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CONTRASTIVE EVALUATION OF EXPLANATIONS IN STUDIES OF
SCIENTIFIC KNOWLEDGE

Master's Thesis in Philosophy

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Introduction

What does it mean to understand explanations in contrastive terms? Is there anything significant about explanations in studies of science that could be understood better with the contrastive approach? These questions, along with many similar ones, have generated a considerable philosophical interest. This thesis shares this interest: I argue that explanations are not only better understood, but also better compared, assessed and organized when we consider them in contrastive terms. That is, by understanding an explanation as an answer to the question “Why is the case that P instead of Q?”

Moreover, the components of an explanation demand a specific order. The main purpose of an explanation is to locate the relation between these components within reasonable inferences. One common aspect of successful explanations is their contrastive sensitivity. They are able to address the specific contrasts that reveal the context in question. In this sense, specifying contrasts is giving things better explanatory context.

Explanations are not isolated units of knowledge. Their formation requires a certain contextualization. This insight is clear in the philosophical literature on contrastive explanations. We can generalize the main project of contrastive approach to explanations as clarifying implicit or explicit contrastive components of explanations. A proper explanation should address the exact contrast, not an approximate one. One immediate problem with this approach is that contrasts are not always explicit. An explanation must then take a contrast as intended, and the way this choice is made should be the primary topic to investigate when evaluating explanations.

What else does contrastive approach explicate other than the inner workings of explanations? This thesis will look for an answer. One way of looking at it is related to the context of choice of explanations. I argue that there is a pattern of contrast between different explanations just like within the components

of explanations themselves. The focus here is on the comparison of types of explanations in their contrastive similarity and difference.

An advantage of such approach is that we get to provide a methodological criterion of assessment between different contrastive explanations. It is particularly important to discuss the possibility of such criteria when it accounts for explanations of scientific practices. Philosophy, history or sociology of science try to explain why some scientific practices are the way they are. These explanations require a special scrutiny. In this sense, a methodological setting for the studies of science largely determines the way that study will approach its subject matter.

A sociological approach known as *Strong Programme*, addresses this issue with the proposal of *symmetry requirement*. Accordingly, explaining why scientists conclude their explanations the way they do should be carefully executed with the symmetrical focus on reasons. That is, the possible epistemic states of the practices under study, such as truth-falsity, rationality-irrationality, success-failure etc., require the same types of explanations, regardless of the actual outcome. One problem with symmetry requirement is its assumption that there is a shared intuition on the types of explanations and ways in which they are compared and contrasted. This thesis will explore this assumption and provide a possible assessment strategy that is informed by the philosophical debates on contrastive explanations. Given the influence, I will call this strategy *contrastive symmetry*.

The road to contrastive symmetry is paved with debates in two areas of research. The chapters of this thesis are planned in order to make justice to relevant discussions under these two main topics: *Strong Programme in Sociology of Scientific Knowledge* and *Philosophy of Contrastive Explanations*. Both topics already have their well-established discussions, advocates, problems and concepts that are the product of at least half a century of academic attention. This thesis will not and cannot treat all the details of these topics. Instead, the main focus here will be how *symmetry requirement* initiated a certain understanding of explanatory choice and why do we need to re-consider contrastive insights of it with the help of

philosophical analysis of explanations. Therefore, the selection of topics under aforementioned areas of research will serve for a task of exposition.

In the first chapter, I will introduce the context in which *symmetry requirement* established. From early to later works of David Bloor, we will see the different formulations of the requirement and how some criticisms against it have been met. The Strong Programme's examination of Millikan's Oil Drop Experiment will be visited as a case where symmetry requirement is put to actual use. Finally, I will argue that the main shortcoming of the symmetry principle should be addressed with an explication of criteria based on which explanations are compared and contrasted.

The second chapter will visit the relevant philosophical debates that have focused on the contrastive approach to explanations. After a brief introduction of how contrastive approach emerged out of the mainstream philosophy of explanations, I will move on to crucial debates that shaped the field. These debates will cover the questions such as "Are contrastive explanations reducible to non-contrastive forms?" and "Are all contrasts incompatible?". There are certain aspects of these topics that make the contrastive approach substantially important for this thesis. At the end of the second chapter, I will evaluate the possibility of employing the contrastive approach in order to compare different explanations.

In the last chapter, I will present and defend the thesis of contrastive symmetry. As a methodological strategy, contrastive symmetry indicates that types of explanations can be evaluated according to their contrastive character. After a brief comparison of contrastive symmetry with *strong* symmetry requirement, I will argue that assuming less shared intuitions on types of explanations will provide better observation of scientific practices. After that, I will conclude my analysis with a brief discussion on possible broader philosophical alignments and possible weak spots of the idea of contrastive symmetry.

Chapter 1

Symmetry Requirement for Explanatory Choice

As a pioneering example of the studies in scientific knowledge, Strong Programme represents one of the most well-known accounts for organizing the explanatory strategy of research. Explanations are everywhere and it is easy to take them for granted in terms of their function in certain contexts. The novel step of Strong Programme was to propose a cautionary strategy for researcher's selection of types of explanations. It is therefore my first task to visit this strategy to see whether it provides a solid framework for explanatory choice in studies of science.

This chapter has three aims corresponding to its three sections. First, I will introduce the symmetry requirement. A brief overview of the formulations of this requirement by David Bloor will elucidate its philosophical implications (or lack thereof) that call for further analysis. Second, a case study by Bloor and his colleagues will be visited for a charitable understanding of what is aimed by symmetry requirement and related methodological commitments. The case study under focus will be the study of Millikan's oil drop experiment. In the final section, I will argue that even the most moderated definition of symmetry requirement calls for a better understanding of what exactly is the criteria for comparing explanations.

1.1 Story of the Symmetry Requirement

This section will introduce the *symmetry requirement* of the Strong Programme. Before explaining its conceptual framework, it is necessary to visit a brief history of where and why it has emerged.

The field known as Sociology of Scientific Knowledge (hereafter, SSK) has emerged around 1970's. Sociological study of science, prior to SSK, was mainly focused on the scientists as subjects of study under sociological interest. It was the maneuver of SSK to include the science itself as a sociological field of study. More specifically, the advocates of SSK sharpened their methodology to the point where

any knowledge process would be considered as a subject for sociology. In other words, it was an attempted “science of science”. One of the most prominent names of SSK was David Bloor, who categorized the prior sociology as ‘weak’ while his new methodology as the ‘strong programme’ in SSK. According to Bloor, SSK should take knowledge as belief of scientist in the broadest sense. It was the task of SSK to explicate how these beliefs (in this context, about scientific knowledge) are formed. The methods of SSK, in this respect, should replicate the methods of sciences.

Symmetry requirement was one of the four tenets David Bloor formulated to declare the methodology of Strong Programme. These four tenets were thought to be inseparable methodological components of ‘strong’ SSK. They are as follows:

1. It would be causal, that is, concerned with the conditions which bring about belief or states of knowledge. Naturally there will be other types of knowledge apart from social ones which will co-operate in bringing about belief.
2. It would be impartial with respect to truth and falsity, rationality or irrationality, success or failure. Both sides of these dichotomies will require explanation
3. It would be symmetrical in its style of explanation. The same types of cause would explain, say, true and false beliefs.
4. It would be reflexive. In principle its patterns of explanation would have to be applicable to sociology itself. Like the requirement of symmetry this is a response to the need to seek for general explanations. It is an obvious requirement of principle because otherwise sociology would be a standing refutation of its own theories. (Bloor 1991 [1976], 7)

It is not immediately evident what is implied by symmetry requirement (or any of the other tenets) in this form. This was a source of criticism that Bloor received following the release of *Knowledge and Social Imagery*'s first edition¹. Symmetry requirement, as understood in these criticisms, seems to allow the researcher to equate truth with falsity, rationality with irrationality etc. Although this would be a rather liberally shortened version of these criticisms, the important point here is to see that they emerged from the ambiguity around the formulation of the principle at the first place. To tackle this very ambiguity, Bloor went on to further elaborate and explicate the symmetry principle. For the moment it is important to see the motive behind the principle concerning the selection of ‘what

¹ See for example Laudan (1981), where he dissects the dichotomies Bloor puts forward to show how they require different treatment, as opposed to a symmetrical one.

to explain', since it will be the key point to relate this debate to the philosophical account of explanations which will be our subject later.

Bloor's further explications of the symmetry requirement points out a suggested difference in ordinary explanations and scientific explanations. The difference lies in the asymmetrical evaluation pattern of ordinary explanations. According to Bloor, human habituation directs the interests to phenomena according to regularities of ordinary life. In other words, only the events that are out of expectations require explanation in everyday life. While a car crash needs explanations, a normal flowing traffic attracts no *why* questions. There is no need to oppose this, but there is a need for eliminating the residues of this habit for a systematic study of science (Bloor 1991 [1976], 176). In this regard, a classification can be made between the possible candidates of symmetry requirement. Bloor gives a hypothetical scenario² of 'the study of anthropologists researching witchcraft belief in a tribe', in order to show the differences between psychological, logical and methodological contexts of the symmetry requirement. Accordingly, the question 'what would cause a rational person to believe in witchcraft' is a question that wouldn't contradict the anthropologist's method. The answer of the tribe member could be something contradicting with the anthropologist's belief but it would be still evaluated using the same toolshed of explanations.

The interesting question is how the world is going to be described by the actors under study. That the world doesn't contain witches leaves open the question of whether it will or will not be believed to contain witches. Having chosen the true option is no less problematic than having chosen the false one: that is what methodology symmetry amounts to. (*Ibid.*, 177)

Even though Bloor explicates his argument so that symmetry requirement points to the capacity of tracing back the credibility of explanations (Bloor 2004, 937), the credibility under focus is defined in terms of the choice of the types of explanations. It is still not discussed in what ways explanations can be of different or same type. In *Enigma of Aerofoil* (2011, 6) - Bloor's most recent work on the history of aerodynamics - the issue is presented in more or less the same manner.

² This example of Azande tribe and explanation of the belief of witchcraft is most likely based on an actual case (Evans-Pritchard 1937). It curiously invoked an earlier philosophical discussion on the nature of explanations in social science (Winch 1964)

Bloor's complaint is that the symmetry requirement has been misunderstood by philosophers because they interpret the requirement as if it promotes the epistemic equality of truth and falsity.

In conclusion, the debate over symmetry seemed to be trapped between what Bloor insists the misunderstanding is and what is genuinely missing in terms of a criterion for comparison between types of explanations. One way to look at it may be that it was not needed in Bloor's context to take such a distinction seriously. However, it attracts a certain philosophical curiosity to clarify what would be the possible types of explanations in the researcher's toolshed. It is also intriguing to see if a certain pattern of using explanations would tell anything about the character of research. This curiosity is the drive behind the examination of contrastive explanations in later chapters. But for now, I would like to turn to an example of methodological symmetry in use.

1.2 Strong Programme's treatment of Millikan's Oil Drop Experiments

Let us now turn to a concrete case where the symmetry requirement is actually used as a methodological guideline. As discussed above, Strong Programme went through a period of defending its tenets against criticism. A considerable amount of this criticism was directed on the ambiguity of the methodological proposals it was actually making. Meanwhile, David Bloor and his colleagues in Edinburgh were committed to broaden the reach of Strong Programme's applications in study of science. A book titled *Scientific Knowledge*, co-authored by Bloor along with Barry Barnes and John Henry (1996) was intended as an introductory work on the sociological approach to study of science.

In the second chapter of the book, entitled *Interpretation*, the initial aim is to capture what would be a sociological reading of a concrete example from the history of science. The selected case for this task is the famous oil drop experiment of Robert A. Millikan in the beginning of 20th century. As the title of the chapter indicates, the sociological analysis here is focused on the interpretive stages that are crucial in the construction of the experiment, its results and, most importantly,

its further examination by others. Here I will follow the chapter, focusing on the application of symmetry requirement to this particular case.

The experiment was rather simple and accessible within the general concepts of physics. Millikan wanted to find the charge of the electron, a particle that was not as well known about as it is today. In this sense the experiment also played a role in transforming the concept 'electron' as a more concrete entity in scientific terms. The apparatus Millikan used was a container with two charged parallel plates inside and a little hole in the middle of the one on top. Oil was sprayed into the chamber in order to produce little drops of oil that went through the hole and were ionized by the air inside. The observer looked inside the chamber and recorded the movements of charged oil drops. Their falling speed, their behavior when they get close to the bottom plate and their upward movement indicated that they were capturing electrons. According to the relevant laws of physics, Millikan was isolating the effect of electrons on the oil drops and therefore measuring the unit of electron charge itself. Repeated observations and their measurement records provided a pool of data. The impact of interpretation is most visible in this data where it is clear that Millikan was selectively picking out agreeable results.

The analysis of the progress from Millikan's laboratory notes to published papers carried out by historian and philosopher Gerald Holton shows that the procedure was far from being unproblematic. As already mentioned, Millikan did not simply consider all observational data equally. Among them, the ones that made it to the final paper are the ones that are closest to his previously desired results. Holton points out that Millikan defines some results as errors writing "Something went wrong". However, there is no further analysis of what that something really is. This could be the effect of interpretive scientific culture that Millikan is part of. The desired aims of science only care about the approval processes and their stages. It is enough just to point out the falsity or error, without giving further analysis.

Things get more dramatic when it comes to the case of another physicist of

Millikan's time, Felix Ehrenhaft. He was also experimenting to find out the charge of an electron which caused a dispute between his and Millikan's interpretation. Ehrenhaft's conclusion differed from Millikan's realist conclusions about atoms. For various reasons, Millikan's work considered to be more valid than Ehrenhaft's. However, as Holton claims, the proper falsification of Ehrenhaft's work never took place. The long debate between two parties has gradually dissolved as Millikan's view gained more success.

Similarly to the dispute between Millikan's and Ehrenhaft's interpretation of electron charge, a dispute regarding the interpretation of Millikan's laboratory notes arose between Holton and Alan Franklin. Holton's reading of the notes were not accurate according to Franklin. The proper reading of the notes should reveal that Millikan's conclusions were not altered by data selection. What was missing in Franklin's interpretation, if Holton's interpretation was not false? In order to answer this question, authors point out to a central dispute between Holton's and Franklin's interpretations. Only some of the drop records have made it to Millikan's final paper. That means some of the oil drop notes were excluded. While Holton points out this selective process as a crucial dynamic in the final results, Franklin claims that these unpublished results would also give the similar results, so there is no need to be suspicious about Millikan's interpretation. However, Franklin fails to see a point that Holton makes, that is, if every experimental step was openly published by Millikan, that would give Ehrenhaft the chance to relate his work and possibly survive in the scientific debate, rather than become ignored.

Overall, this case supports the view that interpreting or explaining scientific processes requires extra effort to distribute attention to both sides of epistemic states and to distribute it symmetrically. Explaining Millikan's unsuccessful drops in terms of 'the final picture' of his eventual success is exactly what Bloor and advocates of Strong Programme take as asymmetrical treatment. Holton's choice of explanations on the other hand could be seen as a template of symmetrical approach.

As indicated previously, the reason I point out this particular case study is that it represents the methodology of strong programme, especially the use of symmetry requirement. In this respect, it is not the issue here how accurate Barnes et al. are with their interpretation of the historical case³. Instead, how exactly the symmetry requirement is fulfilled by the authors in their own terms is under investigation here.

1.3 Shortcomings of *Same Types*

It is now necessary to ask what makes symmetrical choice of explanations unique. Given the case demonstrated in the previous section, symmetry requirement seems to address a sensitivity to an explanation seeking parts of the scientific practice. Formulated this way, it seems to be a regular bias check that one would anticipate in any legitimate study of science. If it is something more as promised, it will require showing exactly how the choice of explanations could be assessed.

What were the *same types of explanations* in the symmetrical approaches of the case study examined earlier? One layer of the dispute was between two claims over the significance of Millikan's neglected experiment results. On the one hand, we have an explanation:

(A) Even if all Millikan's experimental trials were published, it would still support his conclusions for approximated electron charge. For this reason, "neglected notes" are insignificant when it comes to overall scientific achievement at that time.

On the other hand, we have another explanation:

(B) If Millikan's failed experimental trials were accessible to scientific community, Ehrenhaft would have better chance in the debate. For this

³ For a comparative work on different interpretations of Oil Drop Experiment, involving the same parties mentioned above with an addition of later interpretation from David Goodstein, see: Niaz (2005). The interpretation of Barnes et al. is appraised in this work particularly because of its insight on the problem of inferring the rightness of scientific claims from their eventual success.

reason, there was a chance of prolonging the scientific rivalry and possibly enhancing the fruitfulness of achievements at that time.

If (A) is asymmetrical and (B) is symmetrical choice of explanations, their hypothetical counterparts must reveal the sameness and difference. The interpretation that accommodates (A) should also contain an explanation of the failure of Ehrenhaft. In this case:

(A*) Poor experimental setting and lack of precision was the main reason for Ehrenhaft's failure.

Now, if we compare these supposedly asymmetrical counterparts (A) and (A*), difference is apparent between the content of their explanations, rather than their types. This is not compatible with what symmetry requirement suggested. There is a possible confusion innate in the tenet that enables this switch between components and types of explanations. It is better observable when we try to achieve the symmetrical counterpart of (B). Given the same types of explanations used for accounting success and failure, (B*) will look almost identical with (B):

(B*) Ehrenhaft failed to successfully rival against Millikan because the local scientific culture was promoting Millikan's selected findings.

What is same (or, at least, similar) in formulations of (B) and (B*) is their inference to local contingencies. In this case the same local contingency governs both Millikan's success and Ehrenhaft's failure. These contingencies have more to do with explanatory content rather than the type of explanation. It seems like there is a subtle tie between the content of explanations and the types of explanations used. Symmetry requirement does not offer a method to clearly separate these two aspects. For this reason, asymmetrical explanations can differ in their content and stay similar in structure while symmetrical explanations stay similar in both senses.

As I mentioned earlier, Bloor's struggle with criticism against the symmetry requirement did not go further than a promise that types of explanations can be chosen symmetrically. The intuition is that there is a more or less shared method of comparing the explanations in terms of their similarity and difference. The

ambiguity is twofold. First, we have the unclear relationship between the content of explanations and the type of explanations. It is not obvious how these two aspects work together or whether it is possible to analyze them independently from one another. Second, it is unclear under what criteria explanations can be compared with each other.

Addressing these ambiguities will not necessarily solve any problems of the strong programme. Neither do the advocates of the programme demand any further involvement from philosophy to their game nor is it an urgent topic for philosophy of science to help out sociology⁴. It is rather an independent philosophical task to isolate these ambiguities to see if it is possible to account for problems surrounding explanations.

In terms of accounting for the goals and interests that govern the choice of explanations, I have to make a cautionary point. Bloor and his colleagues have an advanced account for interests in scientific work. In fact, the details of their account (namely, sociological finitism) is presented in the aforementioned book *Scientific Knowledge*. Accordingly, they are not supporting a naive position that could be summarized as “Individual or common interests are the main motive behind the choice of explanations in science”. Instead, their work remains observational in the sense of not asserting a straightforward function to interests but observing the case specific instances where interests let themselves be shown. In this respect, I choose to isolate their take on explanations from their take on interests and goals⁵.

This chapter demonstrated how Strong Programme in SSK understood explanations in scientific context. Accordingly, studies on science must be symmetrical in their choice of explanations. Eventually, this requirement rests on

⁴ In an interview (Li et al. 2010) Bloor’s disinterest is most visible in his humorous final advice to future scholars of science studies:

“Training in history and sociology of science helps you detect self-interest and self-serving ideology more accurately. You will understand through case studies. Your mind will be able to immediately link to the case. So, I would say: encourage history, encourage causal explanatory sociology and above all keep the philosophers out of it [all laughing].”

⁵ See Ylikoski (2001) for a detailed study on the interests in this context. The same author is particularly important for the purposes of this thesis since he is one of the few scholars that work on the topics SSK and contrastive explanations extensively.

an ambiguity that surrounds the unclear intuitions of the criteria to compare explanations. To address this problem, I argue that we must clarify our understanding of explanations in terms of their inner workings as well as contextual roles. In the next chapter this task will be cultivated with the help of relevant debates on contrastive explanations.

Chapter 2

Contrasts *Within* and *Among* Explanations

This chapter focuses on the topic of “contrastive explanation”. Contrastive approach holds that the best way to understand explanations is to explicate their contrastive features. This specific formulation of the subject marks a distinct shift of focus from mainstream contemporary philosophy of explanation to philosophy of contrastive explanation. After a brief excursion through this shift, I will move on to some substantial topics in philosophy of contrastive explanation that revolve around the topics of context, compatibility and reducibility. I argue that a fruitful way to expand these inner-explanation topics is to apply their analyses to the issues of inter-explanation comparison.

2.1 From “*Why P*” to “*Why P rather than Q*”

Carl Hempel (Hempel 1942, Hempel and Oppenheim 1948) is widely recognized as the pioneer of the tradition of contemporary philosophy of explanation. His influential take on Deductive-Nomological model of scientific explanation set the ground for upcoming contributions. At the heart of Hempel’s account, there was a motivation to take an explanation as a sort of argument. As the name suggests, this argument would *deduce* the explanation from a natural law and set of circumstances. The deductive argument explains *why* is it the case that P? In this sense, explanation must be understood as an answer to *why* questions. This insight presents one of the main drives behind scientific inquiry - explaining *why* instead of merely describing *what*.

Aftermath of Hempelian approach to explanations followed largely the task of solving the details of explanations that answer why questions in different settings. Singular causal explanations for example required a slightly different treatment compared to general statistical explanations in science. However, the initial insight that takes explanation as an answer to *why* question stays the same. So does the strategy of investigating explanations as isolated units.

An alternative insight suggests to take another look at *why* questions. The form of explanation seeking to answer the question *why P* is not revealing the fundamental contrastive function of *why* questions. A better way to approach these questions is to consider them in the form of *why P rather than Q*. Explanations are, in this sense, answers to contrastive questions. This contrast might not be explicit. Obviously not all explanations come with their questions, and the ones that come with their questions may not contain the contrastive element in the sentence. A simple “Why is the sky blue?” is not *apparently* pointing out to a contrast. Yet the purpose of contrastive approach is to understand what an explanation is actually doing, while answering the question. The explanation “The sky is blue, because the molecular structure of earth's atmosphere allows blue light to form.” points out an implicit contrast between the possible colors that sky could be. It is blue rather than green, red, yellow etc. because [the explanation].

Furthermore, deciding what is implicitly contrasted is to decide what is in need of explaining. In his pioneering study on contrastive explanations, Alan Garfinkel (1981, 21) illustrates the matter with an example of a famous bank robber, Willie Sutton. When Sutton was asked by a priest why he robbed banks, his response was “that’s where the money is.” What makes the misunderstanding between two parties is their different assumptions of implicit contrasts behind the question. While Sutton assumes the contrast is between “robbing banks” and “robbing other places”, the priest intends the contrast to be between “robbing banks instead of living an honest life.” Therefore, Garfinkel claims:

The effect of such differing spaces of alternatives is not always a joke; what aspect of a given state of affairs we take to be problematic radically affects the success or failure of potential explanations. For an explanation to be successful, it must speak to the question at hand, whether explicit or implicit, or else we will have failures of fit like Sutton and the priest. What we need, therefore, is some way of representing what is really getting explained in a given explanation, and what is not. The contrast spaces give us such a representation of one basic way in which explanation is “context relative.” My claim is that this-relativity-to-a-contrast-space is quite general; I will call it *explanatory relativity*. (ibid., 22)

Similarly, Bas Van Fraassen (1980) argues that the contrastive insight can be fruitful to solve some philosophical problems of explanation. However, the

difficult aspect of this approach is to detect the implicit contrast, which is proven not to be easy in all cases.

Overall, the Hempelian insight into explanations as answers to *why* questions is reformed by some philosophers by suggesting that there may be an implicit or explicit *contrast* inside every explanation that is seeking to answer a question. Contrastive approach, in this respect, pointed out to an immediate difficulty of understanding some questions' contrastive intent. Philosophy of contrastive explanations must investigate the details of this difficulty. It is a crucial question, for example, whether the contrasted elements of explanations should be considered incompatible with each other or not. In later sections, some of the problems that stand out concerning this difficulty will be visited.

Contrastive approach has been spreading to other branches of philosophy as well. It is even a popular taxonomy to understand contrastive explanation as a sub-branch of Contrastivism. My strategy here is to keep contrastive approach only within the scope of understanding explanations. Yet, this choice doesn't necessarily discard Contrastivism entirely. As a self-described "card-carrying explanatory contrastivist", Kareem Khalifa (2010) associates the contrastive approach in explanations as a part of Contrastivism. I would like to express my concern about this diagnosis and its usefulness. As far as the contributions to contrastive explanation topic is concerned, there are number of different motivations and disputes that define the specifics of authors' positions. While some of them take the issue as their central topic, some merely point it out as a side attraction. Therefore, it is hard to say that these developments are part of a certain movement in philosophy.

Two recent attempts to gather literature under the roof of Contrastivism are 'Contrastivism in Philosophy' (Blaauw 2013, ed.) and Social Epistemology issue (vol.22 no.3) devoted to Contrastivism. These sources are arguably the best that one can assemble to present a picture of what contrastivism would be. While some areas associated with this movement are closely related to contrastive explanations

in particular (contrastive accounts of beliefs, for instance) it is difficult to observe the same with contrastive moral theories⁶.

Contrastivism, if understood in rough terms, can be applied to many subject-fields. This rough understanding is already summarized in the *manifesto* (Sinnott-Armstrong 2008) of this movement as *all claims of reasons are relative to contrast classes*. This is promising but not sensitive enough to deal with detailed problems within individual domains. It would not be productive to expect Contrastivism to solve everything, but then again, if there is a question of alignment with a movement or an attitude, we want to deal with the specific problems that are at stake. A very particular set of those specific problems will be discussed here. This is more or less why taking the contrastive idea without any alignment is sufficient, at least for the purposes of this thesis.

Following Gijbers (2017), I will consider contrastivism as a position within the limits of philosophy of explanation that claims that all explanations can be understood in contrastive terms. In this way, the discussion of explanation can be secured without making any commitments.

2.2 Contrastive Explanation and Context

In the literature of philosophy of explanations, the focus on contrastive explanations is often associated with contextualization of claims. If an explanation seeking question is formulated as: “Why is it the case that P rather than Q?”, the contrastive motive is assumed to add more contextual info compared to its non-contrastive counterpart: “Why is it the case that P?”. Therefore, given this assumption, contrasts function as explanatory tools to enhance contextual information.

It makes sense to address this association between contrastive explanations and contextual aspect a bit more closely. To say that some forms of explanation seeking questions are more contextually sensitive is to assume that explanations are directed towards a pool of information, ready to be discovered. This pool of

⁶ See for example Julia Driver’s (2012) contribution in the above mentioned collection.

information is full of alternative outcomes that are close enough to be contrasted with the main outcome.

It seems plausible to accept that whenever the contrast is made to specify a narrower distinction, it serves a contextual purpose. One question is, are there cases where it is difficult or even impossible to pin down such narrow distinctions? After all, if the main outcome (*fact* or *focus* or *topic* are the alternative uses of same idea) is peculiar enough that no contrast would be considered as a close alternative, then it is difficult for the contrast to enhance contextual information. Although the explanation seeking question is still in a contrastive form of “why P rather than Q”, the foil Q here is simply *anything*.

To illustrate this point more concretely; “Why did you wear your red shirt instead of the black one?” is a question pointing out a narrow contrast that aims to make room for demanded explanation in certain context. The explanatory answer is expected to address exactly the contrast given the choice between red and black shirts. What if the question was simple and seemingly non-contrastive like: “Why do you wear a shirt?”. Our habitual response to such question will most likely try to hold onto some contextual assumptions, in order to make something meaningful out of the demand. In its isolated level, the question itself does not give any contrasts for us to formulate our answer. In this case, the best contrast that can be offered here is “Why do you wear a shirt instead of doing something else?”. But even this assumption leaves out the possibility that the original demand was directed not at “wearing a shirt” part. It is equally possible that the intended contrast was that “it is *you* wearing a shirt, instead of someone else”. Therefore, not all contrastive explanations are contextually functional in similar way.

Then what does it mean for a contrastive explanation to have contextual function? Henrik Hålstén (2007) claims that any proper theory of explanation should address the distinction between objective and contextual relevance. An explanation could be contextually relevant when it addresses exactly the contrast pointed out in the question. So it is something to be evaluated after the question is answered. While objective relevance is concerned with truth of the information

given in the explanation, contextual relevance is more about the relation of the explanation to surrounding context. “I’m wearing my red shirt instead of the black one, because my cat is allergic to pollen” could be objectively relevant given that, for example, the black shirt was worn at the picnic previous day and covered with spring pollens⁷. Whether it is contextually relevant is the question of whether the history of the black shirt is known to others. Therefore what determines the contextual function of an explanation is its position with respect to surrounding information.

What makes this relation crucial for the purposes of this thesis is that how it opens a door to see an evaluation pattern of explanations in terms of their contrastive character. However, the most crucial dispute against the contrastive insight is that its sensitivity to compatibility of contrasted elements. The next section will address this issue and show how this problem is deeply connected with the contextual function of explanations.

2.3 Compatibility and Reducibility

For a contrast to be visible, we expect the components of contrast to be incompatible. Only when the alternatives (foils) *are not the case*, the main outcome (fact) is considered as explanatory. A simple incompatible pair would be “lights are on” against “lights are off”. Truth of one outcome is incompatible with the truth of the other. But is this diagnosis acceptable for every single contrastive explanation? Some philosophers have doubts about this issue since not all contrasts have to be incompatible. There may be a different way to approach to the function of the tension between fact and foil in contrastive explanations. In fact, there may be something else going on when fact and foil are brought together, compared to their independent explanations. To see the relevant contributions over this topic, now let’s see how Peter Lipton (1990) has addressed the discussion on incompatibility:

⁷ A more extreme case would involve an explanation that is objectively relevant but it’s relevance is not known to anyone, including the explainer.

We often ask a contrastive question when we do not understand why two apparently similar situations turned out differently. In such a case, far from supposing any incompatibility between fact and foil, we ask the question just because we expected them to turn out the same. By the time we ask the question, we realize that our expectation was disappointed, but this does not normally lead us to believe that the fact precluded the foil, and the explanation for the contrast will usually not show that it did. Consider the much discussed example of syphilis and paresis (cf. Hempel, 1965, pp. 369-70; van Fraassen, 1980, p. 128). Few with syphilis contract paresis, but we can still explain why Jones rather than Smith contracted paresis by pointing out that only Jones had syphilis. In this case, there is no incompatibility. Only Jones contracted paresis, but they both could have: Jones's affliction did not protect Smith. Of course not every pair of compatible propositions would make a sensible contrast but, as we will eventually see, it is not necessary to restrict contrastive questions to incompatible contrasts to distinguish sensible questions from silly ones. (pp.250-251)

What Lipton reveals here is that contrasts are not always in the form of *P* instead of *not-P*. This incompatibility cannot be found on every contrastive explanation. The question is, then, what is the significance of contrasts, independent from the compatibility of contrasted elements. In other words, if the contrast is not built on a distinction between *true* outcomes against *false* alternatives, what is there to contrasts?

Lipton claims that a contrastive explanation in the form of *P* rather than *Q* is not the same thing as explaining *P* and explaining *not-Q*. Contrastive explanation points out to a relation between outcomes and alternatives. And this relation is not always an incompatible one where *P means not-Q*. This point simultaneously argues against a reductive understanding of contrastive explanations. In other words, the contrastive form “*P* rather than *Q*” cannot be reduced to conjunctive form “*P* and *not-Q*” simply because explaining contrast is something different than explaining the components of contrast.

While sharing the idea of contrastive explanations' irreducibility to conjunctive forms, Petri Ylikoski (2001,2007) argues against Lipton, stating that any seemingly compatible contrast can be reformulated into incompatible form. Accordingly, on the syphilis/paresis example, the real contrast is not between Jones and Smith in terms of having syphilis as Lipton portrays. It is between the states of Jones as having syphilis (fact) and being healthy like Smith (foil).

My claim is that all apparently compatible contrasts turn out to be incompatible when inspected more carefully. I have not seen a single example of compatible contrast that cannot be resolved in this manner. There is good reason for this. The explanation-seeking questions have to be reconstructed in the above manner in order to give them a properly contrastive answer. Otherwise the explanatory counterfactual could not do its job. Looking too closely at the linguistic form of the contrastive statement can lead to a misguided analysis. The basic idea in the contrastive approach to explanation is to look for the implied contrasts, instead of being satisfied with the usual statement of explanandum. The same approach should be used here: one should not be satisfied with just any contrastive statement. Instead, one should look behind linguistic formulations and try to capture the real contrast. (Ylikoski 2007, 37)

Overall, the question of compatibility of contrasts seems to be tied with the context where the contrast is indicated. As stated before, explanations in contrastive terms are demanding surrounding information, so that their scope of contrast can be evaluated. When a contrast is made explicit in an explanation, it means that the explanation is situated within surrounding information, that is, other possible explanations. The issue of incompatibility of inner components can be tackled with stating what makes an explanation worthy of contrastive investigation is its connection to the context. As long as that context is stated firmly, contrasts will be revealed as incompatible.

While the examples used to make this argument visible are often simplistic cases, incompatibility and non-reducibility of contrasts are crucial for wider explanatory reasons. Solving the problem of incompatibility will secure a contrastive approach to explanations which is a key step before checking if the methods of contrastive analysis can be applied to inter-explanatory evaluative purposes. I will proceed to show in the next section how this leap is justified.

2.4 From Contrasts Within to Contrasts Among

Contrastive assessment of explanations opens a door to locate the explanatory power among alternatives. A question arises: do the same types of contrasts serve the same function in different contexts? In other words, what makes 'P rather than Q' a sharper or duller contrast than 'A rather than B'? In this section I will explicate in what sense a comparison between different contrast can be formulated.

If all explanations can be evaluated in contrastive terms, as pointed out in the previous section, having contrastive form is not a distinctive criterion for an explanation. While it is possible to choose a linguistic format where contrast is not apparent, given the context of explanation it will be revealed. This is due to the nature of explanations which locates information among others. Assuming the contrasts are implicitly or explicitly there in the explanation is the first step in investigating if an evaluative criterion among explanations is possible.

One way to distinguish some contrastive explanations from others may be their respected spaces of alternatives. Garfinkel (1981) uses similar kind of concept to show the extent of contrastive format “fact rather than foil” is capable of comparing a specific contrast between two possible alternatives as well as one against a specific number of alternatives or one against inexhaustibly large number of alternatives. We can formulate these three intuitive forms of contrasts as follows:

- a) P rather than Q
- b) P rather than Q or R or S
- c) P rather than anything else

While first two types of contrast (a) and (b) seem to rise out of a specific contrast class, the last form (c) contains unknown foil. Then it seems possible to categorize contrasts relative to their exhaustibility of foils. Let’s call it contrast class hypothesis (CCH). For CCH, (a) and (b) types of contrasts will be different than (c) type contrasts.

CCH might be an intuitive way to classify contrasts, however what we are searching for is not a linguistic classification of how contrasts formulated. Instead, we must focus on how a suggested criterion like CCH would portray the explanatory function of the contrasts. As I argued before, the main function of contrastive explanation is to contextualize. For the (c) type contrast, the fact is contrasted with a counterfactual foil that is not necessarily specified. But does it mean that a foil in the form of “rather than anything else” is out of any

contextualization? In fact, a brief examination of this types of contrast will show that it functions in same way with (a) and (b) types.

Recall the example from section 2.3, where wearing a shirt was a fact, contrasted against “anything else”. An explanation seeking question of this type could be answered with “I’m wearing a shirt (instead of doing anything else) because I want to wear a shirt before I go outside”. The explanation immediately formed a connection with a more concrete foil which is “not wearing a shirt before going out” so that the contrast will do its explanatory job. This might look like changing what the initial explanation-asking questions intend just like in the case of Willie Sutton, however it is not possible to exhaust all the possibilities “doing anything else” would infer. This why any (c) type contrast is no different than any (a) or (b) type contrasts as far as explanatory function is concerned.

Therefore, CCH is not a successful candidate for a criterion of evaluation among contrastive explanations. However, through the reasoning of why it fails, we can see a hint of an alternative approach. Since what we expect from such a criterion is to divide the types of contrastive explanations in terms of what they actually do, the answer may be around how they connect the contrast to a contextual setting.

So far I have argued that the best possible way to achieve an evaluative criterion, one that would meet the demands of classifying explanations as similar and different ones, could only be through contrastive approach. In contrastive terms, explanations necessarily connect to other pieces of the given context. It means that we cannot isolate explanations and classify them simply according to their structural traits. However, this is more of a gift than an obstacle. If there is no way to isolate the components of explanations from their context, it allows us to evaluate the relation of explanations to their context. I will argue in the next chapter that there is a promising aspect of this approach that would solve our issue with the problem of choice of explanations of the first chapter.

Chapter 3

The Idea of Contrastive Symmetry

In the first chapter, I have argued that the ambiguity of the symmetry requirement was due to its lack of criteria for evaluating explanations. In the light of second chapter's examination of contrastive explanations, this chapter will propose an account of a criterion for evaluating explanations. I will call this account contrastive symmetry. What this account proposes is that explanations in studies of science should be assessed in terms of their contrastive relation to the context. What this proposal means and how it is different from the symmetry requirement of Strong Programme will be discussed in section 3.1. Following this, I will visit the possible objections to contrastive symmetry in section 3.2.

3.1 From Strong to Contrastive Symmetry

What David Bloor's symmetry requirement suggested is that in the studies of scientific knowledge, the choice of explanations one is using should be symmetrical regardless what part of epistemic state is explained. I argued in the first chapter that behind this requirement there is a problematic assumption that explanations can be classified as same or different. I also argued that this problem requires a better understanding of how explanations work and how they can be classified according to their contextual function.

Explaining why a knowledge claim turns out successful must indeed be conducted with a special care towards how each alternative is situated within given domain. I agree with David Bloor that this insight should be taken seriously. However, symmetry requirement cannot fulfil this task due to its ambiguities explained earlier.

What kind of formulation could be a better alternative then? My proposal is the account of contrastive symmetry. What contrastive symmetry suggests is that the only evaluation criteria for explanations must be their contrastive relation to

given context. A study of scientific knowledge, therefore, must be sensitive to contrastive symmetry of explanations it gives.

Recall the example from the first chapter where the suggested symmetrical pair of explanations of Millikan's success and Ehrehaft's failure was almost similar in its content. Contrastive symmetry suggests that what makes these choices of explanations proper for study of science is their contrastive relation of shared contextual setting. The context in this specific example is how the local scientific culture was promoting a certain interpretation over another. Both sides of the explanation are sensitive to this contextual setting. In this sense, what makes contrastive symmetry different from the symmetry requirement is the emphasis on how explanations are contrasted in a shared context.

In his numerous defenses of symmetry requirement, Bloor often brought up how it is actually something intuitively anticipated from any scientific inquiry to be sensitive in the methodology of choosing what to explain and how to explain. This is even more accurate for contrastive symmetry. Selection of contrasts in a study of science will eventually portray the sensitivity to contexts. If the research is properly conducted, the contextual sensitivities should be clearly pointed out. This is what idea of contrastive symmetry would suggest.

One rather radical move of symmetry requirement was its demand for eliminating any asymmetrical choice of explanations. Two sibling tenets of Strong Programme, impartiality and symmetry, provided a strategy for researcher's default position and method of advancement respectively. For the impartiality tenet, the important thing is to set the position of research in equal distance to any interest within the topic. In Millikan-Ehrenhaft dispute, for example, an impartial way to read the historical setting is to keep the equal distance to Millikan's success as well as Ehrenhaft's failure. What symmetry requirement demands is to go one step forward and explain these equally distant parts in an asymmetry-free manner. This is where the normative project of the Strong Programme gets in front of the research. When the symmetry requirement fulfilled, any asymmetrical explanation is excluded from the picture.

Contrastive symmetry argues for impartiality, while not being unreasonably negative about the accommodation of asymmetrical explanations. There are good reasons for doing so. I have shown earlier the formal difficulty of establishing a good criteria for classifying explanations as Strong Programme proposed. In addition, there is much to expect from ‘seemingly’ asymmetrical explanations, given the context they are accommodated is open to new input of information. Asymmetrical explanations are dubbed asymmetrical only with respect to their comparison with other explanations in the context. Ideally, if there is enough input to establish the connection between explanations, these explanations would successfully address the same context.

With the strategy of contrastive symmetry, the problem of ambiguity around the types of explanations and the content of explanations will evaporate as well. Evaluation of an explanation in contrastive terms is to see whether the components are arranged in order to address the given context. There is no division between the components and the structure of evaluated explanation. In contrastive terms, if an explanation seems to address nothing, (i.e. a random explanation such as ‘It’s raining because the pizza is delicious.’) the best an evaluation could say is that there is a lack of context. That context only could be achieved with contrastive questions.

A relatively recent debate concerning the relation between contrastive explanations and the Strong Programme brought up some topics that I must address in relation to my proposal. The issue was between two critics (Tosh 2007, Lewens 2005) and a defender (Kochan 2010) of the Strong Programme. According to critics, the problem was with programme’s restriction of the use of different types of explanations. Kochan claims that the critics misunderstood what Strong Programme actually suggests which is in fact an accommodation of contrastive spaces that are thought to be restricted. Leaving some details of the debate concerning scientific realism aside, I would like to elaborate how Kochan is only partly right to claim that Strong Programme can accommodate contrastive approach. The symmetry requirement of the programme is in fact suggesting a

sensitivity towards the choice of explanations, while it fails to give criteria how to establish a classification of explanations. In this sense, Kochan is not completely right in his defense of the programme. A full accommodation of contrastive sensitivities about choice of explanations requires a criterion to evaluate how these explanations relate to a given context. Contrastive symmetry is precisely pointing out this gap.

3.2 Possible Objections to Contrastive Symmetry

In this section I will consider some possible objections against my account. First I will give the account of contrastive symmetry in four points, then I will consider the possible objections to either some or all of these points.

I) There must be a special strategy for organizing the explanations in studies of science.

II) Explanatory strategy in studies of science must be impartial to all parts of the subject matter.

III) The choice of explanations can only be assessed in terms of their possibility to share a common context.

IV) Seemingly asymmetrical explanations could be accommodated in the same context if there is sufficient contrastive connection in between.

These four points are not to be taken as a programmatic prescription but only a simplified version of this thesis in its core. After all, the points themselves are the results of examining how explanations are working. Now we can continue with the objections and answers to these objections.

For the point (I), an immediate objection could be the possible redundancy of special explanations for disciplinary purposes. Why would ‘explaining something’ be different in different domains? Why can’t we proceed with common sense understanding that explanations provide causes for the unknown information? To answer this question, we should consider the comparison between explanations in everyday context and explanations in specific study field. As David Bloor pointed out, our habits may lead us to find only the interesting or unusual

events worthy of explanation. It is not the same when we research and study something systematically. Scientific practice is open to re-considerations of established points. The systematic study of scientific practices, such as philosophy, sociology and history of science, in fact promotes establishing their special strategies for “what to explain” in order to reveal more out of seemingly obvious achievements.

For the second point of impartiality, I will consider two possible objections. First, it may be impossible for a researcher to be sure whether every trace of ‘partiality’ is removed. My answer to this objection is that it makes sense to take impartiality as an ideal and make an effort to remove all ‘possible’ traces of partiality. A research on history of science could turn impartial with respect to later discovered information, then it is the later researcher’s duty to balance the field of research. Skepticism about ideal impartiality is not a problem for actual scientific practices. Second possible objection against impartiality would be a demand for the exact opposite. In other words, why wouldn’t a research organize their explanatory strategy intentionally partial with respect to their scientific interests? To answer this question, I must point out that impartiality requirement is there to show possibilities of explanations, not the priorities among them. It is one thing to explain an event partially, but it is something else to defend that the unexplained part was not worthy of explanation at all. While symmetry requirement takes this extra step to regulate, impartiality promotes only the recognition of possibilities.

For the last two points (III) and (IV), one can object that contrastive symmetry allows too much for a systematic strategy. Isn’t it a weakness in research method to be open to *any* explanation, since there is always a possibility that an explanation turns out to be sufficiently connected to the context? In response to this objection I would first like to clarify why and when do we even need contrastive symmetry. As I mentioned earlier, understanding explanations in contrastive terms is useful when we need to understand them better. This is why I call contrastive symmetry a research strategy rather than a set of principles or requirements. Ambiguities around the choice of explanations can emerge in critical

points of research. These critical points need a special attention, and this is where the importance of discussing a strategy of explanatory choice comes in. In this sense, it is not the case that history, sociology or philosophy of science must start first evaluating its explanations. Instead these fields should address specially curated strategies when they are faced with critical ambiguities. Contrastive symmetry is just a proposal for such a strategy.

In this section I tried to consider some possible objections against the contrastive symmetry account. Overall, the core ideas behind the contrastive symmetry hold a rather modest strategy of allowing the evaluation of explanations when needed. This strategy is by no means immune to further criticism. The criticism I tried to meet were more about the primary assumptions I have so far achieved in this thesis. Further improvement and application of contrastive symmetry may encounter criticism of different kinds.

Conclusion

In this thesis, I have argued that explanations in studies of science may benefit from a strategy of organizing the contextual relations between different explanations. An attempt to achieve such a strategy was proposed by David Bloor and his colleagues. In the first chapter, I explored this proposal and argued that it was flawed to assume an intuition about classifying explanations according to their sameness and difference in type. For a better understanding of explanations, a philosophically informed strategy is needed. In the second chapter I recaptured relevant philosophical achievements concerning explanations. Contrastive approach to explanation provides sufficient tools to understand explanations within a context. Following the implications of contrastive approach, I introduced the contrastive symmetry account to show how evaluation in studies of science could use a contrastive strategy to organize the evaluation of explanations.

This thesis tried to capture how arguments in social studies of science and philosophy of science can be considered together fruitfully. Contrastive approach to explanations is important not only for the formal linguistic debates but for debates over the organization of scientific research as well. A valuable task for the philosophy of science is to show how these connections are possible. In this sense, my thesis was a modest attempt to contribute towards such purpose.

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Abstract

Contrastive Evaluation of Explanations in Studies of Scientific Knowledge

Seletuste kontrastiivne hindamine teadusliku tunnetuse uuringutes

In order to explain scientific practices, a study of science must organize its method of explanation. Symmetry requirement in the sociology of scientific knowledge demanded that explaining why scientists conclude their explanations the way they do should be carefully executed with a symmetrical focus on reasons. That is, the possible epistemic states of the practices under study require the same types of explanations, regardless of the actual outcome. One problem with symmetry requirement is its assumption that there is a shared intuition on the types of explanations and ways in which they are compared and contrasted. In this thesis, I explore this assumption and provide a possible assessment strategy that is informed by the philosophical debates on contrastive explanations. My proposal is a strategy of evaluating explanations in studies of science with respect to their sensitivity to given context. Explanations are sensitive to the context only if they are contrastively symmetrical. As opposed to strong symmetry, contrastive symmetry can accommodate wider possibilities of explanations given their intended context.

Keywords: symmetry requirement, contrastive explanation, scientific knowledge

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