DISSERTATIONES PEDAGOGICAE UNIVERSITATIS TARTUENSIS

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Word-formation skill in Estonian children with specific language impairment

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LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on the following articles which are referred to in the text by their respective Roman numerals:

I. **Padrik, M.**, Kikas, E. (2007). Special Education in Estonia. In: Cecil R. Reynolds, Elaine Fletcher-Janzen (Eds). *Encyclopedia of Special Education, A Reference for the Education of Children, Adolescents, and Adults with Disabilities and Other Exceptional Individuals, 3 Volume Set, Third Edition.* Wiley, Vol 2, 849–851.

II. **Padrik, M.** (2005). Wortbildungsfähigkeit der Kinder mit Spezifischer Sprachentwicklungsstörung im Alter von 4–5 Jahren. *Sprache Stimme Gehör*, 29, 174–181.

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The author of the dissertation contributed to the above publications I and III as follows:

- In Study I: carrying out data collection and analyses; participating in writing the manuscript.
- In Study III: supervising the master's thesis of Merli Tamtik, on which the publication is based, and writing the manuscript.

1. INTRODUCTION

In Estonia, teaching children with special educational needs started in the 19th century. In 1928, speech therapy became a specialization. Since 1991, when the Republic of Estonia was restored, teaching children with special educational needs has undergone substantial changes. All discriminatory restrictions have been removed and now all children have the right to education that matches their abilities. In 1995, the Disability Policy of the Republic of Estonia was adopted which fully accords with the UN rules of equal opportunities (The general conception of policy for people with disabilities in the Republic of Estonia; Kõrgesaar, 2002). The pertinent terminology has been changed, and the labeling has been removed. Since 2004, Estonia has been a member of the European Union. The inclusive educational system has become prevailing in the educational policy. Also, the forms of teaching have changed (a decrease in the number of special groups, the formation of integration groups) and the need for individualizing curricula has emerged both in kindergarten and at school. Further, the number of children with special educational needs has increased, partly due to the fact that teachers have become more adept at identifying special needs children and partly due to the new ways of thinking about special needs children. Since it is up to the parents to decide whether their child should attend a special school or a mainstream school, children with special needs are increasingly placed in mainstream schools or kindergartens. Although the government is obliged to have a clear-cut educational policy permitting amendments, supplements and adaptations of curricula according to a student's needs, and ensuring the quality of study materials, in-service teacher training, and the existence of support teachers, it cannot be said that all of these requirements are always met. Obstacles are caused by the country's small size, limited financial and professional resources, and lack of regulations pertaining to the implementation of legislation in some areas (for more information see Study I, changes and problems in the education of children with special educational needs). Similar problems concern children with language impairment, as well as the content and organization of speech therapy. To teach children with language impairment in the conditions of inclusive education speech therapists must have professional competence that allows them to identify such children, to assess their speech and language-related subskills, and to choose/develop appropriate teaching methods and materials. The latter depend on the language that is being taught; therefore original Estonian materials are needed along with pertaining scientific research conducted on Estonian-speaking children. To bridge this gap, the present research aims to provide insights into the area of assessing and developing the language of children with specific language impairment (SLI).

1.1. Specific language impairment: manifestations and mechanisms

The term "specific language impairment" (SLI) refers to children who exhibit a significant deficit in language ability, yet display normal hearing, age-appropriate scores on tests of non-verbal intelligence, and no obvious signs of neurological damage (Bishop, 1997; Leonard, 2007). Their frequency of occurrence is 6–8% (Leonard, 1998; Dannenbauer, 2001). The deficits exhibited by children with SLI can be long-standing, which places them at the risk of underdeveloped reading and other academic difficulties. For this reason, it is important to detect the cause or causes of this disorder, and to search for effective ways of preventing and treating the problem (Leonard, 2003).

In the case of specific language impairment, "specific" has been used to signify the definition of this impairment by exclusionary criteria. In the cases where language impairment is not conditioned by hearing impairment, physical disability, acquired brain injury, autism, or learning disabilities, it can be classified as specific language impairment. This is a syndrome that has several forms of manifestation, which may change in the course of the child's development (Bishop, 1997; Leonard, 1998; Dannenbauer, 2001; de Villiers, 2003; Kornev, 2006). Also, positive criteria or specific errors that have a combination specific to SLI are taken into account in diagnosing. Some of the universal hallmarks of SLI appear to be the late appearance of the first word, and a protracted period of lexical development thereafter. Likewise, word combinations appear at a later age than expected. Many children with SLI are described as having more difficulty with language production than with language comprehension, even if their comprehension ability is below their age level. The grammatical ability of many children with SLI is also quite limited. Grammar is concerned with syntactic relations and grammatical morphemes. Grammatical morphology represents an area of special difficulty (Clahsen, 1991; Bishop, 1997; Oláh, 1998; Dannenbauer, 2001; Leonard, 2003; Rice, 2003; Kornev, 2006). In addition to morphosyntactic problems, SLI children tend to have more or less serious phonological and semantic lexical problems (Nettelbladt, 1992; Schöler, Fromm & Kany, 1998; Dannenbauer, 2001; van der Lely& Christian, 2000; van der Lely, 2003; Kovšikov, 2006). However, these aspects have earned significantly less attention from researchers than grammar.
According to the SLI definition, the "specific" aspect of the impairment primarily concerns its manifestation in language development. However, there may be other aspects in which specific language impairment is not so specific. During the last decades of the 20th century, the following question has become the centre of research interest: are the morphosyntactic deficits caused by SLI specific to particular languages, or are they common to all languages even if the languages have different structural properties? In order to get an answer, cross-linguistic studies are needed which would be helpful in lowering the number of potential factors that might have a detrimental effect on the language develop-

ment of children with SLI (Nettelbladt, 1998; Crago & Paradise, 2003; Leonard, 2007).

It appears that the errors made are language-specific: in different languages SLI is not manifested in the same way, although problems with grammar are inherent in all languages. SLI children differ from their normally developing peers by the degree to which they use particular grammatical morphemes, not by whether they use these morphemes or not. When problematic grammatical morphemes are produced, they are used in appropriate contexts (Leonard, 2007). However, children with SLI do not show the same grammatical profile across languages. So far, in Estonian only the phonological development of SLI children has been researched (Vesker, 1986).

Cross-linguistic studies will additionally help researchers to explain the mechanism of SLI, of which no specific knowledge has been obtained previously. The etiology of SLI is still unknown, i.e., with the present possibilities, content, and reliability of science (in respect of brain science and gene studies) it is not possible to draw correct conclusions about the causes of the phenomenon. At least twogroups of theories attempt to explain the grammatical errors made by children with SLI. These theories can be divided into those which put the problems down to deficits in linguistic knowledge (e.g., Gopnik & Crago, 1991; Clahsen, Rothweiler, Woest & Marcus, 1992; Rice, Wexler, & Cleave, 1995; Crago & Allen, 1996; Niedeggen-Bartke, 1999; van der Lely & Christian, 2000) and those which see as the cause difficulties associated with processing of linguistic information (e.g., Kegel, 1991; Grimm, 1991; Bishop, 1994; Veit, 1994; Johnston, 1994; Leonard et al., 1997; Nettelbladt, 1998; Schöler, Fromm & Kany, 1998; Schöler & Shakib-Ekbatan, 2001; Grela, Snyder & Hiramatsu, 2005; Tallal, 2007). The first set of theories assumes that there is a fundamental problem associated with the underlying grammar of children with SLI as a result of which they have difficulties with the acquisition and use of grammatical rules. Therefore, SLI children more successfully acquire and use inflectional forms (and sentences) which are based on associative learning and memory. These theories follow the Chomskyan tradition (1976), and they remain within the framework of the Principles, Parameter and Innate Grammar Theory. On the other hand, theories advocating a processing capacity limitation assume that children with SLI have an intact underlying grammatical structure. Rather than anything else, their errors result from a cognitive system that has insufficient available resources to let them adequately perform the operations required to produce grammatical utterances. “Information processing difficulties” is a very general term for what includes slow perception of verbal and nonverbal audio impulses, problems in perceiving and producing unstressed or weak syllables, deficit of phonological memory. In the cognitve processing literature, the notion of limited processing capacity is discussed in three different ways: (1) space (a restriction on the size of memory); (2) energy (limitation of energy refers to inadequate fuel to complete a cognitive task); (3) time (limitations dictated by the rate at which information can be processed). Investigators differ as to whether limitations in processing are assumed only within particular

domains (in a single resource) or whether the limitations are assumed to be broad in scope (multiple resources should be assumed) (Leonard, 1998). These theories are based on the positions of cognitive- and neuropsychology. However, most researchers share the opinion that understanding regularities in a language and making generalizations of analogy are truly problematic for SLI children; therefore it may be argued that for these children acquiring a language may not only be delayed but also deviant (Spirova, 1980; Sobotovitš, 1995; Schöler, Fromm & Kany, 1998; Dannenbauer, 2001; Crago & Paradise, 2003; Kovšikov, 2006; Leonard, 2007). In order to better understand the mechanism of SLI, it is important to study different areas within one and the same language and the manifestation of errors in different languages which would enable researchers to discover possibilities for either accepting or rejecting causal hypotheses. One area that has deserved unfoundedly little attention from researchers is word formation, which involves both word compounding and derivation.

1.2. Word formation in the Estonian language

The ways of word formation inherent in Estonian (a Finno-Ugric language) are word compounding and word derivation by means of affixes. In Estonian both of these ways are very systemic phenomena, compounds and derivations constituting a significant part of the lexicon. In Indo-European languages (e.g., German and Russian) both suffixes and prefixes are used. In Germanic languages compounds play an important role in word formation, while in Romance languages word derivation holds the leading position.

There are similarities and differences between inflectional and derivational morphologies. In both cases we deal with adding bound morphemes to free morphemes. But while syntactic relations between language units are expressed by grammatical morphemes, new lexemes are created by derivational morphemes. Derivational affixes modify the meaning of words. The connective link between grammatical morphemes and derivational affixes is that their meaning is categorical, not lexical as in the case of root morphemes. The connection with lexical morphemes lies in the fact that they represent semantic, not grammatical categories. Derivations and compounds form a link between lexicon and grammar. Word derivation has a lot of touch with morphology – the added morpheme determines the phonological form (variant) of the underlying stem. Estonian offers many possibilities for that: a suffix can be added to both vowel and consonant stems (e.g., *lõplik* and *lõputu*), in the case of gradation stems, either to the weak or strong grade (e.g., *korduma* and *korrutama*), and in the case of nouns, either to the nominative or genitive stem ((*eesti) keel – ne* and *keele – line*) (Kasik, 2004). Choosing the correct stem variant is largely a question of mastering a language, which makes it problematic for Estonian language learners (e.g., in the case of language impairment, learning Estonian as a second language). With respect to semantic relations, word formation has

many connective links with syntax (Kubrjakova, 2004; Kasik, 2004). According to the theory of generative grammar, regular word formation (e.g., bilateral derivation of verbs and substantives) is a syntactic-semantic process in which an originally syntactic structure is transferred into a derivation or compound in surface structure (Kasik, 2004). However, such a description does not cover all derivations. Lexicalized derivations as ready-to-use words form a part of the lexicon.

Compounding is the most productive way of noun formation in Estonian. The principal aim of compounding nouns is naming things and phenomena according to their mutual relations. Determinative compound nouns are those in which one part expresses the basic meaning and the other specifies it. The part that carries the basic meaning is called the headword and the part that carries the quality is called the modifier (e.g., *paper knife*). There are also copulative compound nouns, the content of which consists in the sum of meanings of the parts that carry equal importance (Erelt et al, 1995). The present paper deals with the issue of forming determinative compound nouns. Compared to derivations, in the case of compounds the connection with syntax is even more obvious. Compounds consist of two or more full words, whereas one of the components may in turn be a derivation. In English, much research has been conducted into the so-called synthetic compounds in which the head is deverbal, and the non-head seems to fulfill an argument function with respect to the verb which the head is derived from (e.g., *truck driver*). This compound appears to be created on the basis of the verbal phrase `*drive a truck*` (Mellenius, 1997). Kaplinski (1968) has described the basic types of compounds which are formed as a result of transformations from different types of sentences they are based on. Such a process does not always occur in speech. Namely, some derivations and compounds are stored in the memory as whole lexemes (so-called lexicon words, e.g., *desk lamp*), similarly to primary words and word formation rules. Part of the multi-morpheme words are formed according to word formation rules in the process of text creation (so-called text words, e.g., *staircase lamp*). People who master a language find it quite easy to form new words. They do it (1) by transforming sentences while creating text (syntactic word formation), (2) by naming something (terms formation), (3) due to the need to express themselves concisely and clearly, or (4) with a pragmatic aim (random formations) of expressing their attitude or emotions (e.g., *sweater guy*) (Kasik, 2004). Assuming that the purpose of novel word formation is to communicate, compounding offers the easiest and the most effective way to create and transfer new meanings (Libben, 2007).

1.3. The development of word-formation skill in normally developing children

What was discussed above allows us to conclude that word formation is a component of speech which is closely related to the communication process. In terms of the latter, rather than master a large number of ready-to-use linguistic forms (words, sentences), it is more important to acquire the skill of combining units of speech and language (Leontjev, 1969; Sahharnõi, 1979; Šahnarovitš, 1991). But this skill needs to be specially developed in SLI children. It is a linguistic skill that involves semantic, morphological and syntactic constituent skills. Many scientists call the stage in the development of speech and language when children acquire the skills of word formation the "period of word formation". This period runs parallel with the development of the skill of incflecting words and thus starts approximately around the second birthday, and the acquirement of the skills is finished by the pre-school age or in primary school (Ušakova, 1979; Tambovtseva, 1983; Oksaar, 1987; Šahnarovitš & Jurjeva, 1990; Clark, 1995b; Mellenius, 1997). Neologisms provide evidence of the word-formation period. The formation of neologisms shows that children acquire the models of word formation unconsciously and do not always master the language norms. Often, the detected models are characterized by overgeneralization . According to Clark (1995a), children's lexical innovations occur in these areas of language where their acquired vocabulary is rather limited. In this case, with respect to meaning, there is a contrast between SLI children's neologisms and the acquired words. In order to support his hypothesis, Clark (1995b) names the following lexical innovations:

1. New denominal verbs. Children acquire verbs more slowly than nouns, which prompts the need to derive new verbs (*car – to car (to drive))*.
2. Names of subcategories (or class). These are novel compounds (e.g., *plate-egg = praemuna (fried egg); cup-egg = keedumuna (boiled egg))*.
3. Novel compounds labeling the agent and the medium (e.g., *rat-man – a man who works with rats in the lab; garden-man – gardener)*.

The given examples demonstrate different psycholinguistic functions of children's word formation. In the first case, there has been a need to change the part of speech when making up a sentence. In the second and third subtype, we see the semantic development of children's vocabulary: with respect to the differentiation in the mental representation, the meaning of the basic category becomes more accurate and is expressed by forming a compound. The major function of novel compound nouns is to label subcategories (Clark, Gelman & Lane, 1985). Clark et al (1985), Windsor (1993) and Mellenius (1997) discovered that by the age of three children distinguish genuine subcategories from pseudo-subcategories and use compounds more often for genuine subcategories. Genuine subcategories of a category are distinguished by inherent properties (e.g., *a chair with a straight back* and *a chair with a curved back* are both particular kinds of chair – genuine subcategories, whereas *a chair with a sitting dog on it* refers to objects in a momentary juxtaposition – pseudo-subcategory). In

order to comprehend the meaning of a compound, it is necessary to distinguish between the functions of the head-word and the modifier. As young as three-year-old English-speaking children seem to differentiate between two objects that are interacting and two objects that are placed next to each other (Clark, Gelman & Lane, 1985; Nicoladis, 2007). Clark (1995 a) points out facts about the Hungarian language, which is also one of the Finno-Ugric languages. First, Hungarian children learn to use zero-derivation and compounding. From age four or so upwards, they rely almost equally on derivation with affixes and compounding. Thus, in languages that enable forming new words by way of both derivation and compounding, children acquire the compounding skill first because it is more transparent and grammatically simpler than derivation.

1.4. The word-formation skill in SLI children

Together with the general delayed development of speech in SLI children, their word formation skill develops later as well. A question of interest here is whether and how the acquisition of the skill in SLI children differs from their normally developing peers. Many authors have conducted comparative studies on the inflectional and derivational skills in normally developing children and in children with language disorders. The results have shown that the dysgrammatism characteristic of language-impaired pupils is manifested both in word formation and inflection. Schöler, Anzer and Illichmann (1986) point out that the word formation by German-speaking language-impaired pupils can be characterized by variable usage of stems and suffixes in different tasks, which means that in the case of one and the same word the children use different affixes that have a similar meaning and different forms of stems. Marshall and van der Lely (2007) found that English-speaking children with Grammatical-SLI at the age of 9.10 – 16 supply derivational suffixes at high rates compared to the past tense suffixes. However, they make more mistakes of different kinds than the control group of the same age. Also, another result from the same authors is intriguing. Namely, phonological (mono- or disyllabic words) and inflectional complexity (non-inflected or inflected word for the plural) in the stimulus causes non-target outputs to be produced. Hebrew children at the age of 8.7–10.3 show good comprehension of novelly derived nouns, but they perform worse than language- and age-matched controls on the production of novel nouns from verbs or nouns (Ravid, Levie, Ben-Zvi, 2003).

Padrik (1996, 1997) studied the development of the word-formation skill in language-impaired Estonian pupils of Grades 1–3 (7–10 years). The control group included normally developing pupils from Grades 1–2 (7–8 years of age). As the aforementioned study served as preliminary research for the current thesis, it will be outlined below. The study in question investigated how pupils use/form agent nouns (see Study II for a detailed description of the procedure). Children were shown 14 pictures one by one and the researcher said: "*I will show you a picture of a person doing something. Tell me who he is!*" On the

basis of the pictures, it was possible to use different suffixes (*-ja, -nik, -ur*) to form derivations of agent nouns. In each of the cases, also a compound noun could be formed because the Estonian language system enables us to express the same meaning (to label an agent) by both a derivation and a compound. It was found that the pupils' word-formation skills were in the developmental stage (see table 1). It appeared that in Grade 1 derivations and compounds formed only a quarter of the answers provided by language-impaired pupils, while in Grade 2 they already formed three quarters. The percentage of derivations and compounds in Grade 3 language-impaired children's answers, however, was even higher and the results were comparable to those of the Grade II control group (over 90% of derivations and compounds in answers).

Table 1. Preliminary study: types of responses in agent-labeling task (%).

Grade (N)	Control group Grade 1 (9)	Control group Grade 2 (11)	LI group Grade 1 (special school) (8)	LI group Grade 2 (special school) (8)	LI group Grade 3 (special school) (11)
Phrases	20	2	42	8	0
Simple nouns	10	3	30	9	9
Compounds	7	8	1	6	13
Novel compounds	4	2	4	1	0
Derivations	51	79	20	65	73
Non-expected derivations	0	5	1	1	1
Neologisms	3	0	1	5	4
Failures	5	1	1	5	0

LI – language-impaired; % has been calculated from the total sum: control group Grade 1 – 126, control group Grade 2 – 154; LI group Grade 1 – 112; LI group Grade 2 – 112; LI group Grade 3 – 154.

The following types of neologisms occurred:[1]

- Use of a morpheme which is semantically different from the target morpheme. Either a contextually unsuitable stem morpheme (e.g., *jooksnik* instead

[1] *Note.* The current study uses the concepts below in the following meanings:
Neologism – derivation that does not correspond to the language norm.
Novel-compound – compound which adults would not use in their daily interactions and which fail to correspond to the language context.

The current paper views neologisms and novel compounds from two aspects:
(1) as lexical innovations that emphasize the developing word-formation skills;
(2) as children's answers that are different from the target. When describing SLI as an impairment, they are also called errors (or mistakes). That is to say, when describing an impairment, errors are seen as features distinguishing SLI children from the control group.

of jalgpallur) or an affix of another part of speech (an adjectival affix instead of a nominal affix) was chosen. Conditionally, these can be named dyssemantic derivations.

- Use of a morpheme which differs from the target morpheme (suffix) in terms of language norms – replacing a suffix by one with a similar meaning within the same part of speech (*kalanik* instead of kalur). These are morphological neologisms.
- Use of a wrong or phonologically malformed stem variant or affix (*kooja* instead of kuduja, *lendurik* instead of lendur). These may be called morpho-phonological neologisms.

There were also combinations of several types of neologisms. Children also formed novel compounds, i.e., they combined unusual stems and formed compounds that are generally not accepted in Estonian (*mesimees* instead of mesinik; *sõjaonu* instead of lendur). In all the classes morphological and morpho-phonological neologisms prevailed in novel formations. One problem associated with this study (Padrik, 1996, 1997) is that it was conducted on a small sample of participants. However, even though the results were not representative enough, the study allowed us to describe the types of neologisms, at the same time generating interest in further research into the word-formation skill of pre-school SLI children, targeting a more narrowly defined group (SLI children instead of language-impaired children).

Analyzing the reasons for errors in word derivation, Spirova (1980) found that language-impaired pupils perceived each word as something independent and new, unrelated to other words of the same stem either by meaning or sound. According to Sobotovitš (1995), it is difficult for SLI children to operate with derivational morphemes – to choose and order them. For them, even acquiring and reproducing the phonetic forms of morphemes is problematic. Consequently, they experience difficulties in acquiring the sign system necessary for expressing meanings, including the phonetic composition of morphemes.

Nevertheless, some scholars argue that inflectional morphology is impaired in SLI but derivational morphology is not (Clahsen, 1989; Rice& Wexler, 1996; Leonard, 1998).

Relatively few studies have examined compounding in children with SLI, and the obtained results are controversial. Based on his study, Dalalakis (1999) reported that English- and Greek-speaking children with SLI had general difficulties with word decomposition and word formation. The study by Grela, Snyder and Hiramatsu (2005) showed that children with SLI at the age of 4.8.–7.0 were as likely as their normally developing counterparts to be aware of the semantic and syntactic constraints governing the production of compounds. However, children with SLI used the information presented in the experimental probes less than the normal controls and made more word-order errors in their production of novel compounds.

The results of studying the word-formation skill of SLI children are inconsistent because of the age differences of the samples, different research methods and the specific features of different languages. However, many

scientists agree that deficits are evident in word formation (both in derivational morphology and in word compounding), but it is unclear how extensive these deficits are.

1.5. The basis for teaching the word-formation skill

The conclusion that can be drawn from the aforementioned is that in language-impaired children the skill of word formation needs to be developed separately, as a special aspect of speech development. In Estonian special education, an important underlying principle of speech development methodology, incl. speech therapy, is action theory (Leontjev, 1965; 1969; Luria, 1979; Võgotski, 1984 et al), according to which speech is initially a semiotic interaction between an adult and child and as such is essentially a social phenomenon. Any new mental act is initially realized externally and therefore needs external support.

Structurally, actions consist of purposeful acts and operations, i.e., special ways of realising these acts. In teaching, one needs to determine these acts and find appropriate teaching methods for them. In the context of the current paper, then, this means that an adult working with language-impaired children must determine the word-formation acts as well as externally stimulate their materialization. In the course of practice, these acts will be automatized and will become internal operations of speech activity. The other important underlying theory of teaching methodology is cognitive psycholinguistics which was born in the 1970s and is interested in how the cognitive structures of thinking are expressed in language (Karlep; 1998; Kubrjakova, 2004). According to Kubrjakova (2004), a derivation is a reflection of one's knowledge structure in speech. People conceptualize and categorize information, and one of the ways for denoting the latter is the use of derivation and compound words.

Linguistically, the current paper will view word formation in the light of synchronic theories, which see word formation as an active process having common features with both form formation and syntax. In this respect, it is relevant to involve the concept of productivity or regularity which allows us to describe word formation by means of grammatical tools (Kerge, 1990; Kasik, 2004).

When children need to find a suitable word for their utterance, they can either (1) search for a ready-to-use word in their memory; (2) form a novel word on the basis of an analogous example; or (3) form a word using an instinctive rule (Mellenius, 1997; Kubrjakova, 2004;). Taking a lexical compound as the basis of analogy, a child seems to copy the word (e.g. , *fisherman, car-man, trainman*) (Kubrjakova, 2004). When the same analogy gets to be used on several occasions, it will eventually become a new morphological rule (Mellenius, 1997). Often a compound is used in speech to replace a syntactic construction. The compound has been defined in the previous context. For example, *Ma tahan seda torti, mille peal on maasikad. Maasikatort on kõige parem. Aga kas see, mille peal on päike, on päikesetort?(I want that cake with*

strawberries on it. Strawberry-cake is the best. But is that one, with a sun on it, called a "sun-cake"?) (Author's examples). In the given example, to form a compound, one must first spot the components *(tort…maasikad; cake…strawberries)* in the previous context and then change their order (s*trawberry-cake*). In that case a more complex analogy is applied – a phrase or a pair of words is taken as the example (*cake with strawberries; tordi peal on maasikad – maasikatort; strawberry-cake; tordi peal on päike; cake with a sun on it – ... (päiksetort; sun-cake*). The ability to form compounds on the basis of direct analogy is developed earlier on, and its primary aim is to fill the lexical gaps in the vocabulary. More complex analogy is needed to make up sentences and to create texts (Clark et al., 1988; Karlep, 2003; Nicoladis, 2007).

When teaching the word-formation skill, we actually try to practise and fix the patterns of word formation. Kerge (1990:46) defines patterns of word formation as follows: "Word pattern (the pattern of word formation) is the form of linguistic combination of signifiers in which the semantic elements give a certain total meaning." The characteristics a the pattern are productivity (gives a maximum of possible formations), frequency (the set is large), and openness (it is possible to form words that are defined within the context) (Kerge, 1990). It is reasonable to teach patterns that have such characteristics. Clark (1995 a) describes three factors that influence the acquisition of patterns of word formation in normally developing children: (1) productivity, (2) transparency (the new meaning must be accessible in part from the elements making up the new word), and (3) simplicity (the simpler a new word's form, the easier it is to interpret and coin it – that is, the less its root changes in the process of its construction).

In the opinion of many authors, the formation of a pattern is based on two processes: analysis (segmentation) and synthesis (Sahharnõi, 1980; Šahnarovitš, 1991). As a result of analyzing the practicality and linguistic resources, semantic changes and the linguistic resources labeling them are discovered. The relation "morpheme – meaning" is formed which, if generalized, will lead to a pattern of word formation. Based on the pattern, a new linguistic form (a derivation or a compound) is synthesized (transformed) using the existing linguistic resources to express the semantic change.

Psycho-linguistically, two groups of operations that children acquire at preschool age can be distinguished in word formation:

- Combining stems and/or a stem and an affix in the process of creating a sentence in order to form derivations or compounds (e.g., *Tüdrukul on sinised silmad. Mulle meeldib see sinisilmne tüdruk. The girl has blue eyes. I like this blue-eyed girl.*) - henceforth syntactic word formation.
- Word formation on the basis of analogy (based on a single word or a word pair; (e.g., *sinisilmne – kergejalgne*; *blue-eyed – light-footed, light-hearted*)– henceforth derivation of analogy (Sahharnõi, 1980; Schöler, Lindner, 1990; Šahnarovitš, 1991; Padrik, 1997).

In the process of speech production these operations are intertwined.

Elaboration of the following methodology was based on the methodology of teaching grammar, including word derivation, in regular and special schools for language-impaired pupils (Levina, 1968; Spirova, 1980) and for pupils with learning disabilities (Triger, 1981; Slepovitš, 1989; Karlep, 1990 a, b, c; Karlep & Padrik, 1996). The principles of *speech therapy corresponding to the level of development* elaborated by German authors for developing the language of SLI children were used (*die entwicklungsproximale Sprachtherapie*; Dannenbauer, 2003): children are helped in finding the essential characteristics of the linguistic form to be learned and as a result arrive at generalizations which are then activated at the maximum. The therapist increases the frequency of use in the children's speech of a linguistic form that corresponds to their language development, pointing out its semantic and formal contrast (in the present study the semantic and formal comparison of the base word and the derivation). In English language literature, structured imitation-based and modeling approaches to treatment of SLI children serve as examples (Leonard, 1998; Fey & Proctor-Williams, 2007). In the first approach, the experimenter produces the exact sentence or phrase or word that is required of the children and the children are asked to repeat it. The children's attention is then drawn to the detail in the utterance serving as the target of interest (e.g., *Kas see on värviline või värvine paber? Is it a coloured or colourful picture?*). Pictures or enactments with toys are presented along with the phrase or word to be imitated. In the modeling approach, the child observes someone (the model) producing examples of linguistic form serving as the focus of treatment. Then the child is asked to take turns with the model, producing new examples of the target form once the observation period is over. Pictures or enactments with toys frequently accompany the modeling. Modeling is also a type of imitation, but what is imitated is a rule for combining morphemes.

In the case of derivations we deal with words as units of language. Zikejev (2000) has presented the stages of acquiring units of language which have been taken into account in developing the teaching methodology:

1. Presenting a unit of language and explaining its meaning (e.g., an adult uses derivations in his/her speech, explaining or specifying their meaning).
2. A unit of language is reproduced by the pupil (e.g., by answering the alternative question by using well-known words with the suffix *-ne*)
3. Variation and combination of units of language (e.g., producing derivations with the suffix *-ne* from different base words, including those that are less common in everyday speech).
4. Using units of language in spontaneous speech (pupils form/use derivations with the suffix *-ne* spontaneously in everyday speech).

Ordering the methods of teaching has also been used in the methodology of teaching foreign languages at preschool age. Negnevitskaja and Šahnarovitš (1981) suggest that vocabulary should be developed in the following stages:

1. Passive recognition of a new word – children need to decide whether the presented word corresponds to an object or a picture (Y/N answers; e.g., *Is this coloured paper?*)

2. Active recognition of a word – children have to choose an object or a picture corresponding to the word (e.g., *Show me coloured paper!*)
3. Reproducing words – children need to choose a word that matches in form and/or content and repeat it (e.g., *Is it a coloured or colourful picture? Is the man a builder or a building?*).
4. Using a word independently (e.g., *Who is Priit's father? (a builder). There are squares in the Mathematics exercise book. What is the Mathematics exercise book like? (squared)*)

Spirova (1980), Schöler & Kany (1989) and Sobotovitš (1995) claim that for language-impaired children it is more difficult to analyze (segment) words morphologically. In order to develop the named skill we can use the algorithm of analyzing grammatical forms (Aidarova, 1978; Karlep, 1990 b, c):

1. Changing the linguistic unit (finding the base word or derivation).
2. Comparing the meanings of the base word and the derivation (e.g., *värv – värviline*; *colour – colourful*).
3. Comparing the form of the derivation with that of the base word (e.g., ***värv – värvi****/line* ***colour – colour****/ful*).
4. Finding the segment that changes the meaning of the linguistic unit and creating the "morpheme – meaning" connection (finding a prefix or a suffix as segments that change the meaning).

Schöler and Lindner (1990) call such an activity decomposing which forms a basis for forming analogies (see also Study IV).

Study IV gives an overview of how patterns of word formation can be practised. Determining the order of teaching particular patterns is dependent on (1) the productiveness of each pattern and the frequency of using a corresponding affix in a given language; (2) the semantics of the affix (it is easier to acquire suffixes (morphemes) which have a clearly perceivable relation to the change of meaning). Taking into consideration the previously described difficulties in choosing the suffixes (morphological neologisms; Padrik, 1993; Padrik, 1997), it is reasonable to use at least two different algorithms with different teaching aims:

1. Introducing one pattern of derivation and shaping the skill of applying it (e.g., deriving adjectives by using the suffix *-line*).
2. Distinguishing between different patterns of derivation and shaping the skill of applying them (e.g., deriving adjectives by using the suffixes *-ne, -lik, -line*).

In view of the theoretical approaches and language teaching methodologies described above, in the case of two teaching algorithms the stages of teaching could be listed as follows:

Algorithm 1 (introducing a pattern of derivation and shaping the skill of applying it):

1) understanding the meaning of derivations;
2) reproducing derivations (verification exercises);
3) using/forming derivations in context, analyzing them;
4) creating patterns of word derivation;
5) applying the patterns, i.e., forming derivations from different base words;
6) correction exercises.

Algorithm 2 (forming the skill of distinguishing and using different patterns of derivation):

1) distinguishing between the meanings of derivations with different affixes;
2) grouping and reproducing derivations;
3) analyzing derivations, choosing the schemes of derivation;
4) verification exercises;
5) correction exercises;
6) independent application of different patterns of derivation with and without context.

2. THE AIM OF THE STUDY

Successful education of SLI children largely depends on the effectiveness of speech therapy they receive. Unfortunately, the etiology and psycholinguistic mechanism of SLI is not yet clear. In order to understand it better, it is necessary to study all language areas and conduct comparative studies between languages. Word formation is an aspect of language that has received comparatively less attention than other aspects, such as tense or agreement labeling. Research results in this area are controversial.

The Estonian language is very productive in terms of compound words and derivation. Words, including compound words and derivations, belong to the lexicon; on the other hand, the production of multi-morpheme words can be described by the rules of grammar just like various other word forms and sentences. Compounds and derivations can be described as liaisons between the lexicon and grammar rules (Kasik, 2004). Word formation (especially word compounding) is the area that enables one to monitor children's creative capacity for enriching their vocabulary (Libben, 2007). In the current study the researcher proceeds from the position that word formation is a process which has common features with both morphology and syntax. But in these areas SLI children manifest the greatest problems.

On the basis of the above facts, it appears that word formation is the field of vocabulary studies where the differences between children with normal speech and language development (ND) and SLI children are identified. The results of the study are interesting in terms of the diagnostics of language impairment and developing language, and they allow the mechanism of SLI to be specified.

The present work aims to gain knowledge on the acquisition of word formation skills of Estonian SLI children.

The study has three main goals.

The first one was to reveal which specific features of word-formation skills characterize SLI children by comparison with their typically developing peers.

The second goal was to interpret the word-formation mistakes made by SLI children in the light of the approaches to different accounts of SLI. What causes SLI is not completely clear yet, because experimental studies involving very young children and thereby allowing researchers to explain the triggering mechanisms are scanty. One possibility to test causal hypotheses is to contrast them in descriptive research. Analyzing children's answers and errors would enable researchers to make assumptions about the mechanisms of their occurrence.

The third goal of the current research was to develop methods of intervention in therapy and classroom use, with the aim of forming patterns of word derivation. Systematic teaching is possible if a child is at the level of development when s/he is able to produce elementary texts and can change the order of words in a sentence, hence mostly at school age.

Research questions:

1. Are there any specific features of word-formation skills that (a) are manifested in the same way in different languages, and (b) reflect the peculiarities of grammar acquisition in one language (in this case – in Estonian)? What are these? (Studies II and III).
2. Based on children's word-formation mistakes, whether and how is it possible to assume which theory can account for the grammatical deficit in SLI children? (Studies II and III). The validity of two main groups of theories – the grammar-specific theories and the input-deficit theories – is studied.
3. What could be the stages of intervention in classroom-based teaching of word-derivation patterns and how does the application of the latter influence the word-derivation skill of language-impaired children? (Study IV). Which constituent skills should be developed? What should the exercises and language material be like?

3. METHODOLOGY

3.1. Participants

Table 2. Children who participated in the study.

	SLI children	Age and gender	Control group	Age and gender
Study II	40 children	from 4.2 to 5.11 years (mean age 5.1.) 29 boys, 11 girls	40 children	from 4.5 to 5.7 (mean age 4.9) 30 boys, 10 girls
Study III	12 children	from 5.1. to 6.9 years (mean age 6.0) 7 boys, 5 girls	60 children	from 5.0 to 6.9 years (mean age 6.0) 30 boys, 30 girls
Study IV	12 children	from 8 to 12 years	–	–

The children in Studies II and III were recruited from 7 kindergartens in 3 towns (Tartu, Elva, Pärnu). Children at the age of (4)5–6(7) were selected because at that age normally developing children actively acquire the skill of word formation. The children in Study IV were in Grade 2 at Tartu Hiie Kool (school for language-impaired pupils). The grade was selected on the basis of the results of earlier studies conducted by Padrik (1993; 1997) which showed the following:

1. For children in Grade 1 word-derivation tasks were not accomplishable yet: they were unable to simultaneously follow the language form and content their vocabulary and sentence structure were too limited and insufficient.
2. Compared to the pupils in Grade 1, Grade 2 pupils perceived linguistic analogy better. However, neologisms were often produced and pupils frequently refused to answer. It was presumed that teaching the word-derivation skill would support children's development and thereby help them to develop generalized derivational patterns.

All children with SLI were receiving speech and language intervention services. The assessment of speech and language development in SLI children is based on the expert opinion of speech therapists. Unfortunately, Estonia has no standardized tests for assessing the development of speech and language. All speech therapists involved in this study had the highest standards of professional qualification and 5–8 years' work experience with SLI children. According to their expert opinion, all the SLI children had language deficits in syntax, phonology, and inflectional morphology. They remained within normal limits for language comprehension, but were below average for expressive language.

The assessment of the development of the children's intellect was based on the expert opinion of the speech therapist, as well as on their parents' and school/kindergarten teachers' assessments in Studies II and IV. At the time of

conducting these studies it was not possible to use standardized tests for measuring cognitive ability in Estonia. Based on expert opinions, none of the children showed signs of neurological or socio-emotional dysfunction or intellectual disability; all the children in the study had language impairment.

For assessing children's intellectual development, Study III used Kaufman's Assessment Battery for Children (K-ABC) (standardized Estonian version by Männamaa, 2000) and its four non-verbal ability sub-tests, namely those of hand movements, triangles, matrix analogies, and spatial memory. The children's results were within the normal range. All the children passed a screening of their hearing and oral-motor abilities. According to parental or teacher reports, none of the children showed signs of neurological or socio-emotional dysfunction.

Study IV involved all the children of the same grade at school. It needs to be pointed out that grades in special schools definitely do not comprise "clear SLI cases"; rather, there are individuals with more or less clear SLI symptoms. These pupils have varying developmental histories, but their primary problem is language impairment. The study aimed to develop methods of therapy which would be applicable in daily special pedagogy practice, where, instead of clinical criteria, study groups at school are formed on the basis of children's learning ability and mechanisms of their disability.

The control group in Studies II and III comprised normally developing children matched by age. The assessment of the development of the children's intellect, speech, and language was based on the expert opinion of the speech therapist, as well as on their parents' and kindergarten teachers' assessments. None of the children in the control group had received language intervention services. Study IV involved no control group, which admittedly decreases the reliability of the results. However, there is only one specialized school for children with language impairment in Estonia and finding a control group with children matching by age and by language development proved to be unrealizable for the researcher.

3.2. Procedures and materials

In Studies II and III descriptive and causal-comparative research methods were resorted to.

Study IV used one-group pretest-posttest experimental design which involved three steps: (1) administration of a pretest measuring the dependent variable; (2) implementation of the experimental treatment (independent variable) for participants; (3) administration of a posttest measuring the dependent variable again.

Study II focused on the word-derivation skill of nouns, Study III on the comprehension and production skills of compound nouns, and Study IV on how the skill of deriving nouns and adjectives was developed. In Studies II and III,

as well as in the pretest and posttest of Study IV, the tasks were presented to children individually. Teaching in Study IV was carried out in a group.

Study II contained only one task, the aim of which was to determine how children used/formed agent nouns. Children were presented with 14 colored pictures in A4 format; each picture depicted a person doing something. On the basis of the pictures it was possible to use different suffixes (*-ja, -nik, -ur*) to form derivations of agent nouns. In each of the cases it was also possible to form a compound noun, because the Estonian language system enables speakers to express the same meaning (label an agent) by both a derivation and a compound. For example, there was the following picture: *A man is fishing*. Possible answers were: *kalur – fisher* (derivation), *kalamees – fisherman* (compound), *kalapüüdja – fish catcher* (compound with a derivational headword). The activities and objects described on the pictures were familiar to children. Children were shown a picture and the researcher said: "*I will show you a picture of a person doing something. Tell me who he is!*" The children were given two practice trials where the researcher also provided a verbal context for the picture. For example, the researcher said: *"Look! A man is fishing. He is a fisherman. But here a boy is riding a horse. He is a horse-rider.*" In the test tasks the researcher asked: "*Who is on the picture?"*

Study III consisted of 3 tasks. The tasks were presented to children via the computer. The aim of Task I *Comprehending compounds* was to study whether children use both the modifier and the headword to comprehend a compound as a whole and whether they understand what effect the order of word components has on the meaning of a compound.

In Task II *Labeling of sub-categories* the children had to label three types of sub-categories: (1) inherent sub-categories of a known category (e.g., cars made from candy, a banana, and an apple); (2) semi-inherent sub-categories (e.g., blocks decorated with stickers of a cat, a car, and a doll, respectively); (3) accidental sub-categories (e.g., a tree with a bird sitting in it; a book with a block placed on its cover). The aim of the task was to investigate whether children distinguish genuine sub-kinds from accidental juxtapositions. If they do, they should be more likely to use compounds (such as an **apple-car* or a **cat-book*) for objects that are integrally related, that is, for inherent and semi-inherent subcategories rather than for pseudo-categories which label the objects in temporary juxtapositions. The children have to produce novel compounds.

In Task III *Producing compounds on the basis of sentences provided (verbal context)* the children had to produce compounds on the basis of a picture slide and verbal context provided by the researcher. Compared to the previous task, the given task proved to be more difficult for the children as they had to memorize a whole set of verbal information presented, to find the components of compounds in the sentences (e.g., a *castle is made of sand*), and to put the components in the right order for producing a compound (e.g., *a sand/castle*). The context and the slide enabled the subjects to produce transparent and non-

lexicalized compounds. It was assumed that by comparison with the previous task, the children would make more mistakes in the task that is grammatically more complex and presupposes a larger processing capacity. For details please see the description of methodology in Study III.

In Study IV pupils of Grade 2 at Tartu Hiie Kool (school for language impaired pupils) were taught derivation of nouns and adjectives for two months. 20 lessons were conducted: eight lessons focused on forming different patterns of derivation one by one (the first teaching algorithm was applied); 12 lessons focused on distinguishing between different patterns of derivation (the second teaching algorithm was applied). The first teaching algorithm alternated with the second (e.g., after forming the patterns of derivation of nouns, distinguishing between these was focused on, after which the teachers moved on to forming the patterns of adjective derivation). The lessons were conducted by a class teacher who followed the lesson plans and used the teaching materials prepared by the author of the present paper. Previously, the teacher had been duly instructed. During teaching the teacher made notes in the lesson plans on the suitability and feasibility of the methodology and the materials.

Below the stages of teaching will be described and examples given of the techniques used (see also Study IV).

I: Introducing a derivation model and developing an application skill.

The aim is to teach children how to derive words by means of the ... suffix and subsequently apply the acquired skill in sentences. Only one suffix is involved. If the suffix can convey several meanings, one basic (most frequently used) meaning is initially confined to.

I Comprehension and reproduction of derivations using the….suffix.

The most frequently occurring derivations learnt by pupils as ready-to-use unanalyzed chunks will be actualized. At this stage the teacher will use in her/his speech many words with the suffix to be learnt, explaining their meanings. For semantic practice, the following techniques may be suggested:

- Passive recognition of derivations. For instance, *Is this dress checkered? – Yes. Can you call a dress with stripes a checkered dress?*
- Active recognition. For instance, *Give me a colored pencil!* Show me a *colored pencil!*
- When explaining the meaning of derivations, one must proceed from a morphological analysis, i.e., reveal what the derivation is based on. For instance, *What can you see on a flowery dress? – Flowers. What is a dancer doing? – Dancing.*

For better results, the teacher should repeat and correct the pupils' answers, emphasizing in her speech the contrast (connection) between the derivation and its basis (*flowery – flowers; dancer – dancing*).

When reproducing derivations whose meanings are familiar, students can get help and support from

- verification tasks – in which the child is provided with two derivations and asked to choose one which is suitable (correct) either by meaning or form. So, students will ascertain whether the meaning or form of a particular derivation is correct (semantic and form verification).

For semantic verification, the teacher will provide derivations that have either a semantically unsuitable stem or suffix (e.g., *Kas see on värvine või värviline paber?).* For the purpose of form verification, such derivations are provided which deviate from the language norm by having an inappropriate/ distorted stem or suffix (e.g., *Kas see on muldne või mullane labidas?).* When choosing vocabulary items for verification tasks, the teacher should be aware of and take into consideration the mistakes that children tend to make (wrongly chosen suffixes, faulty stems).

In Stage I, thus the teacher will create so-called "problematic situations" in which the learner needs to understand the meanings of derivations, explain them, and choose the correct/appropriate derivation.

By completing Stage I the child will learn to understand the derivations used in adult speech and will him/herself be able to choose derivations which are correct by their meaning and formed after one derivational pattern.

II. Formation and use of derivations independently. Creation of derivational patterns as generalizing images or visual schemata/schemes.

The aim of this stage is to help children start generalizing on the basis of analogy, i.e., they will learn how to form derivations with suffixes according to rules.

Generalization on the basis of analogy happens thanks to analyzing skills. In Stage I, too, analyzing skills were used (explaining the meaning of a derivation, verification), but largely unconsciously. In contrast, in Stage II the learner will become aware of the analyzing skills he/she needs. At this stage, the learner will proceed from a situation, either real or imaginary, and will use as context the short text which requires him/her to form/use a derivation. Thus in acquiring the skill of morphological analysis, the learner's primary action is the creation of a derivational pair (the base-word and derivation itself) in a problematic or playful situation. Derivations are formed in both sentences and phrases.

- In a sentence – the teacher presents a derivational basis and derivation in context. The student must fill in the gap analogically to the example given (e.g., Teacher: *Kingad on liivaga koos. Kingad on liivased. Saapad on poriga koos*. Learner: *Saapad on .....(porised)*).
- In the case of phrases, the verbal context is shorter, which is why the analogy will be more clearly evident than in sentences (e.g., *lill – lilleline kleit; täpp – .....(täpiline) kleit*).

For subsequent analysis, the word pairs will be written on board and repeated orally: *täpp – täpiline; lill – lilleline*.

This is followed by word-pair analysis, in the course of which the base-words and derivations are contrasted and their meanings and forms are compared. On the basis of this analysis, a mental picture of the derivational pattern will emerge which can be materialized with the assistance of a scheme.

- By way of comparing and contrasting the base-word and derivation, the learner will ascertain their differences in meaning and form; in other words, he/she will notice the suffix that changes the meaning.

The contrasting of words is performed letter by letter:

L I L L LI L L E L I N E

- As a result of word-pair contrasting, the learner will find which part the two share and will, in very simple terms, formulate its meaning (e.g., the *-line*-suffix helps express different qualities of things).

lill – lille**line**
värv – värvi**line**
täpp – täpi**line**

So the first contrasting is horizontal (base-word ↔ derivation), while the second one is vertical (derivations with the same suffix: ↓).

As a result of comparing and contrasting, the learner will conjure a generalizing mental pattern of analogy. In doing so, he/she gets support from the a graphic scheme of derivation.

- Demonstration of a derivational scheme followed by word-derivation practice

On the board: ☐ + -line → ☐

värv + -line → värviline

This will be followed by application of the model, i.e., forming derivations from the given words on the basis of the above scheme and placing them in a context that will help specify the meanings of the derivations.

However, this word-derivation scheme is unable to help us get over the specific characteristic difficulty of Estonian − the fact that instead of the nominative form of a noun, the suffix is frequently added to the noun's genitive form. To get the genitive form of a noun, children may add to the latter's nominative form a pronoun in the genitive case, which will inevitably require the use of a noun in the genitive case.

For instance, (selle) värvi +-line → värviline

(selle) ☐ +-line → ☐

In this way, a suitable (genitive) stem will be arrived at. When applying the model, it is necessary to bear in mind that the base-words should be given as groups (series) according to how the stems change (e.g., a genitive or nomina-

tive stem). At this stage the context should be kept to a bare minimum, to let the children better perceive the language analogy. Therefore, phrases not sentences are preferable.

- For semantization of the derivations obtained by means of the scheme, matching tasks can be used. For instance, a selection of nouns is given that must be matched with the previously formed adjectives.

Plekiline – õun, kass, põll, pluus
Use the words in pairs!

Plekiline kass
Laiguline nägu
Vöödiline õun

- Filling gaps in sentences with a derivation or base word.
  For instance, *Saapad on…….Põrandal on palju ….. (liiv, liivane).*

For the purpose of semantization teachers can also use pictures, objects, action demonstration (in the case of verbs), drawings (e.g., *a spruce, spruce forest*), short texts, and synonyms.

III. Independent use of a derivation model.

The aim is to achieve a maximum level of generality to/for the derivational model, that is, children must be able to apply analogy in various verbal contexts (phrases, sentences) and with new base words. As base words, teachers use words that have not occurred earlier in the process of teaching but have meanings that are familiar to the children. So while at the previous stage one operation of word derivation – derivation on the basis of analogy – was taught and practiced, at the present stage the aim is to develop both word-derivation operations: the one based on analogy and the one based on syntax. Therefore such sentence transformation tasks are used which require application of the word-derivation skill (e.g., turning an object or complement into an attribute). For this purpose the following techniques will be suitable:

- Derivation of words and their use in phrases.
  Missugune kardin? Täpp, triip, ruut, värv, lill, plekk
- Derivation of words and subsequent use in sentences (filling gaps in sentences).
  Vanaisa näos on kortsud. Vanaisa nägu on .....(kortsuline).
- Substitution of a single word form, a compound word or a word combination with a derivation. For instance,
  Ema seelikul on triibud. Emal on triipudega seelik. Ema kannab tihti oma ……(triibulist) seelikut.

At this stage of learning, it is also customary to use

- correction exercises in which the child must find and correct meaning- or form-related mistakes.

e.g., *Mallel on jooneline seelik.* (semantic correction).
Mallel on triibukas seelik. (form-related correction).

For lending support, a word-derivation scheme can be made available in the case of all the above tasks.

II. Developing the skill of distinguishing between and applying various derivation models.

The aim is to teach the skill of distinguishing between words with different affixes and to practice the use of particular word-derivation models. Distinguishing between different suffixes presupposes that children are able to generalize on the basis of analogy, using particular models of derivation. Likewise, more awareness is needed in morphological analysis than in developing one particular derivation model. In the framework of the previous algorithm of teaching, derivations were contrasted and compared with base words, and derivations with identical suffixes were used for analogy-based generalizations. In the case of the descriptive algorithm, however, varying suffixes are additionally contrasted and compared. Thus multiple comparisons are involved here: base word ↔derivation 1(e.g., *värv – värviline*); base word ↔derivation 2 (e.g., *värv – värvine*); derivation 1↔derivation 2 (*värvine – värviline*).

The teacher should first start off with developing the skill of distinguishing between two models, raising the level of difficulty of operations by increasing the number of models.

I. Comprehension, differentiation between and reproduction of derivations.

The work will begin with presentation of derivations either in spoken context or as written observational exercises (involving pictures or objects whenever possible). The students' task is to try to understand the meaning of derivations and explain it. Here both active or/and passive recognition techniques can be used (*Is this….? Show me ……!;* see additionally Algoritm I). Derivations with differing suffixes (initially two, later a larger number of differing models) will be presented randomly.

Work will continue with grouping of derivations using various bases, such as similar stem, suffix, meaning. Grouping presupposes semantic and form-based comparison of derivations. The following techniques are used:

- ✓ Finding words with identical stems.

The teacher will explain that members of a family usually have the same last name (an example is given). On the basis of a list of names written on the board, the students will discuss which of the names might belong to members of one and the same family. Teacher: "*Words too have families. Find the family members of the word "ehitama"!* (ehitaja, ehitus, maja, müürsepp, ehitamine, kivi). *On the basis of what did you decide?* (words of one "family" have one and the same stem). Now the meanings of the words of the same stem are explained, together drawing the conclusion that due to differing suffixes the meanings of the words are dissimilar.

✓ Grouping derivations on the basis of a derivational scheme.

e.g., The teacher displays the schemes: _____-nik, _____-ur
Next s/he presents various words or objects (incl. such words which do not match either scheme): *kirjanik, kaevur, kunstnik, rattur, kirjutaja*. In the case of this technique, too, the meanings of the words are discussed, finding the common meaning provided by the same suffix.

✓ Grouping derivations on the basis of meaning. The students have to decide whether the meanings of given derivations are similar or different. For example, in Estonian the suffixes *–nik* and *–ur* both refer to an actor/ agent/doer and therefore the derivations *ratsa**nik*** and *rats**ur*** are synonymous. So among other things, attention is paid to the fact that the same meaning can sometimes be expressed by means of different suffixes.

✓ Tasks asking students to find "the odd one out".

e.g., *Which word does not match? Why?*
Among words with the same suffix, one having a different suffix needs to be spotted, or among words with the same stem, one whose stem is different needs to be identified.

✓ The grouping of derivations is followed by an analysis, in the course of which the previously unconscious analysis will be brought to awareness.

✓ The meaning of each word is explained.

✓ In the words, the affixes and derivative stems are found and a suitable scheme is chosen for derivation.

✓ The base words are uncovered.

In Stage I of differentiation the teacher may also exploit

- verification tasks (recognition and naming of a correct derivation). Here it is appropriate to involve characters from children's plays or programs who speak with mistakes and whose speech therefore needs to be corrected.

A selection of correct derivations and neologisms is presented in which the suffixes are erroneous (confining oneself to the models taught: e.g., *Aias töötab aednik. Aias töötab aedur*.). Also, students are asked to tell which derivational stem is correct (e.g., *ratsnik, ratsanik*).

This stage will lead to enhanced understanding of the meanings of derivations with different suffixes. The students will be able to distinguish between and choose, within the confines of two or more derivation models, derivations with semantically close affixes. Subsequently, they will start actively implementing various models of derivation.

II. Independent derivation and use of words with different affixes

This stage of work aims to teach students to choose correct models of derivation and to derive words with affixes that are close in meaning.

From verification tasks involving alternative questions now we will go over to

- correction tasks in which the students must spot a mistake and independently form a correct derivation. In addition to mistakes in affixation, also those in the use of stems (choosing a wrong stem, derivations with

malformed stems) will be corrected. In tasks of this type, one can advisably use neologisms that students themselves have formed.

- As distinct from the algorithm of one derivation model in which possibly minimal context was used for evoking a mental picture of analogy, here the development of the skill of differentiation is based on sentences. It is believed that the accompanying text will be helpful when interpreting the meanings of derivations, thereby facilitating selection of appropriate affixes. The following methods are used:

✓ Filling out gaps in sentences (derivations with two or more affixes must be used)

e.g., *Orav ja siil on metsa-ela___/nikud. Lend___/ur juhib lennukit.*

✓ Eliciting derivations by means of questions.

e.g., *Who lives in the following countries – Japan, China,* etc.

Name the occupations of the following people knowing what they do! He builds houses, carries luggage, teaches pupils, etc.

✓ Eliciting derivations by means of sentence transformation.

e.g., *Mati on täpne, viisakas ja korralik. Ka tema sõbrale meeldib täpsus, ……(viisakus) ja ……(korralikkus).*

For assistance (1) affixes or derivation schemes; (2) correct and incorrect derivations; (3) correct derivations with various affixes.

- The context will play a decreasing role in the process of derivation and application of words with various affixes. Gap-filling and sentence transformation are followed by exercises asking students to form derivations with different affixes and use them in phrases. For assistance, they can use word derivation schemes.

For instance,

Form adjectives! Use them in word combinations!

_____NE	_____LINE	_____LIK
……....laps	……....pliiats	…....……laps
……...hommik	……....vihik	……..……päev

The words presented: *õnn, rahu, värv, uni, joon, udu* jne.

- As a result of word-derivation practice, the students will develop word-derivation paradigms. The latter are products of conscious development and appear as students form derivations with different affixes on the basis of analogy, having no accompanying text.

e.g.

lugema – lugeja – lugemine

jooksma -……..-……..

When forming derivations with different affixes with no support from accompanying text, students rely on derivational meanings (e.g., names of actors, tools, occupations). For assistance a selection of (1) affixes or derivation schemes, (2) analogical examples, or (3) accompanying texts may be made available.

Even more independence will be required when the students need to match stem-words and affixes that have been presented in columns or tables.

At the final stage of teaching, the word-derivation tasks are used that require

- ✓ derivation from a given base word, using as many different affixes as possible,
- ✓ derivation by means of a given affix, using as many stem words as possible.

Before and after the treatment students' skills were determined by means of a **pre- and posttest** including the following tasks:

- ✓ Naming exercise: students were asked to name the agent based on the activity shown in a picture (e.g., *lendur, saagija*, / *flyer, sawyer*, etc.)
- ✓ Association exercise: students were to derive nouns and adjectives based on analogy (e.g., *hüppab – hüppaja; võimleb – võimleja* / *jump – jumper, gymnastics – ... (gymnast*))
- ✓ Finding the base word: students were to explain the meaning of a derivation; naming the base word was expected (e.g., *Millega sõidab laevnik? Laevaga. What does a boatman operate? A boat.*)
- ✓ Deriving nouns using a picture and an accompanying text (a sentence) (e.g., *Poiss ratsutab. Kes ta on? Ta* on …. /*A boy is riding? Who is he? He is a* ...).
- ✓ Deriving adjectives using an accompanying text (a phrase and a sentence) (e.g., *uni – ……..(missugune?) poiss; Õunas on palju mahla. See on ……..(missugune?) õun /sleep – ..... (what kind of?) boy; There is a lot of juice in the apple. It is a ..... (what kind of?) apple.*

Pre- and posttests were carried out individually, exercises were done orally. The language materials (words) used in the exercises were not used in teaching. The types of exercises were similar in both teaching and the pre- and posttest. In the pre- and posttest the skill of using newly introduced patterns of derivation were checked. During the experiment, the topics related to word formation were not taught in the lessons of the native language.

When assessing the effectiveness of teaching, the primary indicator is the number of derivations corresponding to the language norms in children's answers before and after teaching, and the changes in the number and essence (the type) of neologisms.

The children's answers were recorded, transcribed and subsequently coded in Studies II–IV (see the results). To determine the reliability of the transcription and coding, all the answers were assessed by two persons. The percentage of agreement was over 95% for the SLI children and over 97% for the ND children.

4. THE MAIN RESULTS AND DISCUSSION

Study I is based on an analysis of legislation and literature which develops into an overview of the development of special needs education and speech therapy in the 20th and 21st century, as well as of the actual situation and the social changes influencing the development. Transition to inclusive education has provided children with special educational needs and their parents with more possibilities and freedom (e.g., the right to acquire education home place in a special or regular educational institution) to make decisions about their child's educational path. However, involving children with special educational needs and providing them with equal educational opportunities presupposes the existence of a well-functioning counseling system and supportive network. Demands on the quality of training and knowledge of special education teachers, speech therapists and (kindergarten) teachers also increase, because these people have to be able to notice and help groups of children with special educational needs also within regular education settings. SLI children form a subgroup of children with special educational needs, for whom timely and effective speech therapy is crucial for their further educational path and coping in life. When developing teaching methods and materials for these children, it will be necessary to take into account the peculiarities of the Estonian language. This article provides a historical and educational political background for Studies II to IV.

In the case of **Study II,** it was presumed that, similarly to the results of studies conducted about other languages, Estonian-speaking SLI children at the age of 4–5 form fewer derivations and compounds than their normally developing peers and use derivational affixes stereotypically. A repeated measures ANOVA showed significant differences between the groups in answering by a simple noun ($F(1; 78)=30$; $p<0,001$), by a phrase ($F(1; 78)=7,94$, $p<0,01$) and by a derivation ($F(1; 78)=68,48$, $p<0,001$). When naming agents, SLI children used the same types of answers (naming strategies) as the control group, but they preferred simple nouns and phrases to derivations. At the same time, children in the control group predominantly used derivations. An analysis of the phrases produced by SLI children showed that in 50% of cases these phrases lacked a base word; instead, they used a verb with general meaning to describe an activity (e.g., *A woman is making a dress.* pro *A woman is sewing a dress.* → *sewer*). This shows insufficient differentiation in terms of the meaning of nouns, which inhibits the development of the word-formation skill. Novel compounds and neologisms (derivations that do not correspond to the language norms) constituted only a small percentage of the answers given by both groups (SLI children 7%, ND children 9%). However, such neologisms point to the children's skill of forming new words. Regarding the total number of neologisms, SLI children did not differ from the control group ($F(1; 78)=0,75$; $p>0,05$), but a significant difference was manifested between the two groups in the following types of neologisms: morphological neologisms (e.g., *laulnik* pro laulja; $F(1; 78)=12,32$; $p<0,001$) and mixed-type neologisms (morphological+

morpho-phonological type; e.g., *loenik* pro lugeja; $F(1; 78)=6,88$; $p<0,0$). In SLI children the morpho-phonological type of neologisms (using a wrong or mispronounced stem variant or suffix) prevailed, while in ND children morphological neologisms (using a wrong suffix) were more common. Mixed-type neologisms, which in SLI children formed a fifth of all the neologisms, did not appear in ND children. Thus for ND children, choosing the correct affix appears to be the most problematic operation and they make comparatively fewer errors in choosing a stem variant. SLI children, on the other hand, characteristically tend to choose a wrong stem variant and to produce malformed stems (it is especially evident between the stem and affix, e.g., *kirjutija* pro kirjutaja; *saeja* pro saagija), which is accompanied by choosing a wrong affix.

Comparison of the use of suffixes showed that SLI children used them more stereotypically: while ND children used altogether 5 different suffixes, SLI children used only three.

Study II confirmed that the word-formation skill in SLI children is different from that of the control group (Spirova, 1980; Schöler, Anzer & Illichmann, 1986; Sobotovitš, 1995; Dalalakis, 1999; Ravid, Levie & Ben-Zvi, 2003; Grela, Snyder & Hiramatsu, 2005; Marshall & van der Lely, 2007). Also, Estonian SLI children use and form derivations and compounds significantly less frequently than ND children, and they use a smaller number of different suffixes. The types of answers provided by SLI children were similar to those of the age-matched control group; discrepancies were found in the proportions and in the pattern of errors.

An analysis of neologisms showed an important qualitative difference, which is connected to the peculiarities of acquiring grammar, including the word-formation skill in SLI children. While for ND children choosing the correct derivational affix was the most problematic task, morpho-phonological errors were characteristic of SLI children, which has also been reported by Sobotovitš (1995). SLI children produce malformed word stems and/or affixes more frequently than ND children, which indicates that SLI children find it difficult to operate with phonetic and morphological composition. Based on the types of neologisms, it can be assumed that, when forming a new word, it is difficult for SLI children to choose and order morphological and phonetic elements. The reasons for forming morpho-phonological and mixed-type neologisms which are characterized by suffix-related and stem-related errors and malformations can probably be found in vague understanding of the morphological composition of words as well as in the difficulties with establishing morphological paradigms (the paradigms of affixes and stem variants), which has also been reported by Leonard (1998) and Schöler, Fromm & Kany (1998).

It became evident that in the area of word formation, the morpho-phonological errors characteristic of Estonian SLI children are mainly manifested in the use of a wrong stem. Morpho-phonologically, Estonian is a variable language, i.e., one word may have several stem variants (e.g., **luge**ma – **luge**da – **loe**n; **hüppa**ma – **hüpa**ta – **hüppa**n). The variability of stems is characteristic of Estonian, but the meaning of a word does not depend on the

right choice of the stem variant, which makes acquiring it difficult for SLI children. Likewise, ND children made the same mistakes in forming words, but compared to SLI children, the number of such mistakes was considerably smaller.

In Study II, an attempt was made to answer the question whether and how it is possible to tell on the basis of word-formation errors which theory can account for the grammatical deficit in SLI children. The results do not support the grammar-specific theory, according to which children with SLI have difficulties in constructing implicit morphological rules. They may overcome this problem by treating morphological forms as unanalyzed lexical items or by constructing explicitly learned rules (Crago, Allen, 1996). The study showed that SLI children form words similarly to their ND peers, which was indicated by neologisms in their answers. They use derivational morphemes and combine stems to form compounds, although they do it considerably less frequently than their normally developing peers. There are no such types of errors that cannot be found in the development of ND children, but the pattern of errors is different. Based on the results of Study II, it is not possible to draw conclusions about the validity of the input-deficit theory, according to which the problems of SLI children reflect a general limitation in language processing capacity (Johnston, 1994). The representatives of both groups of scientists share the view that SLI children have difficulties with acquiring morpheme variants that lack semantic correlates. This position is affirmed by the nature of errors related to the use of word stems in Study II by Estonian SLI children.

Study III (1) investigated whether and how the comprehension and production of compound nouns by Estonian SLI children differs from those of their typically developing peers, and (2) interpreted the mistakes made by SLI children in producing and understanding compound nouns in the light of approaches to different accounts of SLI. If children with SLI have a deficit in linguistic knowledge, then it is very likely that they will exhibit errors associated with the syntactic and semantic constraints of compound constructions. In the context of the given study, it could be expected that children would make word-order errors, failing to see the effect that the order of components has on the meaning of a compound, and would use modifiers which are not typical of Estonian. If SLI is instead associated with limited processing capacity, then SLI children form compounds using the same function and manners as their normally developing peers, although they make more mistakes in tasks that are grammatically more complex and presuppose a larger processing capacity. For the same reason, SLI children might not comprehend a compound as a whole, but rather focus on one of its components.

Comprehending compounds was not difficult for either of the groups, yet a one-way ANOVA confirmed a significant difference between the numbers of correct responses provided by the SLI and ND children ($F(1; 70)=27,86$; $p<0,01$). Another important result was that in the case of SLI children, comprehension of compounds was more frequently based on the modifier, which in Estonian carries the word stress. Such errors were mainly associated with the

comprehension of compounds with a reversed word order, i.e., in more complex processing conditions.

When producing compounds on the basis of simple analogies, SLI children use compounds to label genuine categories and avoid producing compounds to label objects in temporary juxtapositions. A one-way ANOVA showed that the types of answers were dependent on the group of children ($F(7; 64)=4,39$; $p<0,01$). The SLI children produced a considerably smaller number of expected compounds but used more modifiers (in 8% of the answers, while the ND children never did so), produced inappropriate compounds, or did not answer at all. The differences between the groups in the production of compounds to label genuine or pseudo-categories, i.e., accidental subcategories (for objects in temporary juxtapositions) were not significant ($p>0.05$). The SLI children used compounds to label pseudo-categories in 10% of the cases, while the control-group children used them in 12% of the cases (labeling genuine categories in 83% and 98% of the cases, respectively).

Producing compounds on the basis of the given sentences (verbal context) was more difficult for both groups than labeling sub-categories. The group effect on the types of answers was also present in this task ($F(8; 63)=9,76$; $p<0,01$). The SLI children produced considerably fewer compounds applying to the context, but used more sentences or phrases which did not completely correspond to the information in the picture and sentences. Compared to their peers, they more frequently repeated the sentences that had been presented by the experimenter.

Errors in both of the production tasks show that, compared to their peers, SLI children have more difficulties in producing compounds and/or in using the information provided for constructing compounds. Grela et al (2005) and Marshall & van der Lely (2007) have described an analogical discrepancy in the quality of answers and its dependence on the type of exercise between SLI children and ND children. The number of errors increased substantially in tasks where syntactic constructions had to be replaced by compounds. The statistical analysis of the group and the type of task interaction showed that for the SLI children the third task was considerably more difficult than for the control group.

Interpreting the results in the light of approaches to different causes for SLI, the findings of this study suggest that errors in SLI children are more likely caused by problems associated with online processing than by the noun compounding rules, which differs fundamentally from their normally developing peers. They use compounds to label genuine subcategories on the basis of analogy; they comprehend the role of the head-word and the modifier in the meaning of a compound. With regard to word-order errors, the SLI children did not differ from the ND children and used modifiers that in Estonian had semantically correct functions. However, compared to their linguistically normally developing peers, they more frequently answered by a modifier; in comprehending the meaning of a compound, they focused on the first component.

The number of mistakes increased in tasks that required more working memory – this suggests a problem in auditory processing of verbal information

Study IV. When assessing the effectiveness of teaching, the basic indicators to be considered are the number of derivations corresponding to language norms before and after teaching and the changes in the number and nature (types) of neologisms.

The pretest results showed that Grade 2 pupils in a special school for language-impaired pupils had less than 75% of correct answers in all exercises (expected answers in different test tasks 45–72%). An analysis of the results obtained after teaching revealed that the number of correct derivations had increased in all exercises. Although the growth of correct answers varied for different exercises, the percentage of correct answers in the total of the answers in all exercises was rather equal (85–96%). Therefore we can conclude that after the teaching period the practiced word-derivation exercises no longer proved to be problematic for the children. Moreover, it needs to be emphasized that after teaching pupils also formed neologisms, but their percentage decreased (except for Exercise I – naming exercise –, whereas the number of neologisms increased after teaching). In the development of language, neologisms indicate the stage when children acquire the skill of word formation (so-called word-formation period). So an increase in the total body of neologisms might be an indicator of the development of the word-formation skill. Also, a qualitative analysis of neologisms indicates the development of skills: the total number of morphological neologisms (using a suffix with a similar meaning) decreased more than threefold, and the number of morpho-phonological neologisms (malformed stem or affix, choosing a wrong stem variant) decreased only 1.6-fold. In Exercises I and II, the number of morpho-phonological neologisms even increased. This allows us to draw the conclusion that as a result of teaching pupils became more skilful in differentiating between suffixes, whereas the skill of choosing the correct morpheme variants (including stem variants) that have no semantic importance was less easily acquired. It merits to be stressed that the number of neologisms decreased fourfold in tasks from given phrases and twofold where they had to be derived on the basis of provided sentences. Thus neologisms in the last excercises had a more constant nature, because compared to phrases in the sentences, linguistic analogy was not so easily perceived.

It can be inferred that as a result of training, children became more skilful in deriving words on the basis of analogy (based on a single word or a derivational pair), which is one of the psycho-linguistic operations of word formation and probably creates the basis for acquiring the word-formation skill. However, the second word-formation operation – forming a derivation in a sentence-production process – develops somewhat more slowly and with greater difficulties, yet it is highly important in generating text. An analysis of the pupils' individual results revealed great differences in pre- and posttests (before teaching M=42; S=17,9, after teaching M=75; S=12,3). As a result of teaching, the children's individual differences had decreased, but the levels of skills displayed by different pupils were still unequal after teaching.

In brief, it can be said that teaching achieved the basic aims: based on analogy, pupils were able to form/use the most common noun and adjective derivations, they were able to distinguish between suffixes with the help of an accompanying text – thus they had acquired the primary general patterns of derivation. Certainly, it is important to continue teaching by practicing the application of the acquired derivation patterns in spontaneous speech and by developing and/or raising pupils' awareness of new patterns.

5. SUMMARY AND CONCLUSIONS

The current research confirmed that word formation is the borderline between the development of vocabulary and grammar where the differences between children with normal speech and language development and SLI children are identified. The results showed that Estonian children with SLI aged between 4.2–6.9 years are capable of producing compound nouns and noun derivatives. Similarly to ND children, SLI children use compounds to label subcategories, i.e., they use compounds that have semantically correct functions, and form/use derivations to label the agent depicted in the picture. In word formation, the types of answers and neologisms produced by SLI children were mostly similar to those produced by ND children. Analyzing word formation, the following position reached by several cross-linguistic studies was confirmed: SLI children differ from their ND peers by the degree to which they use particular grammatical morphemes, not by whether they use these morphemes or not. The answers and types of errors produced by SLI children and ND children differ in number and proportions. By comparison with their peers, SLI children formed fewer derivations and compounds in all word-formation exercises.When forming agent nouns, SLI children predominantly resorted to simple words and phrases, and when forming compounds on the basis of verbal context, they produced semantically inappropriate answers, repetitions or failures. At the same time, in the answers produced by their ND peers, the expected derivations and compounds were predominant, and all the exercises were accomplishable for them **(Studies II and III).** When deriving words, SLI children also form neologisms, which has been described in the case of various languages, but they tend to choose a suffix which is different from the target derivational suffix (using a suffix of another part of speech or a semantically similar suffix within the same part of speech), they tend to use a wrong or phonologically malformed stem variant or suffix (*kooja* instead of kuduja, *lendurik* instead of lendur), and they often form novel compounds which in fact are the result of putting together stems in an unconventional way, thus producing a compound that is commonly not used in the given language (*mesimees* instead of mesinik; *sõjaonu* instead of lendur). Such creative errors show that SLI children at the age of 4–6 are acquiring the language system and norm by applying analogy; for these children learning the language does not mean learning ready-to-use forms and lexemes. Consequently, the results do not support the theory of deficits of the underlying grammar in SLI children. An analysis of the types of neologisms showed that SLI children have difficulties with choosing the appropriate stem variant, which can often additionally be accompanied by choosing an appropriate suffix (resulting in the production of a mixed neologism). In SLI children, morpho-phonological errors tend to prevail, while in ND children the most frequent type of errors is choosing a wrong suffix. Thus the morpho-phonological variability feature, which is characteristic of Estonian but has no semantic function in the language, appears to be more difficult for SLI children to learn than for their ND peers **(Study II).**

Compared to derivations, compounds are characterized by greater simplicity in their formation and semantic transparency, which is why in those languages where both word-formation techniques are equally exploited, compounding emerges before any affixation, and it proves to be a very productive way of word formation. Comprehending and producing compounds on the basis of simple analogies proved to be accomplishable by Estonian-speaking SLI children at the age of 4–5 years. Nevertheless, also in these exercises there were significant differences between the SDI and ND groups. In the case of the SLI children, comprehension of compounds was more often based on the modifier, and in production, too, they used a modifier instead of a compound. Although by comparison with production, comprehension of compounds turned out to be somewhat easier for the SLI children, they had difficulties in determining the functions of the head-word and the modifier in more complex processing conditions (compounds with a reversed word order). The use of a modifier instead of a compound can be explained by phonological problems experienced by SLI children. Both results support the validity of the theory of language processing limitation.

In both compounding tasks, the SLI children (compared to the children in the control group) more frequently responded to a picture and/or a verbal context with inapplicable compounds, phrases, or sentences. They tended to repeat the sentences uttered by the researcher or denied the answer. Such errors show that, compared to their peers, SLI children have more difficulties in both producing compounds and/or in using the given information for constructing compounds. It appeared that the number of such errors made by SLI children increased substantially in the task where syntactic constructions had to be replaced by compounds **(Study III).**

The results of Studies **II and III** allow us to argue that children with SLI experience difficulties that are related to processing linguistic information. The neologisms in Study II and errors in Study III were more probably caused by problems associated with online processing than with word-formation rules, which differs fundamentally from the data of normally developed peers. Thus, children with SLI understand the grammatical and semantic properties of compound formation. Their language system enables them to produce compound nouns on the basis of analogy. Therefore, when they copy the example as a prototype, compounding is obviously not difficult for them. But they have difficulties in those cases when a sentence has to be transformed in order to produce a compound, and/or in tasks that require more working memory. SLI children have difficulties in choosing and ordering morphemes to form new words. Estonian SLI children find it especially difficult to learn stem variants that have no clear semantic correlates.

However, it would be an oversimplification to explain the manifestation of the impairment by means of a single theory. Greater difficulties in producing compounds on the basis of verbal context can to some extent be interpreted by the Computational Grammatical Complexity Hypothesis (van der Lely, 2005). In order to test the latter hypothesis, further research is needed primarily into the

production of synthetic compounds (e.g., a *street-sweep-er*) on the basis of syntactic context, which requires transformation of the structure of the phrase and application of two ways of word production – combination and derivation, i.e., compounding in grammatically complex conditions. One of the limitations of the current study is that it involved a small number of children with SLI in Studies III and IV. Another limitation is the lack of a control group of younger children whose level of language development would have equaled to that of the SLI children (in Studies II and III), and the lack of a non-taught control group (Study IV). Involvement of these groups would have enabled us to study whether younger ND children experience similar difficulties in combining words as do SLI children. The above limitations are due to the small population of native Estonians. The number of SLI children in a country with about a million native speakers of Estonian is extremely limited. In addition, Estonia has no standardized speech development tests that would enable us to select children for the control group who would have suitable speech production skills.

Based on **Studies II–IV,** the following conclusions could be drawn about teaching the word-formation skill to SLI children:

(1) Teaching should be organized on the basis of formation patterns. In order to acquire a pattern, it is necessary to notice the common characteristics shared by the phenomena/objects that are labeled by words following the same pattern. It is also important to notice the common characteristics of the words (derivations, compounds). Thus it is essential to help children find/notice semantic changes and the linguistic resources labeling them. Acquiring formation patterns is a psycho-linguistic process within which children acquire the common meaning of a word group (e.g., words with the suffix *-ja*) and the word-forming operations

(2) Two types of skills need to be developed which correspond to the psycho-linguistic operations (subskills) used when forming words. Children do not acquire them simultaneously, and therefore they should be separated when teaching SLI children. As the first step, words should be formed on the basis of analogy – analogy-based formation (based on a single word or a pair of words, e.g., *liivaloss – kiviloss, klaasloss, lumeloss; triipudega seelik – triibuline seelik; mummudega pluus – .....pluus / sand castle – stone castle, glass castle, snow castle; a skirt with stripes – stripy skirt; dotted blouse – .....blouse*). Along with developing children's coherent speech (narrative skills) and their sentence transformation skill, also a more difficult subskill of word formation needs to be developed, namely, joining stems and/or a stem and a suffix into a derivation or a compound in the process of sentence formation (e.g., *The girl has blue eyes. I like this <u>blue-eyed</u> girl*.) or syntactic word formation.

(3) In view of the errors made by SLI children in using suffixes and semantic substitutions or semantically inaccurate unexpected answers in forming compounds, children should be taught how to distinguish between different patterns of derivation (e.g., deriving adjectives by means of the suffixes

-ne, -lik, -line) and how to form compounds based on the semantic function of the modifier (e.g., modifiers denoting a place – *a corner shelf,* function/exterior quality – *book case,* material – *glass shelf*).

(4) Developing the understanding of compounds and derivations precedes their formation. In the case of compounds, the ability to understand the functions of the headword and the modifier needs to be developed (e.g., *bird cage – cage-bird*).

(5) Proceeding from the three factors that influence the acquisition of the patterns of word formation in Estonian-speaking children (productivity, transparency and simplicity), it is reasonable to begin with teaching the formation of determinative compound nouns. The first patterns of derivation to be taught should be those deriving nouns with the suffix *-ja* and adjectives with suffixes *-ne, -line,-lik*.

(6) As Estonian is a morpho-phonologically variable language, children need help in choosing the correct stem variant. In order to support the development of analogy generalization ability, the base words should be chosen as series (sub-paradigms). One series includes words with similar stem changes. In the process of developing word-derivation patterns, it is crucially necessary that the variability of stems should be considered when grouping language material.

(7) In view of evidence suggesting that children with SLI have unusual limitations in processing capacity, it would be useful to find ways for reducing the processing demands of the word-formation learning tasks for these children. When choosing exercises for speech therapy, the children's working memory capacity has to be considered (length of words, eliciting words in the original or inflected forms, length of sentences and the complexity of constructions). At the same time, the linguistic system needs to be trained to tolerate more complex linguistic information. If the children's vocabulary contains a certain number of lexicalized compounds and derivatives, they are able to apply simple analogy in compounding. Only then the next and more complicated skill – producing words by transforming sentences – should be taught.

Recommendations for further research

The term SLI is reserved for those children whose language deficits appear to represent their central, and perhaps only problem. If impaired speech development is not caused by any other primary disability, it is called specific (mainly speech development is affected, the other areas being less or not affected). This is also the reason why SLI has captured researchers' attention – it appears to be a condition in which language development alone is adversely affected. From the neuropsychological aspect, SLI constitutes an ideal test case for the notion that language, or at least its major component, is autonomous of other mental faculties (Leonard, 2003). The second reason why the study of SLI is important

is the long-lasting deficits experienced by children with SLI, which place them at risk for reading, writing and other academic skills. Unfortunately, SLI is overwhelmingly diagnosed only when language deficits are clearly marked, that is, the condition is diagnosed on the basis of mistakes made by the children.

If we look at each group of mistakes separately, it appears that similar mistakes occur in the speech of children with some other speech impairment as well as in the speech of normally developing children at early stages of language development. When assessing SLI children's speech, it is absolutely essential to determine the overall number of mistakes and the percentage of typical patterns of errors, which will yield a unique and impairment-specific combination. When observing the development of such children, one more peculiar feature will be revealed – namely, when the children grow older, their impairment will become less specific. However, a decrease in specific language errors is accompanied by retardation in cognitive development by comparison with ND peers. Insufficiently developed speech impedes the development of higher-level cognitive processes (e.g., operation with mental images, verbal-logical thinking). Many SLI children experience learning difficulties. In the course of development, thus, the word 'specific' will lose its original meaning.

It needs to be pointed out, too, that SLI is language-specific. The current paper concentrated on word-formation errors that are typical of the Estonian language.

For the sake of further research, the following conclusions can be drawn on the basis of the above findings:

1. Research should focus on possibly earlier age brackets when the specificity of language impairment is more clearly revealed by comparison with other areas of development.
2. The chosen sample must be homogeneous. However, getting a sufficiently large homogeneous sample of SLI children is extremely complicated. As an alternative, case studies might be recommended, in which care should be taken to describe the characteristics of each child. By piecing together many individual case profiles, a more insightful picture might be achieved about how different components of language interact in SLI.
3. The description of the specificity of speech impairment can be effectively split into two: (a) how language specificity is expressed in the case of SLI – in Estonian, morphology being the yet unexplored area; (b) how the specificity of speech impairment is manifested in SLI children by comparison with other language-impaired children – in addition to ND children, control groups should involve language-impaired children whose language deficits are caused by some other primary impairment.

Organising the studies in the ways indicated above will make it possible to work out and adjust methods of therapy which consider the special chracteristics of Estonian irrespective of the type of language impairment involved. Moreover, speech therapists need to know in which aspects treatment of SLI children differs from the traditional methods used for treating language-impaired children.

The intervention methods for teaching word derivation which were suggested in Study IV were based on the author's earlier research and, in terms of time, preceded Studies II and III. Proceeding from the findings of the above two papers, the following recommendations can be given about research into teaching methods:

1. When assessing the effectiveness of teaching: (a) the long-lasting effect of intervention should be tested, i.e., how long the acquired skills last in terms of time; (b) the application of the word-derivation skill should be tested in spontaneous speech, i.e., in non-language tasks.
2. Analogically with Study IV, stages and techniques should be worked out for teaching children how to derive compound nouns. The principles for teaching appropriate patterns to language-impaired children have been described by Karlep (2003). Now these patterns should be concretised for both children of school and preschool age.
3. The stages and methods of teaching described above should be adapted for preschool children by replacing written-language tasks with oral tasks accompanied by games and practical activities and by optimizing the language input.

SUMMARY IN ESTONIAN

Spetsiifilise kõnearengupuudega eesti laste sõnamoodustusoskus

Kõnepuuetega laste õpetamine kaasava hariduse tingimustes nõuab logopeedidelt häid teadmisi nende laste märkamiseks, keelelis-kõneliste osaoskuste hindamiseks, õpetamismeetodi ja materjali valikuks/väljatöötamiseks. Need aga sõltuvad õpetatavast keelest, mistõttu on vajalikud emakeelsed originaalmaterjalid ja teadusuuringud eesti keelt kõnelevate lastega. Käesolev uurimus pakub teadmisi spetsiifilise kõnearengupuudega laste (SKAP) kõne hindamise ja arendamise osas. Spetsiifiline kõnearengu puue (SKAP) (ingl k *specific language impairment* (SLI)) esineb lastel, kelle kõne arenematus ei ole tingitud sensoorsest ega füüsilisest puudest, omandatud ajukahjustusest, autismist või intellektipuudest (negatiivsed kriteeriumid). Eestis on varem kasutatud selle kõnepuude tähistamiseks terminit *alaalia*, mis pärineb algselt saksa, hiljem vene logopeediast. Lähtudes seisukohast, et keel on vahend ja kõne selle rakendus, on eesti keeles ingliskeelse termini *SLI* kohta õige kasutada vastet *spetsiifiline kõnearengu puue* (mitte keelearengu puue). Seda kasutatakse laste puhul, kelle peamiseks probleemiks on kõnepuue: kannatab eelkõige kõne areng muude arenguvaldkondadega. Diagnoosi püstitamisel arvestatakse eelpoolnimetatud negatiivsete kriteeriumide kõrval ka positiivseid kriteeriume ehk spetsiifilisi vigu, mille kombinatsioon on omane just SKAP-le. Kui vaadelda igat veatüüpi eraldi, siis kõiki neid esineb ka varastel kõnearengu etappidel eakohases arengus või mõne teise kõnepuude puhul. SKAP laste kõne hindamisel on oluline just vigade hulga ja veatüüpide osakaalu (vigade mustri) määramine, mis muudab pildi unikaalseks ja puudespetsiifiliseks. SKAP tuuma moodustavad morfosüntaktilised probleemid, millele suuremal või vähemal määral lisanduvad ka fonoloogilised ja semantilis-leksikaalsed vead.

Kuigi grammatika omandamise raskusi kirjeldatakse SKAP puhul kõigis keeltes, on vigade avaldumine keelespetsiifiline. Eesti keeles on seni uuritud ainult SKAP laste fonoloogilist arengut (Vesker, 1986). Käesolevas uurimuses püüti leida eesti keelele spetsiifilisi vigu sõnamoodustamisel.

Paraku ei ole SLI etioloogia ja psühholingvistiline mehhanism siiani täiesti selge. Võib eristada kahte teooriate rühma, mis püüavad selgitada SKAP mehhanismi.

I. Lingvistilised teooriad, mille teoreetiliseks aluseks on generatiivne grammatika (Chomsky, 1976). Universaalgrammatiliste printsiipide alusel toimuv grammatika omandamine on sõltumatu teistest arenguvaldkondadest. SKAP puhul ei suuda lapsed kasutada sünnipäraselt kaasaantud grammatilisi teadmisi/reegleid. Kergem on omandada muutevorme ja lauseid, mis baseeruvad assotsiatiivsel õppimisel ja mälul.

II. Psühholoogilised teooriad, mis seavad esikohale keele töötlemise defitsiidi probleemi. Need teooriad rajanevad kognitiivse ja neuropsühholoogia seisu-

kohtadele, mille järgi, vastupidiselt lingvistilistele teooriatele, ei vaadelda SKAP-d kui keelelise võimekuse isoleeritud puuet, vaid kui taju (auditiivse taju eristusvõime kiirus ja täpsus), mälu (piiratud verbaalse töömälu maht), keele õppimise strateegiate defitsiidi tagajärge.

Uurimused, mille alusel SKAP nimetatud tekketeooriad on loodud, on valdavalt tehtud inglise keele baasil. Eelmise sajandi viimastel kümnenditel on uurimisfookusesse tõusnud keeltevahelised võrdlevad uuringud, mille eesmärgiks on leida eri keeltes nö. universaalseid ja ka keelespetsiifilisi tunnuseid, et kontrollida SKAP mehhanismi selgitavate hüpoteeside paikapidavust. Samal põhjusel on vaja laiendada uuringuid kõigile keelevaldkondadele. Sõnamoodustus on üks morfoloogia valdkond, mida võrreldes vormiõpetusega on väga vähe uuritud. Uurimistulemused on seejuures vastukäivad.

Eesti keele sõnamoodustussüsteem (sõnatuletus ja liitsõnamoodustus) on väga produktiivne (Kerge, 1990; Kasik, 2004). Tuletised ja liitsõnad kuuluvad leksikoni, kuid samas saab mitmemorfeemilise sõna moodustamist kirjeldada grammatikareeglite abil. Sõnamoodustus (eriti liitsõnamoodustus) on valdkond, mis võimaldab uurida laste loomingulist võimet rikastada oma sõnavara (Libben, 2007). Käesolevas uuringus lähtutakse seisukohast, et sõnamoodustus on protsess, mis haarab nii morfoloogiat kui ka süntaksi. Need on aga valdkonnad, milles avalduvad SKAP laste puhul peamised probleemid.

Eelpoolöeldust selgub, et sõnamoodustus on valdkond, milles SKAP laste oskused erinevad eakohase kõnearenguga lastest (edaspidi EK). Töö tulemused pakuvad huvi kõnepuuete diagnostika ja kõne arendamise seisukohalt ning võimaldavad täpsustada SKAP mehhanismi.

Uuringu eesmärk ja ülesanded

Uuringu eesmärk on selgitada, kuidas omandavad sõnamoodustusoskust spetsiifilise kõnearengupuudega eesti lapsed.

Uurimisülesanded on järgmised:

(1) Selgitada SKAP laste sõnamoodustusoskuse iseärasused võrreldes eakohase kõnearenguga samaealiste lastega.

(2) Interpreteerida sõnamoodustusülesannetes tehtud vastuste tüüpe ja vigu SKAP kahe erineva tekketeooria valguses. SKAP põhjused ei ole siiani üheselt selged, sest eksperimentaalseid uuringuid, mis võimaldaksid põhjuslikkust selgitada, on laste puhul varajases eas võimalik läbi viia äärmiselt piiratult. Üks võimalus testida põhjuslikke hüpoteese on nende vastandamine kirjeldavas uuringus. Laste vastuste ja vigade analüüs võimaldab teha oletusi nende tekkemehhanismide kohta.

(3) Kirjeldada sekkumisviise (õpetamisetappe ja ülesandetüüpe), mille eesmärgiks on kujundada sõnatuletusmalle. Süstemaatiline õpetamine on võimalik siis, kui laps suudab moodustada elementaarset teksti, oskab muuta sõnade järge lauses ja lauseid sisestada, seega enamasti alles koolieas.

Uurimisküsimused:

1. Millised on sõnamoodustusoskuse iseärasused võrreldes eakohase kõnearenguga, (a) mis avalduvad erinevates keeltes sarnaselt, ja (b) mis peegeldavad grammatika omandamise iseärasusi sõltuvalt keelest (antud juhul eesti keele spetsiifika)? (II ja III uurimus).
2. Kas ja kuidas on laste sõnamoodustusvigade alusel võimalik oletada, milline teooria selgitab SKAP põhjusi paremini? (II ja III uuring). Uuritakse kahe peamise teooriate rühma – grammatikaspetsiifilise teooria ja keeletöötlemisvõime defitsiidi paikapidavust.
3. Millised võiksid olla sõnatuletusmallide kujundamise etapid SKAP laste õpetamisel klassitingimustes ja õpetuse mõju alakõnega laste sõnatuletusoskusele? (IV uuring). Milliseid osaoskusi tuleks kujundada? Millised võiksid olla kasutatavad ülesanded ja keelematerjal?

I artikkel põhineb seadusaktide ja kirjanduse analüüsil, mille tulemusena antakse ülevaade eripedagoogika ja logopeedia arengust 20.-21.sajandil, hetkeseisust ja arengut mõjutavatest ühiskondlikest muutustest. Üleminek kaasavale haridusele on andnud HEV lastele ja nende vanematele rohkem võimalusi ja valikuvabadust (nt hariduse saamise õigus kodukohas, eri- või tavaõppeasutuses) otsustada oma lapse haridustee üle. Samas eeldab HEV laste kaasamine ja neile võrdsete hariduslike võimaluste pakkumine hästi toimivat nõustamissüsteemi ja tugivõrgustikku. Suurenevad nõudmised ka eripedagoogide, logopeedide ja (lasteaia)õpetajate ettevalmistusele ja teadmistele, et nad suudaksid märgata ja aidata erinevaid HEV laste gruppe ka tavaõppe tingimustes. SKAP lapsed on HEV laste grupp, kelle puhul logopeedilise abi õigeaegsusest ja efektiivsusest sõltub nende edasine haridustee ja toimetulek elus. Nende laste õpetamismeetodite ja õppematerjalide väljatöötamisel tuleb arvestada eesti keele iseärasusi. Artikkel annab ajaloolise ja hariduspoliitilise tausta uuringutele II–IV.

II uuringu puhul eeldati, et sarnaselt teiste keelte baasil tehtud uuringute tulemustele moodustavad eesti 4–5-a. SKAP lapsed eakaaslastega võrreldes vähem tuletisi ja liitsõnu ning kasutavad tuletusliiteid stereotüüpselt. Isikute nimetamisel kasutasid SKAP lapsed kontrollgrupiga võrreldes samu vastusetüüpe (nimetamisstrateegiaid), kuid eelistasid vastamisel lihtsõnu ja fraase tuletistele. Kontrollgrupi lastel olid ülekaalus tuletised. Uudis-liitsõnad ja neologismid (keelenormile mittevastavad liitsõnad ja tuletised) moodustasid mõlema lasterühma vastustest väikese osa (SKAP lastel 7%, EK lastel 9%). Samas näitavad sellised uudissõnad laste oskust sõnu ise konstrueerida. Uudissõnade üldarvu poolest ei erinenud SKAP lapsed eakaaslastest. Oluline erinevus avaldus rühmade vahel aga järgmistes neologismitüüpides: morfoloogilised neologismid (nt. *laulnik* pro laulja) ja segatüüpi neologismid (morfoloogiline+ morfofonoloogiline tüüp; nt. *loenik* pro lugeja). SKAP lastel olid ülekaalus morfofonoloogilist tüüpi neologismid (vale või häälduslikult moonutatud tüvevariandi või häälduslikult moonutatud sufiksi kasutamine), EK lastel seevastu morfoloogilised neologismid (vale sufiksi kasutamine). Segatüüpi neologisme, mis SKAP

lastel moodustasid kõigist neologismidest 1/5, ei esinenud EK lastel üldse. Seega valmistab EK lastele peamiselt raskusi õige liite valik, mõnevõrra vähem eksitakse tüvevariandi valikus. SKAP lastele on aga iseloomulik vale tüvevariandi valik ning tüvede moonutamine (eriti avaldub see tüve ja liite piiril, nt *kirjutija* pro kirjutaja; *saeja* pro saagija), millele lisandub vale liite valik.

Sufiksite kasutamise võrdlus näitas, et SKAP lapsed kasutavad neid stereotüüpsemalt: EK lapsed kasutasid kokku viit erinevat sufiksit, SKAP lapsed vaid kolme erinevat.

II uuringus leidis kinnitust, et SKAP lapsed erinevad eakaaslastest sõnamoodustusoskuse poolest (Spirova, 1980; Schöler, Anzer & Illichmann, 1986; Sobotovitš, 1995; Dalalakis, 1999; Ravid, Levie & Ben-Zvi, 2003; Grela, Snyder & Hiramatsu, 2005; Marshall & van der Lely, 2007). Ka eesti SKAP lapsed kasutavad ja moodustavad tuletisi ja liitsõnu oluliselt vähem, kasutades seejuures vähem eri tüüpi liiteid. SKAP laste vastusetüübid olid sarnased vanuseliselt sobitatud kontrollgrupiga, erinevus avaldus nende omavahelistes proportsioonides (vastusetüüpide osakaaludes vastuste koguhulgas) ja vigade mustris (veatüüpide erinevas osakaalus vigade koguhulgas). Neologismide analüüs näitas olulist kvalitatiivset erinevust, mis seostub grammatika, sh ka sõnamoodustusoskuse omandamise iseärasustega SKAP lastel. Kui EK lastele valmistas peamiselt raskusi õige tuletusliite valik, siis SKAP lastele olid iseloomulikud just morfofonoloogilist tüüpi eksimused, millele viitab ka Sobotovitš (1995). EK lastest oluliselt sagedasem sõnatüvede ja/või liidete moonutamine ning vale tüvevariandi valik näitavad, et SKAP lastel on raske opereerida sõna häälikulise ja morfoloogilise koostisega. Vigade põhjal võib oletada, et SKAP lapsed ei suuda uue sõna moodustamisel valida ja järjestada selle morfoloogilisi ja foneetilisi elemente. Seega seostuvad SKAP lastel sõnu moodustades nii grammatika kui ka foneetika/fonoloogia probleemid. Morfofonoloogiliste ja segatüüpi neologismide, milles kombineeruvad liite- ja tüvevaliku vead ning moonutamised, moodustamise põhjused peituvad ilmselt ebaselges kujutluses sõnade morfoloogilisest koostisest ja morfoloogiliste paradigmade (liidete ja tüvevariantide paradigmad) ülesehitamisraskustes, millele on viidanud Leonard (1998) ja Schöler, Fromm & Kany (1998).

Selgus, et SKAP lastele iseloomulikud morfofonoloogilised vead avalduvad eesti keeles sõnade moodustamisel peamiselt vales tüvekasutuses. Eesti keel on morfofonoloogiliselt varieeruv keel, st ühel sõnal võib olla mitu tüvevarianti (nt **lug**ema – **luge**da – **loe**n; **hüppa**ma – **hüpa**ta – **hüppa**n). Tüvede varieeruvus on küll eesti keelele iseloomulik nähtus, kuid tüvevariandi õigest kasutusest ei sõltu sõna tähendus, mistõttu on selle omandamine SKAP lastele raske. Samu vigu tegid sõnade moodustamisel ka EK lapsed, kuid SKAP lastega võrreldes oluliselt vähem.

II uurimuse alusel püüti vastata ka küsimusele, kas ja kuidas on laste sõnamoodustusvigade alusel võimalik oletada, milline teooria selgitab SKAP laste kõnes esinevat grammatilist defitsiit. Tulemused ei toeta lingvistilist teooriat, mille kohaselt SKAP lastel on raske omandada implitsiitseid morfoloogiareegleid, mistõttu nad omandavad morfoloogilisi vorme kui terviklekseeme

ja/või toetuvad grammatika omandamisel välistele õpitud reeglitele (Crago, Allen, 1996). Uurimuses selgus, et sarnaselt EK eakaaslastele moodustavad SKAP lapsed ise sõnu, mida näitasid vastustes esinenud uudissõnad. Nad kasutavad tuletusmorfeeme ja liidavad tüvesid, moodustades liitsõnu, kuigi teevad seda oluliselt harvem ja vähemal määral kui eakaaslased. Ei esine veatüüpe, mida ei esineks eakohases arengus, kuid vigade muster on erinev. II uuringu tulemuste alusel ei ole siiski võimalik teha järeldusi psühholoogilise ülekaaluga teooriate paikapidavuse kohta, mille kohaselt SKAP laste probleemid peegeldavad keelelise töötluse piiratud võimet (Johnston, 1994). Mõlema teooriarühma esindajad on aga sarnasel seisukohal, et SKAP lastele on raske omandada morfeemivariante, millel puudub semantiline korrelaat. Tüvekasutusvigade iseloom eesti SKAP lastel käesolevas uuringus kinnitab seda seisukohta.

III uuringus uuriti, (1) kas ja kuidas liitnimisõnade mõistmine ja moodustamine SKAP eesti lastel (keskmine vanus 6.0) erineb eakohase arenguga vanuseliselt sobitatud kontrollgrupi lastest**,** ja (2) interpreteeriti SKAP laste vigu liitnimisõnade mõistmisel ja moodustamisel erinevate põhjuslike teooriate valguses. Oletati, et kui SKAP lastel esineb lingvistiliste teadmiste defitsiit, eksivad lapsed keelereeglite ehk keelesüsteemi vastu. Antud uurimuse kontekstis oodati, et SKAP lapsed teevad liitsõnade moodustamisel sõnajärjevigu, ei mõista täiend- ja põhisõna rolli liitsõna tähenduses ja kasutavad täiendsõnu sellises semantilises funktsioonis, mida eesti keel ei võimalda. Kui aga SKAP põhjus on pigem piiratud keeletöötlusvõimes, siis kasutavad SKAP lapsed liitsõnu samas funktsioonis nagu kontrollgrupi lapsed, kuid teevad siiski rohkem vigu ja seda eelkõige ülesannetes, mis on grammatiliselt komplekssemad ja eeldavad lastelt suuremat verbaalse töömälu mahtu. Samal põhjusel ei pruugi SKAP lapsed mõista liitsõna kui tervikut, vaid orienteeruvad mõistmisel pigem selle ühele komponendile (eeldatavasti täiendsõnale, millele langeb rõhk sõnas).

Kuigi liitsõnade mõistmine ei valmistanud raskusi kummalegi lasterühmale, eksisid SKAP lapsed eakaaslastest siiski oluliselt rohkem. Seejuures orienteerusid SKAP lapsed oluliselt sagedamini täiendsõnale, mis kannab eesti keeles sõnarõhku. Sellised vead avaldusid peamiselt pööratud sõnajärjega liitsõnade puhul (nt *lille/pott – poti/lill*, osutati sõna *pott* referendile), st komplekssema töötluse tingimustes.

Analoogia alusel liitsõnu moodustades (analoogiamoodustus) sarnanesid SKAP lapsed eakohase kõnearenguga lastele: nad moodustasid liitsõnu loomulike kategooriate tähistamiseks ja vältisid pseudo-kategooriate tähistamist liitsõnadega. Samas oli õigete vastuste arv SKAP lastel oluliselt väiksem kui kontrollgrupil, nad kasutasid oluliselt sagedamini täiendsõna, mittesobivat liitsõna eeldatu asemel või loobusid sagedamini vastusest.

Liitsõnade moodustamine lauselise kaasteksti alusel (süntaktiline sõnamoodustus) osutus mõlemale lasterühmale oluliselt raskemaks kui allkategooriate tähistamine analoogia alusel. SKAP lapsed moodustasid EK lastest vähem kaastekstile vastavaid liitsõnu, sagedamini moodustasid nad lauseid või fraase,

mis ei vastanud esitatud verbaalsele ega pildilisele infole, kordasid EK lastest sagedamini uurija esitatud lauseid.

Seega näitavad kirjeldatud vigade hulk ja kvaliteet, et SKAP lastel on EK lastega võrreldes suuremad raskused liitsõnade moodustamisel ja/või ülesandes esitatud informatsiooni kasutamisel. Vigade arv kasvas käesolevas uuringus oluliselt ülesandes, kus liitsõna moodustamine toimus lauselise kaasteksti alusel. Statistiliselt avaldus SKAP laste puhul ülesande tüübi ja grupi koosmõju, mis näitab, et SKAP lastele valmistas süntaktiline sõnamoodustus kontrollgrupiga võrreldes oluliselt suuremaid raskusi. Analoogilist vastuste kvaliteedi erinevust ja sõltuvust ülesande tüübist SKAP lastel võrreldes EK lastega kirjeldavad ka Grela et al (2005) ja Marshall & van der Lely (2007).

Uuringu tulemused näitavad, et SKAP laste vead tulenevad pigem keelelise töötluse probleemidest. Tulemused ei võimalda väita, et need lapsed ei suuda omandada keelereegleid, mille alusel liitsõnu moodustada. Nad tähistavad liitsõnadega allkategooriaid keelelise analoogia alusel, mõistavad põhi- ja täiendsõna rolli liitsõna kui terviku tähenduses. SKAP lapsed ei erinenud EK lastest liitsõna komponentide järjestamisel liitsõnas ja kasutasid täiendsõnu semantiliselt sobivates funktsioonides. Siiski vastasid nad liitsõnade moodustamisel sagedamini täiendsõnaga, osutasid liitsõnade mõistmisel täiendsõnale vastavale pildile ja vigade arv kasvas oluliselt ülesandes, mis nõudis suuremat verbaalse töömälu mahtu – see kõik viitab verbaalse informatsiooni töötluse probleemile.

IV uuringus õpetati kahe kuu vältel Tartu Hiie Kooli II klassis nimi- ja omadussõnade tuletamist. Töötati välja kaks tunnikava tüüpi, mida rakendati vahelduvalt 20 tunni vältel.

I tunnikava tüüp (ühe tuletusmudeli tutvustamine ja kasutamisoskuse kujundamine):

1) tuletiste tähenduse mõistmine;
2) tuletiste reprodutseerimine (verifitseerimisülesanded);
3) tuletiste kasutamine/moodustamine kontekstis, nende analüüs;
4) sõnatuletusmudeli loomine;
5) mudeli rakendamine, so tuletiste moodustamine erinevatest tuletusalustest;
6) korrektuurharjutused.

II tunnikava tüüp (erinevate tuletusmudelite diferentseerimis- ja kasutamisoskuse kujundamine):

1) eriliiteliste tuletiste tähenduste eristamine;
2) tuletiste rühmitamine ja reprodutseerimine;
3) tuletiste analüüs, tuletusskeemi valik;
4) verifitseerimisülesanded;
5) korrektuurülesanded;
6) tuletusmudelite iseseisev rakendamine kontekstis ja kontekstita.

Õpetamise efektiivsuse hindamisel võeti peamiste näitajatena arvesse keelenormile vastavate tuletiste arvu enne ja pärast õpetamist ning neologismide hulga ja iseloomu (liikide) muutust.

Eeltesti tulemused näitasid, et kõnekooli II klassi õpilased täitsid kõik ülesanded alla 75%-lise edukusega (eeldatud vastuseid erinevates katseülesannetes 45–72%). Pärast õpetamist saadud tulemuste analüüsist selgub, et õigete tuletiste arv kasvas kõigis ülesannetes. Kuigi õigete vastuste juurdekasv oli ülesannete kaupa erinev, oli õigete vastuste protsent vastuste üldarvust kõigis katsetes suhteliselt ühtlane (85–96%). Niisiis võib väita, et kasutatud sõnatuletusülesanded ei valmistanud õpilastele pärast õpetamist enam olulisi raskusi. Rõhutamist väärib asjaolu, et ka pärast õpetamist moodustasid õpilased neologisme, kuigi nende osakaal vastustes vähenes (v.a. I ülesanne, milles neologisme moodustati peale õpetamist isegi rohkem). Neologismid viitavad kõne arengus etapile, mil omandatakse sõnaloomeoskusi (nn. sõnaloomeperiood). Seega võib neologismide absoluutarvu kasv olla sõnaloomeoskuste arengunäitajaks. Oskuste arengule viitab ka neologismide kvalitatiivne analüüs: morfoloogiliste neologismide (tähenduselt lähedase liite kasutamine) absoluutarv vähenes üldkokkuvõttes üle kolme korra, morfofonoloogiliste neologismide (tüve või liite moonutamine, vale tüvevariandi valik) absoluutarv vaid 1,6 korda. I ja II ülesandes morfofonoloogiliste neologismide absoluutarv isegi kasvas. Võib teha järelduse, et õpetamise tulemusel omandasid õpilased suhteliselt paremini liidete diferentseeritud kasutamise, raskemini omandatav on aga morfeemivariantide (sh tüvevariantide) valik, millel pole semantilist kaalu. Rõhutamist väärib ka tulemus, et neologismide arv vähenes sõnaühendites 4 korda, lausetes 2 korda. Seega olid neologismid püsivama iseloomuga lauselise kaasteksti puhul, milles keeleline analoogia ei ole nii hästi tajutav kui sõnaühendis.Võib järeldada, et õpetamise tulemusel on lastel paremini edasi arenenud oskus tuletada analoogia järgi (aluseks üksiksõna või tuletuspaar), mis on üks sõnaloome psühholingvistilistest operatsioonidest ning millest ilmselt algabki sõnaloomeoskuse omandamine. Mõnevõrra aeglasemalt ja raskemini kujuneb aga 2. sõnaloomeoperatsioon – tuletise moodustamine lauseloomeprotsessis, mis muutub eriti oluliseks teksti genereerimisel.

Kokkuvõtteks võib väita, et õpetus täitis peamised eesmärgid: õpilased oskasid analoogia alusel moodustada/kasutada kõnes enamlevinud nimi- ja omadussõnalisi tuletisi, suutsid õpitud liiteid kaasteksti abil diferentseerida – järelikult olid õpilased omandanud tuletusmallid, mida nad suutsid rakendada standardolukordades (antud juhul samatüübilistes keelelistes ülesannetes). Kindlasti on vaja õpetust jätkata: harjutada omandatud tuletusmudelite kasutamist spontaanses kõnes ja kujundada ja /või teadlikustada uusi mudeleid.

II–IV uuringu alusel alusel võib teha järgmised järeldused sõnamoodustusoskuse õpetamiseks SKAP lastel:

(1) Õpetada oleks otstarbekas moodustusmallide kaupa. Malli omandamiseks on vaja märgata ühiseid tunnuseid nende nähtuste/objektide vahel, mida tähistatakse ühte malli kuuluvate sõnadega, samuti on vaja märgata nende sõnade (tuletiste, liitsõnade) ühiseid tunnuseid. Õpetamisel on seega vaja

aidata lapsel leida semantilised muutused ja neid tähistavad keelelised vahendid. Moodustusmalli omandamine on psühholingvistiline protsess, mille käigus omandavad lapsed sõnarühma ühise tähenduse (nt *ja*-liitelised sõnad) ja nende sõnade moodustamise operatsioonid.

(2) Kujundada tuleb kahte tüüpi oskusi, mis vastavad psühholingvistilistele operatsioonidele, mida inimene sõnu moodustades sooritab. Lapsed ei omanda neid üheaegselt ja SKAP laste puhul tuleb need õpetamisel lahku viia. Alustada tuleks sõnaloomest analoogia alusel ehk analoogiamoodustusest (aluseks üksiksõna või sõnapaar; nt. *liivaloss – kiviloss, klaasloss, lumeloss; triipudega seelik – triibuline seelik; mummudega pluus – .....pluus*). Paralleelselt siduskõne ja lausete transformeerimisoskuse arenguga tuleb kujundada oluliselt raskem oskus – tüvede ja/või tüve ja liite ühendamine tuletiseks või liitsõnaks lauseloomeprotsessis (nt. *Tüdrukul on sinised silmad. Mulle meeldib see sinisilmne tüdruk.*) ehk süntaktiline sõnaloome.

(3) Arvestades SKAP laste eksimusi liidete kasutamisel (liidete asendused sama sõnaliigi piires ja teise sõnaliigi liitega) liitnimisõnu moodustades, tuleb õpetada lapsi tuletusmudeleid diferentseerima (nt. omadussõnade tuletamine liidete *–ne, -lik, -line* abil) ja moodustama liitsõnu lähtuvalt täiendsõna semantilisest funktsioonist (nt. täiendsõna väljendab kohta – *nurgariiul;* funktsiooni/välist tunnust – *raamaturiiul;* materjali – *klaasriiul*).

(4) Liitsõnade ja tuletiste mõistmise kujundamine eelneb nende moodustamisele. Liitsõnade puhul tuleb kujundada oskust mõista põhi- ja täiendsõna funktsiooni (nt. *linnupuur – puurilind*).

(5) Lähtudes kolmest faktorist, mis mõjutavad sõnamoodustusmallide omandamist lastel (produktiivsus, läbipaistvus ja lihtsus), on eesti keeles mõttekas alustada determinatiivsete liitnimisõnade moodustusoskuse õpetamisest, mille täiendsõna väljendab selgesti tajutavat tunnust (nt ruum). Õpetatavatest tuletusmallidest esimesed võiksid olla nimisõnade tuletamine liitega *-ja* ja omadussõnade tuletamine liidetega *-ne, -line, -lik.*

(6) Morfofonoloogiliselt varieeruva eesti keele puhul vajavad lapsed abi tüvevariantide valikul. Et toetada analoogiaüldistuse kujunemist, tuleks tuletusalused valida sarjadena (all-paradigmad). Ühte sarja kuuluvad sarnase tüvemuutusega sõnad. Sõnatuletusmallide kujundamisel on tüvede variatiivsuse arvestamine üks keelematerjali rühmitamise aluseid.

(7) Lähtudes tulemustest, mis viitavad SKAP laste keeletöötlusvõime piiratusele, tuleks sõnamoodustusoskuse kujundamisel ja ülesannete koostamisel arvestada nende laste verbaalse töömälu piiratud mahtu. Seda mõjutab kasutatavate sõnade pikkus, sõnade esitamine alg- või muutevormis, lausete pikkus ja konstruktsiooni keerukus. Järk-järgult õpivad lapsed töötlema järjest keerukamat lingvistilist informatsiooni ja rakendama raskemaid sõnamoodustusoperatsioone. Kui laste sõnavaras on olemas teatud hulk leksikaliseerunud tuletisi ja liitsõnu, on nad suutelised rakendama lihtsat analoogiat liitsõnade moodustamisel, seejärel saab

õpetada järgmist ja keerukamat sõnamoodustusoskust – sõnade moodustamist lauseid transformeerides, mis on hädavajalik oskus suhtlussituatsioonis ja teksti luues.

Edasiste uuringute kontekstis võib eelöeldu põhjal teha järgmised järeldused:

1. Uuringud peaksid keskenduma võimalikult varasele eale, mil kõnepuude spetsiifilisus võrreldes muude arenguvaldkondadega avaldub selgemalt.
2. Tähtis on valimi homogeensus. Paraku on SKAP laste puhul piisava suurusega homogeense valimi koostamine väga komplitseeritud. Alternatiiviks võiksid olla juhtumiuuringud. Detailsete juhtumikirjelduste võrdlemisel võib kujuneda täpsem pilt sellest, millised on seosed kõnepuude erinevate tunnuste vahel, ning kuidas vastastikune mõju arenguliselt avaldub.
3. Kõnepuude spetsiifilisust on otstarbekas kirjeldada kahest aspektist: (a) keelega seotud spetsiifika avaldumine SKAP puhul – eesti keeles on seni uurimata morfoloogia valdkond; (b) kõnepuude avaldumise spetsiifika SKAP puhul võrreldes teiste alakõnega lastega – kontrollgrupi peaksid lisaks eakohase arenguga lastele moodustama ka alakõnega lapsed, kelle puhul kõnearengupuue tuleneb mingist muust esmasest puudest.

Uuringuid sel viisil korraldades saab täpsustada ja välja töötada teraapiameetodeid, mis ühelt poolt arvestavad eesti keele spetsiifikat mistahes mehhanismiga alakõnega laste õpetamisel. Samas on logopeedidel vaja teada, millises osas erineb teraapia SKAP laste puhul traditsioonilistest teraapiameetoditest alakõne puhul.

IV uuringus kirjeldatud tunnikavade tüübid sõnamoodustusoskuse õpetamiseks põhinesid autori varasematel uuringutel ning töötati välja ajaliselt enne II ja III uuringut. Arvestades nimetatud kahe uuringu tulemusi, võib teha õpetamismeetodite edasise uurimise osas järgmised soovitused:

4. Õpetamise efektiivsuse hindamisel: (a) tuleks kontrollida õpetamise efekti püsivust ajalise intervalli möödudes; (b) tuleks kontrollida sõnaloomeoskuste rakendumist spontaanses kõnes, st mittekeelelistes ülesannetes.
5. Analoogiliselt IV uuringule tuleks välja töötada õpetamise etapid ja töövõtted liitnimisõnade moodustamisoskuse kujundamiseks. Liitumismalli kujundamise põhimõtteid alakõnega lastel on kirjeldanud Karlep (2003). Oleks vajalik nende konkretiseerimine nii õpilaste kui koolieelikute jaoks.
6. Kirjeldatud õpetamisetappe ja –võtteid tuleks kohandada koolieelikutele: kirjalikud keelelised harjutused tuleks asendada mängulist ja praktilist tegevust saatvate kõneülesannetega; optimeerides tajutava keelelise informatsiooni hulka.

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