

LIIVI HOLLMAN AND URMAS SUTROP

# Basic Color Terms in Estonian Sign Language

IN AN ARTICLE published in *Sign Language Studies*, Dan Slobin, a well-known linguist, argues that “we must expect any linguistic theory to be equally applicable to both [spoken and signed] types of language” (2008, 117). He continues that our research “must be directed at determining the level of comparison that leads to a *general* understanding of human languages, as well as the *special characteristics* of signed and spoken languages” (121).

First, in this article we apply Brent Berlin and Paul Kay’s (1969) theory of basic color terms (BCTs) to Estonian Sign Language (ESL). According to this universalistic theory, the color categories in any language become encoded in a certain order. Depending on the categories encoded Berlin and Kay described seven evolutionary stages in a language development. Every language possesses at least two BCTs—black and white (Stage I). If the language has three BCTs, it also has a term for “red” (Stage II). Next come yellow and green or green and yellow (Stages III and IV). Then follow blue (Stage V) and brown (Stage VI). On the final Stage VII gray, pink, orange, and purple become basic. Second, we discuss special characteristics of the expression of BCTs in ESL.

First we give an overview on the ESL. After that we introduce the theory of BCTs and the latest studies on BCTs in signed languages. Third, we explain our empirical research method (list task of the color

---

Liivi Hollman is a lexicologist at the Institute of the Estonian Language in Tallinn, Estonia. Urmas Sutrop is director of the Institute of the Estonian Language in Tallinn, Estonia, and professor of anthropological and ethnolinguistics at the University of Tartu, Estonia.

names and color-naming task) and describe the fifty subjects who participated in our study. Finally we discuss our results. Special attention is given to the etymology of the color signs in ESL.

## Estonian Sign Language

Estonian Sign Language (ESL) is used by Estonian deaf people and their families. According to different studies, deaf ESL users number between 1400 and 2000 (Laipea, Miljan, Sutrop, and Toom 2003, 27, 51; Toom, Trükmann, and Hollman 2006, 285). Considering the average percentage of deaf people worldwide (0.1 percent of the world’s population), one may assume that, despite the lack of a more definite estimate, the number of deaf people living in Estonia is approximately 1400–1500. In Sutrop (2000b), ESL is described under the language code *eso*.

The fact that most signers do not learn their primary language from their parents but from teachers and peers is characteristic of any sign language community, as 90–95 percent of deaf people are born into hearing families (Anderson 2006, 137; Kyle and Woll 1995, 25; Laipea 2003, 1904; Toom 2003, 185). The core of the signing deaf community is therefore quite small inasmuch as it includes only deaf people who have acquired sign language in their families. Bearing all of this in mind, one may conclude that ESL, which is currently the primary language for approximately fifteen hundred people, is actually not the native first language for the whole community.

The history of sign languages is often related to the establishment of deaf schools. Although deaf people in Estonia in all probability used ESL to communicate long before deaf schools appeared, the development of ESL may also be very strongly related to the establishment of the first Estonian deaf school in 1866 (Laipea 2001, 2610, Laipea et al. 2003, 12). The school was established in Vändra by a German Lutheran pastor, Ernst Sokolovski (Kotsar and Kotsar 1997, 9). Emphasizing the importance of verbal language in deaf education and the development of students’ vocal skills, the first teacher, Johannes Eglon, used the oral teaching method. At the same time, he supported the use of sign language for student communication (Toom 2002, 26). In 1924 the school moved to Porkuni. The oral teaching method continued to

be used, but despite this the school remained an important center of the deaf, where over time deaf people from different families and various parts of Estonia came together to form a signing environment and spend a considerable amount of time together.

Research on ESL began in the 1980s, and since the early 1990s ESL has been used as the teaching language in the educational system for deaf children. At Tallinn Helen's School (called the Tallinn Deaf School when it was established in 1994), bilingual education is now the order of the day. Both deaf and hearing teachers use ESL; otherwise, sign language interpreters are provided by the school.

As a developing language, ESL is taught in universities and other schools as a second language, and interpreting services from and into ESL are provided for its users. During the last two decades, three small ESL dictionaries have been written (Toom 1988, 1990; Kivisild and Toom 1990); they contain approximately seven hundred signs that form the basic vocabulary of ESL. A multilingual dictionary of basic vocabulary of written Estonian, with four thousand lexical entries, which also contains ESL equivalents, is in progress at the Institute of the Estonian Language in Tallinn. Several overviews of sign languages and ESL have been published (Laipea 1992, 2001, 2007). More specific descriptions have focused on noun phrases (Miljan 2000), adjectives (Miljan 2001), numbers (Miljan 2003), and expressions of time in ESL (Trükmann 2006), as well as the classification and etymology of name signs (Paales 2002). Since March 2007, ESL has been recognized as a separate language by the Estonian Language Law, which defines ESL as an independent language and signed Estonian as a form of Estonian. The law also stipulates that the state encourages the use and development of ESL and signed Estonian. For deaf people, the right to use ESL or signed Estonian is guaranteed by providing sign language interpreting services.

### Basic Color Terms in Sign Languages

Basic color terms have been extensively studied since Berlin and Kay published their *Basic Color Terms* in 1969. In their universalistic theory, Berlin and Kay point out that languages that have a fully developed color system utilize eleven basic color categories: *white, black, red,*

*green, yellow, blue, brown, purple, pink, orange, and gray.* If a language encodes fewer than eleven basic color categories, there are strict limitations on which categories it may encode (Berlin and Kay 1969, 2).

Berlin and Kay define a basic color term as follows:

1. a monolexemic term whose meaning is not predictable from the meaning of its parts
2. a term whose signification is not included in that of any other color term
3. a term whose application is not restricted to a narrow class of objects
4. a term that is psychologically salient for subjects (having a tendency to occur at the beginning of elicited lists of color terms, as well as stability of reference across subjects and occasions of use in the idiolects of all subjects)

For doubtful cases that may arise, Berlin and Kay provide the following subsidiary criteria:

5. The doubtful form should have the same distributional potential as the previously established basic terms.
6. Color terms that are also the names of objects characteristically having that color are suspect and would be excluded if they were doubtful cases on the basis of the first four criteria.
7. Recent foreign loan words may be suspect.
8. In cases where lexemic status is difficult to assess, morphological complexity is also given some weight as a secondary criterion (Berlin and Kay 1969, 6–7).

According to Berlin and Kay, a language with two BCTs is a Stage I language; and one with eight to eleven basic terms, a Stage VII language as described above. Basic color terms in sign languages have not been widely studied. James Woodward (1989) examined the lexicalization of BCTs in ten sign languages from seven different sign language groups and concluded that lexicalization of basic color terms follows the same pattern found in spoken languages. He stated that languages that have only two basic color terms (e.g., Providence Island

Sign Language) have them for *black* and *white*. Sign languages with three basic color terms (e.g., ASL) have added the term for *red*. Four-term systems also have a term for *yellow* (Mainland Chinese Sign Language) or *grue* (i.e., a basic term denoting green and blue at the same time) (French Sign Language). Including examples from six-term, seven-term, and eight-term systems in Hong Kong, Indian, Saudi Arabian, Japanese, and Taiwanese sign languages, he arrives at Australian Sign Language, which also includes *pink* in a nine-term system (Woodward 1989, 150).

Recently, journalist Margalit Fox, after the introduction of the theory of BCTs, reported in her monograph *Talking Hands* that Al-Sayyid Bedouin Sign has two BCTs. The pure black-and-whiteness of that language contrasts with the major spoken languages of that region, Hebrew and Arabic, as well as Israeli Sign, all of which are Stage VII languages (2007). Fox concludes that such a situation is extra evidence that Al-Sayyid Bedouin Sign developed outside the region (2007, 77).

In her descriptive analyses of Adamorobe Sign Language (Ghana), Victoria Nyst (2007) concludes that, according to Berlin and Kay's strict criteria, Adamorobe Sign Language has no BCTs. Yet, the grouping of color signs based on their motivation is in line with the implicational hierarchy described by Berlin and Kay. The Adamorobe Sign Language uses signs for *white*, *red*, and *black*, which are all formed by the same manual sign and are distinguished by mouthing. The signs can be modified for intensification by reduplication. Signs for *yellow* and *green* are based on the entity bearing the respective color (FAT CHICKEN or BANANA SOFT for *yellow* and LEAVES or BANANA HARD for *green*). According to Nyst's survey, no separate signs were found for *blue*, *purple*, *gray*, or *brown* (Nyst 2007, 95–96). It is possible interpret Nyst's data so that Adamorobe Sign is a Stage II language with basic terms for *black*, *white*, and *red*.

Nyst shows five different ways in which color terms are formed in sign languages:

1. *derivation*: The meaning of the sign for an entity with a typical color is extended to include reference to that color;
2. *pointing*: An object directly available in the environment is pointed at. In several sign languages, such color signs point at the

body part that typically displays the specific color (e.g., eyebrows, teeth, lips);

3. *mouthing*: Mouth movements based on spoken language color words combine with a generic manual sign;
4. *initialization*: Signs incorporate a fingerspelling handshake that represents the initial letter of the color term used in spoken language;
5. *arbitrary color signs*: Other color signs may utilize none of the aforementioned techniques.

Nyst concludes that a methodological problem makes it difficult to define a BCT in sign languages, as only the arbitrary color signs should be considered basic terms, all other types being either derived or non-native. Examples from different sign languages in which the first three colors in the color hierarchy are expressed by pointing to body parts (eyebrows, teeth, lips, white skin), indicating the color typically associated with them, show that these color signs are derived and thus, strictly speaking, are not basic terms. In grouping the color signs according to their formation, those that are formed in the same way generally refer to colors that are adjacent in the color hierarchy (Nyst 2007, 92–93). However, the original definition of a BCT can be taken too literally. The aforementioned definition includes four primary criteria and four secondary criteria. The latter should be applied only in situations in which the status of a term is not clear after analyzing it with the help of the four primary criteria (i.e., if the term is basic according to the primary criteria, the secondary criteria do not matter).

Nyst's first method of forming color terms—*derivation*—corresponds to secondary criteria (2007, 6), and terms formed in this way can be basic ones. The second method—*pointing*—excludes terms from the basic status, for they are formed ad hoc. The third method—*mouthing*—and the fourth—*initialization*—are questionable; one should carefully examine the primary criteria and then decide the status of the term. *Arbitrary* color signs can but do not have to be basic.

Preliminary research on Ban Khor Sign Language also challenges the notion of the basic term in sign languages. According to Angela M. Nonaka (2004), Ban Khor Sign Language is a Stage II three-color-term sign language, and its three basic terms are BLACK, WHITE, and RED. Expression of other colors is achieved in two different ways: If

an object of the appropriate color can be found in the immediate physical environment, the object is pointed at. Otherwise, nonbasic color terms are expressed using one of the three basic terms. However, all three BCTs in Ban Khor Sign Language are signed by pointing at body parts: hair for *black*, teeth for *white*, and lips for *red*. However, Nonaka states that, despite the pointing, the terms are fully lexicalized. Although the historical origin of these terms may have been iconic representation, this is no longer the case (Nonaka 2004, 750–51). Indexing to an object to indicate color has also been reported in Providence Island Sign Language where *blue* is indicated by pointing to or touching a blue object with the index finger (Washabaugh, Woodward & DeSantis: 1978: 100).

The question of how to define a basic color term in sign languages has been the main issue in studies of such terms. Disputed color signs are mostly initialized signs and those formed by indexing to body parts.

William C. Stokoe describes ASL BLACK, WHITE, and RED as arbitrary signs, contrasting them with signs for many other colors in ASL, French Sign Language, and other related languages that have been derived by borrowing the color word directly from spoken language using the manual alphabet handshape of the word's initial letter (Stokoe 2005, 163). In his *Sign Language Structure*, Stokoe analyzes ASL color signs, showing that BLACK, WHITE, and RED are genuine signs that use arbitrary handshapes, movements, and locations (Stokoe 1978, 65–66). BLACK (made on the brow), WHITE (made on the chest), and RED (made on the lips) have no alphabetical association. Their handshapes are two of the least marked of all sign handshapes; that is, they are most typical in the sense that they occur in all sign languages, are used for more signs than other handshapes in these languages, and are among the first to appear in the signing of infants growing up in deaf signing homes (Stokoe 1987, 10–11). At the same time, he also states that the three Stage I–II color terms in French and American signing may not be basic in the strictest sense. As indexes in semiotic terms, they represent directly by pointing or proximity: the brow for *black* or *dark*, the lips for *red*, and the collar or other neckwear for *white* (Stokoe 1987, 11).

Yet, indexing is unique to sign languages, something oral languages just cannot apply because of the different modality. In sign languages the three first colors in the color hierarchy are frequently expressed by pointing or touching an appropriate body part. Nyst also states that the BCTs that originated from pointing at colored body parts in ASL described earlier are now fully lexicalized and formally distinct from referential pointing (2007, 92).

In contrast to initialized signs, signs formed by indexing are, however, considered arbitrary and native. Woodward concludes that, in ASL, only BLACK, WHITE, and RED are native signs (1978, 100), while BLUE, YELLOW, and GREEN, as initialized signs, are loanwords from spoken language (1989, 149).

On the other hand, initialization itself is not a sufficient reason for excluding a lexeme from basic status, either. According to the definition given by Berlin and Kay (1969), only if any doubt arises on the basis of the first four criteria might recent foreign loans become suspect.

Initialization in ASL and in the sign languages influenced by French and American Signs is explained by the *signes méthodiques* used by the Abbe de l'Épée. Partly as a result of initialization, by the middle of the nineteenth century the sign languages in France and the United States included the color signs of Berlin and Kay's Stage VII as spoken French and English (Stokoe 1987, 9–10).

### Research Method

This article focuses on the study of (basic) color terms in Estonian Sign Language, based on Berlin and Kay's theory of BCTs (1969). The survey was carried out in summer 2005. The research consisted of three tasks, following Davies and Corbett's (1995) field method, which was developed further by Urmas Sutrop (2001, 2002), which was also used for the BCT survey in Estonian (Sutrop 2000a, 147–148; 2002, 58):

- the list task, which asked subjects to name as many colors in ESL as they could
- the City University color vision test for assessing the subjects' ability to see color (Fletcher 1980)

- the color-naming task, which involved showing the subjects sixty-five different color squares, one square at a time, in random sequence. The subjects were asked to name the colors of the squares.

All of the tasks were carried out indoors and in natural daylight. Both the list task and the color-naming task were videorecorded by a deaf cameraman to encourage direct signing contact with the subject. The interviewer was a fluent, hearing signer.

The collected data were notated using the ESL transcription system (Toom, Trükmann, and Hollman 2006, Paabo, Födisch, and Hollman 2009) and analyzed using the method of Davies and Corbett (1995) and Sutrop (2001).

Along with the ESL signs, Estonian color words were often articulated by the subjects. For the data analyses both ESL signs and the color concepts they referred to were transcribed. If no mouth pattern accompanied the sign formation, the concept it referred to was noted by the interviewer according to the sign's usual meaning. If the Estonian word that was articulated along with the ESL sign differed from the sign's usual denotation, the Estonian word used by the subject was written down as a translation of the sign. Referring to a sign, its English equivalent is given in the text in small capital letters (e.g., WHITE), the glosses of signs are shown in lowercase letters (e.g., white), and the glosses of the concepts are given in lowercase italic letters (e.g., *white*). The letters of fingerspelled words are shown as small capital letters separated by hyphens (e.g., W-H-I-T-E).

In addition to the traditional analyses, the collected data were analyzed as both vocabulary items and concepts.

For the list task data analyses, the mean position ( $mP$ ) of a term in the lists containing the given term was calculated according to the following formula:

$$mP = (\sum R_j)/F,$$

where  $F$  is the frequency of the term, and  $R_j$  is the rank of a term in an individual list (Sutrop 2001, 273). The main parameter in the analyses

of the list task data was the cognitive salience index, designed by Sutrop (2001, 270, 273):

$$S = F/(N mP),$$

where  $N$  is the total number of lists. The index combines two indicators of the psychological salience of a basic term—the tendency to occur at the beginning of the lists and occurrence in the idiolects of all subjects (Berlin and Kay 1969, 6). An ideal psychologically most salient term has a designation of 1 as it is named by every subject (term frequency  $F$  equals the number of subjects  $N$  [i.e.,  $F = N$ ]) and is always in the first position ( $mP = 1$ ) (Sutrop 2001, 271).

### Description of the Subjects

The participants were selected from four different regions: Tallinn and Tartu, as the biggest centers of deaf people in Estonia, with deaf schools, deaf clubs, and other opportunities for social interaction; Pärnu, as an active center of deaf people, presumed to be the area of the archaic ESL; and Võru, as a small center with quite a few deaf people and with ESL therefore probably influenced more by Estonian. The proportion of the subjects from all four regions followed the proportions of the actual number of deaf people living in these areas. A total of 50 subjects were interviewed: 20 from Tallinn, 13 from Pärnu, 11 from Tartu, 5 from Võru, and 1 from Rakvere. The subjects included 24 men and 26 women between the ages of 15 and 74, with an average age of 43 years.

Although half of the subjects (25) had lived in the same city throughout their lives, only 2 of them had actually studied in the local deaf school. The others, even if they were living in the place of their origin, had either been in a Tartu school for students with hearing impairment or in the Porkuni Deaf School for many years. Thirty-six subjects had studied in the Porkuni Deaf School: Some of the younger subjects had started their education in the Porkuni Deaf School and then continued at the Tallinn Deaf School; 12 subjects had studied at the Tartu Hiie School; and the youngest subject was still a

student at the Tallinn Deaf School. Only 1 of the subjects had been to the local mainstream school. Most of the subjects had completed a basic (22 subjects, 44 percent) or secondary (high school) (15 subjects, 30 percent) education; 9 subjects (18 percent) had completed an elementary education, and only 4 subjects (8 percent) had graduated from a university. Among the subjects were garment makers, teachers, carpenters, students, pastors, shoemakers, tailors, an artist, a camera operator, a librarian, a homemaker, and representatives of many other professions.

Thirty-eight subjects (76 percent) were profoundly deaf, and 12 (24 percent) either had some residual hearing or identified themselves as having a hearing impairment rather than deaf. All of the subjects communicated in ESL, but only 8 (16 percent) were from deaf families. Seven (14 percent) people from hearing families stated that they had access to ESL in their families (mainly because of deaf siblings) before they entered a school or kindergarten for the deaf. Thirty-five (70 percent) subjects were from totally hearing families and had started learning ESL at 2–14 years of age. Eighteen subjects had access to ESL when they went to kindergarten (ages 2–5); 13 found themselves in a signing environment only when they went to school (ages 6–9); and 3 started learning ESL between the ages of 12 and 14. One of the subjects did not remember the age at which he started learning ESL.

As generally about 90 percent of deaf children are born to hearing parents (Kyle and Woll 1985, 25), we can see that, although most of the subjects did not come from the core of the deaf community, they still represented a typical selection of deaf sign language users.

All of the subjects had normal color vision (controlled by the City University color vision test [Fletcher 1980]).

### Results of the List Task

In the list task the fifty subjects named altogether 681 color terms. One of the subjects only listed 4 terms, and two of the subjects named 25 different ones. The average number of terms given by a subject was 13.62, out of which 11.38 terms were named prior to the first longer pause for thinking. The subject who could not recall more than 4 color terms was a 73-year-old man from Pärnu; deaf himself, he had

come from a hearing family and was not able to remember the approximate age at which he had started learning sign language. He had studied in a school for students with hearing impairment, which suggests that he did not learn sign language before going to school. He had no trouble naming the colors in the next task, but the fact that he used mostly Estonian words instead of ESL signs confirms that Estonian had probably remained his first language even after learning to communicate in ESL. The subjects who listed 25 different terms were a 68-year-old female garment maker from Pärnu, who was also from a hearing family but had a deaf brother to sign with early in her childhood, and a 37-year-old painter, a graduate of the Estonian Academy of Arts, also from a hearing family. The total of 681 color terms comprised 109 different signs, including compounds, denoting 70 different shades of colors.

Variations in the articulation of the signs, as well as sign order in compounds, were registered while transcribing the research data but were not considered here as different signs. For example, compounds such as BLUE LIGHT, LIGHT BLUE, and LIGHT BLUE LIGHT were analyzed as the same signs (i.e., all meaning *light blue*), as far as the signs LIGHT and BLUE were the same. In the same way, the simple signs, which were articulated with only one different phoneme (a difference in handshape, location, movement, or orientation of the palm or fingers), were regarded as variants of the main sign. For example, GREEN for *green* was considered as a main sign articulated in the neutral signing space with a downward movement. Besides the main sign, two different variants were used: one articulated with the same movement but a different location, the face, and the second articulated in the same location but with an upward movement. Both of these were considered as variations of the same sign. BLUE had different variants, which were articulated either on the nose or in the neutral signing space, here regarded also as variations of the main sign. RED 1 for *red*, articulated mainly with the ESL A handshape, was in many instances formed with the ESL F or S handshape. However, RED 2 for *red* was considered to be a different sign because it differed from the first in practically all of its parameters and has a totally different etymology. WHITE 2 for *white* also could not be regarded as a variety of WHITE 1 because both the orientation of the palm and the movement were

different. Therefore, the signs are here referred to as WHITE 1 and WHITE 2.

Out of 70 different colors, 35 were named only once. The most frequent color referred to was *black* ( $F = 49$ ), followed by *white* and *blue* (both  $F = 48$ ), *red* ( $F = 47$ ), *yellow* ( $F = 46$ ), *green* and *brown* (both  $F = 45$ ), *orange* ( $F = 40$ ), *gray* ( $F = 39$ ), *purple* ( $F = 37$ ), and *pink* ( $F = 33$ ). The next most frequent concept was mentioned by only twenty-two subjects and was a compound (*light blue*); the monolexic terms *beige* and *purple* were mentioned only 18 and 3 times, respectively.

Although *black* was the most frequent color referred to, the most salient concept was *red* (see table 1,  $S = 0.374$ ), as it was generally named at the beginning of the list ( $mP = 2.5$ ). According to the salience index, *blue* ( $S = 0.281$ ), *green* ( $S = 0.196$ ), *yellow* ( $S = 0.186$ ), *black* and *white* (both  $S = 0.170$ ), *brown* ( $S = 0.115$ ), *purple* ( $S = 0.105$ ), *orange* ( $S = 0.092$ ), *gray* ( $S = 0.086$ ), and *pink* ( $S = 0.073$ ) followed *red*.

The most frequent ESL sign out of 109 different signs named in the list task was BLACK ( $F = 49$ ), followed by BLUE ( $F = 48$ ), YELLOW ( $F = 47$ ; 44 times used to refer to *yellow*, and three times used to refer to *orange*, further referred to as YELLOW), RED 1 ( $F = 43$ ), GREEN ( $F = 42$ ), and GRAY ( $F = 42$ ; the sign was used 39 times to refer to *gray* and three times to denote *purple*). The sign for *pink* ( $F = 42$ ; further referred to as PINK/PURPLE) was used with the same frequency, but its meaning did not seem to be as clearly defined, as it referred to *pink* for 27 subjects, to *purple* for 11 subjects, and to *orange* for 3 subjects. One subject used the same sign even for *green*. The signs for *white* ( $F = 34$ , further referred to as WHITE 1) and *brown* ( $F = 34$ ) followed. Fifty-one signs were named only once during the list task.

The first longer gap in the decrease of the frequencies was between the ninth (BROWN,  $F = 34$ ) and the tenth terms (ORANGE 1,  $F = 17$ ).

The most salient sign named in the list task was RED 1 ( $mP = 2.3$ ,  $S = 0.370$ ). It was not as frequent or as salient as the concept *red* because four subjects used a different sign for *red*, mentioned earlier as RED 2 ( $F = 4$ ,  $mP = 4.5$ ,  $S = 0.018$ ). BLUE ( $S = 0.276$ ), GREEN ( $S = 0.190$ ), YELLOW ( $S = 0.176$ ), BLACK ( $S = 0.170$ ), WHITE 1 ( $S = 0.124$ ), PINK/PURPLE ( $S = 0.103$ ), GRAY ( $S = 0.091$ ), BROWN ( $S = 0.084$ ), WHITE 2 ( $S = 0.056$ ), PURPLE ( $S = 0.053$ ), ORANGE 1 ( $S = 0.037$ ), and BROWN/BEIGE ( $S = 0.035$ ) followed.

TABLE 1. List task, most frequent concepts named

	Concept gloss in English	Frequency (F)	Mean position (mP)	Salience index (S)
1	<i>red</i>	47	2.511	0.374
2	<i>blue</i>	48	3.417	0.281
3	<i>green</i>	45	4.600	0.196
4	<i>yellow</i>	46	4.935	0.186
5	<i>black</i>	49	5.776	0.170
6	<i>white</i>	48	5.646	0.170
7	<i>brown</i>	45	7.844	0.115
8	<i>purple</i>	37	7.081	0.105
9	<i>orange</i>	40	8.650	0.092
10	<i>gray</i>	39	9.103	0.086
11	<i>pink</i>	33	9.000	0.073
12	<i>light blue</i>	22	11.500	0.038
13	<i>beige</i>	18	10.889	0.033
14	<i>dark blue</i>	16	10.750	0.030
15	<i>dark green</i>	12	11.250	0.021
16	<i>light green</i>	11	11.545	0.019
17	<i>dark red</i>	9	10.000	0.018
18	<i>light yellow</i>	9	11.222	0.016
19	<i>light brown</i>	10	13.000	0.015
20	<i>light red</i>	6	10.167	0.012
21	<i>golden</i>	7	12.143	0.012
22	<i>silvery</i>	8	14.125	0.011
23	<i>light pink</i>	4	9.250	0.009
24	<i>dark gray</i>	4	11.500	0.007
25	<i>dark brown</i>	5	14.800	0.007
26	<i>light gray</i>	4	13.000	0.006
27	<i>azure</i>	3	10.333	0.006
28	<i>bronze</i>	4	14.750	0.005
29	<i>dark black</i>	2	7.500	0.005
30	<i>violet</i>	3	13.000	0.005
31	<i>light black</i>	3	14.667	0.004
32	<i>light beige</i>	3	14.667	0.004
33	<i>neon green</i>	2	11.000	0.004
34	<i>light purple</i>	2	12.500	0.003
35	<i>dark purple</i>	2	13.500	0.003

In table 2, the ESL signs used in the list task are shown together with the various meanings attached to the sign. When the mouth pattern accompanying the sign was different from its usual denotation, the respective English gloss is shown for the sign together with their

TABLE 2. List task, the most salient ESL signs named

No	ESL sign	Sign gloss in English	F	mP	S
1	RED 1	<i>red</i>	43	2.326	0.370
2	BLUE	<i>blue</i>	48	3.479	0.276
3	GREEN	<i>green</i>	42	4.429	0.190
4	YELLOW	<i>yellow (44), orange (3)</i>	47	5.340	0.176
5	BLACK	<i>black</i>	49	5.776	0.170
6	WHITE 1	<i>white</i>	34	5.500	0.124
7	PINK/PURPLE	<i>pink (27), purple (11), orange (3), green (1)</i>	42	8.143	0.103
8	GRAY	<i>gray (39), purple (3)</i>	42	9.238	0.091
9	BROWN	<i>brown</i>	34	8.088	0.084
10	WHITE 2	<i>white</i>	12	4.250	0.056
11	PURPLE	<i>purple</i>	16	6.063	0.053
12	ORANGE 1	<i>orange (16), beige (1)</i>	17	9.118	0.037
13	BROWN/BEIGE	<i>brown (11), beige (3)</i>	14	8.071	0.035
14	BLUE DARK	<i>dark blue</i>	16	10.750	0.030
15	BLUE LIGHT	<i>light blue</i>	13	11.308	0.023
16	BEIGE	<i>beige (10), creamy (1)</i>	11	11.182	0.020
17	ORANGE 2	<i>orange (3), beige (2)</i>	5	5.600	0.018
18	RED 2	<i>red</i>	4	4.500	0.018

frequencies in brackets. Thus, ESL YELLOW, mostly denoting the color *yellow*, was also used to refer to *orange*, while the sign notated as PINK/PURPLE meant both *pink* and *purple*, and BROWN/BEIGE (in the meaning of both *brown* and *beige*) was sometimes used both for *gray* and *purple*.

According to the mean position, RED 1 ( $mP = 2.3$ ), BLUE ( $mP = 3.5$ ), WHITE 2 ( $mP = 4.3$ ), GREEN ( $mP = 4.4$ ), YELLOW ( $mP = 5.3$ ), WHITE 1 ( $mP = 5.5$ ), BLACK ( $mP = 5.8$ ), and PURPLE ( $mP = 6.1$ ) were the leading terms in the list task, leaving out RED 2, as well as the signs for *beige* and *orange*, as their frequency is too low to establish a significant mean position. RED 1 was in the first position in the lists of almost half of the subjects, as table 3 illustrates.

In the list task, the subjects used few fingerspelled Estonian color terms. As the preceding analysis shows, PINK/PURPLE, mostly denoting *pink* (for 64 percent of the subjects using the sign), was also used to mean *purple* (by 26 percent of the subjects using the sign). Three subjects preferred to use the fingerspelled Estonian word L-I-L-L-A for *purple* ( $mP = 7.3$ ) and R-O-O-S-A ( $mP = 9.0$ ) for *pink*. The Estonian

TABLE 3. List task, ESL signs named first

ESL sign	Sign gloss in English	Frequency
RED 1	<i>red</i>	24
BLUE	<i>blue</i>	6
BLACK	<i>black</i>	5
WHITE 1	<i>white</i>	4
GREEN	<i>green</i>	3
PINK/PURPLE	<i>pink, purple</i>	2
WHITE 2	<i>white</i>	2
YELLOW	<i>yellow</i>	2
BROWN	<i>brown</i>	1
ORANGE 2	<i>orange</i>	1
Total		50

equivalent of *beige* was fingerspelled by one subject (B-E-E-Ž,  $mP = 10$ ). The Estonian words for *violet* and *turquoise* were both articulated once without any signed counterpart; the subjects only pointed to their lips to show they were using the Estonian word instead of the ESL sign, and *Bordeaux red* was once articulated in Estonian in the same way.

### Results of the Color-Naming Task

In the color-naming task, of all of the possible instances (50 subjects  $\times$  65 color tiles = 3,250), the subjects were not able to name the color square in ten cases. In 125 instances (3.8 percent) the subjects were unable to decide which term described the color tile best and gave two or even three names for one tile. All of the names were recorded and transcribed. The total number of names was 3,374, which includes 578 different color concepts expressed by 696 different ESL terms. The length of the terms ranged from 1 to 5 signs, and the average length was 1.79 signs. At the same time, only 179 concepts out of 578, as well as 225 ESL signs out of 696, were named at least twice; most of the terms (399 concepts [69.0 percent] and 471 ESL terms [67.7 percent]) occurred only once during the task. As a mean, 21.52 different ESL names were given for each tile; these were translated into 15.95 equivalents in Estonian.



In table 4, the most frequent terms used in the color-naming task are shown together with their total frequencies, the number of tiles that were named at least once, and the number of tiles for which they were dominant. Terms used fewer than fifteen times are not included here.

According to the mean frequency, the signs were used to name one tile (total  $F$  / number of tiles for which the sign was named), the most salient ESL signs in the color-naming task as shown in table 4 were BLACK, RED 1, BLUE, a compound sign, DARK GREEN, and WHITE 1. After some other compounds, simple signs such as BROWN, GRAY, YELLOW, and GREEN were also quite frequent.

Excluding all of the compounds (figure 1), the most frequent simple color terms in the color-naming task were, in sequence, BLACK, RED 1, BLUE, WHITE 1, BROWN/BEIGE, GRAY, YELLOW, GREEN, ORANGE, PINK/PURPLE, WHITE 2, and PURPLE.

As table 5 shows, in 12 of 65 cases, a simple monolexemic color term was dominantly used to name a tile. BLACK ( $F = 41$ ), YELLOW ( $F = 37$ ), GRAY ( $F = 35$ ), WHITE 1 ( $F = 33$ ), BLUE ( $F = 29$ ), RED 1 ( $F = 27$ ), and GREEN ( $F = 27$ ) were named by more than half of the subjects. PINK/PURPLE ( $F = 21$ ), ORANGE ( $F = 19$ ), BROWN ( $F = 16$ ), PURPLE

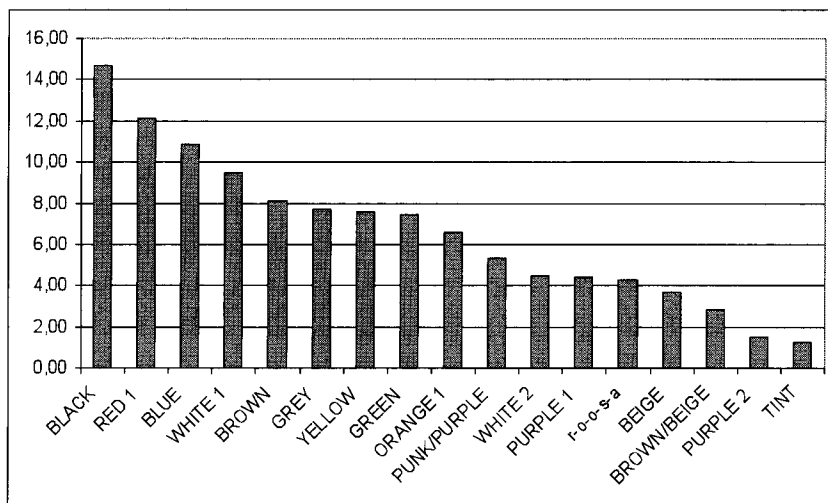


FIGURE 1. Most frequent simple monolexemic terms in color-naming task according to mean frequencies.

Table 4. Color-naming task, most frequent terms, frequencies ( $F > 15$ ), number of tiles, dominant terms and the total number of tiles the term was used with

No	ESL sign	Occurrence in the list task	Total F	No of dominant tiles	No of tiles	F/No of tiles
1	PINK/PURPLE	+	133	4	25	5.32
2	BLUE	+	130	5	12	10.83
3	BLUE DARK	+	130	3	15	8.67
4	GREEN DARK	+	108	4	11	9.82
5	GRAY	+	100	2	13	7.69
6	BROWN	+	89	4	11	8.09
7	GREEN	+	89	4	12	7.42
8	BLACK	+	88	2	6	14.67
9	RED 1	+	85	4	7	12.14
10	BROWN DARK	+	85	3	10	8.50
11	YELLOW	+	83	2	11	7.55
12	GREEN LIGHT 1	+	78	4	9	8.67
13	PINK/PURPLE DARK	+	78	2	20	3.90
14	GREEN LIGHT 2	+	59	0	11	5.36
15	PURPLE 1	+	53	3	12	4.42
16	PINK/PURPLE LIGHT 1	+	50	3	12	4.17
17	PURPLE 1 DARK	-	49	2	10	4.90
18	BLUE LIGHT 1	+	48	1	7	6.86
19	GRAY DARK	+	47	1	5	9.40
20	GRAY LIGHT 1	+	46	2	5	9.20
21	ORANGE 1	+	46	3	7	6.57
22	BLUE LIGHT 2	+	46	1	11	4.18
23	PINK/PURPLE LIGHT 2	+	43	1	17	2.53
24	GRAY LIGHT 2	+	40	0	8	5.00
25	WHITE 1	+	38	1	4	9.50
26	BROWN/BEIGE	+	37	0	13	2.85
27	PURPLE 1 LIGHT 1	-	36	3	10	3.60
28	YELLOW DARK	-	31	1	7	4.43
29	BROWN LIGHT 2	+	31	1	12	2.58
30	BROWN LIGHT 1	+	29	0	8	3.63
31	RED 1 DARK	+	27	0	7	3.86
32	BEIGE	+	26	3	7	3.71
33	TINT	+	24	0	19	1.26
34	PURPLE 2 DARK	+	23	0	9	2.56
35	RED 1 LIGHT 2	+	21	0	9	2.33
36	BLUE GREEN	+	20	0	6	3.33
37	WHITE 2	+	18	0	4	4.50
38	BROWN/BEIGE DARK	+	18	0	6	3.00
39	TINT DARK	-	18	0	14	1.29
24	r-o-o-s-a	+	17	0	4	4.25
39	PURPLE 2	+	17	0	11	1.55
42	TINT LIGHT 2	-	17	0	14	1.21

TABLE 5. Dominant simple terms in color-naming task

Color	Dominant name in ESL	F	Dominant name in Estonian	F	glosses in English
BLACK	BLACK	41	<i>must</i>	44.4	black
Y	YELLOW	37	<i>kollane</i>	32.5	yellow
GRAY 4	GRAY	35	<i>hall</i>	34.4	gray
WHITE	WHITE 1	33	<i>valge</i>	41.9	white
BGB	BLUE	29	<i>sinine</i>	31.9	blue
RO	RED 1	27	<i>punane</i>	27.5	red
G	GREEN	27	<i>roheline</i>	37.5	green
ROR T3	PINK/PURPLE	21	<i>roosa</i>	28.8	pink
OYO	ORANGE 1	19	<i>oranž</i>	35.0	orange
YO S3	BROWN	16	<i>roheline</i>	10.6	brown, green
VRV	PURPLE	13	<i>lilla</i>	21.3	purple
YOY S2	BEIGE	8	<i>hallikas-roheline</i>	6.9	beige, grayish-green

( $F = 13$ ), and BEIGE ( $F = 8$ ) were also dominant names, but their frequencies were quite low, as the respective tiles were named using very many different names. Dominant color names given to the respective tiles in Estonian were taken from the basic color terms survey by Sutrop (2002). As eighty people participated in the survey on Estonian Sign Language, the frequencies were multiplied by 0.625 (50/80) to make the results comparable.

While dominant names for *black*, *yellow*, *gray*, *blue*, and *red* are used with quite similar frequencies in Estonian and ESL, names for *white*, *green*, *orange*, and *pink* show some differences in their frequencies. In nine cases, subjects using ESL named a different sign (WHITE 2) for *white*. In five cases, the Estonian word *roosa* for *pink* was fingerspelled instead of using the ESL sign. Besides the main sign ORANGE, eight different signs for *orange* were used, most of them occurring only once for one tile. In one instance, the Estonian word *oranž* for *orange* was also fingerspelled.

## Discussion

Considering the first four criteria of the basic term according to Berlin and Kay (1969), the candidates for basic color terms in ESL are

BLACK, WHITE 1, RED 1, GREEN, YELLOW, BLUE, BROWN, GRAY, and PINK/PURPLE.

BLACK (figure 2a) seems to be an arbitrary native ESL sign that has no counterpart in neighboring sign languages. The sign has two variants: It may be articulated with just one upward movement or with a repeated movement. The first variant likely denotes deep black, and the repeated movement, blackish shades, but the results do not show the difference in meaning of these two variants. It is difficult to detect any motivation for this sign. According to Vahur Laiapea, the etymology of the sign might be associated with the transfer of the relationship between *black* and *dirty* in Estonian, both marked by the same word, *must*, so BLACK might be motivated by the movement of cleaning a nose (Hollman 2008, 859). It is also possible that the sign is motivated by the method used to help deaf students feel the airflow while articulating nasal sounds since the Estonian counterpart, *must*, starts with nasal *m*. A comparison of the frequencies of color concepts and ESL signs used in the list task shows that BLACK is the only sign used for *black* in the current study.

WHITE 1 (figure 2b) is also an arbitrary sign, in all probability a native ESL sign with no similar signs in neighboring sign languages. In contrast to another sign for *white*, WHITE 2 (figure 2c), it is difficult to detect any motivation for this sign. It may refer to the white skin of the hands, but this is only an assumption. WHITE 2 is definitely not a basic term as it is not as salient as WHITE 1 and has a different meaning, *clean*, as well.

RED 1 (figure 3a) is articulated on the cheek mainly with an ESL  $\Lambda$  handshape (figure 4a) and sometimes with the ESL F (figure 4b) or S handshape (figure 4c). The sign might be motivated by a blush, especially when articulated with an F handshape as the ESL sign BLUSH is formed in the same location with F handshape. ESL RED 1 is very similar to the sign PINK (VAALEAPUNAINEN) in Finnish Sign Language but, as mentioned earlier, it is mostly articulated with a different handshape.

RED was the most salient term according to the list task and followed BLACK in the color-naming task. It was also very salient compared to RED 2, articulated on the lips with the index finger, a sign that is similar to RED in many other sign languages, including ASL, and was



FIGURE 2. ESL color signs BLACK, WHITE 1 and WHITE 2. Photos: Triin Jõeveer, signed by Maret Õun.

probably derived from a pointing sign, as discussed earlier. RED 2 is, according to the current study, rare and used mostly by elderly people.

GREEN is articulated with two hands, either with a divisive downward movement or a round upward movement. A wiggling movement of the fingers is also characteristic of the sign in all of its variants. GREEN in ESL is likely derived from the sign for *spruce* (repeated downward movement, no wiggling of the fingers) or *Christmas* (round upward movement with wiggling fingers) but differs from them, for now, at least in one parameter. There is no similar sign in neighboring sign languages, and it was basically the only sign for *green* in ESL, as it was almost as salient as the concept *green*.

Variants of GREEN seem to illustrate precisely the principles of diachronic change in sign form described by Nancy Frishberg (1975).

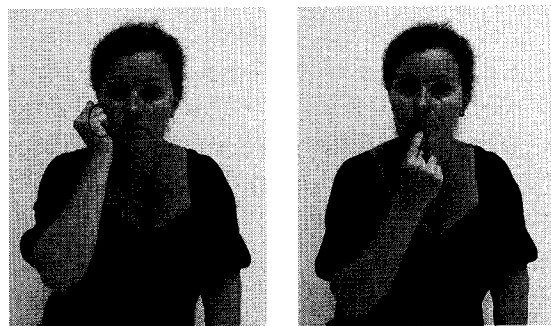


FIGURE 3. ESL color signs RED 1 and RED 2.

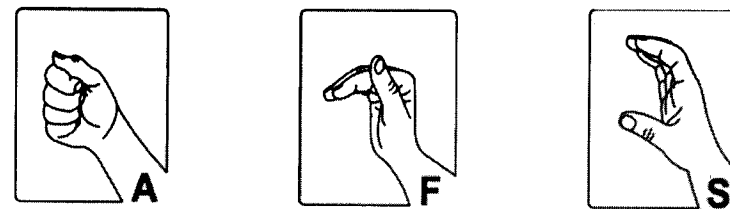


FIGURE 4. ESL hand-shapes used to form sign RED 1. Illustrations by Ivo Kaunissaare.

The first variant of GREEN (figure 5a), articulated in the neutral space, with a round upward movement, was used mostly by the elderly subjects. In the list task the average age of the subjects using this variant was 59.7 years, while the other sign, articulated with the upward movement, was used by subjects with an average age of 36.8. In both the list task and the color-naming task the percentage of the first variant was lower than that of the others (22.5 percent). In most cases this variant was two handed; in the color-naming task the sign was articulated with one hand in only 9.9 percent of all cases. The most frequent variant of GREEN (figure 5b) was, however, the sign with an upward location, articulated with a simpler diagonal movement. This sign was used mostly by the middle-aged subjects from different regions. This was also mainly a two-handed sign: In the list task it was formed only with two hands, while in the color-naming task, it was formed by one hand in 6.4 percent of all cases. Younger subjects (average age 30.0 years) from all regions used the third variant of the sign, in which the location of the sign is in front of the face (figure 5c). To



FIGURE 5. Different varieties of ESL sign GREEN.

free the mouth, the sign is obviously changing to a single-handed sign. In the color-naming task, in 39.5 percent of all cases in which the sign was used, it was formed by one hand only.

In the case of YELLOW and BLUE, although the signs are very salient (i.e., outperforming even BLACK and WHITE I in the list task and being dominant also in the color-naming task), the same signs are also used in Russian Sign Language. In the Estonian context YELLOW (figure 6a) seems to be arbitrary, with no clear motivation or initialization, but considering the obvious influence from Russian Sign Language or even an implicit influence from French Sign Language and ASL, ESL YELLOW may have originated from an initialized sign (the Y handshape from the English *yellow* or J handshape from French *jaune*). Although the ASL YELLOW is a one-handed sign, in ESL and Russian Sign Language the sign is formed by two hands. It might be assumed that ESL YELLOW, with Russian, American, or French provenance, has moved from its original location to a more central one (characteristic of a sign formed in front of the body) and become a two-handed sign. Both signs are formed with very small variations and are practically the only terms for *yellow* and *blue* in ESL, which suggests that they cannot be very recent loans.

GRAY is also very clearly a basic color term in ESL and is in all probability a native sign, very salient and practically the only sign for *gray* in ESL. The sign might be motivated by one's image of a beard, typically gray in color. The sign has two variants: one with a single touching movement on the cheek; the other with a repeated move-



FIGURE 6. ESL color signs YELLOW and BLUE.

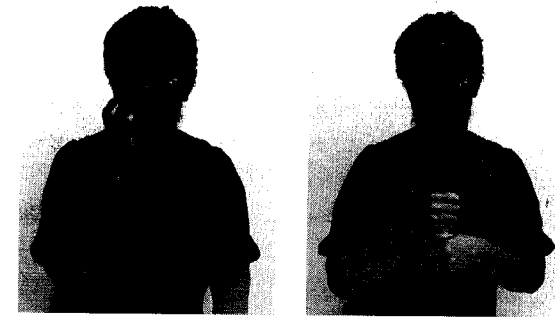


FIGURE 7. ESL color signs GRAY and BROWN.

ment. However, as with BLACK, there was no difference in their meaning: They denoted both *gray* and *grayish*.

BROWN seems to be a native ESL sign, similar to the ESL sign for *coffee*, differing from it by one phoneme (hands touching each other). In some Russian Sign Language dictionaries the same sign for *brown* may be found, although the main sign for *brown* in Russian Sign Language is different.

The ESL sign that, in the current study, was used to denote both *pink* and *purple*, also meets all of the requirements of a basic color term. It outperformed, in salience, GRAY and BROWN in the list task and was a dominant name for four tiles in the color-naming task. The sign here referred to as PINK/PURPLE (figure 8a) is probably also a native ESL sign.

ORANGE I (figure 9a), PURPLE I (figure 9b) and BEIGE (figure 9c),



FIGURE 8. ESL color sign PINK/PURPLE.

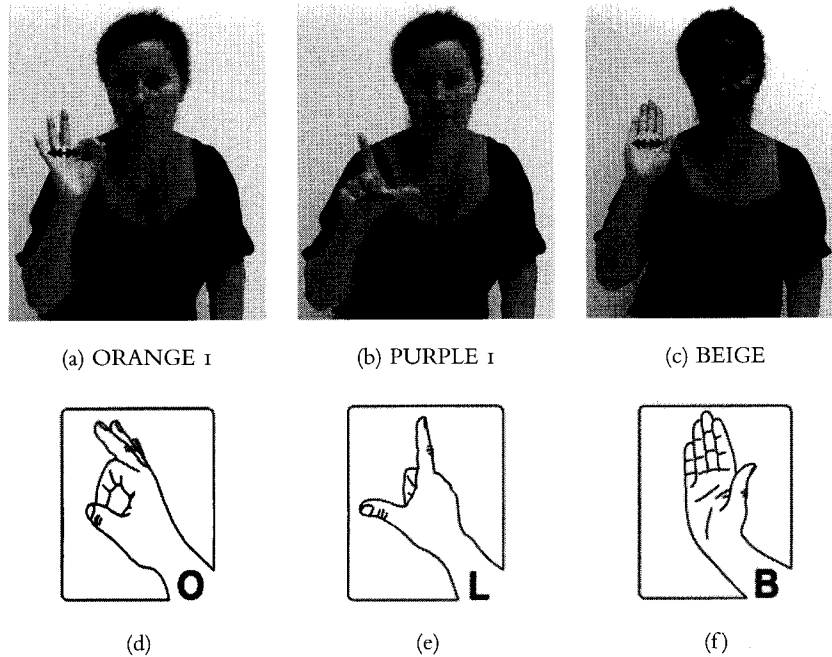


FIGURE 9. ESL color signs ORANGE, PURPLE and BEIGE and the hand-shapes used in formation of the signs.

in contrast, are typical examples of initialization. ORANGE I is articulated with the ESL O handshape (figure 9d) from the Estonian word *oranž*, for *orange*; PURPLE is articulated with the same movement and in the same location but with the L handshape (figure 9e) as the Estonian word *lilla*, for *purple*. Although BEIGE is articulated with a B handshape (figure 9f, the Estonian word *beež*, for *beige*), the sign is likely derived from the ESL sign LIGHT (articulated with two B hands in neutral space).

### Conclusions

Comparing the salience of different concepts and ESL signs named in the list task, we conclude that more salient concepts, such as *red*, *blue*, *green*, *yellow*, *black*, *white*, *gray*, and *brown*, are mostly denoted by one dominant sign. The concepts *red*, *white*, and *brown* all have at least two

different signs, but one of them clearly occurs more frequently than the other(s). At the same time the frequencies of different signs for *orange*, *purple*, and *beige* are distributed more evenly.

Drawing on this discussion, it appears that Estonian Sign Language is a Stage VII language and has nine basic color terms: BLACK, WHITE, RED, YELLOW, GREEN, BLUE, GRAY, BROWN, and PINK/PURPLE. In addition, YELLOW and BLUE, although basic and quite high in the hierarchy and very salient in both the list task and color-naming task, are in all probability nonnative ESL signs. The arguments against the validity of the definition of a basic term were not supported by the results of the current study. Initialized signs appeared quite low in the hierarchy, and signs obviously derived from pointing movements were rare.

Our study, on the one hand, shows that the universalistic theory of basic color terms is applicable to sign languages studied with a sufficient number of subjects (fifty). On the other hand, our results, which were obtained from a sign language, make the universalistic theory of basic color terms even stronger and more inclusive.

In some idiolects the tendency to mouth Estonian words was observed, and in some cases the correspondence of the mouth pattern and the color signs was questionable. However, in terms of the signs themselves, the BCT hierarchy is clearly displayed by the data collected.

### Acknowledgement

This work was supported by Estonian Science Foundation Grant no. 6744 and Estonian Research Council Grant no. SF0050037810.

### References

- Anderson, D. 2006. Lexical Development of Deaf Children Acquiring Signed Languages. In *Advances in Sign Language Development of Deaf Children*, ed. B. Schick, M. Marschark, and P. E. Spencer, 135–60. New York: Oxford University Press.
- Berlin, B., and P. Kay. 1969. *Basic Color Terms: Their Universality and Evolution*. Berkeley: University of California Press.
- Fletcher, R. 1980. *The City University Colour Vision Test*, 2d ed. London: Keeler.

- Fox, M. 2007. *Talking Hands: What Sign Language Reveals about the Mind*. New York: Simon and Schuster.
- Davies, I. R. and Corbett, G. G. 1995. A Practical Field Method for Identifying Probable Basic Colour Terms. *Languages of the World* 9: 25–36.
- Frishberg, N. 1975. Arbitrariness and Iconicity: Historical Change in American Sign Language. *Language* 51(3): 696–719.
- Hollman, L. 2008. Miks must on must ja valge valge: Eesti viipekeele värvinimedest [Why Black Is MUST and White Is VALGE: On Color Terms in Estonian Sign Language]. *Keel ja Kirjandus* (Tallinn) 51(11): 847–62.
- Kivisild, K., and R. Toom. 1990. *Eesti kristlikud viiped* [Estonian Christian Signs]. Stockholm: Np.
- Kotsar, J., and K. Kotsar. 1997. *Eesti kurtide elu ajaraamat. Esimene osa* [Chronicles of the Estonian Deaf], vol. 1. Tallinn: Eesti Vaegkuuljate Ühing.
- Kyle, J., and B. Woll. 1995. *Sign Language: The Study of Deaf People and Their Language*. New York: Cambridge University Press.
- Laiapea, V. 1992. Mis on viipekeel? [What Is a Signed Language?] *Akadeemia* (Tartu) 10: 2098–2136.
- . 2001. Kuulja märkmeid kurtidest, viipekeeltest ja nende iseolemist [Notes on the Deaf by a Hearing Person: Sign Language and Deaf Identity]. *Akadeemia* (Tartu) 4(12): 2603–23.
- . 2003. Palun kirjuta ruttu kui võimalikult . . . Kurtidest lastest, nende keeltest, keelte õppimisest ja õpetamisest [Please Write as Quickly as You Can . . . On Deaf Children, Their Languages, Studies, and Teaching of Languages]. *Akadeemia* (Tartu) 6(9): 1888–1913.
- . 2007. *Keel on lahti: Tähendusi viipekeelest* [The Language Is Open: Meanings from Estonian Sign Language]. Tallinn: Estonian Language Foundation.
- , M. Miljan, U. Sutrop, and R. Toom. 2003. *Eesti viipekeel* [Estonian Sign Language]. Tallinn: Estonian Language Foundation.
- Miljan, M. 2000. The Noun Phrase in Estonian Sign Language from the Typological Perspective. Bachelor's thesis, Estonian Institute of Humanities, Tallinn.
- . 2001. Adjectival Modification in Estonian and Estonian Sign Language. *Estonian Typological Studies* (Tartu) 5: 169–88.
- . 2003. Number in Estonian Sign Language. *Trames* 7(3): 293–23.
- Nonaka, A. M. 2004. The Forgotten Endangered Languages: Lessons on the Importance of Remembering from Thailand's Ban Khor Sign Language. *Language in Society* 33: 737–67.
- Nyst, V. 2007. *A Descriptive Analysis of Adamorobe Sign Language (Ghana)*. Utrecht: LOT.
- Paabo, R., M. Födisch, and L. Hollman. 2009. Rules for Estonian Sign Language Transcription. *Trames* 13(4): 401–24.
- Paale, J. 2002. Isiku-ja kohanimed eesti kurtide märgipärimuses [Name Signs for Persons and Places in Estonian Deaf Folklore]. *Lemmeleht*, 154–67 (Pro Folkloristika 9). Tartu: Estonian Literary Museum.
- Polun, I. D. 2008. Breaking the Molds: Signed Languages and the Nature of Human Language. *Sign Language Studies* 8(2): 114–30.
- Stokoe, W. 1978. *Sign Language Structure*, rev. ed. Silver Spring, Md.: Linstok.
- . 1987. Lexical Indicators of Cultural Change. In *Sign and School: Using Signs in Deaf Children's Development*, ed. J. Kyle, 7–11. Philadelphia: Multilingual Matters.
- . 2005. Visible Verbs Become Spoken. *Sign Language Studies* 5(2): 152–69.
- Sutrop, U. 2000a. The Basic Color Terms of Estonian. *Trames* 4(1): 143–68.
- . 2000b. Estonian Sign Language. In *Ethnologue*. Vol. 1, *Languages of the World*, 14th ed., ed. B. F. Grimes, 663. Dallas: Summer Institute of Linguistics.
- . 2001. List Task and a Cognitive Salience Index. *Field Methods* 13(3): 261–76.
- . 2002. *The Vocabulary of Sense Perception in Estonian: Structure and History* (Opuscula Fenno-Ugrica Gottingensia 8.) Frankfurt am Main: Lang.
- Toom, R. 1988. *Kõnelevad käed: Eesti viipekeele sõnaraamat* [Talking Hands: Estonian Sign Language Dictionary]. Tallinn: University of Tartu and Estonian Association of the Deaf.
- . 1990. *Abimaterjale eesti viipekeele omandamiseks* [Guidelines for Learners of Estonian Sign Language]. Tallinn: University of Tartu and Estonian Association of the Deaf.
- . 2002. Kurtide keeleline variatiivsus kommunikatsioonis [Language Diversity in the Communication of Deaf People]. *Eripedagoogika: Logopeedia ja emakeel* [Special Education: Logopedy and Mother Tongue], vol. 3, ed. K. Plado, 25–32. Kose-Uuemõisa: EEL.
- . 2003. Üks perekond—kaks keelt ja kultuuri [One Family—Two Languages and Cultures]. In *Haridus kõigile*, ed. K. Karlep and E. Krull, 185–89. Tartu: Tartu University Press.
- , M. Trükmann, and L. Hollman. 2006. Eesti viipekeele transkriptsioonist [Estonian Sign Language Transcription]. *Eesti Rakenduslingvistika Ühingu aastaraamat* [Estonian Papers in Applied Linguistics] (Tallinn) 2: 285–301.
- Trükmann, M. 2006. Ajasuhete väljendamine eesti viipekeeles [Temporal Relations in Estonian Sign Language]. Master's thesis, University of Tartu.
- Washbaugh, W., Woodward, J., and DeSantis, S. 1978. Providence Island Sign: A Context-Dependent Language. *Anthropological Linguistics*. Vol. XX, ed. Florence M. Voegelin: 95–109.
- Woodward, J. 1989. Basic Color Term Lexicalization across Sign Languages. *Sign Language Studies* 63: 145–52.