giorgio Agamben and Post-Foundational Political Ontology. Tartu, 2015, 169 p.
14. **Jaana Eigi.** The Social Organisation of Science as a Question for Philosophy of Science. Tartu, 2016, 282 p.
15. **Tarmo Tirol.** Subjektiivsus Jean-Paul Sartre'i eksistentsialismis. Tartu, 2017, 253 p.
16. **Eve Kitsik.** Revisionary Ontology: Improving Concepts to Improve Beliefs. Tartu, 2018, 196 p.
17. **Juhan Hellerma.** Mapping Time: Analysis of Contemporary Theories of Historical Temporality. Tartu, 2020, 138 p.
18. **Henrik Sova.** The Structure of a Consistent Global Pragmatism. Tartu, 2020, 87 p.
19. **Riin Kõiv.** The Content and Implications of Nativist Claims. A Philosophical Analysis. Tartu, 2021, 182 p.
20. **Lisa Zorzato.** Towards a Realist Approach to the Challenge of Fictional Models: Augmented Determination. Tartu, 2023, 150 p.
21. **Jay Zameska.** The Ethics of Public Health: Balancing the Interests of Populations and Individuals. Tartu, 2023, 122 p.
22. **Semen Reshenin.** Individual Self-Determination in Friedrich Schiller's Philosophical Writings. Tartu, 2023, 228 p.
23. **Sergei Sazonov.** The Entrepreneurial Theory of Ownership. Tartu, 2024, 191 p.