

**A DESCRIPTION OF TIME LINES IN
FINNISH SIGN LANGUAGE**

Master's Thesis
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<p>Abstract</p> <p>This Master's thesis focuses on the nature of time lines in Finnish Sign Language (FinSL). Sinte described the time lines in ten different sign languages in her paper from 2013. Her work was chosen as the framework for this thesis and the findings from FinSL were compared to the time lines presented in her paper.</p> <p>The natural conversations subcorpora from the Corpus FinSL was used as data to study the existence of time lines in natural conversational material by comparing the findings to those described by Sinte. The use of these time lines in the natural discourse was studied as well as whether the data reveals any new lines that would be unknown previously. The data comprised of 1 hour 25 minutes of video material produced by two pairs of signers and it was annotated and analysed on both lexical and discourse levels.</p> <p>Based on the results all six of the time lines and the two-dimensional plane presented by Sinte were found in the data, as well as one additional time line that has not been mentioned before. Lexical signs that directly refer to time, other types of lexical signs as well as non-lexical depictive signs that explicitly describe the passing of time all make use of time lines. On the discourse level temporal information is conveyed through continuous narratives, verbal reduplication and by localizing non-topographical discourse referents. Purely non-manual instances were noted to be common especially within the first mentioned type of discourse level temporal expressions.</p> <p>Examples which gave reason to question the frequent notion on the direction of time were found. The study argues that time does not have just a single clear direction especially on the horizontal axis, but the direction is more likely dependent on the signer's dominant hand in that in the data the signs directed to the ipsilateral side were significantly more common than the contralateral ones. Evidence also proposes that eventually the information on where does the time flow to is tied to the surrounding context, as the conversation partners were likely to understand the temporal references even though they were inconsistent and the movement was occasionally directed to the contrasting direction.</p>	
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Tiivistelmä <p>Tässä maisterintutkielmassa tarkastellaan aikalinjojen esiintymistä suomalaisessa viittomakielessä. Viitekehukseksi valittiin Sinten vuonna 2013 julkaistussa artikkelissa esittämät kuvaukset aikalinjoista kymmenessä eri viittomakielessä, ja havaintoja tässä tutkimuksessa käytetystä aineistosta verrattiin niihin.</p> <p>Työssä tutkitaan miten suomalaisen viittomakielen Corpus FinSL-korpuksen luonnollisesta keskusteluaineistosta löytyvät aikalinjat vertautuvat aikaisemmin kuvattuihin, löytyykö siitä jotakin uutta ja miten aikalinjoja käytetään luonnollisessa diskurssissa. Aineisto koostuu kahden parin tuottamasta, yhteensä 1 tunnin ja 25 minuutin mittaisesta videoaineistosta, joka analysoitiin leksikon ja diskurssin tasoilla.</p> <p>Tulosten perusteella kaikki kuusi Sinten esittämää aikalinjaa sekä kaksiulotteinen taso löytyvät suomalaisesta viittomakielestä, ja niiden lisäksi löytyy yksi aiemmin kuvailematon aikalinja. Aikaan viittaavat leksikaaliset viittomat, muut leksikaaliset viittomat, sekä ajan kulkua kuvailevat viittomat ilmentävät aikaa näiden aikalinjojen avulla. Diskursiivisella tasolla aikalinjojen käytöstä on erotettavissa jatkuvat narratiivit, verbaalien toisto ja ei-topografisten olioiden paikantaminen viittomatilaan. Erityisesti ensimmäisen diskursiivisen tyyppin yhteydessä aikalinjojen käytön havaittiin olevan puhtaasti non-manuaalista.</p> <p>Ajan suunnan suhteen löydettiin perusteita kyseenalaistaa aikaisemmin lausuttuja toteamuksia. Erityisesti ajan kulkusuuntaa horisontaalisella akselilla tarkastellaan kriittisesti. Löytyneiden todisteiden valossa aika ei niinkään kulje yksiselitteisesti tiettyyn suuntaan, vaan pikemminkin kunkin viittojan vahvemman käden suuntaan, mitä tukee aineistossa selkeästi hallitseva taipumus suosia vahvemman käden puolelle suuntautuvia viittomia. Tutkimuksen perusteella ajan kulku on kuitenkin viime kädessä tulkittavissa vain ympäröivästä kontekstista.</p>	
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Annotation conventions used in this thesis:

All the annotation information presented in this thesis is extracted from the data as it was written. All the translations from Finnish to English are done by the author for this thesis and they only refer to the Finnish ID-gloss in question without referring to any other corpus or their ID-glossing systems outside the scope of this thesis.

MUUTTUA	An ID-gloss for a sign as it is marked in the data in Finnish written with capital letters (Salonen & Wainio 2019).
[AFTER]	An English translation for the ID-gloss in question.
KOKO-AJAN	An ID-gloss comprising of two words. The same method is used if the English translation will require several words.
_num	An additional grammatical note referring to numerals is added at the end of the ID-gloss.
_kvap	A grammatical gloss for the depictive sign is an acronym for “ K uvaileva V iittoma A ika/ P aikka” [Depictive Sign Time/Location].
ISO(L_ylös)/BIG(M_upwards)	Additional information after the ID-gloss in brackets tells the direction of the movement [“liike” in Finnish].

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1 INTRODUCTION

What is time? How is time expressed through linguistic means? Does time have a direction? If there indeed is direction for time, do these directions differ between spoken and signed languages? What about between different sign languages? These are some of the questions that were pondered regularly whilst working with this thesis. Some of them have been answered already, some are more philosophical in nature and will probably never receive a completely satisfactory answer. What this thesis aims to do is to take a look at Finnish Sign Language (FinSL) and focus on the concept of time lines within it. Time lines in this thesis are defined to mean the metaphorical vector-like lines with a specific direction and length. The study is set at the culmination point between studies on the use of space and that of the temporal expressions in sign languages.

Time lines were first mentioned in the research literature in the 1970's (Friedman 1975), but sign language scholars Jacobowitz & Stokoe (1988) were critical towards the whole concept of time lines, much like Selvik (2006) later in her own dissertation. Descriptions of time lines and other temporal structures have however persisted and remained popular among scholars around the world, time lines have been reported from almost all of the sign languages studied so far, and the findings seem rather cohesive throughout the field (Quer et al. 2018: 219). Time lines have however not been systematically studied in FinSL yet. There are two mentions about the usage of space in temporal expressions in the literature, but they are both based on the authors' anecdotal evidence (Paunu 1992; Rissanen 1985).

In this study systematically gathered and nationally representative corpus data was used as the data to draw the conclusions from, to ensure the reliability of the results and the replicability of the study. As Salonen et al. (2016) mention using corpus data is superior to the more conventional research methods due to its variability and better reliability. The study was particularly current now since the Corpus FinSL was published only months before this thesis project started (University of Jyväskylä 2019b). Sinte (2013) was chosen as the theoretical framework, as her paper provides the most exhaustive comparison between the time line descriptions in one study to date. She used corpus data as the basis of her research and it continues the line of work Engberg-Pedersen (1993) did for Danish Sign Language (DTS) and eventually became canonized for. Sinte's (2013) descriptions seem to be cohesive with those mentioned in other sources (eg. Leeson, 1996), and other scholars have used her work as a

reference to present their findings as well (Karabüklü 2018). This thesis is interested in how FinSL fits into this framework, and looking at how is time expressed in FinSL through the use of time lines forms the core of the research problem.

More specifically the research questions are:

- 1) *Do the time lines identified by Sinte (2013) exist in FinSL?*
- 2) *Are there additional time lines?*

Quer et al. (2018: 220) suggest in their guidebook for sign language grammar writers and researchers that merely describing the forms of the time lines is not enough, but also the usages should be described to contribute to building a fully functional grammar. This is where the scholars representing the Cognitive-Functional approach working with corpus linguistics base their whole approach to. In this thesis novel approaches were implemented to find all the possible forms time lines might take.

The report comprises six chapters. It starts by describing how time and space are conceptualized in languages in general, and then shifts the focus onto signed languages. The first chapter also explains what is known about time lines in sign languages in general and the chapter ends by telling what little is known about the expressions of time in FinSL so far. The third chapter is dedicated to methodology. The nature of the data and the informants are presented, as are the reasons for choosing this particular type of data over other options, the various stages of the annotation process and the methods that were used to find answers to the research questions. The fourth chapter focuses on the results, namely what kind of time lines were found from FinSL through the annotation and analysis of the data, and how do the various ways of expressing temporal information differ between the time lines. In the following chapter the findings are discussed in relation to the preceding knowledge that was presented in the chapter 2 alongside with the credibility and validity of the research. The report is finished by drawing a conclusion, giving ideas for future research and closing with some final words.

2 SPACE AND TIME IN SIGN LANGUAGES

2.1 Space and time as psycholinguistic concepts

Time is considered one of the basic tenets of human psyche. All cultures and languages have means on telling whether something happened before, after or at the time with the speech act. (Friedman, 1975: 941.) Each utterance in every natural language must express temporal and aspectual information together with an interpretation about the modality to which it is set (Pfau et al. 2012). Unmarked utterances are in most cases interpreted as currently happening in the present, but not necessarily so (Sinte 2013: 230). This is where studies about time come into play and what makes the study of the different means to express time a necessary building block of a basic grammar of any language.

Time is an abstract concept which cannot be directly experienced using the visual, auditory, olfactory, gustatory or somatosensory senses available to us. Space on the other hand can be directly perceived through the visual and to some extent even through the somatosensory sense as well. We humans do have a biological circadian clock, a system that synchronizes bodily functions at a roughly 24-hour cycle, and which is readjusted daily by the daylight. This internal process gives us a vague sense of time passing and a rough estimate of what the time could be, but the system is not precise enough to rely our interpersonal communication on (eg. Bellet & Sassone-Corsi, 2010; Giebultowicz, 2010.) Instead languages use the means of *metaphor* to borrow linguistic expressions from a more familiar, concrete domain and transfer them to be used for a more abstract one, in this case the concrete three-dimensional domain of space to describe the abstract domain of time. We use expressions such as “time is passing by” or “Hanukkah is approaching”, as if temporal events would be concrete entities moving in the physical space. (Haspelmath 1997.) “TIME AS SPACE” is considered a universal root metaphor that all cultures and languages across the world base their worldviews on and onto which additional, more culturally relevant metaphors are built on. Lakoff & Johnson (1980) talk more specifically about *orientational metaphors* that organize whole systems of concepts in relation to spatial dimension and to each other. Temporal information is just one system that relies on this kind of organization, and they are all culture specific. The different systems are cohesive with each other within the same culture; all of the metaphors have a basis stemming from the physical world, but the interpretation of these might differ from culture to culture. (Lakoff & Johnson, 1980.) One example of how cultures see time as an orientational metaphor is the relation of the speaker/signer with the concept of time itself: some cultures and languages

are egocentric and see the time moving in respect to the ego, others see time as being set still like a setting around us and the ego moving within it. One can say “Christmas is coming in two weeks” which implies that the ego is seen as static and the temporal event is approaching it. It is also possible to say, “I will see you in two weeks time”, in which case the time forms a setting and the speaker is moving within it. These two options are not mutually exclusive, however. As the two examples clearly demonstrate for example the English language can use both views interchangeably. (Boroditsky, 2011; Friedman, 1975: 951; Lakoff & Johnson, 1980.) Both of these approaches need a bit more information added to them to be fully functional. In order to move in relation to time we need to have some reference points. Temporally the obvious options would be the three of the most common tenses; the present, the future and the past.

As stated previously, the domain of space is concrete and three dimensional; it can be described though the sagittal, horizontal and vertical axes as depicted in Figure 1 below. Sagittal axis goes between the behind of the ego and the front of the ego, horizontal axis runs between the left and the right, and vertical axis runs between below and above the ego. These spatial concepts provide us with the feature of direction. It is important to notice, that the concept of axis does not dictate whether something is approaching or farthening from the ego, it merely states the relative direction the movement takes. As we will later see in chapter 2.2.3 these different axes are used to convey different kinds of information in the temporal domain.

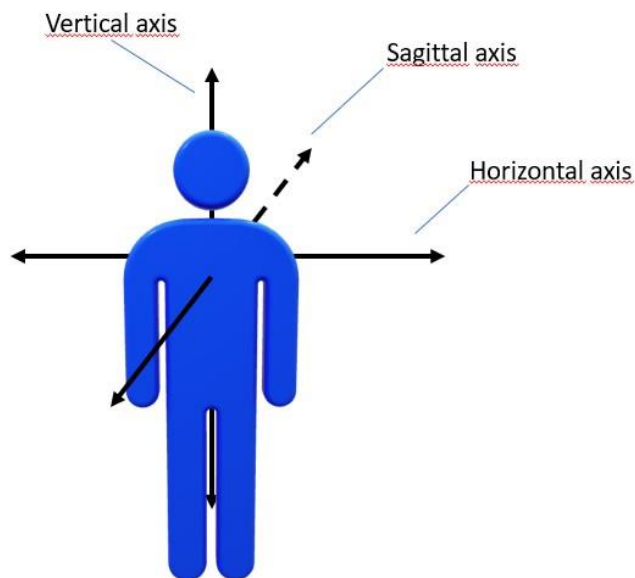


Figure 1. The three axis along which three-dimensional space can be coordinated.

Most famously some languages see future being situated in front of the ego, on the sagittal axis, regardless whether the ego is seen as moving toward it or the future approaching the ego, while other cultures and languages consider the past and the history being openly displayed as plain to see in front of them, and future withholding itself from the seeing eye behind the observer (Lakoff & Johnson 1980: 15; Núñez & Sweetser 2006). Time is also seen as flowing on the horizontal axis in respect to the ego, and there is evidence that this flow of time is aligned with the writing direction of the language one is speaking. Boroditsky (2011) has shown how English speakers see it flowing from left to right on a horizontal plane and people who speak languages like Arabic or Hebrew see the flow going from right to left, all in accordance to their respective writing directions. Mandarin speakers however demonstrate that these are not the only options by conceptualizing time flowing on a vertical plane from up to down. (Boroditsky, 2011; Gu et al., 2017.) Miles et al. (2011) have asked whether it is possible for individual speakers to have two time lines simultaneously. In addition to the aforementioned arguments Lakoff & Johnson (1980) have mentioned how regardless of the horizontal writing tradition in English, and in Western cultures in general, there is a metaphor for “FUTURE IS UP”, which would suggest that languages can have spatio-temporal metaphors for all axes existing at the same time, but some are just culturally preferred and thus stronger than others, much like proven by Gu et al. (2019) for Mandarin. As for the division between linear and cyclic concepts of time Núñez & Sweetser (2006: 413) explain how they are not necessarily mutually exclusive either:

“[T]emporal linearity coexists with and is mapped onto cyclic structure such as the repeating structure of the solar year. In English, as well as in Malagasy, Christmas 2003 precedes Thanksgiving 2004. A circular path preserves linear topology, in the sense that at any given point on the path, the traveler is experiencing a local linear environment and forwards orientation with respect to it.”

There are also known examples of individual languages that do not see the flow of time relative in this sense, but rather the direction is tied to the absolute cardinal directions of the topographical surroundings and a reported case of at least one language in which the concept for future does not even exist. These will be elaborated on in the chapter 2.2.4. (Boroditsky & Gaby, 2010; Engberg-Pedersen, 1993; de Vos, 2012; Yano & Matsuoka, 2018.) Sinha et al. (2011) have challenged the universality of the “TIME AS SPACE” root metaphor altogether based on their findings from the Amazonian Amondawa people, who do not see time as having any direction to begin with. The Amondawa do not employ any spatial expressions to talk about temporal events, and when presented with pictures depicting different seasonally repetitive yearly events and asked to put them in order all of the informants produced similar answers

lacking any spatial structure. They placed the pictures in an S-shaped formation, with no circular or cylindrical shapes in them and with no references to the events repeating seasonally. Although the shape of the formation was similar among the informants, the relative direction of the events that follow another varied between them. (Sinha et al., 2011.)

2.2 Space and time in the domain of sign languages

As mentioned before both space and time are integral parts of all humans' psyches and therefore part of all our languages. Due to the youth of sign linguistics there are no general grammars of sign languages written yet where these themes would have been generally described and canonized, but rather they are studied by individual scholars in unrelated publications. So far some scholars have written exhaustive descriptions on how space is used in their respective language (eg. Engberg-Pedersen, 1993; de Vos, 2012; Winston, 1991), while others have dealt with the expressions of time in detail (eg. Leeson, 1996; Selvik, 2006; Sinte, 2013). Time lines themselves are naturally at the culmination point of both of these approaches, but as Sinte (2013: 231) mentions, time lines alone do not cover the whole spectrum of temporal expressions. In the coming chapters it is discussed more thoroughly how the time lines are not a grammatical domain of their own, but the means through which they are expressed fall onto the domains of lexicon, morphosyntax and pragmatics. Both the signing space and temporal expressions will be dealt with separately before turning the focus on how the time lines fit the picture.

2.2.1 Signing space

One of the biggest and most obvious differences between spoken languages and sign languages is the modality. Sign languages are visual and use space and spatial relations as communicative resources unlike linear and "immaterial" auditory utterances of spoken languages. The use of signing space is one of the basic domains of sign languages and it has inspired several descriptions on several sign languages, and the usage seems rather similar across the line (eg. Engberg-Pedersen, 1993; de Vos, 2012). De Vos (2012) studied the usage of signing space exhaustively in the signed language of Kata Kolok in Bali, Indonesia, and according to her there are three domains of sign-spatial mapping that seem universal throughout all sign languages: referring to topographical space, referring to grammatical person on the syntactic level and that of temporal expressions.

Topographic use of space is the most straightforward of these; the referents that the signer is talking about are placed into the signing space according to their topographical locations and relations. If a car is situated on the left and a person on the right from the signer's viewpoint, these referents will be placed to the space accordingly, even if they would not be currently actually visible in the situation. The referents are explicitly named and placed when they are mentioned the first time in the discourse, especially when the location is relevant for the topic and reference at a later stage is considered likely. After the initial localizing referring to these locations is consistent throughout the course of the text, although done by directing signs towards them or with mere referential pointing with a finger or with a gaze.

With the syntactic use the placing of the referents is more arbitrary. Either the actual topographical location of the referents is not known, or perhaps the referents are abstract and they do not even exist in the actual space, in any case the actual location in the signing space is not relevant. The referents can be placed anywhere the signer wishes. Syntactic use of space deals with the verb agreement and pronominal reference. Topical relations can also be conveyed through spatial means, in which case the relative placement of the referents is meaningful although the actual position is not. In verb agreement the signer may modify the movement of a predicate verbal according to the arbitrarily placed referents to convey their agreement, ie. who did what (to whom), or point at them pronominally to distinguish who or what is the topic of the conversation. (Perniss, 2012.) The arbitrariness of these referents is also culture specific: village sign languages are reported on relying more on absolute locations based on for example a person's home, workplace or a plot of land. Urban sign languages on the other hand use purely arbitrary localizations, which can change from situation to situation, although the actual person being referred to would stay the same (Quer et al. 2018: 746). Using space to convey temporal information is the main interest within this thesis and the means on how it is done will be dealt with in detail throughout this report.

The aforementioned functions can be expressed through different linguistic levels. Every sign by default has a placement of articulation that can be varied on the phonological level to an extent without changing the meaning of the sign. It is the morphosyntactic level where space is used for modulating the signs according to the grammatical and semantic rules in order to express verbal agreement, marking aspect, person and number marking and localizing referents. Spatial locations and movements are always gradient and making distinctions between the meaningful and meaningless changes in them can be challenging (Jantunen, 2010). On discourse level the main interest is on structuring the signing space to maintain cohesion within the discourse. Discourse cohesion can be achieved and maintained by placing different themes

to different locations inside the signing space, which is done by using the morphosyntactic means. Maintaining discourse cohesion also allows for displacement of citation form of the sign (Perniss 2012: 418). Engberg-Pedersen (1993) points out that even signer's attitudes towards the topic affect their choice of referent placement: items that are considered important are situated higher in the signing space in relation to those of lesser value; referents that are considered good and are close to one's liking are signed closer to signer's body than those that they dislikes. (Perniss, 2012.) The horizontal axis is also divided in terms of referent placement; Barberà Altimira (2015: 63) introduces the concept of laterality when she mentions how the ipsilateral side, that is the side of the respective dominant hand in relation to the center line of the signer's body, is naturally preferred for economical reasons whenever other restrictions permit.

2.2.2 Temporal information in sign languages

Temporal information can be expressed on different levels of linguistics. Quer et al. (2018: 752) propose distinguishing between lexical and discourse usage. *Lexical level* deals with individual signs which can be further divided into lexemes and depictive signs (Figure 2). According to the widely canonized definition by Johnston & Schembri (1999) lexemes are conventionalized signs with a solidified meaning that is unrelated to the context they are uttered in. Individual lexemes that express temporal information such as EARLIER, NOW, LATER, TOMORROW are often referred to as temporal adverbs and they are thought of forming a closed sign class of their own (eg. Rissanen, 1985). They vary according to the level of accuracy, NOW and YESTERDAY are more accurate than LATER or BEFORE, as well as according to the referencing function. The meaning of YESTERDAY is dependent on the day of the utterance and therefore deictic, EARLIER and LATER on the other hand usually have an immediate reference in the surrounding context which affects their interpretation and thus makes the meaning anaphoric. Signs like EARLIER or LATER can also be used deictically, with the present as the assumed reference, in which case the meaning is not as precise as usually, when the signs have an explicit contextual reference they are compared to. These signs are often seen as the device through which sign languages express whether events are situated in the past, the present or the future, since the verbals do not inflect according to tense and sign languages are thus considered tenseless (Pfau et al. 2012). There are however no general definitions of this class or the signs that would belong to it. Temporal adverbs have not been defined as a sign class in FinSL either, and thus they will not be referred to as such (Jantunen, 2010). Instead in

this thesis the term *time signs* is used to refer to signs that directly refer to temporal information, like those mentioned earlier, as separating them from other signs does matter as we will see in coming chapters. This is not to suggest they would be similar to temporal adverbs in spoken languages or that they would form a clearly defined closed sign class of their own.

Depictive signs on the other hand do not have a solidified form, but they make use of finite selection of handshapes to convey the desired meaning. Depictive signs are used for serving functions varying from describing shapes and sizes of nominals to types and directions of movement, degrees of aspectual information and conveying temporal meaning. (Johnston & Schembri, 1999; Takkinen, 2008.) Making distinctions between sign internal movement that is motivated spatially from the temporally motivated one is key here. As depictive signs are also used for narrating the physical movement of an object across space, understanding the difference between these two is important. The handshapes for the depictive signs conveying both temporal and spatial information are the same, the difference ultimately depends on the surrounding discourse. An open palm facing the signer and moved forward along the sagittal axis can be interpreted differently if the context is “EXCUSE-ME, COULD, YOU, depictive sign” where the implied meaning is “Excuse me, could you move forward” uttered for example in a crowd or a queuing situation, when the same sign in a sentence “I, HOPE, MY, WORK, depictive sign” is interpreted as “I hope my work will continue” or “I hope I can keep my job”, thus referring to a temporal meaning.

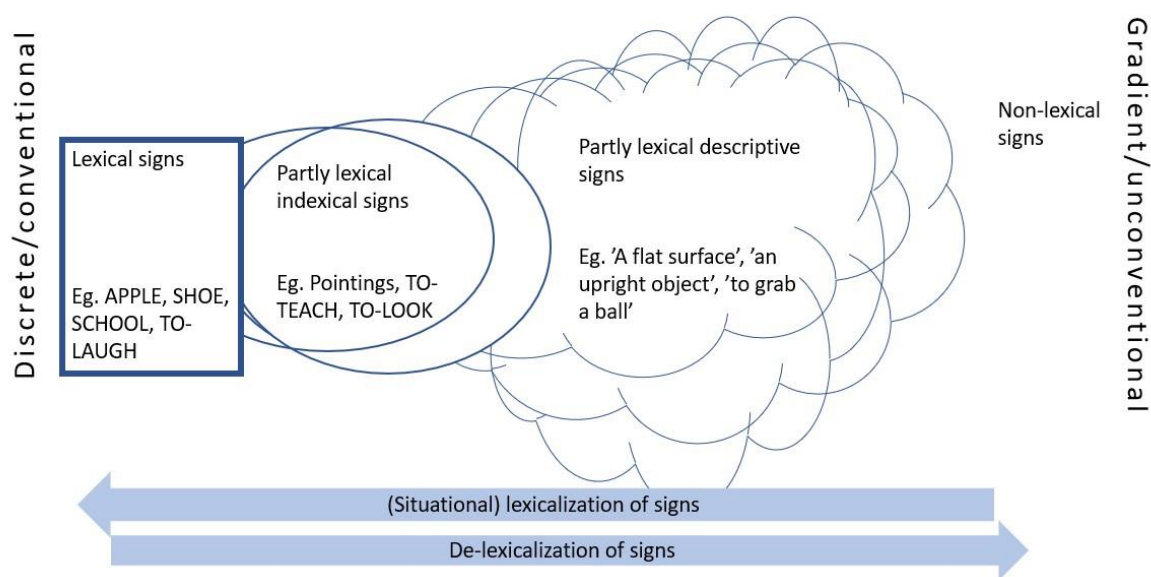


Figure 2. The stages of lexicalization among signs (adapted from Jantunen, 2018: 115).

Following the idea of Lakoff & Johnson's (1980) orientational metaphor both the conventionalized lexemes and the more gradual depictive signs convey temporal information through the sign internal movement. Even the lexemes that are not referred to as time signs and are considered belonging to another sign class do convey temporal information through their structural makeup. Within this thesis these signs are called as *other signs*. Some scholars even see that all temporal information is dependent of the surrounding discourse, but some signs have just lexicalized that movement into their citation form, as the direction of the movement conveys information about where the culture sees the time flowing (Jantunen, 2020). Regardless of the sign class, which are not even generally established, the key feature is the function of the movement. These signs can be modulated as well in terms of numeral inflection or changing the movement according to tense (Sinte 2013). In FinSL a good example of this is the sign **VIKKO** [WEEK] which can be numerally inflected to numbers up to nine, and the movement pattern of the citation form can be turned 90 degrees from the non-marked/present form to either facing backwards to mark the past or forward towards the future.

In this thesis the *discourse level* of conveying temporal meaning is defined through the study of pragmatics, by examining how the meaning is constructed through and within the context, not by directly referring to certain points in time per se which is the case with lexical expressions. The deictic and anaphoric natures of the lexical signs make the temporal references also ultimately dependent on the surrounding discourse as well, although the meaning of the

lexical signs is more explicit and specific. Structurally the discourse expressions exceed the length of a sign. There are several ways to do this: the signer might start a part of a discourse from one point in the signing space and move their body within it as they proceeds, including several utterances inside the movement path before reaching the end. The movement can also be more subtle in the sense that the signer's body stays still but the hands move constantly and the signs are thus located to different parts of the signing space as the discourse goes on. I have named this usage as *continuous narrative* for this thesis. Discourse referents might also be placed to different locations on the time line and new ones placed in reference to them over the discourse. As Emmorey (2001: 111) and Engberg-Pedersen (1993) have pointed out not all signs have sign internal movement within them, and in those cases they have to be placed on a time line to express temporal information. I call this usage *localization of non-topographical discourse referents*. Usually referent placement that is not exclusively topographic or temporal is seen merely as arbitrary, which it of course is in the view of grammar. There are instances such as narrating about counterparts, where the two opponents are placed on the opposite sides of the signing space to convey the relation between the two. This type of placement is neither topographical nor temporal, but it is not arbitrary either since the placement itself is significant for semantical reasons. In the purely arbitrary cases it does not matter semantically where the referents are placed, but it is hypothesized in this thesis that it might reveal something about the underlying time concept of the signer. If the referents could be placed anywhere in the signing space, can it be just pure coincidence that an individual signer is always preferring the order from left to right? Or that another one is always placing the referents from right to left. A third way temporal information can be expressed on the discourse level has to do with *reduplication*. Reduplication in itself can have many functions ranging from expressing plurality to stressing and emphasizing the meaning of adjectives, but as Lakoff & Johnson (1980: 128) mention, when applied to verbs it could imply continuation, that is, something happening continuously over time. In spoken languages the function of reduplication is dependent on the word-class of the reduplicated word. In sign languages a general consensus on dividing signs into different classes is yet to be reached, and some scholars suggest that such a division is impossible to make and that the "class" or the function of a sign is always dependent on the context it is uttered in (Jantunen 2010). Within sign languages, where almost all of the linguistic resources make use of space, the case of reduplication becomes more complicated. When nominal signs such as TREE, CAR or HOUSE are reduplicated, the reduplication is interpreted as a sign of plurality; there are several trees, cars or houses in question. Even when the signs that are interpreted as nominals in their respective contexts and the repetition would imply mere

plurality, the reduplicated signs rarely are produced exactly in the same location. With signs interpreted as verbals this movement between the locations is considered as an expression of the flow of time. Repeating the same verbal sign is seen as implying continuing the same action over the course of time. Depending on the type of reduplication the act can be seen as either extending the action or repeating it at a later stage in time. With nominals the case is similar to that of localizing discourse referents; even though grammatically the reduplication conveys plurality and the locations of the signs is arbitrary, it is proposed in this thesis that metaphorically the movement implies chronology, order of things in relation to time.

2.2.3 Focus on the time lines

Time lines are generally considered to be straight imaginary vectors with a particular direction. Signers can place referents along these lines through various means to convey certain points in time. Relative distances along the lines correspond to the conceptual distances in the selected domain, be that temporal or topographical in nature. (Friedman 1975: 960; Leeson 1996: 89; Quer et al. 2018: 752) Other means such as repetition, facial expressions and prosodic variations in the nature of the movement are used for expressing the respective distance on the lines. Although usually the time lines are described and defined in relation to the signer's body, the most drastic anecdotal examples show they are not restricted to only that domain. In her article Winston (1991) describes how a deaf lecturer giving a lecture related to American Sign Language (ASL) poetry goes as far as to project the time spatial metaphors to the space surrounding himself and positions his whole body and moves himself in the space portraying certain temporal referents in the story. Signers are not restricted only on deictically pointing at these lines or placing signs along them either. They can also lean their bodies from side to side or twist their torsos from one side to the other, which is also considered to be part of semantically using the space to convey temporal meaning. These non-manual movements within space can be gradual. (Friedman, 1975: 952; Paunu, 1992: 119; Winston, 1991.)

In addition to the relative distance another aspect to the line is the direction. In cultures where time is seen as linear, the direction of movement along the time line is seen as the direction time flows. On each of the axes there is a metaphorical direction for the past and the future and some, but not all, axes and time lines that run along these axes have a set point for the present. Using these directions a signer can place events into chronological order in relation to each other.

According to Sinte (2013) the research on time lines was started by Friedman (1975), as she assumed that sign languages do not express tense through verbal inflection unlike most spoken languages, but instead place signs on linear time lines to express time. Leeson (1996) has noted that Engberg-Pedersen (1993) was the first one to describe and present time lines in a systematic way instead of merely mentioning them alongside presenting examples. Supposedly this systematic approach was at least one of the reasons for the canonization of Engberg-Pedersen's (1993) work in the body of research to follow. Selvik (2006: 15) points out that Engberg-Pedersen (1993) also used more varied methodology to arrive at her conclusions compared to preceding scholars. All sign languages studied so far are reported as having time lines of some sort, and that these time lines do reflect the conceptualization of time in the surrounding cultures respectively (Pfau et al. 2012; Quer et al. 2018). These time lines are based on orientational metaphors which are culture specific as we will see in practice in the following chapters (Lakoff & Johnson 1980).

Sinte (2013) has gathered the findings from ten urban sign languages across the world, onto which she reflects her own findings from French Belgian Sign Language (LSFB), and presents the time lines found in those languages in her paper. The results are rather consistent throughout the languages. Not all of the lines are found in all the languages, but all the languages use the lines in fairly similar ways when they do (Quer et al. 2018). The lines Sinte has found are pictured in the Figure 3 below and the descriptions of each line paraphrased after that with added input from additional sources. (Sinte, 2013.)

Expression of time in French Belgian Sign Language (LSFB) 207

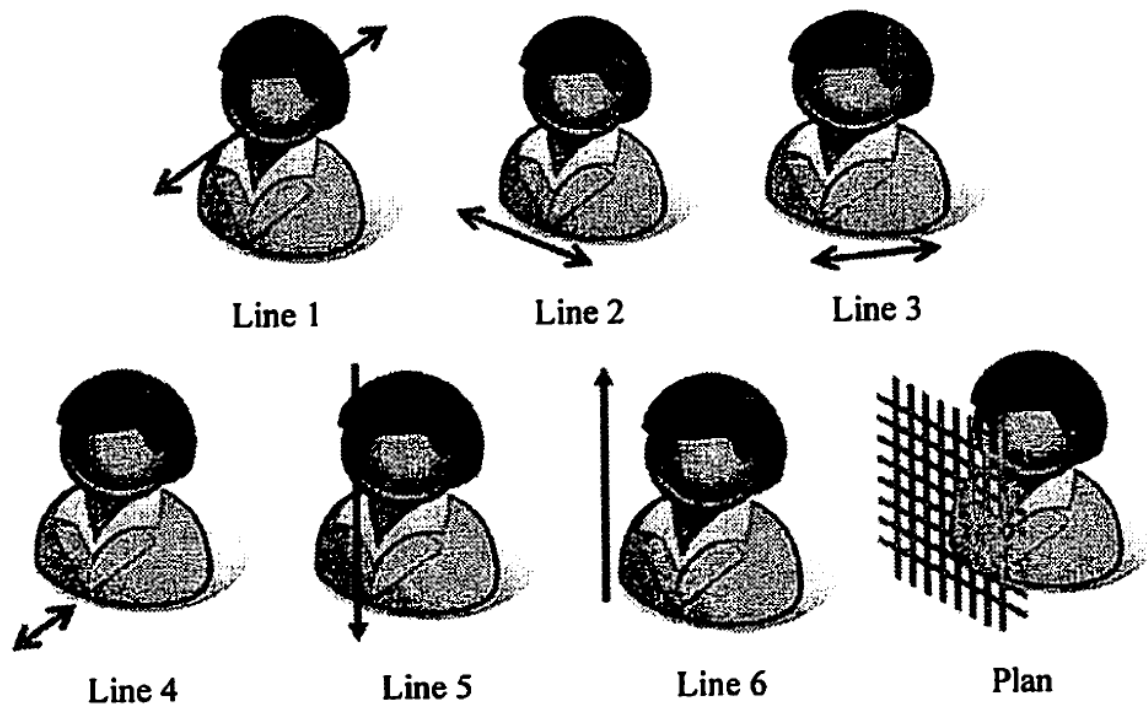
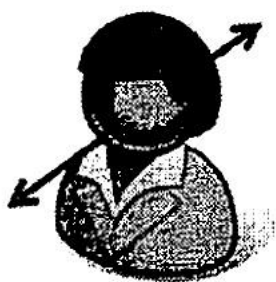


Figure 1. Time lines found in different sign languages

Figure 3. Time lines found in different sign languages according to Sinte (2013: 207).

Time line 1



Line 1

Figure 4. Time line 1 according to Sinte (2013: 207).

Time line 1 goes along the sagittal axis next to the signer's shoulder on the dominant side of the signer as shown in Figure 4 and it is considered to be dedicated for the deictic functions described earlier (Engberg-Pedersen 1993). Engberg-Pedersen (1993) goes on dividing the line

into three distinct parts; “before now” which is located behind the signer, “now” which is the reference point for articulation and “after now” which is located forward from the reference point and which can also be appointed nondeictic value in discourse. Other scholars who studied British Sign Language (BSL), ASL, Sign Language of the Netherlands (NGT), Argentinean Sign Language and Italian Sign Language have settled for dividing the line into two parts at the side of the signer (Leeson 1996: 95). Leeson herself found evidence for dividing the time line found in Irish Sign Language into six parts (1996: 96). This line is also one of the basic lines found in all the languages Sinte (2013) mentions and usually considered the most important (Quer et al. 2018; Sinte 2013). Although languages differ in the way they see the past and the future being situated either in front or behind of the speaker or signer, the signer’s body itself is universally in all known sign languages considered unmarked and thus representing the present. (Quer et al. 2018: 219; Sinte 2013: 1).

Time line 2



Line 2

Figure 5. Time line 2 according to Sinte (2013: 207).

Time line 2 runs along the horizontal axis in front of the signer as shown in Figure 5 and it is typically referred to as the sequence line (Engberg-Pedersen 1993; Leeson 1996). This line is used for describing a sequence of events in relation to an event that has been expressed in the discourse. The events can be situated either before or after the reference point but also during the event of reference itself (Engberg-Pedersen 1993). Sequences of temporal units like hours, weekdays and months are reported on being situated on this line (Quer et al. 2018: 752). Time is often mentioned of running from left to right along this line, although a possible culture specific correlation is suggested by Quer et al. (2018: 752) based on Emmorey's (2001: 111) findings on Jordanian Sign Language, where time runs from right to left in parallel with the

writing of the surrounding Arabic language. Emmorey (2001: 111) also mentions how the direction of lexical signs along this line runs from right to left for the left-handed signers. (Emmorey 2001; Leeson 1996; Paunu 1992; Quer et al. 2018; Sinte 2013.)

Time line 3



Figure 6. Time line 3 according to Sinte (2013: 207).

Out of all the time lines found so far the time line 3 is the only body-anchored one as it runs along the non-dominant hand from elbow to the fingers. A depiction of this is found in Figure 6. The usage of this line varies from language to language: Engberg-Pedersen (1993) mentions anaphoric referencing for DTS, use for calendar expressions is mentioned for BSL and Quebeq Sign Language (LSQ) in Sinte (2013) as well as the sole location for signs that directly refer to time like BEFORE and AFTER (Engberg-Pedersen 1993; Sinte 2013).

Time line 4



Figure 7. Time line 4 according to Sinte (2013: 207).

This line is a combination of the previous lines, a “mixed line” as the initial name giver Engberg-Pedersen (1993) called it. It is located in front of the signer extending forward from the chest (Figure 7). Following the approach of Comrie (1976), the line is not considered to having a specific end point at the front, but the line continues at least metaphorically forever. Due to the conceptual metaphor where the future is situated in front of the signer, all the events expressed on this line are also posterior, never situated in the past. Engberg-Pedersen (1993) went as far as suggesting that the mixed time line could be used in the place of the time line 1, when the time reference is situated in the future. Leeson (1996: 104) notes that unlike other sources Brennan (1983) did not report this line in her description of time lines in BSL.

Time line 5



Figure 8. Time line 5 according to Sinte (2013: 207).

Sinte (2013) only found two mentions of this line, from NGT and LSQ. A depiction based on those sources is provided in Figure 8. Based on her findings Sinte (2013) describes the line as having been used as a run-down line to list weekdays. Brennan (1983) and Malmquist &

Mosand (1996) have listed a single line running both up and down in their descriptions for BSL and Norwegian Sign Language respectively.

Time line 6



Line 6

Figure 9. Time line 6 according to Sinte (2013: 207).

Time line 6 runs from down to up in front of the signer, as pictured in Figure 9 above. This is considered the growth time line representing the growth of an individual and it is used for describing the big events of one's life and different stages in one's growth in a grand scale. The direction of this line is also coherent with the culturally shared "FUTURE IS UP" metaphor described by Lakoff & Johnson (1980: 23). As with the time line 5 this line is included in the two-way line described by both Brennan (1983) and Malmquist & Mosand (1996).

Plan

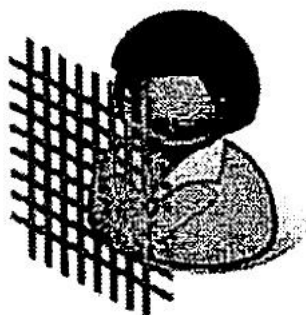
**Plan**

Figure 10. The plan according to Sinte (2013: 207).

The plan as Sinte (2013) calls it is a two-dimensional structure on the vertical axis in front of the signer where for example monthly or weekly views of a calendar can be projected. A depiction is provided in Figure 10 above. According to Sinte (2013) the two axes can be used so that the vertical axis is comparable to the time line 5 in that the beginning of a day or a month is located at the top and the later points in time go down along the axis towards the bottom. The horizontal axis is used for arranging either the days of the week or months of the year in relation to each other, so that the first item is on the left-hand side and the list continues towards the right. (Sinte, 2013.)

Spoken languages have time lines as well and Mental Time Lines (MTL) is a well-established concept in the field of cognition studies and cognitive psychology (eg. Boroditsky, 2011: 336; Christian et al., 2012; Fuhrman & Boroditsky, 2010). It is known that the direction of written language affects the conceptualized direction of time along the horizontal axis which is probably why blind people do understand time moving along a line similarly to seeing people, and that neural hemispatial neglects correlate with inability to conceptualize time in the corresponding spatio-temporal areas (Hendricks & Boroditsky 2015; Saj et al. 2013). However, spoken languages can only utilize metaphors to talk about time, therefore they are restricted to talking only about axes and directions. Signed languages exist in the tactile visuo-gestural domain and can access the attributes of length and trajectory to describe the vector-like time lines. Thus it is proposed in this thesis that the term time lines would be reserved to be used only by the visuo-gestural sign languages and using the term metaphors to talk about temporal references within the context of spoken languages.

2.2.4 Some exceptions and criticism

An intriguing example from Japan suggests that the direction of the time lines can at least in some cases be independent of the writing direction of the area and of the other sign languages from the same region. The Miyakubo Sign Language is described as not conceptualiz future through its time lines or any other means. The only time line the researchers have found begins from the past reaching the present which is situated at the ego but does not continue any further as depicted in the Figure 11 below. (Yano & Matsuoka 2018.) It is also known from village sign languages that not all sign languages make use of the time lines as described before, but rather use the position of the sun as their reference point for the temporal moments via what is called a celestial time line (see de Vos 2012 for Kata Kolok; Engberg-Pedersen 1993 for Urbu Kaapor Sign Language and Le Guen 2012 for Amondawa Sign Language). This is also true for at least the language of Nheengatú which is one of Brazilian indigenous spoken languages and which consistently uses celestial cospeech pointings when talking about temporal events similarly to the signed languages (Floyd 2016).



Figure 11. Time line in Miyakubo Sign Language in Japan as depicted in Yano & Matsuoka (2018: 655).

Jacobowitz and Stokoe (1988: 338) criticise the canonization of time lines in general by claiming that researchers merely cut corners by creating a time line metaphor instead of describing the phenomena as they are, almost as of making real life occurrences fit a model. They acknowledge the movement found in lexemes, but consider it just that, one structural

element within a sign, not as a proof of a generalization. (Jacobowitz & Stokoe, 1988.) Selvik (2006) also proposes abandoning the time lines altogether and using her “FUTURE IS A SPATIAL PATH FORWARD FROM EGO” metaphor approach which stems from Cognitive Linguistics theory instead.

The building of sign language corpora has started only recently, and there still is only a handful of scientifically significant corpora available for study. Being able to access even these few nationwide statistically relevant amounts of data through the corpora enables the building of more stable arguments, as before these corpora all the theories and statements have been built on the scholars’ anecdotal experiences and limited data sets that they have had access. (Salonen et al. 2016).

2.3 Temporal expressions in Finnish Sign Language

From the temporal expressions only aspect has been purposefully studied in Finnish Sign Language by Salonen (2012) in his Master’s thesis. Rissanen (1985) had described aspect in FinSL to much detail, but had not touched the time lines as much. In his educational material Paunu (1992) on the other hand has explicitly described the time lines in FinSL but his claims are not scientific and are not based on systematically gathered and analysed data, rather he used his own anecdotal experience as the basis for his arguments.

According to Paunu (1992: 116) FinSL has five time lines as presented in Figure 12 below. Paunu dissects the time line 1 into three parts with the past behind the signer’s head, the present at the side of the head and future frontward (ibid.: 117). Time line 3 is also divided in a similar manner with the wrist being the reference point for the present, anything from there towards the elbow is considered as the past and movement towards the fingers as the future (ibid.: 118). Paunu has not only defined the direction of time to be flowing from left-to-right along the time line 4, but also explicitly describes that this line allows one to move their torso along the line during a narrative (ibid.: 119).

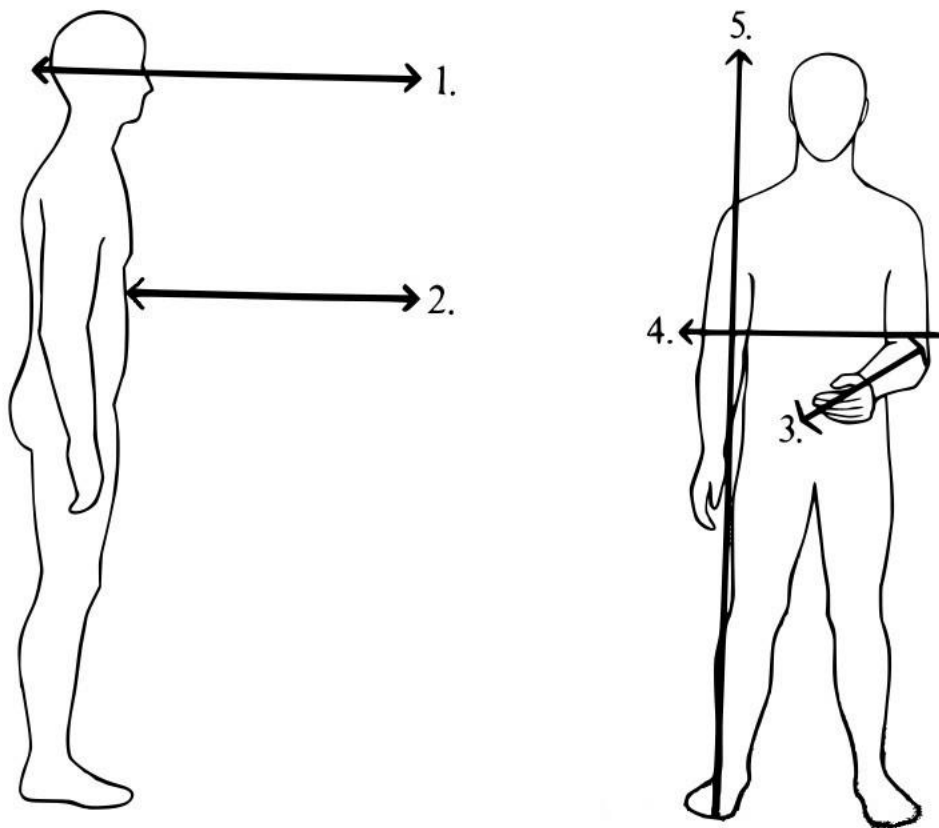


Figure 12. Time lines in Finnish Sign Language according to Paunu (1992: 116).

3 METHODOLOGY

3.1 The data and the collection of it

The Corpus FinSL was chosen to be used as the data for this study in order to ensure the best reliability and diversity of the results. The participants in the corpus are of different ages, different genders, different socioeconomic backgrounds and they come from all across Finland to ensure the corpus gives a thorough impression of all the levels and layers of the language in the country (Salonen et al. 2019). The metadata for the corpus included background information on the informants' sociolinguistic profiles such as their age, their gender, the area in where they live and the dominant hand of each of the signers, which is relevant not only for the variability but also in part for interpreting the preferences regarding laterality, which proved meaningful on the horizontal axis.

The Corpus FinSL consists of two parts; a sub-corpus containing conversations and another containing elicited tasks. The sub-corpus containing natural non-elicited conversations between participants was decided as the best option considering the research interests. This part of the corpus is divided into four thematic sections: 1. Introductions, 2. Work and hobbies, 6. Deaf events and 7. Free discussion, out of which the first three were used. In addition to these themes the situations do not contain any further instructions or elicitations for the signers. The natural non-elicited data was chosen based on the assumption that since these topics are personal and have to do with people's life histories, they would presumably contain several excerpts of temporal expressions. Other potential corpus material available in FinSL included a corpus containing the language policy program of the sign languages of Finland translated from written Finnish to FinSL produced by The Finnish Association of the Deaf (The Finnish Association of the Deaf 2015) and the publicly available part of the Corpus FinSL which contains elicited data where Deaf participants were asked to sign the contents of certain stories to one another after receiving qualitatively different inputs (Salonen et al. 2019). In addition to the previously mentioned reasons regarding the benefits of using natural data, studying translated texts or elicited material would not provide suitable material for the proposals of studying how people solve certain communicative challenges whilst meeting each other for the first time even though temporal expressions would have most likely been abundant in them for this thesis.

All of the videos in the corpus were recorded in 2014 at the University of Jyväskylä using five different camera angles to provide the viewer with a possibility to focus on specific aspects in more detail in addition to the overall scope if they so wish. (Salonen et al., 2019.) The selected corpus data is annotated on lexical level using ID-glosses, which are glosses with a dedicated value based on the structural form of the sign, even though the meaning could be different in different contexts (Johnston 2010); with some additional grammatical notions (eg. repetition) and translations all in Finnish. An image of the readily available annotation tiers is provided in Figure 13 below. Salonen & Wainio (2019) had included depictive signs into the glosses as well, dividing them into six different categories, giving a separate gloss for each of them, although the signs describing either temporal or spatial movement or locations were combined as one. While annotating each of these glosses needed to be individually checked whether the movement was temporal or not. Ideally corpora's value would be increased by elaborating and enhancing the annotations by different researchers to the same video files (Crasborn & Sloetjes, 2008: 43). In this case however, the additional annotations produced within this study will not be added to the existing corpus.

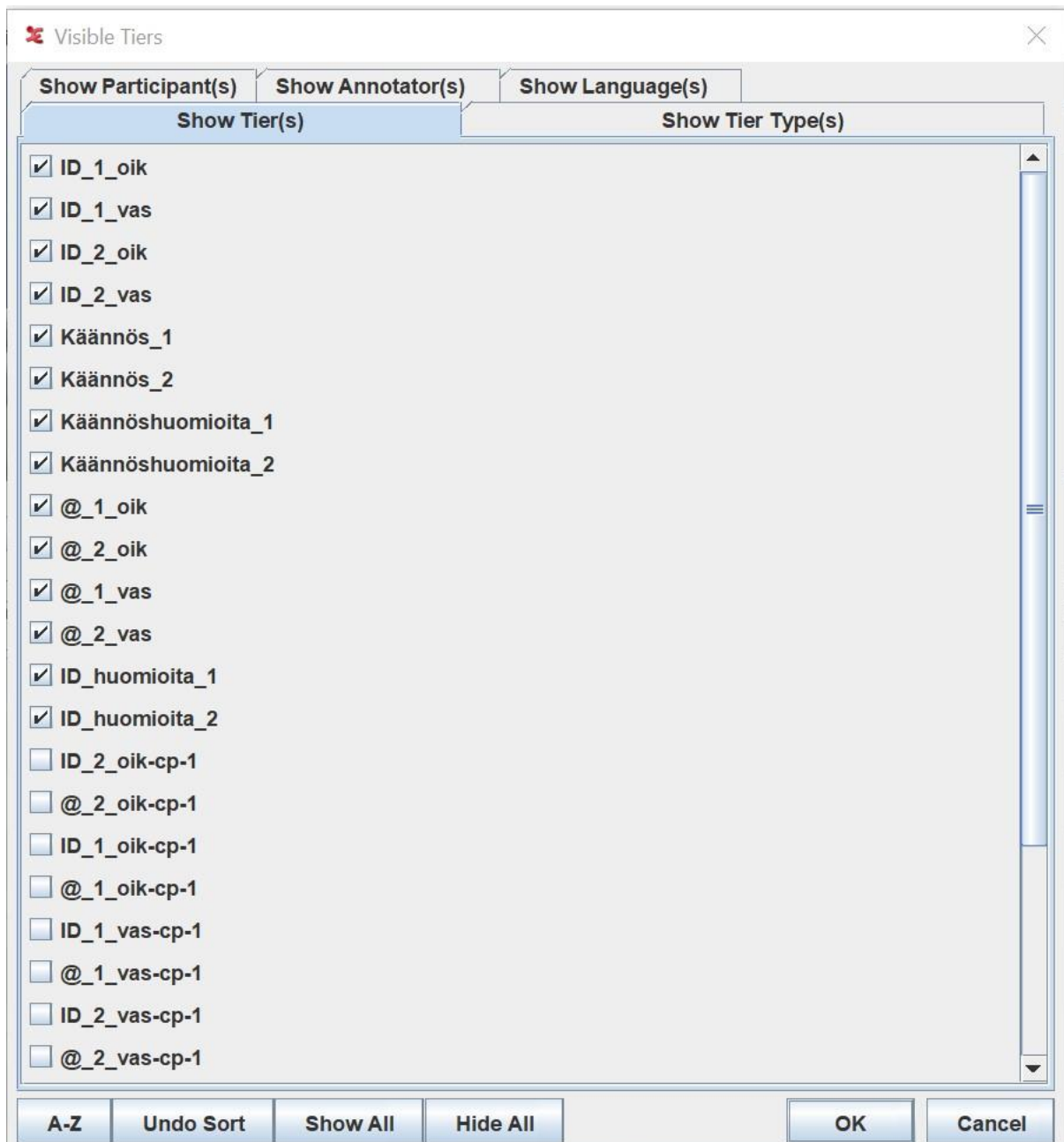


Figure 13. Initial annotation tiers that were available on all files when they were given for this study as shown in the video annotation software ELAN.

The natural conversation sub-corpus is publicly available, but not publicly accessible for everyone. The permission to use all the data that has been annotated so far was granted for this study, covering 18 individual signers divided into 10 pairs which all know each other previously each assigned a number, altogether 10 hours of their signing. At a later stage it was decided to refine the focus of the study onto a smaller sample size. Deliberate selection of the sample is well accepted and typically used method for qualitative research, so reducing the sample size in itself did not affect the quality of the study (Hirsjärvi et al. 2003: 155). As it was noted during the initial annotation rounds that certain pairs have distinctive usages of space in their signing

and would thus potentially provide valuable data for the analysis, the pairs titled 11 and 15 were chosen as the only sample. The length of the videos to be annotated and analysed was now 1 hour 25 minutes which was distributed as presented in Table 1 below. The whole sub-corpus consists of 10 hours of signing data, so the 1 hour 25 minutes from pairs 11 and 15 represents approximately 15% of the whole available data set, with twice as much data from pair 15 compared to pair 11 (University of Jyväskylä 2019a). The restricted sample size makes this study a case study (Hirsjärvi et al. 2003: 127).

Table 1. The division of the durations of video files from the pairs 11 and 15.

Pair 11		Pair 15	
1. Introductions pair 11	04:58	1. Introductions pair 15	19:47
2. Work and hobbies pair 11	16:20	2. Work and hobbies pair 15	17:14
6. Deaf events pair 11	06:17	6. Deaf events pair 15	21:32
Pair 11 altogether	27:35	Pair 15 altogether	58:33
Both pairs together			1:25:28

The signers in this piece of data are all male, the pairs know each other previously and thus understand each others' signing without any problems. The actors in pair 11 are aged between 18-29, are both right-handed and come from Western and inland Finland. The actors in pair 15 are aged 70-79, are right-handed and come also from Western and inland Finland. Even though the pairs are both male and come from the same area in Finland, the age difference between them is significant and slightly improves the generalizability, although, as the study is qualitative in nature, statistical generalizations are not even expected (Hirsjärvi et al. 2003: 171).

3.2 Annotation process

The data was annotated using the video annotation software ELAN, which is developed by the Max Planck Institute of Psycholinguistics (Sloetjes & Wittenburg 2018). In ELAN a video file is enriched with adding time aligned annotations to potentially infinite number of tiers each dedicated for a different aspect a researcher might be interested in. A new set of tiers for the ELAN files was created for this study with separate tiers for marking the direction of the movement, the linguistic level of the temporal expressions, the time line as described by Sinte (2013) that would best match the movement seen in the video, and finally a tier for the possible

other notions about the utterance. The tiers created for this study are all presented in more detail in Table 2.

Table 2. Table on all of the annotation tiers added for ELAN and the descriptions on how they were used.

Signer 1	Separate tiers for each of the signers were created for marking the temporal movement even if it was simultaneous on both signers. Having separate tiers for both signers also enabled analysing differences between them later at the analysis phase. It was decided to mark the direction of the movement here as movement along the line using absolute reference (up, down, left, right, front, back) as the direction of time was left to be discussed about later and because the phenomenon of laterality only regards one of the axes.
Signer 2	
Annotation type	This tier was used to mark whether the function of the expression was lexical or discourse.
Sinte	This was the most important tier for answering the first research question, as the number of the line found in Sinte's (2013) description that matched with the findings from the data was marked here. For the initial annotation phase the sign "?" was used to mark a time line found from FinSL which was not mentioned in Sinte (2013) or any of the other sources.
Notes	This tier was used for marking notes that were meaningful but could not be marked as any of the above, such as unusual use of the sign or the type of discourse usage, which proved very useful later in the analysis phase.

A picture showing all the annotation tiers that were used for annotating is presented in Figure 14 below. Whenever the utterance had temporal movement in it all the possible information was marked to these tiers for later use. An answer to the first research question were sought by annotating the number of the time line as borrowed from Sinte (2013) to the dedicated tier each time a temporal movement was found from the data. Comparing findings of the sign language under study to some pre-established descriptions of lines in other sign languages is an established strategy for creating descriptions of time lines in a given language (eg. Emmorey, 2001; Leeson, 1996; Sinte, 2013). The other tiers provided more tools for describing the time lines in as much detail as possible. Marking down the direction of movement in each case provides information about the underlying cognitive concept of time, ie. the direction of its flow.

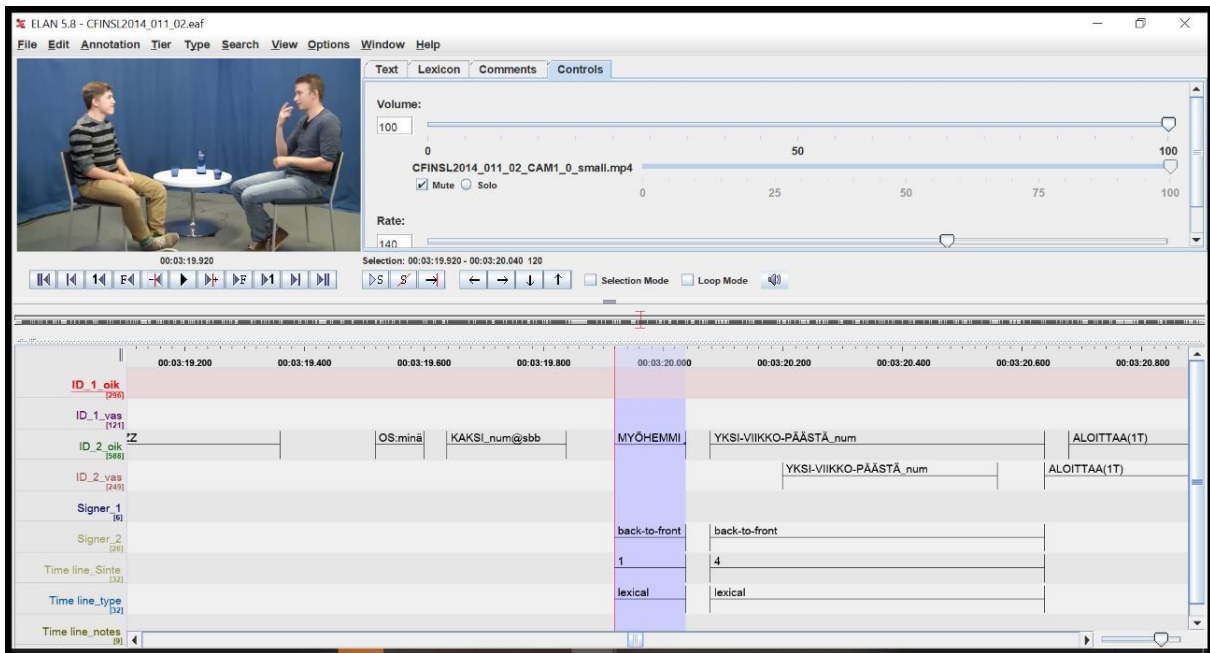


Figure 14. A view of an ELAN window with all the annotation tiers that were used for annotating.

The time lines can be exploited on the discourse level in three different ways, as described in detail earlier in the chapter 2.2.3 The signer might tell about the passing of time by twisting or turning their whole body, or just hands, along a time line as the narrative goes on. Thus this type of usage is called continuous narrative in this thesis. This means that the signs themselves are not placed anywhere particular, they are uttered in the neutral signing space, but the whole neutral signing space is moving in relation to the signers central point as they twist or turn the body. Methodologically these are easy to spot from the signing stream as the whole body or even the hands moving cohesively is very explicit.

Another, more specific method of using the signing space is placing the discourse referents to the signing space. In this case the signs are deliberately placed in different locations, which in this thesis is considered to be a sign of implicit temporal information. Methodologically noticing the placements from the signing stream is more difficult, as one has to first distinguish the start of an utterance and to keep track on whether the placements are part of the same discourse or if the topic has changed.

Third way in which temporal information can be encoded on the discourse level is reduplication. In reduplication an individual sign is reduplicated twice or more immediately after the initial instance. The reduplicated signs are not deliberately localized into the signing space, but it is the minor placement of the two signs side by side that enables the interpretation of the implementation of time lines and thus engaging the temporal element into the

interpretation. As reduplication has other, even more significant functions than to tell the passing of time, signs can be reduplicated within a continuous narrative or within a narrative that employs localization of discourse referents. Reduplication is although very rapid also relatively easy to spot from the signing stream as human eyes and brain are hardwired to recognize patterns.

All of the annotations were checked again in their surrounding context to find the underlying discourse uses that do not necessarily show on the lexical level. The discourse level expressions might be relatively long and the possible bodily movement so subtle, that it is hard to notice when focusing on the movement on the lexical level while annotating. As the depictive signs might have the sole purpose of conveying information of the passing of time, but lexical signs can do it additionally by being situated along the time line respectively, they are not mutually exclusive. There are two kinds of constructs where this might happen. The first one is the lexical signs that functioned as discourse referents and which were placed in different locations in the signing space. They were checked, and the annotations on the localization tier were replaced with new ones on other tiers that covered the whole length of the expression. That is to say that the other structure is placing two lexical signs that have no sign internal temporal movement on the time line with a depictive sign with the exclusive function of expressing the direction of time between them. The placement of the signs makes the utterance discursively temporal, but the depictive sign does so on the lexical level. In other words it is possible to convey temporal information on both lexical and discourse levels within one utterance simultaneously, although often the temporal meaning of the lexical sign stems from the surrounding discourse. A concrete example of this is provided in the Figure 25 in chapter 4.2.2, where the signer is signing an utterance containing only three signs, YKSI-LUOKKA_num@sbb, _kvap, YHDEKSÄN-LUOKKA_num@sbb [FIRST-GRADE_num, depictive sign, NINTH-GRADE_num], where the placement of the first and last signs on the time line makes the expression temporal on the discourse level, and it would be temporal even without the lexically temporal depictive sign in between. The three discourse level methods of conveying temporal information were distinguished to the additional notes tier in ELAN, where the instances were easy to gather for further analysis.

As only the direction of time and the nature of the time lines was within the interest of this study, the direction of the movement along the line was annotated using absolute references to the spatial axes and the direction of the lines was classified according to Sinte's (2013) classifications. The length or duration of the movement was not taken into account. For the analysis only the added information was useful, defining the length of the sign was not

necessary. The two hands were annotated on separate tiers for the ID-glosses already, so it did not cause any extra work for this study. When looking into the laterality of the movement more closely, combining the direction of the movement from the time line tiers with the information about which hand was used for producing the sign from the initial ID-glosses proved utterly useful.

3.3 Analysis

Answers to the research questions were sought in the annotation phase by attesting a value from Sinte's (2013) distinction to the lines that had been found from the data. The analysis method was observing the temporal movement from the videos. Once the annotating was completed, all the annotation data was exported as Annotation Overlaps Information from ELAN into Excel in order to create a spreadsheet out of the tab delimited text file. The data was sorted and thematized in different ways to easily find the information to be presented in different parts of this report. The whole spreadsheet is attached as appendix 1 at the end of this report.

In order to depict as detailed picture of the time lines as possible different types of signs appearing on the time lines were also analysed. These were divided into time signs, other signs and depictive signs, as described in more detail in the chapter 2.2.2. Methodologically the three different types were analysed so that the types were color coded into the data sheet. As the data was already glossed on the lexical level, including the analysis on the sign types did not require any additional steps in the annotation phase. The depictive signs were already glossed as `_kvap` in the corpus data, so they were easy to distinguish from the data set. Time signs were separated from other signs individually. This way it was possible to distinguish differences in patterns on how the three types of signs are distributed on the time lines.

The temporal phenomenon marked to the annotations as “?” turned out to be coherent and consistent, it was assumed as a new time line and was named as the time line 7 for the presentation of this thesis in the analysis phase.

4 RESULTS

The main objective is to describe FinSL time lines in the framework of Sinte. The two research questions are: 1) do the time lines identified by Sinte (2013) exist in FinSL and 2) are there additional time lines in FinSL? As answers to these questions it was found that all of the time lines described in Sinte (2013) were also found in the data of FinSL as well as one additional line. This chapter is constructed so that the general findings and trends are presented first, and then the different time lines are described individually in more detail after that.

4.1 General findings

There were 331 annotations in total which were divided along seven time lines and a plane as presented in Figure 15.

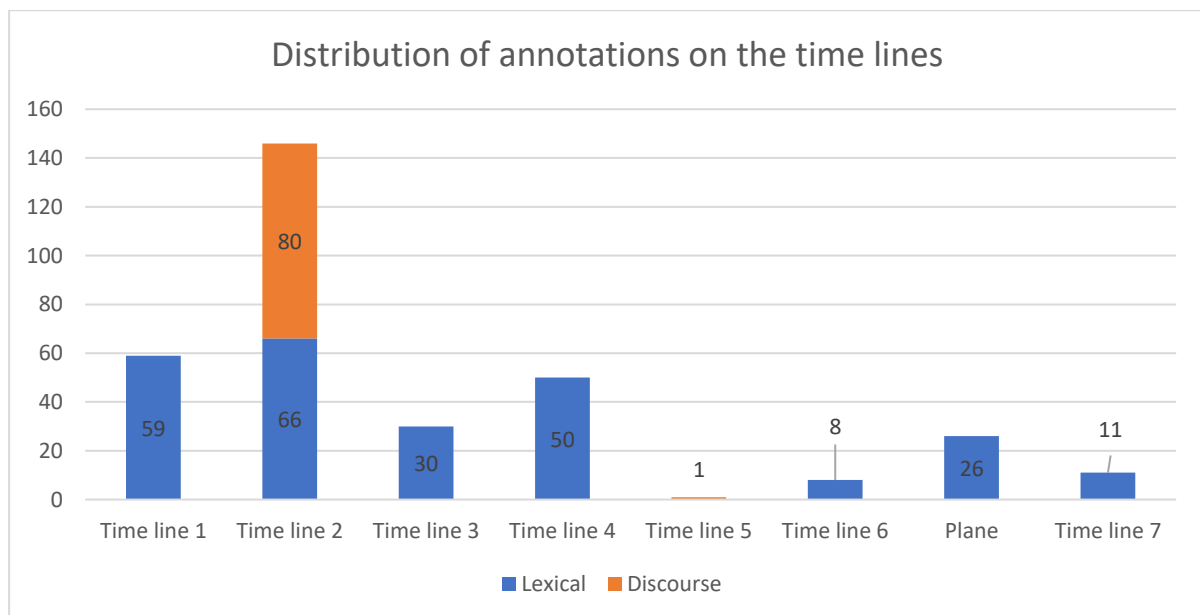


Figure 15. The two different types of annotations distributed into the time line categories found in the FinSL data. The figure also shows the total number of annotations on each time line.

As can be seen the amount of annotations are divided very unevenly among the lines. The time line 5 has only a single annotation ($n=1$) when the time line 2 yields 146 annotations ($n=146$). From this presentation we can also clearly see that the linguistic functions do not disperse evenly. The lines 1, 3, 4, 6, 7 and the plane do not have any non-lexical annotations on them, when most of the annotations on time line 2 as well as the single annotation on the line 5 are non-lexical. Important detail that does not come across from the figure or the numbers is

that there are a few instances where there was overlap between discursive usage and the lexical usage. A discourse narrative might take over a longer period which includes several lexically temporal signs in it like described in the chapter 2.2.2. We will take a closer look on how these instances looked in the data in chapter 4.2.2.

The two types of annotations divided very unevenly among the whole data with only 24% of the annotations being of discourse level and the 76% majority lexical. Both of the types can be analysed in more detail. If we take a look on the lexical expressions first we can see from the Figure 16 the three different types of signs are fairly evenly dispersed across the whole data, but what is particularly interesting is how differently they are distributed among the different time lines as shown in Figure 17.

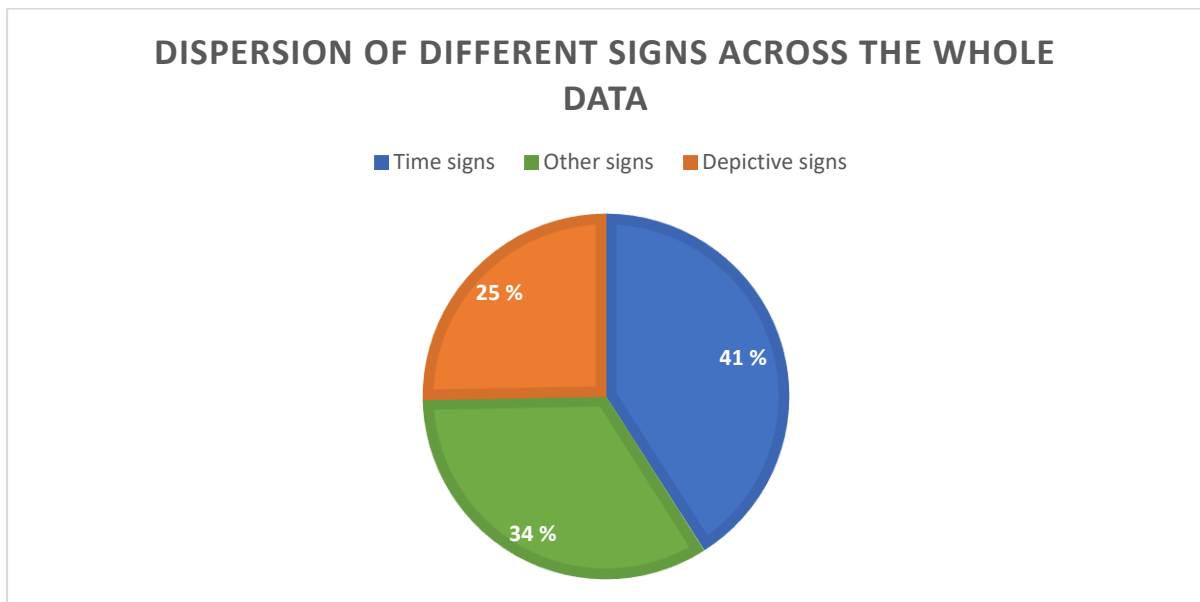


Figure 16. The dispersion of different types of signs in all of the data.

From the Figure 17 we can see that most lines are lacking a certain type of sign altogether, while the line 4 has almost evenly of all three of them. Using only the time signs to study and analyse the nature of time lines would not take us very far, as in the data there were three time lines with no utterances including time signs and on the time line 2 the time signs provide merely a fraction of all lexical annotations. As the time signs are the most explicitly time related, the time lines favoring those signs must be culturally preferred also the most clearly associated with the concept of time with the users of the language. As time line 2 is situated right in front of the signer, and most signs along it falling to the neutral signing space in the center, the relatively high number of other signs on this line is likely to be a sign of unconscious perception

of time, unaware even to the signers themselves. This would also explain the situation with the time line 6 and the plane. There is controversy on whether to consider the vertical time lines as time lines at all in the research literature, and the plane is also relatively hard to place in to the realm of straight vector-like lines. They are used often enough to be distinguishable, and the results from the data would fit the argument that some implications the available temporal devices are not explicit, but rather give themselves away in a more subtle manner.

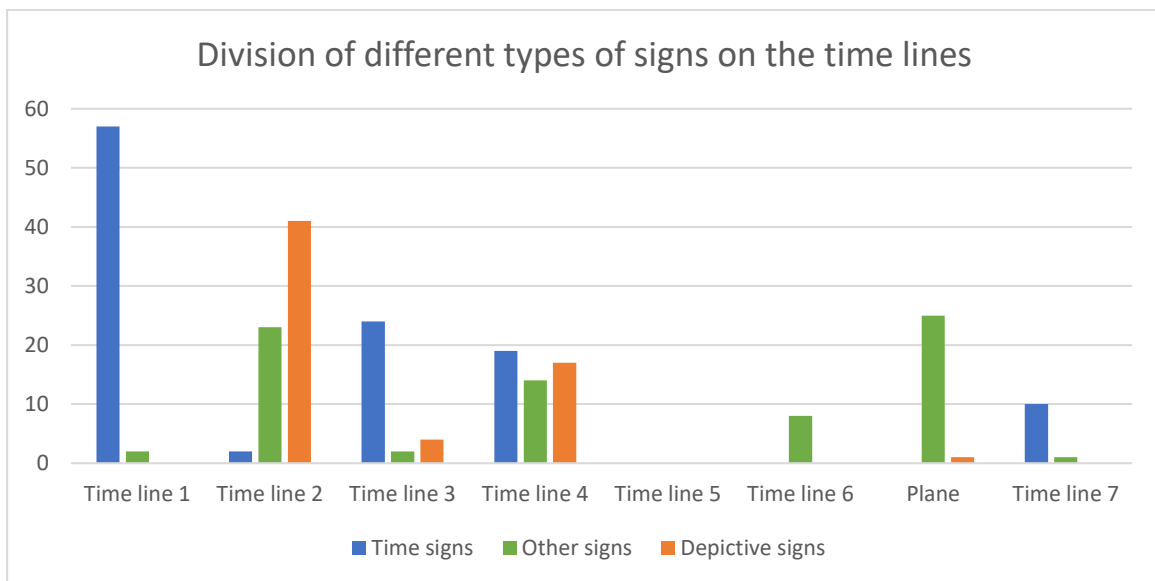


Figure 17. The distribution of different types of signs across the time lines.

As the Figure 15 in the beginning of this chapter showed the temporal expressions on the discourse level were very unevenly distributed among the time lines. Altogether we can see from the Figure 18 that reduplication is the most common usage for this type. Localizing

discourse referents is the least common of the usages, but it is also the most complex one and the utterances were often lengthy, sometimes even including reduplication within them.

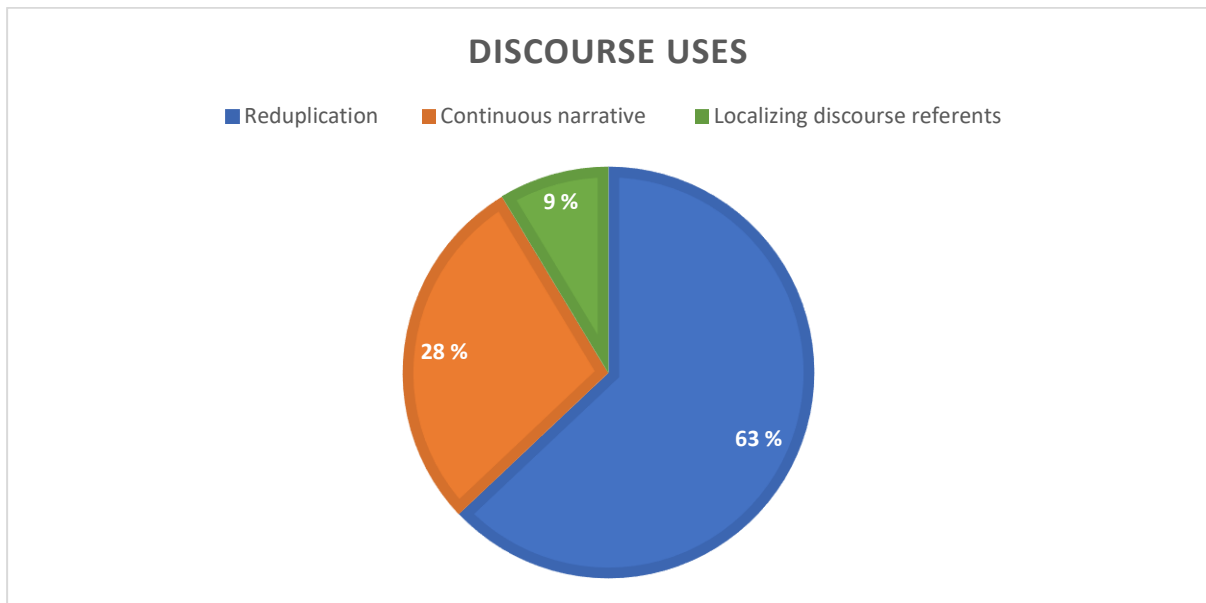


Figure 18. The division of discourse level instances in the whole amount of data.

As for the localizing discourse referents it was described earlier in the chapter 2.2.1 that the localizing can be topographical where the referents are placed in the signing space according to their actual topographical locations and/or relations. If the actual topographical locations of the referent is not known or it is not relevant, or if the referent is abstract with no actual real space location, the usage of such localizing can be considered arbitrary, although there are other possible reasons to do so. In the data it is evident that such arbitrary localizing runs along time line 2, but the usage seems to vary between the signers. The clearest and most revealing example comes from the pair 15, where it is noted that the signer 1 consistently starts his referential pointings from the left and moves righthwards as his list of references continues (Figure 19). The signer 2 uses the same device in an exactly opposite manner, always placing the initial referents to the space on his right and moving left as he goes along. The significance of this will be dealt in more detail in chapter 5.2.

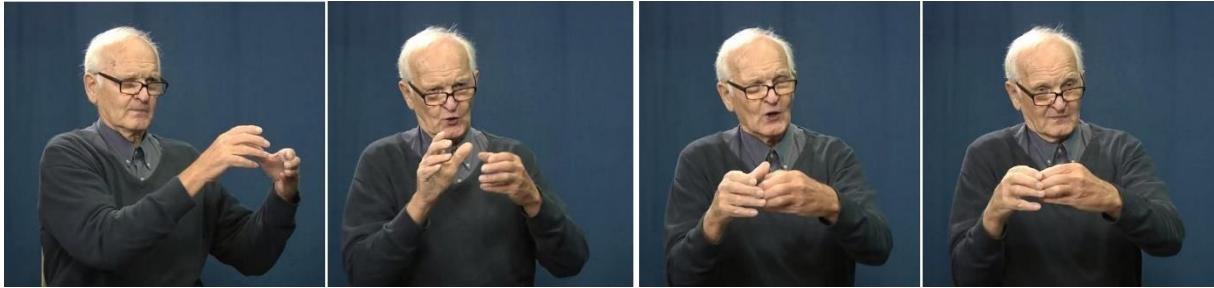


Figure 19. Signer 1 placing four different elements onto different locations along the time line 2 starting from locations 4 at the left and moving towards the right. File CFINSL2014_015_01 (05:18.102 – 05:21.985).

4.2 Time lines found in the data

The forms of all the time lines found from the FinSL data in this study are presented in the Figure 20 below. Following that Sinte's (2013) division is used as the basis again when answering the first research question by presenting the findings one time line at a time. After describing the form of each line the description will continue by distinguish the different functions the lines are used for. As the general findings already revealed, there was an additional time line found from the data that was not described in Sinte (2013). This newly found time line, named as the number 7 in the Figure 20 below, is described in detail in the chapter 4.2.8.

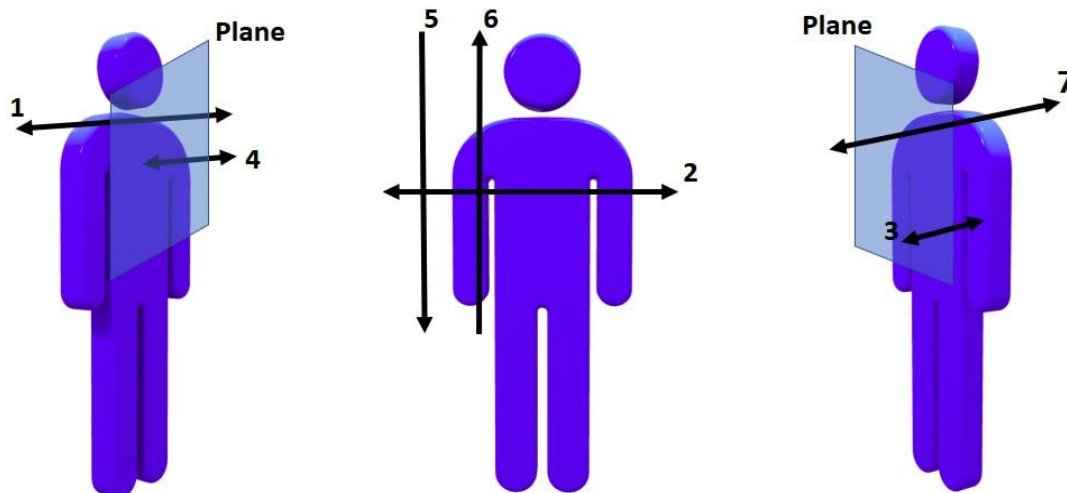


Figure 20. All the time lines found from the FinSL data. Time lines 5 and 6 are presented next to each other for the display purposes, in reality they exist along a single line. There is also only one plane, it has been repeated on both sides for display purposes as well.

4.2.1 Description of the time line 1

There were 59 annotations made for this line based on the data. The form of the line runs perpendicularly from behind the signer to ahead of the signer, exactly like described in Sinte (2013). The flow of time along this line is consistent so that the past is situated behind and future ahead of the signer as shown in Figure 21 below.



Figure 21. Illustration of the time line 1.

In the data lexical time signs such as AIKAISEMMIN [EARLIER], MYÖHEMMIN [LATER], ÄSKEN [RECENTLY] and a more specific EILEN [YESTERDAY] are situated on this line and they are deictic in nature as one cannot know which moment are they referring to without knowing the surrounding temporal context. The movement of all these signs is cohesive with the orientational metaphor in Finland and Western countries in general so that concepts that refer to anterior moments move forward and those that refer to past move backwards. The sign VUOSI [A-YEAR] does not have movement along any of the time lines, but the temporal inflections for the future form does. ENSI-VUONNA [NEXT-YEAR] is very similar to the basic form, except that the movement is directed forwards along this time line. An example of this is presented below in Figure 22.



Figure 22. Example of the sign ENSI-VUONNA [NEXT-YEAR] by signer 2 in the file CFINSL2014_015_02 (14:37.080 – 14:37.480).

The usage of this line seems to be limited in the sense that there are no depictive signs located on it in the data, all the occurrences were phonetically defined lexemes as the Figure 17 in the previous chapter 4.1 showed.

4.2.2 Description of the time line 2

Time line 2 runs horizontally between right and left in front of the signer as depicted in Figure 23. In the data this line is clearly the most exhaustively used. There are 146 annotations altogether for this line, with only two individual time signs, both of which would not belong there in their citation form's phonetic setup and are allophonic variations of signs that normally would run along a different line. The use of depictive signs on the other hand reaches several dozens.

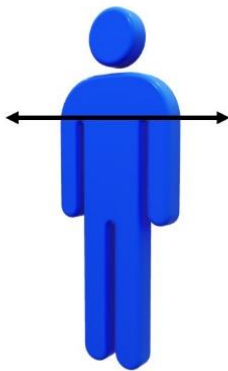


Figure 23. Illustration of the time line 2.

This is also a line that allows for expressing temporal information on the discourse level using purely the body movement, as the hands are reserved for other purposes. The body movement and eye gaze co-occurring with manual movement is also frequent on this line. An example of this is on the file CFINSL2014_015_01 (12:14.520 – 12:19.881) where the signer

1 is telling a continuous narrative about his experiences related to the deaf club using lexical temporal signs while simultaneously twisting his body along the time line 2 (Figure 24).

The screenshot displays the ELAN 5.8 software interface. At the top, there is a menu bar with options like File, Edit, Annotation, Tier, Type, Search, View, Options, Window, and Help. Below the menu is a video window showing two signers in a conversation. The video is timestamped at 00:12:14.520. To the right of the video is a text window containing a list of signs and their parameters, such as 'ID_1_oik', 'KYLÄ', 'ERILAINEN', 'ISA', 'OS:miinä', 'LOULLA', 'KYLÄ', 'OISI', 'SORVI(AxX)', 'OS:miinä', 'ZZZ', 'VAPAN(Ax)', 'HELPOTTUA', 'VÄLTÄÄ', 'SORVI(AxX)', 'ZZZ', 'METALLI', 'SORVI(AxX)', 'kvkt', 'SELVÄ', 'SEISOA', 'PALJON(B)', 'SEISOA', 'SORVI(AxX)', 'MAALATA', 'kvkk', 'OS: PAREMPI', 'OS: SOPIA(FF)', 'OS: KOULU(BB)', 'OS: VALMIS(L_chj)', 'VALMIS(L_chj)', 'OS:miinä', 'PÄÄSTÄ-VIRKKAAN', 'KUUROJENYHDISTYS', 'OS:miinä', 'KÄYDÄ', 'KUUROJENYHDISTYS', 'JÄSEN', 'KÄMMEN-YLÖS_ele', 'AIKAISEMMIN', 'JO', 'ALOITTA(AZT)', 'NIIN-JUURI', 'NUORI', 'TURVALLINEN', 'VALTA', 'OS:miinä', 'PÄÄSTÄ-VIRKKAAN', 'OS:miinä', 'OPISKELLA', 'VÄHÄN(Ax)', 'OPISKELLA', 'OS:miinä', 'VALITA', 'JO', 'PUHEENJOHTAJA', 'KÄMMEN-YLÖS_ele', 'OS:miinä', 'PÄÄSTÄ-VIRKKAAN', 'kvap', 'ZZZ', 'KUUROJENYHDISTYS', 'JO', 'KILPAILLA', 'YHDISTYS', 'ENNEN-JOTAKIN', 'OS:miinä', 'OPISKELLA', 'kvap', 'KUUROJENYHDISTYS', 'OMA', 'OMA', 'SÄÄNTÖ', 'KÄMMEN-YLÖS_ele', 'OMA', 'KUINKA', 'TAPA', 'kvkk', 'OS:miinä', 'OPISKELLA', 'PALJON(B)', 'KÄMMEN-YLÖS_ele', 'PÄÄ(G)', 'OS: JÄSEN', 'SAMAL lähenevä', 'VASTUU', 'KÄMMEN-YLÖS_ele', 'OS: TÄRKEÄ', 'SYY', 'KUUROJEN-LIITTO', 'OS: OS: KUUROJENYHDISTYS', 'OS: KUUROJENYHDISTYS', 'KUUROJEN-LIITTO', 'HALUTA', 'OS: ZZZ', 'VÄHÄN(Ax)', 'TEHOKAS', 'KUURO(P_korva)', 'kvmk', 'Ei(O_eteen)', 'kvkk', 'SAMM(I lähenevä)', '777', 'SAMM(I lähenevä)', 'HIENO(FF)', 'PÄÄ(G)', 'ÄI YK&S', 'kvkt', 'HYVÄ(R)', 'AIKAISEMMIN', 'KYLÄ', 'PÄLJON(R)

Below the video and text window is a control bar with various playback and analysis tools. At the bottom of the interface is a detailed timeline analysis. The timeline is divided into segments for different signs and their temporal relationships. The signs listed in the timeline include 'ID_1_oik', 'ID_1_vas', 'ID_2_oik', 'ID_2_vas', 'Signer_1', 'Signer_2', 'Time line_Sinte', 'Time line_type', and 'Time line_notes'. The timeline shows the temporal relationships between these signs, with segments for 'left-to-right', 'front-to-', 'left-to-', 'discursive', 'lexical', and 'localizing discourse referents, overlap with lexical ones'.

Figure 24. Signer 1 using his body to employ time line 2 for discourse purposes while the hands are reserved for lexical purposes in the file CFINSL2014_015_01 (12:14.520 – 12:19.881).

Another example of the discourse level expressions of the time line 2 is pictured below in Figure 25 where the signer 2 places two non-temporal lexical signs along the time line with a depictive sign between them. He does not move his body, but merely the placement of the signs carries temporal meaning discursively, with the depictive sign just emphasizing it.

The screenshot displays the ELAN 5.8 software interface. At the top, there is a menu bar with options like File, Edit, Annotation, Tier, Type, Search, View, Options, Window, and Help. Below the menu is a video player showing two men sitting at a table, engaged in a conversation. The video player includes playback controls and a selection bar. Below the video player is a detailed timeline for Signer 2, showing various linguistic annotations. The timeline includes annotations for ID (ID_1_olk, ID_2_olk), VAS (ID_1_vas, ID_2_vas), ISO (ISO(L_ylös)), YKSI-LUOKKA (YKSI-LUOKKA_num@sbb), YHDEKSÄN (YHDEKSÄN_LUOKKA_num@sbb), ANTAA-P (ANTAA-POTKUT), VALMIS (VALMIS(L_loittoneva), VALMIS(L_ohi)), MUUTT (MUUTTAA(SS)), and AMMATTIKOULU (AMMATTIKOULU). The timeline also includes annotations for directional movement (down-to-up, left-to-right) and discourse-level notes (lexical, discursive, overlap wi, lexical). The timeline is color-coded with blue and red bars.

Figure 25. The signer 2 conveying temporal information on the lexical and discourse levels simultaneously in an utterance YKSI-LUOKKA_num@SBB, _kvap, YHDEKSÄN-LUOKKA_num@sbb [FIRST-GRADE_num@sbb, _depictive sign, NINTH-GRADE_num@sbb] in the file CFINSL2014_011_01 (03:34.452 – 03:35.550).

Contrary to what has been stated in the literature about the direction of time on this line going from left to right (eg. Leeson 1996; Paunu 1992; Sinte 2013), in the data there were instances of signers using the line from right to left as well (Figure 26 & Figure 27). Lexical signs that were signed with one hand only were predominantly ipsilateral, meaning that the movement of the hand was directed outwards from the center line of the body (n=58 versus the n=5 of contralateral ones).



Figure 26. Signer 2 signing JÄRJESTÄÄ [TO-ORGANIZE] to an unusual direction in the file CFINSL2014_015_01 (12:48.280 – 12:48.840).



Figure 27. Signer 2 signing MUUTTAA [TO-MOVE] in an unusual way in CFINSL2014_015_01 (00:31.320 – 00:32.400).

4.2.3 Description of the time line 3

There were 30 annotations found on this line. The time line 3 runs along the non-dominant arm from the bent elbow towards the fingers with the wrist representing the present as shown in Figure 28. The space between elbow and wrist is in the past and from the wrist onwards represents the future. The signs ENNEN-JOTAKIN [BEFORE-SOMETHING] and JÄLKEEN [AFTER] are almost exclusively the signs used on this line, and they do follow this general guideline.

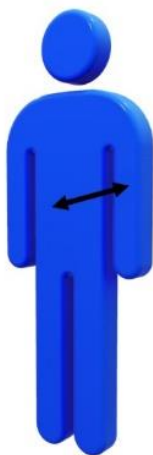


Figure 28. Illustration of the time line 3.

Depictive signs can also be placed on the line following the same rules as with the lexemes: present is at the wrist and anything moving forwards from it is happening in the future.

4.2.4 Description of the time line 4

There were 50 annotations made for this line. Time line 4 is situated directly in front of the signer, running perpendicularly in relation to the signer's chest as shown in Figure 29.



Figure 29. Illustration of the time line 4.

The types of signs that are found on this line are rather evenly distributed between time signs, other signs and depictive signs, which are all moving from back-to-front describing the time moving forward. Time signs are almost exclusively JÄLKEEN and MYÖHEMMIN, both of which could be translated as AFTER.

Even though in the FinSL data there is no evidence of the plane being used for depicting a calendar as described by Sinte (2013), there is a similar phenomenon in FinSL that is located on the line 4. The sign VIIKKO [A-WEEK] is signed along the line 2 together with its numeral inflections, but it can be temporally modified by turning the movement to run along the line 4, which is demonstrated in the data by the two instances KAKSI-VIIKKOA_num@sbb [TWO-WEEKS_num], depicted in Figure 30, and YKSI-VIIKKO-PÄÄSTÄ_num [AFTER-ONE-WEEK_num].



Figure 30. Signer 2 signing KAKSI-VIIKKOA_num@sbb [TWO-WEEKS_num] along the time line 4 in the file CFINSL2014_015_01 (08:55.440 – 08:56.160).

4.2.5 Description of the time line 5

The time line 5 runs vertically downwards in front of the signer on the ipsilateral side of the signer's body, as shown in Figure 31 below.



Figure 31. Illustration of the time line 5.

There is only one example found in the data, a list of numbers running from up to down, depicted in Figure 32.



Figure 32. Signer 2 signing ENSIMMÄINEN_num, KAKSI_num@sbb, KOLME_num@sbb, NELJÄ_num@sbb [FIRST, TWO, THREE, FOUR] along the time line 5 in the file CFINSL2014_011_06 (03:34.640 – 03:35.243).

4.1.6 Description of the time line 6

The form of time line 6 runs upward vertically in front of the signer on the ipsilateral side, depicted in Figure 33.



Figure 33. Illustration of the time line 6.

Eight examples of a single sign depicting growing up ISO(L_ylös) [BIG(M_upwards)] were found on this line from the data (Figure 34). The phonetic form of this individual sign is identical to what has been reported in the literature (Sinte 2013).



Figure 34. Signer 1 signing ISO(L_ylös) [BIG(M_upwards)] in file CFINSL2014_011_01 (03:20.480 – 03:20.920).

4.2.7 Description of the plane

The plane is not a time line as such, but a two-dimensional plane that is situated immediately in front of the signer along the horizontal and vertical axes. A clarifying illustration is presented in Figure 35 below. There were 26 annotations found for this construct in the data.

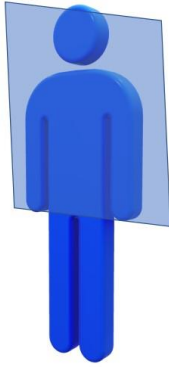


Figure 35. Illustration of the plane.

In the data there were two different types of signs situated on this construct. There is a depictive spatial construct of a clock in FinSL that is placed on the plane. Signers can draw a clock on the plane by placing the numerals of the clock to their respective places in the space and referring to the passing of time by moving their hand accordingly. There is only one example of this in the data, but it is a textbook example of the phenomenon. The imaginary clock is also acknowledged by Quer et al. (2018: 753).

In the example the signer talks about the one hour window between 9pm and 10pm and further illustrates this by moving his hand in the one hour gap in the imaginary clock in the respective place onto a watch face as shown in Figure 36 below. It is noteworthy that the movement does not go downwards or from side to side, but the hand twists from the wrist, and thus the movement cannot be described as running along a line, but requires a two-dimensional plane to place the circular movement onto.



Figure 36. The signer 1 illustrating the time between 9 and 10 pm on the imaginary watch face in the file CFINSL2014_015_01 (02:46.960 – 02:47.240).

Another usage of the plane is very evident in the data. With 25 occurrences the lexeme MUUTTUA [TO-CHANGE] is redundant and the usage fairly cohesive. The two hands in the sign are twisted around the wrists clockwise. A typical form is pictured below (Figure 37).



Figure 37. Signer 1 signing an example of the sign MUUTTUA [TO-CHANGE] in the file CFINSL2014_011_01 (03:18.560 – 03:19.160).

There are also two examples of the sign MUUTTUA by the signer 2 from the pair 11 who signs it in an unorthodox manner counter-clockwise (Figure 38).



Figure 38. Signer 2 signing MUUTTUA [TO-CHANGE] counterclockwise in the file CFINSL2014_011_01 (03:20.480 – 03:20.920).

In the case of this lexeme the nature of the movement is the same as above. The hands do not move along a line, but they rotate around a centerpoint constructed by the wrists, as depicted by the signer 1 in Figure 37, also requiring a two-dimensional plane to accurately explain the type of the movement.

4.2.8 Description of the time line 7

In the data there are altogether 11 examples of a line that no mentions were found about from Sinte (2013) or any other source in the literature. This line runs exactly like the line 1, but on the non-dominant hand side of the signer's body as shown in Figure 39 below. Although the form is very similar to that of the time line 1, the time line 7 is interpreted as a novel, independent time line as argued in detail in the chapter 5.1 in the discussion section.



Figure 39. Time line 7 as found in the data.

A consistent usage for this line is expressing past years. Past years can be expressed syntactically by combining the signs VUOSI [A-YEAR] and AIKAISEMMIN [EARLIER], which runs along the line 1, but there is a designated lexeme VUOSI-SITTEN [A-YEAR-AGO] and its numeral inflections that are situated on this newly found line.

In the data these are almost exclusively signed by the signer 2 from the younger pair 11 as pictured in Figure 40. The signer 1 produces the sign once, but his movement goes allophonically more along the line 2.



Figure 40. Signer 2 signing VUOSI-SITTEN [A-YEAR-AGO] along the time line 7 in the file CFINSL2014_011_02 (03:29.840 – 03:30.240).

In the data there are also some unusual examples located on this line. The first one is an allophonic version of the sign AIKAISEMMIN [EARLIER] that was signed with the non-dominant hand on the ipsilateral side (Figure 41) and another one of KOKO-AJAN [CONSTANTLY] also signed in an unusual location along the new line (Figure 42).



Figure 41. Signer 1 signing AIKAISEMMIN [EARLIER] with his non-dominant hand along the time line 7 in the file CFINSL2014_015_06 (05:42.920 – 05:43.360).



Figure 42. Signer 2 signing KOKO-AJAN [CONSTANTLY] in an unusual location along the time line 7 in the file CFINSL2014_015_01 (09:01.520 – 09:02.720).

5 DISCUSSION

The aim of this thesis was to provide more information on the nature of time and temporal expressions in FinSL. Natural corpus data was systematically classified to see and describe what kind of time lines there are in FinSL and how are they used in natural signing context. In general the form and usage of the time lines was uniform with the descriptions found on the literature (Leeson 1996; Sinte 2013), but a completely novel time line was also found. The data also provided evidence that gave reason to challenge the previously stated opinions on the direction of time on both FinSL and sign languages in general.

Following the line of thought of Haspelmath (2007) this thesis was founded on the idea that all languages should be approached as they are without letting the presumptions from other languages previously known by the researcher skew the findings or the interpretations. This is probably also something that Jacobowitz & Stokoe (1988) had in mind when they expressed their criticism towards the whole idea of time lines in the first place. They proposed that instead of a concept of time lines certain lexical signs just have a sign internal movement that conveys temporal information on morphological level, but it does not follow a definite line. They went as far as to criticise researchers for assuming a line and making their interpretations of individuals signs morphosyntactic form fit the model. Their argument about certain signs having internal movement is acknowledged, but it is responded by proposing that this internal movement exactly is a sign of an unconscious idea for the direction that time takes. Thus the basis of this thesis has been aligned with the notion of scholars who see that all temporal movement is inherently dependent on the discourse, but certain signs just have lexicalized it into their phonetic makeup (Jantunen 2020). In other words the time lines are the cause and not the effect. Selvik (2006) proposed abandoning time lines altogether as well, she argued that the direction of the movement is more important than the location of the trajectory. Her solution was to start using a metaphor approach instead. The metaphor she explicitly proposed was “FUTURE IS A SPATIAL PATH FORWARD FROM EGO” which is based on the idea that the movement in the signs is temporally meaningful and significant, but the spatial location of the movement trajectory would be seemingly irrelevant. This proposal could be challenged as well by pointing out that on the sagittal axis which is where this metaphor is associated with there are two distinct time lines found by Sinte (2013) and a third one that was found from the FinSL. Bearing these in mind one could argue that even while agreeing with the metaphoric concept of future being in front and past in the back in the Western cultures, the fact that there

are several time lines that move along the same direction with distinctive uses and even dedicated lexemes on them does propose that the placement of the movement trajectory does indeed play a role. If only the direction of the movement would be enough to convey temporal information, why would sign languages have dedicated locations for different kinds of expressions and use different locations for different grades of temporal detail as Leeson (1996) had noted? Selvik's metaphor also works well with deictic reference, where the present is universally placed at the ego. On the horizontal lines however we do not have a fixed setting or place for the present or the event that is being referred to, so Selvik's metaphor falls short, but time lines as concepts manage to deal with them as well. Although the existence of vertical time lines has been under debate overall, the evidence for horizontal ones is abundant. On the horizontal axis there are not several placements for the lines, and due to the physiological factors the focus is more on the direction on the movement. (Selvik 2006.)

5.1 The time lines in FinSL

In the chapter 4 the results of the research were presented, according to which all the time lines described in Sinte (2013) were found in the FinSL data, along with an additional one. The interpretations and opinions on the time lines found in FinSL will be presented one spatial axis at a time, as well as some notions about the direction of time on the given axis.

5.1.1 Sagittal axis

Out of all three of spatial axes the sagittal axis seems as the most straight forward. All of the lines found in literature were also found in FinSL and both their phonetic forms and usages followed the descriptions provided in Sinte (2013) and the additional sources (Engberg-Pedersen 1993; Leeson 1996). The directions of time have been proven to be culture specific, and in the Western cultures it is widely acknowledged and accepted that on the sagittal axis the time flows from back to front, so that the past is considered to be back behind the signer and future in front of them (eg. Boroditsky 2011; Lakoff & Johnson 1980). Based on the findings of this study there are no reasons to question this view.

A novel line travelling on the contralateral side of the signer's body was discovered and described in detail in chapter 4.2.8. This line is named "time line 7" following the tradition of sequential or consecutive numbering of the new lines. Later in this chapter it is explained why this does not cause a problem regarding the pre-existing time lines. By naming it like this confusion from giving different names to time lines that have identical referencing functions as is the case with time lines 1 and 7 will be avoided. The default function of the time line 7 is

also deictic, but that name and function was already designated for the time line 1 by Engberg-Pedersen (1993) and her followers. Problems with someone potentially later finding a function on the line that does not fit the given name were avoided by using a different strategy as well as making it easy for quickly seeing the number of time lines found on FinSL at a glance while at the same time leaving the list open for further studies to add new lines if the need be. Karabüklü (2018) had studied Turkish Sign Language in respect to time lines as well and compared their findings to Sinte (2013). They had found two additional time lines, but rather than giving them a dedicated new names, they decided to call them combinations of Sinte's (2013) lines (Karabüklü 2018: 113). In the case of the time line 7 that is not even an option as the findings do not resemble other lines or are not formatively combinations of previously named lines.

The time line 7 has a dedicated function for being the designated placement of utterance for the lexeme VUOSI-SITTEN [A-YEAR-AGO] and its numeral inflections. As discussed earlier in chapter 4.2.8 the same semantic information is perfectly possible to express via syntactically combining two lexemes. Having a separate line dedicated for a concept that already has a functioning and often used expression is solid proof that the line exists and that it is not just a case of allophonic variation of signs that could be situated along other lines. In the data there is also more evidence that further solidify the existence of the line and shows that it allows for allophonic variation. The sign KOKO-AJAN [CONSTANTLY] is normally situated on the line 4, and there were several instances of it uttered in the normal location. The movement for it goes forward, which is consistent with the concept of future situated in front and past in the back of the signer's body. There are however two instances of KOKO-AJAN [CONSTANTLY] placed on this new line in the data. These are uttered by both signers in the older pair, which gives more credibility for the existence of such a line, even though they do not use it for the usual purpose. We have also noted that the laterality along the horizontal axis plays a significant role in the structural make up of temporal expressions. Having a time line designated for signs to be signed on the contralateral side speaks for the independent nature of the line. From a different perspective: the designated sign being anterior in nature is in line with the time line being situated at the anterior side of the signer on the horizontal axis.

The usage of time line 4 follows the metaphor of the future being in the front of the signer, in that all the events described and situated to this line are considered as set in anterior tense. Although Schermer & Koolhof (1989: 303) consider the line 4 as identical with the time line 1, probably based on the shared metaphor of future being in the front and past in the back, arguably

having distinctive lexical uses for the two different locations give grounds for considering them as separate, distinctive lines.

5.1.2 Horizontal axis

On the horizontal axis there is only one line, the time line 2, where the form found in FinSL is consistent with that reported in the literature (Sinte 2013). The time line 3 might be seen as running diagonally between sagittal and horizontal axis (Sinte 2013), but here it is interpreted to be body-anchored to the non-dominant hand, and the exact phonological direction of the movement trajectory is independent of the axes and more tied to the orientation of the non-dominant hand at a given time. The direction of time along the horizontal axis is not as simple as on the others. On the horizontal axis the common notion goes that time flows from left to right (Paunu 1992; Sinte 2013). It has been noted that the flow of time does follow the direction of the writing in the given culture, which in the Western world happens to go from left to right (Fuhrman & Boroditsky 2010). However, even the general notion from everyday life that left-handed signers who sign from right to left is enough evidence to disagree with this general statement of sign languages having a fixed direction of time. Leeson had also mentioned this in her dissertation, although she ended up stating a general direction for time nevertheless (Leeson 1996: 102). Other scholars have mentioned about this possibility in their works as well (eg. Selvik, 2006: 18). Nevertheless, for left-handed signers their left hand is the dominant one, and the movement from right to left is therefore ipsilateral. Emmorey (2001: 111) argues that left-handed signers would only employ this ipsilateral movement on the lexical level, but not on the discourse one. She agrees with other scholars in suggesting the surrounding language culture might play a more significant role in dictating the direction of signing on the horizontal axis. (Emmorey, 2001: 111; Zeshan, 2000: 122.)

In the data of this thesis the one-handed annotations on the horizontal time line 2 are predominantly ipsilateral (n=58) compared to the contralateral ones (n=5) as was already mentioned in the chapter 4.2.2. There are some inconsistencies with all of the signers. Given the size of the data this is significant and shows that too strict statements should not be made without taking a closer look at the exceptions. What is relevant in this context is the exceptions where the movement of the sign goes against the proposed rules. Some, but not all of them use the non-dominant hand instead of the dominant one. In these cases the signers also change the direction of movement to go ipsilaterally in respect of the given non-dominant hand. These examples do require further studying, but they give the impression that it would be ipsilaterality that in the end is more important than an assumed general rule for the flow of time.

There are a few examples evident in the data that employ two handed signs but flow to an unusual direction cannot be explained through the ipsilaterality of the non-dominant hand, which means they challenge the rule about the direction of time altogether. In pair 15 the signer 2 is right-handed, but out of all four signers he is the one making the most exceptions or unusual decisions regarding signing direction. A good example of this is his way of using the sign MUUTTAA [TO-MOVE], which is described in more detail in chapter 4.2.2. Normally the sign MUUTTAA [TO-MOVE] is a Type 3b verbal which is transitive in nature and thus supposed to be directed spatially according to the topographical locations (Jantunen, 2010). The signer 2 however narrates that he moved from Turku to Tampere [two big cities in Finland] but directs the sign from right to left. Topographically Tampere is located North-East from Turku, so spatially the sign should be directed upwards, which is also the citation form of the sign if no topographical information is not available. Since Turku is located on the South-West coast of the country, there is nowhere West to move from there. Even though the aspect of laterality does not apply to a two-handed sign a right-handed signer from a culture with a left-to-right writing direction is generally expected to use time lines towards the right (Fuhrman & Boroditsky 2010). This would also be supported by Barberà Altimira's (2015) notions about signers preferring to locate arbitrary items to the ipsilateral side due to ecological reasons. In the lack of obvious explanation, the concept of moving could be interpreted as exhibiting the use of a time line since it has a temporal aspect to it with a chronological start and finish. Following this line of thought it could be seen that the direction of movement itself is seemingly irrelevant and that the temporal relations of events could be interpreted from the surrounding context.

Other examples are depicted in Figures 26 and 38 in the chapters 4.2.2 and 4.2.8, from which especially the sign MUUTTUA [TO-CHANGE] situated on the plane proves that temporal movement can have allophonic variation on other lines than just time line 2 as well. These three examples form the basis for the argument that like so many other phenomena in the world of sign languages, the passing of time and the chronological relations are evident through the surrounding context, not through the direction of the movement per se.

5.1.3 Vertical axis

Interpreting the results from the vertical line in relation to the literature caused uncertainty, especially in relation to Jacobowitz and Stokoe's (1988) criticism. Even though there is only a singular instance of time line 5 in the data and too fast conclusions should not be drawn, the form of the line is cohesive with that described in the literature (Sinte 2013). The fact that Sinte

(2013) did not find mentions of this line in most of the descriptions in her study further strengthens the presumption that the usage of this line is not so common in the first place. Classes with less than five occurrences are not generally even considered as classes. Rare occurrences do not mean lack of existence. The function in the one example found in the data was contradictory to those mentioned by Sinte (*ibid.*). Schermer & Koolhof (1989: 304) had even gone as far as to claim that the line is only used for a single purpose, which was not the same one as found in the FinSL data. In the FinSL data the line 5 was used for placing a list of numbers. This is not a truly temporal function, as a list of numbers is more of a syntactic phenomenon, but metaphorically the reason to include this is valid: running a list along a line is ordering items chronologically i.e. telling what comes first and what comes after that. The fact that the list contained numbers from one to four in that order is merely coincidental. In a different scenario the same line could have included four random digits in no particular order, but the placement on the line would have revealed which is considered the first, the second and so forth.

In the data there was only the sign ISO(L_ylös) [BIG(M_upwards)] located on the time line 6. The same sign is found on many sign languages and seems to be the only one reported as existing on this line (Leeson 1996; Sinte 2013). In her own report Leeson refused to recognize this as a time line based on Jacobowitz & Stokoe's arguments (Leeson 1996: 109). Johnston and Selvik have also been critical about considering this as a time line on the same basis (Johnston 1989; Selvik 2006). The time line 6 had only a single type of a sign but with several occurrences. However, time line 6 is mentioned in all of the source literature, and many of the sources mention that only the single sign is found on the line, but it has not stopped scholars from including it in their list of time lines in the first place.

As it had already been interpreted that there are time lines in sign languages and in FinSL due to the general root metaphor according to which times has a direction, no cohesive grounds could be found to exclude the vertical axis and these vertical lines from this scheme. How come could all the sign languages utilize space in all three directions and use the vertical axis for other semantic distinctions, but not temporal ones? Gu et al. (2019) have demonstrated that individuals can have three time lines simultaneously. Having a grander time line running from down to up and a separate one on the same exact trajectory going from up to down initially felt impossible but acknowledging this encouraged objectivism and enabled mere interpreting and describing observed phenomena neutrally and not letting predisposed expectations steer the process to an expected and conventional direction. As Haspelmath (2007) called for theoretically and the spatio-linguistic systems of the Japanese Miyakubo Sign Language (Yano

& Matsuoka 2018) and the Amazonian Amondawa people (Sinha et al. 2011) presented in chapter 2 showed practically the concept of time can be something totally unexpected, and thus we should not let the preconceived hypotheses or expectations lead our interpretation too much.

Vertical axis is physiologically the most challenging one for the signers. As Leeson (1996) mentioned, there are differences between the gradience of temporal expression on the sagittal lines 1 and 4, ie. the expressions covering longer temporal distances are expressed differently than those that are more immediate and closer to the present. This could be the case with the vertical lines as well. Due to the physiological restrictions having separate lines next to each other is not an option. So it is possible that FinSL and other sign languages have solved the issue by dividing the two separate functions into two different directions? In other words the grander scale of time would flow upwards, when talking about one's life span, and in the smaller scale time flows downwards when talking about more immediate issues. The village sign languages use celestial time lines with up and down vertical movement by default, so the concept should not be impossible for urban sign languages either. Additionally, will later be argued in the chapter 5.2 a signer can exhibit temporal movement to opposite directions on a single time line and still be fully understood. This is not the first time this is argued, as scholars have also described this exact time line as going both ways before (Brennan 1983: 13; Malmquist & Mosand 1996: 164).

There is also the plane, which was both reported in the literature and found in the research data. The form of the plane is described to be a two-dimensional plane situated along the vertical and horizontal axes right in front of the signer. (Sinte, 2013.) The findings from the FinSL data were inconsistent with the examples reported in the literature, and the following conclusions are drawn: the usage for this construct as described by Sinte (2013) is using the vertical and the horizontal axes simultaneously to place temporally relevant items and information on a grid. As Sinte herself describes, the usage of the vertical aspect of the plane is very similar to the time line 5 (Sinte 2013). It is concluded, that this usage alone does not require assuming a separate grid, as, in Engberg-Pedersen's (1993: 82) words "the time lines are always there, ready for the signer to use", and thus time in sign languages has the potential of three directions constantly and simultaneously ready to be used. The examples found in FinSL which are reported in Figures 37 and 38 in the chapter 4.2.7 are different in the sense that, as described in the previous chapter, the movement in the two lexical signs is not linear, but it revolves around a static point along an arc, and thus requires a two-dimensional plane to be situated on. Since the movement is not linear in nature, it cannot have a distinct direction either. The best proposal

to the default movement for signs situated on the plane is the one seen in the sign MUUTTUA (Figure 37) which is a clockwise rotation around the point of reference.

As a final conclusion based on the data FinSL has six time lines and the plane, but the interpretation of this thesis differs from the one presented in the preceding literature. Although the functions Sinte (2013) presented for the lines 5 and 6 are recognized, and evidence for both of their existence was found from the FinSL data, they are interpreted as separate functions of a single time line.

5.2 The reliability and validity of the research

Several factors contribute to the reliability and validity of any research. Next some specific notions regarding the data and the methodological choices will be discussed and the chapter will end with some general remarks. Overall the thesis accomplished the mission it was set to do, as the time lines had not been systematically studied in FinSL before, but this study provided answers regarding the form and the usage of time lines in spontaneous natural conversation data.

The sample size was rather small as the project was approached as a case study. The small data size raises the question of generalizations and statistically the sample size is too small to form generalizations, but as the study is a qualitative case study by nature generalizations are not even expected (Hirsjärvi et al. 2003). As mentioned previously in the description of the data the signers in the data were of the same gender and lived in the same geographical area in Finland. There was a significant difference in the age between the pairs, which improves the generalizability of the results. The pairs were not selected randomly from the group, which naturally affected the results as the pairs were deliberately selected after seeing video material from all of them to get material for analysis. As the quality of the data is ethically and neutrally acquired/obtained publicly available corpus data, this does not cause reliability problems. The same data will stay in the corpus, so that the arguments for the claims can be critically checked by anyone. Random selection could have potentially given the same pairs to study and thus leading to the same end result, and studying another pairs chosen either randomly or by a different selection could have left notions presented in this study hidden, but possibly shedding some light on other issues, which is always the case when dealing with relatively small sample sizes. The amount of data was good for a Master's thesis, and there were enough evidence to draw reliable conclusions. Saturation was reached as several examples from all of the

previously described time lines plus an additional one was found. For fluent users of the language in question nothing obvious seemed to be missing. One of the time lines only had one singly occurrence, so its status remained under discussion, which could be solved with an increased data size for the studies to follow.

The hermeneutic approach that was adopted as the backbone for the process caused going through the same data over and over again, which might have caused inconsistencies between the rounds, but at the same time made sure the data was thoroughly analyzed and nothing was missed. Although it is acknowledged that in a qualitative humanistic research a sort of inconsistency and re-evaluating and modifying the research as it progresses is perfectly normal and natural, in hindsight thoroughly internalizing the theory before starting the annotating would have resulted in better consistency. Having a more consistent approach to the methodology instead of mere trial and error could have made the process more efficient, although the results would have probably been the same. The most exhaustive list of time line comparisons was chosen as the reference to ensure reliability. Comparing new findings from the data to the previously existing descriptions was known to be an established and accepted approach. In the literature some scholars have been criticized for using too narrow set of methods (Selvik 2006). An exhaustive variety of means for searching the uses for time lines was pursued to be applied. Eventually altogether six different annotation strategies were used to find answers to the research questions, some of which were recognized as being unorthodox or unusual. Both lexical signs and morphological inflections, along with depictive signs were used as annotation criteria. On the discourse side the default option of continuous narratives was taken into count, but also reduplications and even non-topographical localizations of discourse referents were used as an argument. The localizing of discourse referents was included as part of the methodology, even though it is not generally thought of conveying temporal information, because in this thesis it is believed that the order in which signers use the arbitrary locations in their signing space reveal their unconscious concept of chronology, order of things over time. Novel approaches were used for drawing conclusions from the data as well. One of these is not excluding exceptions as outliers but trying to find a way to explain unusual behavior and to include it in the description to display variety.

Although the methodology was broad and the data was analysed through several rounds from different perspectives, some things were forced to leave out of this study either due to scheduling reasons or because of the scope of the study. Different referencing functions, which is largely what (Engberg-Pedersen 1993) based her descriptions on, or the semantic domains that (Quer et al. 2018) proposed would be good to know regarding the use of time lines or the

nature of temporal metaphors for the FinSL users (whether FinSL sees time moving around the ego or the time being the setting and ego moving in it) were not possible to fit into this thesis and were left for future research.

6 CONCLUSION

The nature of temporal expressions in FinSL was studied regarding the use of time lines. The process initiated by carefully studying other scholars' reports on the issue to get an overview of what are the time lines like in other languages and these descriptions were decided to use as a template to compare the findings from FinSL data to. As answers to the research questions it was concluded that all of the time lines identified by Sinte are found in FinSL as well as an additional one running similarly to the time line 1 but on the opposite side of the body. Further evidence on the existence and structural formation of these lines on lexical level could be done by checking the currently available dictionaries.

It is argued that instead of having a fixed direction to either left or right, time on the horizontal axis flows to the ipsilateral direction in respect to the signer. In the data, signers predominantly preferred ipsilateral direction over the contralateral. However, the direction of time is in the end interpreted from the context, and different rules work more as general guidelines than absolutes. The direction of time for the left-handed signers should be systematically studied, so that we would not have to rely merely on anecdotal evidence. Data from cultures with the writing direction going from right to left would be beneficial in order to see how much of an affect does that have on the signing direction. Instead of merely analyzing natural linguistic data the underlying direction of time could be studied through other means as well. Modern technology allows us to use three-dimensional constructs which might reveal novel, so far undiscovered aspects of people's concept of time.

The thesis process started very smoothly and even after getting immersed in the preceding literature everything seemed to fit the model. It was during the annotating and analysis stages that something unexpected revealed itself. Although the aim was merely to describe the time line phenomena, during the process a new time line was found which was not reported in any of the descriptions and evidence which gave reason to question the typical opinions about the flow of time on those lines was discovered. If something, this study has proven that nothing should be taken for granted.

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APPENDIXES

Appendix 1. Data sheet

File	Begin time	End time	Sinte	Linguistic cl	Signer_1	ID_1_oik	ID_1_vas	Signer_2	ID_2_oik	ID_2_vas	Notes	Laterality
CFINSL2014_011_01.ea	64600	65080	1	lexical	front-to-back	ÄSKEN						
CFINSL2014_011_01.ea	65160	65680	1	lexical	front-to-back	YKSI-VIIKKO-AIK	YKSI-VIIKKO-AIK					
CFINSL2014_011_01.ea	93880	94360	1	lexical	back-to-front	MYÖHEMMIN(I)						
CFINSL2014_011_01.ea	114840	115480	1	lexical				back-to-front	MYÖHEMMIN(I)			
CFINSL2014_011_01.ea	165000	165160	1	lexical				front-to-back	AIKAISEMMIN			
CFINSL2014_011_01.ea	165760	165920	1	lexical				front-to-back	AIKAISEMMIN			
CFINSL2014_011_01.ea	192080	192280	1	lexical				front-to-back	AIKAISEMMIN			
CFINSL2014_011_01.ea	193440	193640	1	lexical				front-to-back	AIKAISEMMIN	KOULU(BB)		
CFINSL2014_011_02.ea	22800	23160	1	lexical				back-to-front	TULEVAISUUS			
CFINSL2014_011_02.ea	44400	44600	1	lexical				back-to-front	TULEVAISUUS			
CFINSL2014_011_02.ea	147200	147560	1	lexical				front-to-back	EILEN@sbb			
CFINSL2014_011_02.ea	148680	149040	1	lexical				front-to-back	EILEN@sbb	PÄIVÄ(BB)		
CFINSL2014_011_02.ea	151880	152360	1	lexical				back-to-front	MYÖHEMMIN(I)			
CFINSL2014_011_02.ea	162520	163520	1	lexical				back-to-front	KAKSI-VUOSI-VI			
CFINSL2014_011_02.ea	199920	200040	1	lexical				back-to-front	MYÖHEMMIN(I)			
CFINSL2014_011_06.ea	11240	11440	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	89320	89880	1	lexical				front-to-back	AIKAISEMMIN			
CFINSL2014_015_01.ea	215800	216280	1	lexical				front-to-back	AIKAISEMMIN			
CFINSL2014_015_01.ea	285040	285280	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	391000	391640	1	lexical	back-to-front	MYÖHEMMIN(I)						
CFINSL2014_015_01.ea	764120	764480	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	778320	779080	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	779840	780120	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	827360	828120	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	876680	877200	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	899760	900640	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	981640	982040	1	lexical				front-to-back	AIKAISEMMIN			
CFINSL2014_015_01.ea	1094600	1095000	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	1097280	1097720	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_01.ea	1147560	1147960	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_02.ea	36080	36400	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_02.ea	127720	128320	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_02.ea	267720	268240	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_02.ea	274520	274800	1	lexical	front-to-back	AIKAISEMMIN	SY					
CFINSL2014_015_02.ea	333320	333600	1	lexical	back-to-front	MYÖHEMMIN(I)						
CFINSL2014_015_02.ea	347160	347920	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_02.ea	567400	568200	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_02.ea	593320	594360	1	lexical	front-to-back	HISTORIA	HISTORIA					
CFINSL2014_015_02.ea	664480	664720	1	lexical	front-to-back	AIKAISEMMIN	PÄÄTTÄÄ					
CFINSL2014_015_02.ea	678200	679000	1	lexical				front-to-back	AIKAISEMMIN			
CFINSL2014_015_02.ea	704600	704880	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_02.ea	721760	722160	1	lexical				front-to-back	HISTORIA			
CFINSL2014_015_02.ea	761520	762080	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_02.ea	877080	877480	1	lexical				back-to-front	VUOSI(G)			
CFINSL2014_015_02.ea	878160	879800	1	lexical				back-to-front	VUOSI(G)			
CFINSL2014_015_06.ea	88760	89320	1	lexical	back-to-front	MYÖHEMMIN(I)						
CFINSL2014_015_06.ea	120960	122240	1	lexical	front-to-back	HISTORIA	HISTORIA					
CFINSL2014_015_06.ea	129960	131360	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_06.ea	135800	137280	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_06.ea	372960	373720	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_06.ea	438840	439800	1	lexical				back-to-front	JOKA-PÄIVÄ			
CFINSL2014_015_06.ea	455200	456240	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_06.ea	599920	600160	1	lexical				front-to-back	AIKAISEMMIN	LENTOPALLO		
CFINSL2014_015_06.ea	600760	601240	1	lexical				front-to-back	AIKAISEMMIN			
CFINSL2014_015_06.ea	966240	966880	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_06.ea	970400	971000	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_06.ea	1007840	1008560	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_015_06.ea	1160880	1161320	1	lexical	back-to-front	MYÖHEMMIN(I)						
CFINSL2014_015_06.ea	1275880	1276720	1	lexical	front-to-back	AIKAISEMMIN						
CFINSL2014_011_01.ea	46680	47600	2	lexical				left-to-right	kvap			ipsilateral
CFINSL2014_011_01.ea	52080	52400	2	lexical				left-to-right	kvap			ipsilateral
CFINSL2014_011_01.ea	54880	56043	2	discursive				left-to-right	JALKAPALLO, O JALKAPALLO, L	localizing discourse referents,		
CFINSL2014_011_01.ea	60160	60400	2	lexical				left-to-right	kvap			ipsilateral
CFINSL2014_011_01.ea	87240	87560	2	lexical	left-to-right	kvap	kvap					
CFINSL2014_011_01.ea	130720	131640	2	lexical				left-to-right	kvap	PUOLI(L_ulos)		
CFINSL2014_011_01.ea	186280	186680	2	discursive	left-to-right	PIENI(L_ alas)					reduplication	ipsilateral
CFINSL2014_011_01.ea	214440	214920	2	discursive				left-to-right			overlap with lexical material	
CFINSL2014_011_01.ea	214960	215200	2	lexical				left-to-right	kvap			ipsilateral
CFINSL2014_011_01.ea	225600	225800	2	lexical				left-to-right	kvap			ipsilateral
CFINSL2014_011_01.ea	244520	245224	2	discursive	left-to-right	KESKITTYÄ, ENE KESKITTYÄ, ENE					reduplication	
CFINSL2014_011_02.ea	28000	28520	2	discursive				left-to-right	OTTAA-YHTEYTTÄ OTTAA-YHTEYTTÄ		reduplication	
CFINSL2014_011_02.ea	29200	29640	2	discursive				left-to-right	HENKILÖ(Lc)		reduplication	ipsilateral
CFINSL2014_011_02.ea	49320	49640	2	discursive	left-to-right	PIENI(L_ alas)					reduplication	ipsilateral
CFINSL2014_011_02.ea	50720	54011	2	discursive	right-to-left	KESKITTYÄ, ENE KESKITTYÄ, ENE					localizing discourse referents	
CFINSL2014_011_02.ea	55120	55520	2	discursive	left-to-right	PIENI(L_ alas)					reduplication	ipsilateral
CFINSL2014_011_02.ea	86840	87120	2	discursive				left-to-right	PIENI(L_ alas)		reduplication	ipsilateral
CFINSL2014_011_02.ea	87720	88080	2	discursive				left-to-right	PIENI(L_ alas)		reduplication	ipsilateral
CFINSL2014_011_02.ea	106480	106720	2	discursive				left-to-right	NYT(BB)	NYT(BB)		
CFINSL2014_011_02.ea	119280	119760	2	discursive				left-to-right	PIENI(L_ alas)		reduplication	ipsilateral
CFINSL2014_011_02.ea	187240	187640	2	lexical				left-to-right	kvap	kvap		
CFINSL2014_011_02.ea	236040	236280	2	lexical				left-to-right	KÄMMEN-YLÖSKÄMMEN-YLÖS_ele			
CFINSL2014_011_02.ea	246480	246840	2	lexical				left-to-right	JAKSO	JAKSO		

CFINSL2014_015_06.eal11880	12320	2	discursive	left-to-right	OS:	JO						localizing discourse referents,	
CFINSL2014_015_06.eal14000	14560	2	lexical	left-to-right	_kvap								ipsilateral
CFINSL2014_015_06.eal15040	15680	2	lexical	left-to-right	_kvap								ipsilateral
CFINSL2014_015_06.eal16400	16960	2	lexical	left-to-right	_kvap								
CFINSL2014_015_06.eal17560	18040	2	lexical	left-to-right	_kvap								ipsilateral
CFINSL2014_015_06.eal22640	24040	2	discursive	left-to-right	KILPAILLA	KILPAILLA						reduplication	
CFINSL2014_015_06.eal29360	29560	2	lexical				right-to-left	JÄRJESTÄÄ(L_p	JÄRJESTÄÄ(L_pomppiva)				
CFINSL2014_015_06.eal36320	38685	2	lexical				left-to-right	VÄLI(P_kämme	VÄLI(P_kämmen)				
CFINSL2014_015_06.eal39680	40840	2	lexical	left-to-right	_kvap								ipsilateral
CFINSL2014_015_06.eal113200	114120	2	discursive	left-to-right	ENSIMMÄINEN	_kvap							
CFINSL2014_015_06.eal187240	188040	2	discursive	left-to-right	OS:								ipsilateral
CFINSL2014_015_06.eal206480	208440	2	discursive	left-to-right	MERKKI	MERKKI						reduplication	
CFINSL2014_015_06.eal208520	209600	2	discursive	right-to-left	KOPIOIDA	KOPIOIDA						reduplication	
CFINSL2014_015_06.eal210160	213322	2	discursive	left-to-right	OPETTA(A_L_ka	OPETTA(A_L_ka							
CFINSL2014_015_06.eal215920	217000	2	lexical	left-to-right	_kvap								ipsilateral
CFINSL2014_015_06.eal239480	249957	2	discursive	left-to-right	OS; TANSKA, V	VAIKUTTAA, AU							
CFINSL2014_015_06.eal290840	292320	2	discursive				left-to-right	TAPPAA	TAPPAA, KUUR			reduplication	
CFINSL2014_015_06.eal314400	316600	2	discursive	left-to-right	HENKILÖ(Lc)							reduplication	ipsilateral
CFINSL2014_015_06.eal339680	340720	2	discursive	left-to-right	POISTAA(BB)	POISTAA(BB)						reduplication	
CFINSL2014_015_06.eal341280	341800	2	discursive	left-to-right	PUHDAS	PUHDAS						reduplication	
CFINSL2014_015_06.eal341840	342880	2	discursive	left-to-right	POISTAA(BB)							reduplication	contralateral
CFINSL2014_015_06.eal370960	370960	2	discursive	left-to-right	LÄPI							reduplication	
CFINSL2014_015_06.eal402400	403200	2	lexical	left-to-right	_kvap								
CFINSL2014_015_06.eal462640	462640	2	discursive	left-to-right	HENKILÖ(Lc)							reduplication	ipsilateral
CFINSL2014_015_06.eal510240	511040	2	discursive	left-to-right	OMA:							reduplication	ipsilateral
CFINSL2014_015_06.eal511560	512200	2	discursive	left-to-right	MERKKI	MERKKI						reduplication	
CFINSL2014_015_06.eal512240	513360	2	discursive	right-to-left	ERILAINEN	ERILAINEN						reduplication	
CFINSL2014_015_06.eal524600	525240	2	discursive	left-to-right	HENKILÖ(Lc)							reduplication	ipsilateral
CFINSL2014_015_06.eal757520	758760	2	discursive				left-to-right	ANTAA	ANTAA			reduplication	
CFINSL2014_015_06.eal835560	836160	2	lexical				left-to-right	JA-NIIN-EDELLE					ipsilateral
CFINSL2014_015_06.eal876520	882957	2	discursive	left-to-right	OS:minä, TEHD	TEHDÄ(BB), kv							
CFINSL2014_015_06.eal898080	898800	2	discursive	left-to-right	TAVATA(L_lähe	TAVATA(L_lähe						reduplication	
CFINSL2014_015_06.eal923240	924000	2	discursive	left-to-right	MONTA	_kvvk							
CFINSL2014_015_06.eal1012440	1012800	2	lexical	right-to-left	OS:								contralateral
CFINSL2014_015_06.eal1042840	1043760	2	discursive	left-to-right	KILPAILLA	KILPAILLA						reduplication	
CFINSL2014_015_06.eal1056400	1064971	2	discursive				left-to-right						
CFINSL2014_015_06.eal1201280	1220550	2	discursive				right-to-left	HUUTAA, OS; H	HUUTAA, TOSI			localizing discourse referents	
CFINSL2014_015_06.eal1225320	1226120	2	lexical				left-to-right	JA-NIIN-EDELLE	JA-NIIN-EDELLEEN_	ele@sbb			
CFINSL2014_015_06.eal1233160	1255733	2	discursive				left-to-right						
CFINSL2014_011_01.eal169400	169720	3	lexical	front-to-back	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_011_01.eal171720	172000	3	lexical	front-to-back	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_011_01.eal174200	174440	3	lexical	back-to-front	JÄLKEEN	JÄLKEEN							
CFINSL2014_011_02.eal111800	112080	3	lexical				back-to-front	JÄLKEEN	JÄLKEEN				
CFINSL2014_011_02.eal144560	144960	3	lexical				back-to-front	JÄLKEEN	JÄLKEEN				
CFINSL2014_011_02.eal150880	151200	3	lexical				back-to-front	JÄLKEEN, VAPAJ	JÄLKEEN				
CFINSL2014_011_06.eal42640	43080	3	lexical				back-to-front	JÄLKEEN	JÄLKEEN				
CFINSL2014_011_06.eal46600	47800	3	lexical				left-to-right	NOIN(BB)	NOIN(BB)				
CFINSL2014_011_06.eal277120	277520	3	lexical	left-to-right	JÄLKEEN	JÄLKEEN							
CFINSL2014_015_01.eal285440	285840	3	lexical	right-to-left	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_015_01.eal444520	444880	3	lexical				front-to-back	ENNEN-JOTAKII	ENNEN-JOTAKII				
CFINSL2014_015_01.eal581720	582160	3	lexical	right-to-left	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_015_01.eal623400	623760	3	lexical	back-to-front	JÄLKEEN	JÄLKEEN							
CFINSL2014_015_01.eal737040	737440	3	lexical	front-to-back	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_015_01.eal1107320	1109400	3	lexical	left-to-right	TÄHÄN-ASTI	TÄHÄN-ASTI							
CFINSL2014_015_01.eal1117720	1118320	3	lexical	left-to-right	TÄHÄN-ASTI								
CFINSL2014_015_02.eal335040	335400	3	lexical	back-to-front	_kvap							unusual (non-dominant hand missing)	
CFINSL2014_015_02.eal591480	591920	3	lexical	front-to-back	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_015_02.eal597600	598040	3	lexical	back-to-front	VÄHITELLEN	VÄHITELLEN							
CFINSL2014_015_02.eal609080	609560	3	lexical	front-to-back	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_015_02.eal682400	683080	3	lexical	front-to-back	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_015_02.eal1022640	1023080	3	lexical	front-to-back	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_015_06.eal32960	33600	3	lexical	back-to-front	JÄLKEEN	JÄLKEEN							
CFINSL2014_015_06.eal34040	35080	3	lexical	back-to-front	JÄLKEEN	JÄLKEEN							
CFINSL2014_015_06.eal42920	44440	3	lexical	left-to-right	JÄLKEEN, AIKA,	JÄLKEEN							
CFINSL2014_015_06.eal49880	51960	3	lexical	left-to-right	_kvap	_kvap							
CFINSL2014_015_06.eal55160	56520	3	lexical	left-to-right	_kvap	_kvap							
CFINSL2014_015_06.eal57000	57440	3	lexical				back-to-front	JÄLKEEN	JÄLKEEN				
CFINSL2014_015_06.eal58280	59200	3	lexical	left-to-right	_kvap	_kvap							
CFINSL2014_015_06.eal133320	134840	4	lexical	right-to-left	ENNEN-JOTAKII	ENNEN-JOTAKII							
CFINSL2014_011_01.eal40240	40960	4	lexical				back-to-front	JÄLKEEN					
CFINSL2014_011_01.eal51320	52000	4	lexical				back-to-front	EDETÄ-RINNAK	EDETÄ-RINNAKAIN@sbb				
CFINSL2014_011_01.eal56480	56880	4	lexical				back-to-front	_kvap					
CFINSL2014_011_01.eal60680	60920	4	lexical				back-to-front	JATKUA	JATKUA				
CFINSL2014_011_01.eal117000	117360	4	lexical				back-to-front	_kvap					
CFINSL2014_011_01.eal224560	224920	4	lexical				back-to-front	JÄLKEEN					
CFINSL2014_011_02.eal154200	154360	4	lexical				back-to-front	JATKUA	JATKUA				
CFINSL2014_011_02.eal158240	158480	4	lexical	back-to-front	JATKUA	JATKUA							
CFINSL2014_011_02.eal174040	174320	4	lexical	back-to-front	JATKUA	JATKUA							
CFINSL2014_011_02.eal200080	200640	4	lexical				back-to-front	YKSI-VIIKKO-PÄ	YKSI-VIIKKO-PÄÄSTÄ_num				
CFINSL2014_011_06.eal175243	175712	4	lexical	back-to-front	JATKUA	JATKUA							
CFINSL2014_011_06.eal175723	176320	4	lexical				back-to-front	JATKUA	JATKUA				

CFINSL2014_011_06.ea176320	176640	4	lexical						back-to-front	JATKUA	JATKUA		
CFINSL2014_011_06.ea176920	177280	4	lexical						back-to-front	JATKUA	JATKUA		
CFINSL2014_011_06.ea318560	318920	4	lexical						back-to-front	TOINEN(V)_nur	JÄLKEEN		
CFINSL2014_015_01.ea199520	100200	4	lexical						back-to-front	JATKUA	JATKUA		
CFINSL2014_015_01.ea189880	190680	4	lexical	back-to-front	_kvap	_kvap							
CFINSL2014_015_01.ea337040	337440	4	lexical	back-to-front	_kvap								
CFINSL2014_015_01.ea535440	536160	4	lexical						back-to-front	KAKSI-VIIKKOA_KAKSI-VIIKKOA_num@sbb			
CFINSL2014_015_01.ea536240	536600	4	lexical						back-to-front	MYÖHEMMIN(KAKSI-VIIKKOA_num@sbb			
CFINSL2014_015_01.ea564480	565920	4	lexical						back-to-front	KOKO-AJAN(L_)	KOKO-AJAN(L_suora)		
CFINSL2014_015_01.ea629280	630480	4	lexical	back-to-front	VÄLEIN								
CFINSL2014_015_01.ea1038440	1039240	4	lexical						back-to-front	_kvap			
CFINSL2014_015_01.ea1048720	1049760	4	lexical						back-to-right	KOKO-AJAN(L_)	KOKO-AJAN(L_suora)		
CFINSL2014_015_01.ea1059360	1060200	4	lexical						back-to-front	KOKO-AJAN(L_)			
CFINSL2014_015_01.ea1070680	1071440	4	lexical						back-to-front	_kvap	_kvap		
CFINSL2014_015_02.ea70200	70880	4	lexical						back-to-front	_kvap	_kvap		
CFINSL2014_015_02.ea71280	72000	4	lexical						back-to-front	KOKO-AJAN(L_)	KOKO-AJAN(L_suora)		
CFINSL2014_015_02.ea324680	325000	4	lexical	back-to-front	JÄLKEEN								
CFINSL2014_015_02.ea331240	332320	4	lexical	back-to-front	_kvap								
CFINSL2014_015_02.ea351480	352200	4	lexical	back-to-front	_kvap								
CFINSL2014_015_02.ea429280	429520	4	lexical	back-to-front	_kvap								
CFINSL2014_015_02.ea471760	472560	4	lexical						back-to-front	_kvap	OPASTAA		
CFINSL2014_015_02.ea595520	595920	4	lexical	front-to-back	HISTORIA	HISTORIA							
CFINSL2014_015_02.ea669400	669840	4	lexical	back-to-front	JATKUA	JATKUA							
CFINSL2014_015_02.ea685960	686120	4	lexical	back-to-front	_kvap	ALOITTA(A)							
CFINSL2014_015_02.ea851880	852720	4	lexical	back-to-front	_kvap								
CFINSL2014_015_02.ea897440	897920	4	lexical	back-to-front	JÄLKEEN								
CFINSL2014_015_02.ea1019680	1020440	4	lexical	back-to-front	_kvap	_kvap							
CFINSL2014_015_06.ea29600	30240	4	lexical						back-to-front	KOKO-AJAN(L_)	KOKO-AJAN(L_suora)		
CFINSL2014_015_06.ea39680	40840	4	lexical						back-to-front	OS_;	KOKO-AJAVÄLI(P_kämmen), KOKO-AJAN(L_suora)		
CFINSL2014_015_06.ea40840	41000	4	lexical						back-to-front	KOKO-AJAN(L_)	KOKO-AJAN(L_suora)		
CFINSL2014_015_06.ea106280	108440	4	lexical	back-to-front	_kvap	_kvap							
CFINSL2014_015_06.ea237360	238520	4	lexical	back-to-front	_kvap	_kvap							
CFINSL2014_015_06.ea377000	378080	4	lexical	back-to-front	_kvap	_kvap							
CFINSL2014_015_06.ea378920	379360	4	lexical	back-to-front	JATKUA	JATKUA							
CFINSL2014_015_06.ea782040	782720	4	lexical						back-to-front	JÄLKEEN			
CFINSL2014_015_06.ea783120	783440	4	lexical						back-to-front	JÄLKEEN			
CFINSL2014_015_06.ea962480	963240	4	lexical	back-to-front	MYÖHEMMIN(I								
CFINSL2014_015_06.ea1014440	1014920	4	lexical	back-to-front	VÄLEIN								
CFINSL2014_011_06.ea214640	215243	5	discursive						up-to-down	ENSIMMÄINEN			
CFINSL2014_011_01.ea29160	30160	6	lexical	down-to-up	ISO(L_ylös)								
CFINSL2014_011_01.ea213720	214400	6	lexical						down-to-up	ISO(L_ylös)			
CFINSL2014_011_06.ea7080	7520	6	lexical	down-to-up	ISO(L_ylös)								
CFINSL2014_015_01.ea68560	68880	6	lexical						down-to-up	ISO(L_ylös)			
CFINSL2014_015_01.ea130240	130960	6	lexical	down-to-up	ISO(L_ylös)								
CFINSL2014_015_01.ea238960	239600	6	lexical	down-to-up	ISO(L_ylös)	ISO(L_ylös)							
CFINSL2014_015_01.ea329560	330520	6	lexical	down-to-up	ISO(L_ylös)								
CFINSL2014_015_01.ea264840	265400	6	lexical	down-to-up	ISO(L_ylös)								
CFINSL2014_011_01.ea143520	145268	7	lexical						right-to-left	YKSI-VUOSI-AIK			
CFINSL2014_011_01.ea223120	223805	7	lexical						front-to-back	KAKSI-VUOSI-AIK			
CFINSL2014_011_02.ea140320	140640	7	lexical						front-to-back	VUOSI-SITTEN_			
CFINSL2014_011_02.ea141360	141760	7	lexical						front-to-back	VUOSI-SITTEN_	YLIOPISTO		
CFINSL2014_011_02.ea194560	194920	7	lexical						front-to-back	YKSI-VUOSI-AIK			
CFINSL2014_011_02.ea209840	210240	7	lexical						front-to-back	YKSI-VUOSI-AIK			
CFINSL2014_011_06.ea172360	172440	7	lexical						front-to-back	KOLME-VUOSI-			
CFINSL2014_011_06.ea313360	314567	7	lexical						front-to-back	KOLME-VUOSI-			
CFINSL2014_011_06.ea331960	332240	7	lexical						front-to-back	YKSI-VUOSI-AIK			
CFINSL2014_015_01.ea541520	542720	7	lexical						back-to-front	KOKO-AJAN(L_)		unusual location	
CFINSL2014_015_06.ea342920	343360	7	lexical	front-to-back		AIKAISEMMIN						non-dominant hand	
CFINSL2014_011_01.ea198560	199160	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_011_01.ea199680	199960	plane	lexical						counterclockw	MUUTTUA	MUUTTUA	unusual	
CFINSL2014_011_01.ea200480	200920	plane	lexical						counterclockw	MUUTTUA	MUUTTUA	unusual	
CFINSL2014_015_01.ea117000	117440	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_01.ea166960	167240	plane	lexical	arc	_kvap							clock	
CFINSL2014_015_01.ea329080	329520	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_01.ea330800	331480	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_01.ea478320	478600	plane	lexical						clockwise	MUUTTUA	MUUTTUA		
CFINSL2014_015_01.ea479040	479440	plane	lexical						clockwise	MUUTTUA	MUUTTUA		
CFINSL2014_015_01.ea606960	607440	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_01.ea789600	791120	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_01.ea802520	802880	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_01.ea941920	942200	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_02.ea458080	458400	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_02.ea701040	701840	plane	lexical	counterclockw	MUUTTUA	MUUTTUA						unusual	
CFINSL2014_015_02.ea706800	707120	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_02.ea710320	710680	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_06.ea490440	491560	plane	lexical						clockwise	MUUTTUA	MUUTTUA		
CFINSL2014_015_06.ea493640	494240	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_06.ea545480	546600	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_06.ea547120	547960	plane	lexical	clockwise	MUUTTUA	MUUTTUA							
CFINSL2014_015_06.ea767120	767320	plane	lexical						clockwise	MUUTTUA	MUUTTUA		
CFINSL2014_015_06.ea785880	786400	plane	lexical						clockwise	MUUTTUA	MUUTTUA		
CFINSL2014_015_06.ea786560	787200	plane	lexical						clockwise	MUUTTUA	MUUTTUA		
CFINSL2014_015_06.ea794080	794640	plane	lexical						clockwise	MUUTTUA	MUUTTUA		
CFINSL2014_015_06.ea1161360	1162160	plane	lexical	clockwise	MUUTTUA	MUUTTUA							