Research Article **Open Access**

Tommi Jantunen*

Constructed Action, the Clause and the Nature of Syntax in Finnish Sign Language

DOI 10.1515/opli-2017-0004
Received November 17, 2016; accepted February 22, 2017

Abstract: This paper investigates the interplay of constructed action and the clause in Finnish Sign Language (FinSL). Constructed action is a form of gestural enactment in which the signers use their hands, face and other parts of the body to represent the actions, thoughts or feelings of someone they are referring to in the discourse. With the help of frequencies calculated from corpus data, this article shows firstly that when FinSL signers are narrating a story, there are differences in how they use constructed action. Then the paper argues that there are differences also in the prototypical structure, linkage type and non-manual activity of clauses, depending on the presence or non-presence of constructed action. Finally, taking the view that gesturality is an integral part of language, the paper discusses the nature of syntax in sign languages and proposes a conceptualization in which syntax is seen as a set of norms distributed on a continuum between a categorial–conventional end and a gradient–unconventional end.

Keywords: constructed action, gesturality, clause, syntax, Finnish Sign Language

1 Introduction

In sign languages, signers use their body and its parts not only to *tell* about events from an outsider's perspective but also to *show* the actions, thoughts or feelings of the referents who participate in the events (e.g. Hodge & Ferrara 2013). This demonstrative process – in which the activity of the torso, head and facial features, i.e. *nonmanuality* (e.g. Puupponen et al. 2015; Puupponen 2018), has a defining role – is a form of gestural enactment and in many recent works (at least since Liddell & Metzger 1998) is referred to as constructed action, abbreviated here as CA (e.g. Hodge & Ferrara 2013; Ferrara & Johnston 2014; in the literature, aspects of the physical activity constituting CA have also been investigated with the help of such notions as role shift, reference shift, transfert personnel and surrogate blending, see e.g. Padden 1990, Sandler & Lillo- Martin 2006, Cuxac 2000 and Liddell 2003, respectively). Figure 1 demonstrates CA in Finnish Sign Language (FinSL) with the help of two depictive expressions, the first of which, (a), includes the use of a type of verb-like sign (to be discussed further in the paper) and the second, (b), a whole-body gesture.

In contrast with traditional grammatical phenomena, the study of CA is still little studied in sign languages, although interest in it within corpus-based functional linguistics has been increasing in recent years. In this framework – the guiding assumptions of which the present study acknowledges – CA has been investigated in the narratives of individual sign languages (e.g. Australian, British) in terms of its frequency, interaction with clausal constituents, and articulatory components. In practice, the research has shown that, in the languages investigated, CA is a compositionally complex narrative device which can integrate with many kinds of syntactic constructions and units: for example, CA can occur simultaneously with, and sequentially to – signed clauses. And in clauses where lexically expressed core arguments have been omitted, CA may even be

***Corresponding author: Tommi Jantunen,** Sign Language Center, Department of Language and Communication Studies, P.O. Box 35 (F), FI-40014 University of Jyväskylä, Finland, E-mail: tommi.j.jantunen@jyu.fi

the only cue through which the participant information of the encoded event can be interpreted (e.g. Cormier et al. 2013; Hodge & Ferrara 2013; Ferrara & Johnston 2014; Hodge & Johnston 2014; Cormier et al. 2015a). In general, it is also known that the phenomenon of CA is not limited to the domain of sign languages but is also available to speakers of spoken languages. For example, Enfield (2009) has argued that, together with speech, CA forms tightly intertwined composite utterances, and Ladewig (2014), among others, has shown that CA can also express participant information in spoken language clauses.

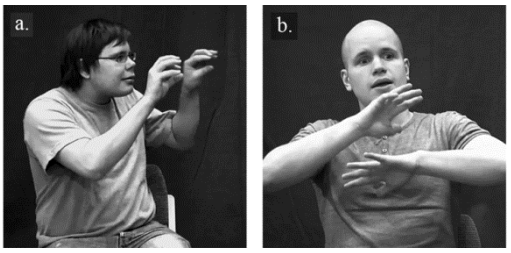

Figure 1. Two examples of how CA is used in FinSL. In (a), CA co-occurs with a depictive Type 3 verbal including handling classifier handshapes, the whole expression representing a boy putting coals as eyes on a snowman. In (b), CA is manifested as a whole-body gesture showing a snowman pulling back from a hot stove.

In FinSL, CA and its effect on syntax has not been extensively studied (see Lukaszyck 2008). However, as linguistic work on FinSL, and especially on its clauses, has progressed (Jantunen 2016, Jantunen 2017; Puupponen et al. 2016), it has become evident that a specific investigation of CA can no longer be postponed, partly because of the salient use of CA in the recently compiled FinSL corpus (Jantunen et al. 2016; Salonen et al. 2016). Consequently, in line with international studies, this paper sets out to analyze the use of CA with the clauses of FinSL. More precisely, the study investigates the differences in internal structure, type of clause-level linkage and non-manual activity of the clause when signers narrate with CA and without it. For its data, the study exploits the signed retellings of the story *Frog, where are you?* (Mayer 1969), also used in research into CA in, for example, Auslan, the sign language of Australia (e.g. Hodge & Ferrara 2013; Ferrara & Johnston 2014). The data has been recorded for the corpus of FinSL and annotated for signs, translations, grammar and phonetic events. To aid the investigation of non-manual activity, the data also includes computer-vision measurements that describe the head movements of the signers (Luzardo et al. 2014). The part of the data that is permitted by research consents is freely accessible in a slightly reduced format via the LAT online service of the FIN-CLARIN's Language Bank of Finland (*Kielipankki* in Finnish) at *http://urn.fi/urn:nbn:fi:lb-1001100113005*.

In the annotation of the FinSL data, the conceptualization of CA differs in two respects from the conceptualization used in the most recent international work (in particular Cormier et al. 2015a). First of all, in this analysis, CA does not include forms of *constructed dialogue* (CD), the signers' showing of the speech of the enacted referent (also known as referencing, see Lukaszyck 2008). As instructed in Johnston's (2016) annotation guide for Auslan, which forms the basis of the annotation of CA in the present work, CD has been annotated separately and is not discussed analytically in this paper. Secondly, the manifestations of CA have not been classified into compositional sub-categories (see Cormier et al. 2015a). As in Hodge and Ferrara (2013) and in Ferrara and Johnston (2014) for example, CA is approached in this paper as an articulatorily holistic phenomenon.

As stated above, CA is defined in this paper as a form of *gestural* enactment, a way of showing instead of telling (e.g. Cormier et al. 2013; Hodge & Ferrara 2013; Ferrara & Johnston 2014; Hodge & Johnston 2014; Cormier et al. 2015a). In this article, the term 'gestural', which is used in the definition, refers broadly to any sort of expression in signing or in speech that "can't be analysed in discrete, categorial terms" (Kendon 2008). In other words, it refers to the relatively gradient (i.e. uncategorial) and unconventional aspects of language production. Generally speaking, this semiotic use of the term gestural has become more and more typical in research into sign languages since the publication of works by, for example, Okrent (2002)

and Liddell (2003). However, at the same time, defining gesturality in this semiotic way means that the underlying concept of *gesture* is approached very differently from the mainstream view, in which the notion of gesture is still primarily associated with the physical activity of the hands (e.g. McNeil 1992; Emmorey 1999; Kendon 2004).

From an ontological point of view, the present study supports the view that gesturality is an intrinsic property of language, not an external or complementary aspect. In essence, this *gesturality-in-language* view (Jantunen 2015a) holds that language as a conceptual entity can be set out on a continuum between categorial and conventional properties at one end, and gradient and unconventional properties at the other. In itself, this view is in no way particular to the present study, but has been present in much previous work. A wellknown application of the view from the field of gesture studies is Kendon's continuum (McNeill 1992, 2000; see Kendon 2004) which has been used to describe how manual gesticulation (which has no traditional linguistic categories and conventions) is connected to sign languages with relatively fixed categories and conventions via language-like (i.e. speech synchronized) gestures and emblems. The following is a schematic illustration of Kendon's continuum along the dimensions of categoriality and conventionality, adapted from McNeil (2000; see Kendon 2004):

Categories absent			Fixed categories
GESTICULATION	– LANGUAGE-LIKE GESTURES –	EMBLEMS –	SIGN LANGUAGES
Conventions absent			Fixed conventions.

With respect to this concept of the continuum, the point of departure of the present article is that CA as a phenomenon occupies its more gradient–unconventional end, whereas the prototypical clause is a unit which, by definition, is situated at the more categorial–conventional end. However, the issues discussed in the article will show that both CA and the clause can also occupy other positions on the continuum – but the two cannot meet. This is because it is assumed that CA has a tendency to locate on the dimension of gradience (i.e., by definition, the degrees in the re-enactment are never clear cut, although the enactment may become more conventional) while the clause is assumed to locate more on the dimension of conventionality (i.e. the clause is a unit defined primarily by the existence of a social convention, although the borders of the unit may become fuzzy) (e.g. Jantunen 2009; Hodge 2013).

In the field of sign language research, the gesturality-in-language view has already had an impact on some of the ways sign language researchers conceptualize sign language structure (see Liddell 2003 for the re-conceptualization of the role of morphemes in sign languages, Ferrara & Johnston 2014 for clause structure, Cormier et al. 2015b for indicating signs and the use of space, and Jantunen 2017 for ellipsis). In this article, the view is applied to the study of CA and FinSL clauses to take in discussion of the nature of syntax in sign languages. Specifically, this article suggests that the syntax of sign languages should not be seen as a categorial construct with monovalent content (as is often the case, especially in work in the formal tradition), but, in line with the more general view of language described above, as a set of norms that are distributed on a continuum that spreads between the categorial–conventional and the gradient–unconventional features of language use.

The research described in this article builds on previous work on FinSL grammar (most notably Jantunen 2008, 2010, 2013, 2016, 2017) which has been investigated from the ontological premises of the functional (communicative–cognitive) approach outlined, for example, in Van Valin and LaPolla (1997). In this approach, grammar is seen as a gradient collection of societally maintained and changing patterns that emerge from the cognitively motivated communicative actions of individuals. As for its core methodology, research into the grammar of FinSL has been based on the general conventions of Basic Linguistic Theory (Dixon 2010; Dryer 2006; Jantunen 2009), a framework which is widely used by, for example, field linguists, and which emphasizes informal description over formal explanation. On the other hand, research into FinSL grammar has also been influenced by one of the guiding assumptions of modern functional typology, that is, that individual languages should be described as much as possible in their own terms with locally defined categories (e.g. Haspelmath 2007a, 2010; Jantunen 2009). The effect of these guiding assumptions is seen most clearly in some of the terminology used in the present article (e.g. the sign-class notions).

The paper is structured as follows. The next section presents an overview of the data and methodology used in the current study (Section 2). The following section then discusses the specifics of clause structure, clause linkage types and non-manuality in signing with and without CA (Section 3). The nature of syntax in sign languages is addressed in Section 4, after which comes the conclusion.

2 Research material and its processing

All of the results in the present article are based on a sample of video data extracted from a larger body of material constituting the FinSL corpus (Puupponen et al. 2014; Salonen et al. 2016; Jantunen et al. 2016). In practice, this sample refers to the signed re-tellings of the story *Frog, where are you?* (henceforth the frog story) elicited in 2013 from five native FinSL signers (4 female, 1 male; aged between 20 and 60 years) with the help of a text-less picture book (Mayer 1969). In the recordings, the signers worked in pairs in a dialogue setting in which the recording set-up consisted of 6 Full HD cameras directed toward the signers from different angles. The task of the signers was to look at the book, memorize the story, then put the book away and tell the memorized story to the addressee.

The combined duration of the signed stories in the sample is 13 minutes and 18 seconds. The relatively short duration of the stories is compensated by the relatively extensive and time-consuming annotation work that has been carried out in ELAN (Crasborn & Sloetjes 2008; Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, The Netherlands, see *http://tla.mpi.nl/tools/tla-tools/elan/*). In short, in the three years since the original recording of the video, the material of the five signers has been annotated for signs and their lexico-grammatical categories, for sentence-level Finnish translations, for clauses (which are centered around a verbal predicate) and their internal structure, for CA (and CD), and for head and body movements (see Jantunen et al. 2016 for more details). Of the different annotations, the most crucial ones for the present study are those that identify the structure of the clauses and the periods of CA – in total, the sample includes 537 structurally annotated verbal-centered clauses and 198 instances of CA (see Sections 2.1–2.4 for a more detailed discussion on the annotation of clause structure and CA).

In addition to the clause structure and CA annotations, the present study also exploits analytically the low-level annotations of various types of head and body movements in the data (see Section 3.3). The annotation of head movements is roughly based on the categorization presented in Puupponen et al. (2015) and makes a distinction between 10 types of head movements: nods, noddings, thrusts, pulls, tilts, shakes, turns, tiltings, chin-ups and chin-downs. The number of distinctively annotated body movement types in the material is 9: body leans forward, backward, right or left; body turns right or left; body tiltings; shoulder ups and shrugs. Being low level, the annotations are not organized hierarchically into more abstract classes (for more, see Puupponen et al. 2014 and Jantunen et al. 2016).

A novel feature of the material is that the videos of each signer recorded from the near frontal angle have been automatically processed with computer-vision technology implemented in the SLMotion software specifically developed for the motion analysis of sign languages (Karppa et al. 2014). With SLMotion it has been possible to estimate, for instance, the continuous movement of the signer's head in three dimensions: *yaw*, *pitch*, and *roll*, which associate with the dimensions of turning-like movements, nodding-like movements, and tilting-like movements, respectively (Luzardo et al. 2014). This quantitative information has been linked into ELAN, where it can be visually inspected in the time series panels, together with the annotations. In the present work, the computer-vision data has been used in the analysis of the interplay between non-manual activity and the syntax of FinSL. An example of the computer-vision data with annotations in ELAN is shown in Figure 2.

The annotation work has been carried out in cycles by three researchers in total, all of whom have native competence in FinSL. All the annotations have been checked several times in order to ensure that the work is completed to the highest possible standard.

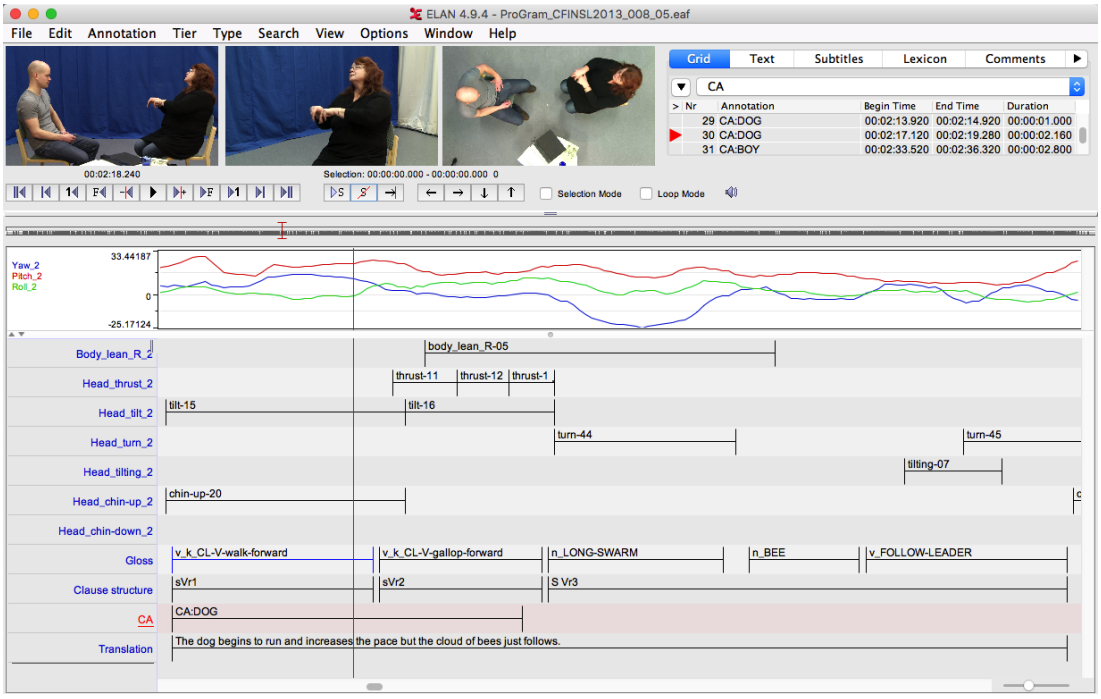

Figure 2. ELAN screenshot showing the video from three angles, the computer-vision based descriptors for head movements (the time series panel), and annotations (the tiers).

2.1 Verbal signs and their annotation

In research into FinSL (Jantunen 2008, 2010, 2013, 2016, 2017), signs (other than *ad hoc* gestures) are analyzed as belonging to two main lexico-grammatical categories: *nominal* and *verbal*. These broad categories – the core members of which resemble not only nouns and verbs but also units that have been analyzed as adjectives in many languages – have been defined by semantic and grammatical criteria (Jantunen 2010) and both can be further divided into subclasses. The three subclasses of verbal signs – Type 1, 2 and 3 verbals (resembling the plain, indicating and depictive verbs of Liddell 2003, respectively; see Jantunen 2010 for a full discussion of the differences) – are the most researched; they are also crucial for the present study. Examples of the three types of verbals are presented in Figure 3.

Type 1 verbals are formationally the most fixed type, with a relatively straightforward form–meaning connection, i.e. they are closest to the categorial–conventional end of the gesturality-in-language continuum (see Section 1). Type 2 and 3 verbals, on the other hand, are groups of signs which include gradient features (i.e. a gestural component) as part of their structure, i.e. they are positioned more towards the gradient–unconventional end of the continuum. In Type 2 verbals (as, for example, in pointings), the gestural component is manifested through the directionality of the movement of the hand: in order to understand the meaning of these signs, the addressee must make a semantic association between the morphological content of the sign and the location toward which the sign is directed (see Liddell 2003). In Type 3 verbals, the gestural component refers to the gradient properties inherently present in the placement, orientation and movement parameters of the sign structure. Together these features enable Type 3 verbals to iconically depict events that have movement taking place in different topographic locations. Type 3 verbals also contain a nominal classifier morpheme (the handshape) which refers to the entities present in the event.

In the annotated material, the glosses that identify the signs (on the ELAN tier *gloss*) contain prefixed information about the lexico-grammatical category of the sign, that is, whether the sign is a nominal (n) or a verbal (v), or unspecified (x). The category has been decided on the basis of both the sign meaning and

the linguistic context, with the result that the annotation distinguishes, for example, between WORK (a nominal) and TO-WORK (a verbal), regardless of their fairly similar forms in FinSL. Moreover, the annotation specifies whether the verbal belongs to the class of depictive Type 3 verbals (the additional prefix k). In the present sample from the five signers, the total number of sign tokens is 1473. Of these, the share of signs identified as verbals is 38 percent, and of the verbals, the share of Type 3 verbals is 31 percent.

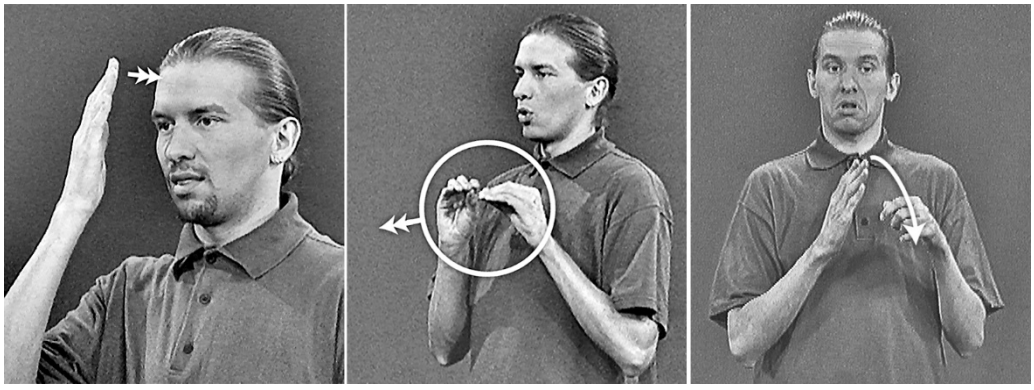

Figure 3. FinSL verbals with the meanings (from left to right) 'know' (the finger pads of the open hand touch the forehead twice), 'teach [someone in front of the signer]' (the two hands move forward twice in the shown configuration), and 'an oblong vehicle (e.g. a bicycle) moves forward over something like a mound' (the dominant hand articulates an arc-shaped movement over the stationary non-dominant hand). The verbals represent Type 1, Type 2, and Type 3, respectively. Images from *Suomalaisen viittomakielen perussanakirja* (1998).

It should be noted that all the signs in the sample have been annotated by following the so-called 'long conception of the sign' (as opposed to the 'short conception of the sign' followed in the annotation of sign language material in some corpora). In practice, this means that, in continuous signing, the beginning of the sign is identified as being located very close to the ending of the preceding sign (there is often only one video frame left in between the two annotation cells in ELAN). For more on this view concerning the length of the sign, see Jantunen (2015b).

2.2 Clauses with a verbal predicate and their annotation

In FinSL, the clause has been understood in the basic sense presented in Role and Reference Grammar (RRG) by Van Valin & LaPolla (1997; see also Van Valin 2005). In RRG, the structure of the clause is considered to be based on two semantic contrasts. The first is that between predicating and non-predicating elements: languages tend to distinguish predicating elements from those not predicating (Van Valin 2005). The second is the contrast between the arguments of the predicate and its non-arguments: languages tend to make the distinction between units required by the semantics of the predicate and those not required by it (Van Valin 2005). The predicate, which may be a verbal or a nominal of some sort, is the main syntactic constituent in the clause. The arguments of the predicate are syntactically core arguments which, together with the predicate, constitute the clausal core; non-arguments (e.g. units with an adverbial function) form the periphery.

Clauses that have a verbal sign as their predicate (V) can be categorized, on the basis of the semantic valency of the verbal, into intransitive clauses (prototypically monovalent predicates), transitive clauses (bivalent predicates) and ditransitive clauses (trivalent predicates) (e.g. Dixon & Aikhenvald 2000). In the syntactic annotation of the 537 verbal-centered clauses of the sample (on the ELAN tier *clause structure*), these transitivity distinctions were indicated with the labelling of the nominal core arguments: the symbol S was used for the single core argument of an intransitive clause; A and P referred to the primary and

secondary core arguments of a transitive clause, respectively; and E referred to the third core argument of a ditransitive clause. The annotation also indicated the cases where core arguments were left lexically unexpressed by placing the core argument label in parentheses. In the sample, the share of intransitive clauses is 54 percent and that of transitive and ditransitive clauses is 46 percent. Interestingly, of the 537 clauses analyzed, only 53 percent are realized as syntactically complete i.e. at least one of the core arguments is left lexically unexpressed in almost half of the clauses (for more, see Jantunen 2017).

The prevailing theory of verbal-centered clauses in FinSL, presented first in Jantunen (2008), treats clauses formed around Type 1 and Type 2 verbals differently from clauses formed around Type 3 verbals. In the prototype of the clause with a Type 1 or 2 verbal as its predicate, the predicate and the core argument or arguments, are all free lexical or semi-lexical units (e.g. lexical nominals or pointings). In the prototype of the clause with a Type 3 verbal as its predicate, on the other hand, the core arguments are analyzed as being fused into the predicate (cf. the phenomenon of head-marking: Nichols 1986; Jantunen 2008). In practice, in the standard case, the core arguments are represented by the classifier handshape(s) of the Type 3 verbal. A consequence of this analysis is that Type 3 verbals can form clauses on their own, without any additional lexical clause-internal material. If Type 3 verbals concatenate with any preceding material (e.g. topics setting the interpretative framework for the verbal comment, for example by specifying the meaning of the semantically vague classifier handshapes), this material is counted as clause-external (yet sentence-internal). Concatenated material that follows the verbal specifies the goal of the motion encoded by the Type 3 verbal and is analyzed as forming the clausal periphery.

The distinction between clauses that are formed around Type 1 and 2 verbals, on the one hand, and those that are formed around a Type 3 verbal, on the other, is significant from the point of view of claims concerning constituent ordering (i.e. word order): it makes sense to discuss the order of main constituents only with respect to clauses that have a Type 1 or 2 verbal as their predicate. In general, in these types of clause, the basic order of constituents in FinSL is always such that the S/A argument precedes the V and, in transitive and ditransitive clauses, P and E arguments follow the V. Examples of full intransitive, transitive and ditransitive clauses – derived from the present sample and demonstrating the basic order of constituents – are given in (1). In all of the numbered examples that follow, the first row always presents the glosses (in 1, the gloss POINT refers to an index finger pointing sign directed toward a location in the signing space in front of the signer), the second row the syntactic annotation, and the third row the translation into English.

(1) a. $_{n}$BOY $_{v}$GO-TO-BED
S V
'The boy goes to bed.'

b. $_{n}$BOY $_{v}$FIND $_{n}$FROG
A V P
'The boy finds the frog.'

c. $_{n}$POINT $_{v}$GIVE $_{n}$FROG $_{n}$BOY
A V P E
'It gives the boy the frog.'

Two examples demonstrating the syntactic behavior of Type 3 verbals are given in (2). In (2a), the Type 3 verbal forms the clause, and consequently a simple sentence, on its own. In (2b), the same Type 3 verbal occurs with additional clause-external material (a frame-setting topic on the left) and peripheral material (the goal-setting nominal on the right), which together with the verbal constitute a simple sentence. In the examples, the notation CL-V refers to the two-finger "victory" handshape that functions as the classifier (CL) for two-legged animate objects; the part of the gloss that is written in lower case letters describes the movement of the object; the slash marks a pause, and the single quotation mark a non-durational break in prosody (typically involving at least an eye blink).

(2) a. $_{vk}$CL-V-fall-downwards
sV
'A two-legged animate object falls down from a high place.'
b. $_{n}$BOY / $_{vk}$CL-V-fall-downwards ' $_{n}$RIVER
TOP sV periphery
'The boy falls down from a high place into the river.'

In the syntactic annotation of the sample, a distinction was made between clauses that are formed around Type 1 and 2 verbals (the core arguments were annotated with upper case letters disconnected from the predicate symbol V; see Example 1) and those that have a Type 3 verbal as their predicate (the core arguments were annotated with lower case letters connected to the symbol V; see Example 2). Of the 537 clauses in the data, 74 percent are clauses formed around Type 1 and 2 verbal predicates, while 26 percent of the clauses have a Type 3 verbal as their predicate.

Two further remarks concerning the annotation of clauses are in order here. Firstly, clauses were identified by looking for clause-level semantic predicates, and their annotation cells were aligned with the annotation cells for signs (see 2.1). Secondly, within clauses, some verbals were analyzed as auxiliary-like secondary predicates and some were treated as being combined with other verbals to form more complex predicates; these decisions cause the percentages of verbals presented in this section to differ slightly from those presented in the previous section. The content of the second remark is further discussed in the next section (2.3).

2.3 On the annotation of complex predicates and complex sentences

In addition to the features described in the previous section, the syntactic annotation of clauses also took into account many other features, such as the complexity of the predicates (for a full overview of the features, see Jantunen et al. 2016). The complexity of the verbal predicate is an important issue for the present study as it directly affects the number of clauses that were identified in the data. As a general rule, the annotation distinguished between two main types of clause-internal complex predicates: auxiliary-like secondary predicates (annotated with lower case v) and various combinations of two (or more) main predicates (annotated with upper case V with running numbering). Examples of clauses demonstrating both types of complex predicates are given in (3).

(3) a. $_{n}$ME $_{v}$CAN $_{v}$START
S v V
'I can start.'
b. $_{n}$BOY $_{v}$TAKE $_{n}$SMALL $_{n}$FROG $_{v}$TAKE
A V1 [P] V2
'The boy takes the small frog.'

The syntactic annotation also indicated relationships between the clauses. In general, a distinction was made between flat and hierarchical clausal linkages. *Flat linkage* refers to predicates that have been annotated as being either coordinated or chained to another predicate on the clause level. *Hierarchical linkage*, in turn, refers to predicates or clausal constructs that have been annotated as participating in linkages in which one clause is embedded, in one way or another, in another clause (Velupillai 2012).

In coordination, two or more clauses of the same rank combine to form a single unit. In FinSL, conjunctive coordination ('and') is expressed by simply juxtaposing two (or more) clauses, whereas adversative ('but') and disjunctive ('or') coordination employ the coordinator signs BUT and OR, respectively (for a full discussion, see Jantunen 2016). In clausal chaining, short clauses are concatenated together to form a structural narrative, often completed by the final reference clause, which may have a more complex morphosyntactic structure (Velupillai 2012). In FinSL, clausal chaining is treated as a subtype of coordination and it typically

(but not obligatorily) involves Type 3 verbals (Jantunen 2016). In the annotation of the present sample, all types of coordination were indicated by the predicate symbol V, to which the symbol r was added together with the number of the coordinated clause. For example:

(4) a. $_{n}$BOY $_{n}$DOG $_{v}$CARRY $_{n}$FROG ‘ $_{x}$TOGETHER $_{v}$GO-HOME
[A] Vr1 P periphery (S) Vr2
‘The boy and the dog carry the frog and together they go home.’
b. $_{n}$FROG /$_{vk}$CL-V-circle ‘ $_{vk}$CL-V-jump ‘ $_{v}$BOUNCE $_{n}$WINDOW
TOP sVr1 sVr2 (A) Vr3 P
‘The frog moves around (in the jar), jumps up and bounces to the window.’

Clausal complementation, demonstrated in (5), is an example of a hierarchical clausal linkage. In FinSL, clausal complementation does not prototypically involve the use of complementizer signs although in some cases pointing signs can occur in this function between the two clauses (but not in 5). In the annotation of clausal complementation – as in the annotation of, for example, coordination – the relation between the clauses has been indicated by the symbol of the predicate: the predicate of the main clause has been marked by the symbol m, while the predicate of the complement clause (i.e. a full clause that functions typically as a P argument; for a discussion, see Dixon 2006; Haspelmath 2007b; Jantunen 2016) has been marked by the symbol k. In (5), the sign BEE-HIVE is articulated on the level of the signer’s forehead and the sentence-final pointing sign, functioning as the nominal predicate of the existential complement clause, is directed towards the same location.

(5) $_{n}$BEE-HIVE:up /$_{n}$DOG $_{v}$BELIEVE ‘ $_{n}$FROG $_{n}$POINT:up
TOP A Vm P[N Nk]
‘The dog believes that the frog is in the beehive (up in the tree).’

Clausal complementation represents only one type of hierarchical linkage. In the annotation, several other types of hierarchical linkage were also indicated. These include dependent clauses that function as the periphery of the main clause (cf. adverbial clauses), dependent clauses that specify a nominal phrase in the main clause (cf. relative clauses), and clauses that are simply embedded in another clause without any dependency relation. These linkage types were indicated collectively on the clausal level with the codes advl, rell and upol, respectively.

In general, given the overall lack of formal markers of clausal linking in FinSL, the identification of different types of clausal linkages was based on the semantics and valency of the predicates.

2.4 The annotation of CA

The annotations for CA are the most recent additions to the data, completed in the spring of 2016. In general, the annotation of CA is based on the conventions established for Auslan (Johnston 2016), which, in practice, means that the annotations are written on their own tier in ELAN with the notation CA suffixed with information about whose actions, thoughts or feelings are being enacted. To put it briefly, the notational conventions are relatively straightforward: the notation CA:BOY, for instance, refers to ‘the actions of the boy’. In the identification of instances of CA, the annotator has relied on her own intuition and semantic insights as well as on non-manual cues, of which the most important is the shift of the gaze away from the addressee (Cormier et al. 2015a).

As instructed in the annotation conventions for Auslan, CD was annotated separately from CA (see Section 1). While the total number of CA annotations in the sample is 198, the total number of CD annotations is only 24. This reflects the fact that reporting speech does not play a key role in the frog story (see also Hodge & Ferrara 2013; Ferrara & Johnston 2014).

Again, a note is in order concerning the annotation of CA in the sample. Unlike in Auslan data, the annotations for CA are not time aligned with the clause-level annotation cells. This is because the clause structure annotation and CA annotation were done by two different researchers, and part of the work was completed simultaneously. It should also be noted that the annotation of head and body movements is independent of the other annotations in terms of alignment.

3 Results on the interplay of CA and clause structure in FinSL frog stories

As already stated in Section 2, the total duration of the five stories in the sample is 13 minutes and 18 seconds. In this data, the combined duration of the annotation cells of all of the 537 verbal-centered clauses (on the tier *clause structure*) is 9 minutes and 47 seconds and the total duration of the annotation cells of all of the 198 CA sequences (on the tier *CA*) is 4 minutes and 38 seconds. This information is summarized in Table 1, together with signer-specific total durations for the story, clause and CA (all durations in the text are calculated in ELAN and presented in the format mm:ss,ms).

Table 1. Summary of the total signer-specific and combined durations for the story, clause and CA.

Signer	1	2	3	4	5	Total
Total duration story	01:34,0	01:47,0	02:48,0	04:34,0	02:35,0	13:18,0
Total duration clause	01:06,8	01:21,4	02:04,6	03:23,4	01:50,3	09:46,5
Total duration CA	00:15,0	00:30,0	01:08,2	01:22,6	01:22,2	04:38,0

Table 1 shows that, in terms of total duration, there is plenty of signer-specific variation in the way signers constructed their stories. This variation is normatized in Table 2, which shows how much of the story is composed of verbal-centered clauses and how much of it includes CA. The information is displayed in percentages.

Table 2. Percentage of verbal-centered clauses and CA in the story.

Signer	1	2	3	4	5	Average
Percentage of clauses in the story	71	76	74	74	71	73
Percentage of CA in the story	16	28	41	30	53	35

Table 2 shows that, relative to their duration, the stories of all five signers include roughly the same amount of verbal-centered clauses, an average of approximately 73 percent. However, even from this perspective the stories still vary considerably in how much CA they include. On average, the share of CA in the main data is 35 percent, but at its minimum its share is only 16 percent (Signer 1) while at its maximum it is 53 percent (Signer 5). Overall, the numbers are very close to those presented for Auslan. According to the corpus-based analysis of the frog stories by Hodge & Ferrara (2013), the average share of CA in Auslan narratives was found to be 34 percent of the total combined story duration (ca. 50 minutes, according to the information given in Hodge & Ferrara 2013). In addition, Ferrara and Johnston (2014) have noted that individual variation in the use of CA in Auslan narratives is also very high, some signers preferring to use almost no CA at all while others use it extensively.

Table 3 shows how many of the annotated verbal-centered clauses co-occur with a period of CA. The numbers are based on calculating the overlaps of clause and CA annotations in ELAN for each signer.

Table 3. Summary of clause–CA combinations.

Signer	1	2	3	4	5	Total/Average
No. of clauses	53	107	135	129	113	537 / -
No. of clauses occurring with CA	26	57	94	76	91	344 / -
Percentage of clauses occurring with CA	49	53	70	59	81	- / 64

As seen in Table 3, signers use CA in clause production somewhat differently. Whereas Signers 1 and 2, for example, have approximately the same number of clauses with and without CA, Signer 5 chooses a narrative strategy with a strong preference for clauses with CA. On average, though, 64 percent of clauses co-occur with CA annotations in the sample. This figure is higher than that found for Auslan: according to Ferrara and Johnston (2014), in Auslan the average percentage of clauses in frog stories co-occurring with CA is 44 percent. The difference is most likely due in part to the relatively large size of the Auslan corpus (3,400 clauses), which mitigates the effect of the extreme values on averages. The fact that the FinSL data only takes into account verbal-centered (main) clauses is also believed to contribute to this variation.

The overview above has shown that FinSL signers exploit CA differently with clauses when they tell a story. The next sections will describe differences in the structure, linkage type and non-manual activities of clauses, depending on the presence or non-presence of CA. We will begin by discussing the interplay between CA and clausal structure.

3.1 The internal structure of the clause

3.1.1 Clauses without CA

On average, slightly more than one third (n=193, i.e. 36%) of the verbal-centered clauses in the sample occurred *without* CA (see Table 3). The clause structure annotations show that 84 percent of these clauses had a Type 1 or Type 2 verbal as their predicate (and lexical or semi-lexical nominals as the head of their core arguments). Conversely, on the basis of the same annotations, only 16 percent of these clauses were formed around a Type 3 verbal with a fused core argument (i.e. a classifier handshape morpheme). This information is summarized in Table 4, both in raw frequencies and in percentages.

Table 4. The number and percentage of clauses with a Type 1 & 2 and Type 3 verbal predicate of the clauses with no CA.

Signer	1	2	3	4	5	Total/Average
No. of clauses with a Type 1 & 2 predicate	26	44	38	47	12	167 / -
Percentage of clauses with a Type 1 & 2 pred.	96	88	93	89	55	- / 84
No. of clauses with a Type 3 predicate	1	6	3	6	10	26 / -
Percentage of clauses with a Type 3 predicate	4	12	7	11	45	- / 16

In general, the data in Table 4 shows that when no CA is used, there is a clear preference for signers to use clauses that have a Type 1 or Type 2 verbal as their predicate (see Ferrara & Johnston 2014 and Hodge & Ferrara 2014 for similar claims concerning Auslan). Of the five signers, the only exception to this trend is signer number 5, who also uses CA the most (see Table 2): in Signer 5's story, the number of clauses with a Type 3 verbal as their predicate is almost half of the total number of clauses (i.e. 45%).

In the clauses built around a Type 3 verbal and not involving the use of CA, non-manual behavior was always very restricted – declaring – with the eye gaze directed at the addressee. A frequent example was the type of clause that depicted an event in which a two-legged animate object (the boy, the frog) either fell down or jumped up (see examples in Section 2).

3.1.2 Clauses with CA

In the sample, 64 percent of the verbal-centered clauses (n=344) occurred *with* CA (see Table 3). Analysis of clause structure annotations of these clauses show that 66 percent (n=229) had a Type 1 or Type 2 verbal as their predicate and 34 percent (n=115) had a Type 3 verbal as their predicate. This information is summarized in Table 5.

Table 5. The number and percentage of clauses with a Type 1 & 2 and Type 3 predicate occurring with CA.

Signer	1	2	3	4	5	Total/Average
No. of clauses with a Type 1 & 2 predicate	17	36	82	45	49	229 / -
Percentage of clauses with a Type 1 & 2 pred.	65	63	87	59	54	- / 66
No. of clauses with a Type 3 predicate	9	21	12	31	42	115 / -
Percentage of clauses with a Type 3 predicate	35	37	13	41	46	- / 34

In general, when compared with the type of clauses in the bits of narrative with no CA (Table 4), the total share of clauses with Type 1 and Type 2 predicates was lower and that of clauses with a Type 3 predicate was higher in the bits of narrative that contained CA (Table 5). In other words, with CA, clauses with a Type 3 verbal predicate occurred more frequently with all five signers (see Ferrara & Johnston 2014 and Hodge & Ferrara 2014 for similar findings for Auslan). On the sole basis of averages (84% vs. 66% for clauses with a Type 1 or Type 2 verbal predicate and 16% vs. 34% for clauses with a Type 3 verbal predicate), the difference appears to be considerable. However, by conventional criteria (i.e. $p<0.05$) it is considered to be not quite statistically significant ($p=0.07$); in other words, the effect of chance cannot be fully ruled out.

Nevertheless, from the perspective of structural clause types, it is argued here that clauses with a Type 3 verbal strongly favor the use of CA. In part, this claim is based on the figures presented in Table 5. In part, the claim is based on the fact that the share of clauses that are built around a Type 3 verbal predicate *and* occur with CA is 82 percent (n=115) of the total share of clauses built around a Type 3 verbal predicate (n=141).

3.1.3 On CA and lexical core argument omission in FinSL

In work on Auslan, the specific claim has been made that CA *is* the clausal core argument in cases where a lexical core argument has been omitted (e.g. Ferrara & Johnston 2014). In this paper, the use of CA is not analyzed in this way, i.e. it is not treated as a concrete instance of a core argument. Instead, CA is simply interpreted as contributing to the mental construction of the meaning of the omitted unit (in the sense of Liddell 2003). This analysis stems from the ontological view of language accepted in this paper, according to which CA and the clause are located on the same continuum but occupy, in terms of their definition, different dimensions of it (see Section 1).

The example in Figure 4 is drawn from the present data and shows how CA can be the sole conveyer of participant information in FinSL. The figure is an example of a complex sentence consisting of a conjunctively coordinated intransitive clause and a transitive clause (as stated in Section 2.3, conjunctive coordination in FinSL does not include the use of coordinator signs; for a full discussion on coordination in FinSL, see Jantunen 2016). The structure of the first intransitive clause is manifested as lexically complete because it re-introduces the dog as the second thematic referent in the discourse. The following transitive clause, on the other hand, is manifested only as a semantically divalent Type 2 verbal predicate (the verbal is articulated markedly with two hands, which makes the proposition expressed by the verbal plural, i.e. the verbal refers to both the dog and the boy). In this clause, the participant information associated with the lexically omitted A argument can be analyzed as being expressed with CA, in which the signer enacts the

behavior of the referent which she has just re-introduced (the dog) as well as that of the boy (on the basis of the plurality of the verbal); CA is layered on top of the lexically expressed clause/verbal for its whole duration. The target of the act of looking ('the frog'), which one could have expected to be coded with the missing lexical P argument, may also be interpreted with the help of CA as the signer's eye gaze is directed toward the location in which the referent (the frog in the jar) was introduced in the previous discourse; the orientation of the fingers of the verbal TWO-LOOK-AT, targeted toward this same location, further hints at the identity of this referent.

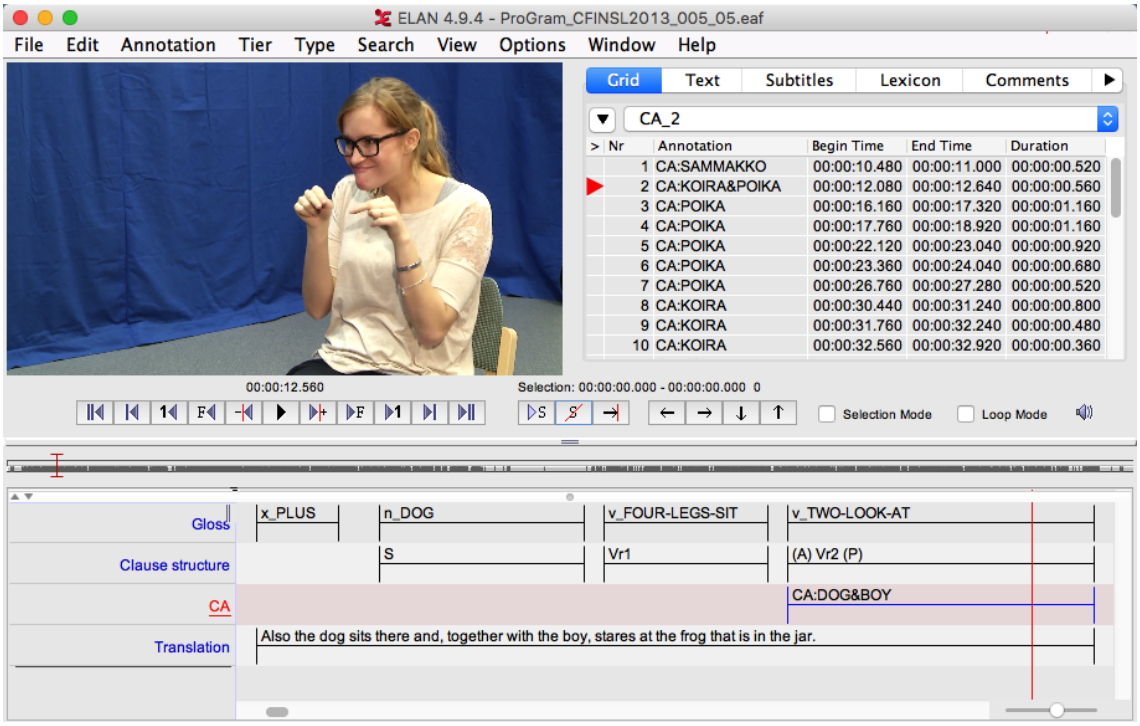

Figure 4. ELAN screenshot showing CA conveying core argument information in FinSL.

Clauses whose core argument may be omitted are all those that have a Type 1 or 2 verbal as their predicate. Of 396 such clauses in the present data (see Section 2), 253 (64%) occur without a lexically expressed nominal core argument or arguments. On the other hand, 229 (58%) clauses with a Type 1 or 2 verbal predicate occur with CA. Unfortunately, because of the way the present data is annotated, one cannot further investigate the interaction of CA and omitted lexical core arguments in terms of frequencies, but it is obvious that lexical core argument omission and the use of CA do overlap to a large extent. However, at the same time, it is also obvious that there are clauses in FinSL that do not have lexical core arguments, and yet they appear with no CA (see Section 2 and Jantunen 2017 for examples). In other words, if a lexical core argument is omitted from the clause, there is no requirement for CA to be present to compensate its absence.

3.2 Linking of clauses

Table 6 shows the frequencies of flat and hierarchical clause linkages in the sample. As we discussed in Section 2.3, the notion of *flat linkage* refers to predicates that have been annotated as being either coordinated or chained to another predicate at clause level (see Jantunen 2016). *Hierarchical linkage*, on the other hand, refers to predicates or clausal constructs that have been annotated as participating in linkages in which one clause is embedded, in one way or another, in another clause (see Velupillai 2012).

Table 6. Frequencies of flat and hierarchical linkages in the data.

Signer	1	2	3	4	5	Total
No. of flat linkages	16	42	60	44	80	242
No. of hierarchical linkages	3	4	9	10	1	27

The data in Table 6 indicates that, in the frog stories, the flat linkage of FinSL clauses is far more typical than any kind of hierarchical linkage: on average, the share of various flat linkages in the data is 90 percent (n=242), leaving only 10 percent (n=27) of various hierarchical linkages. Another clear pattern is that signers use both types of linkage in their stories. The only deviation from this is Signer 5, whose ratio of flat to hierarchical linkages is 80:1, i.e., the signer has 80 flat linkages and only one hierarchical linkage in the story. As Signer 5 is also the one who uses the most CA in the story, the data in Table 6 suggests the possibility that an increased presence of CA may favor coordinative and chained combinations of clauses.

The suggestion that the use of CA favors flat clausal linkage is supported by the data in Table 7. In practice, Table 7 shows, for each signer, both the percentage of predicates that have been annotated as participating in a flat linkage in the stories and the maximum number of consecutive flat linkages. When both types of information are contrasted with the percentage of CA in the stories (shown originally in Table 2), the data indicates almost perfect positive correlations both between the amount of CA and predicates in flat linkage (the linear correlation co-efficient R=0.92) and between the amount of CA and the maximum number of consecutive flat linkages (R=0.97). In other words, the data in Table 7 suggests that the more CA there is in the narratives, the higher the percentage of predicates participating in flat linkages will be, and the higher the number of clauses combined with a flat linkage.

Table 7. Percentage of CA and predicates employed in flat clausal linkage in the story and maximum number of consecutive flat linkages in the story.

Signer	1	2	3	4	5	Average
Percentage of CA in the story	16	28	41	30	53	35
Percentage of predicates in flat linkage in the story	30	39	44	34	71	44
Max no. of consecutive flat linkages	2	3	7	4	8	-

In the long sequences of flat linkages, the clauses are typically formed around Type 3 verbals. An example of such a clause sequence from Signer 5, also displaying the use of CA, is given in Figure 5 (in order to make the information in the image as visible as possible, the original form of the sign glosses has been altered).

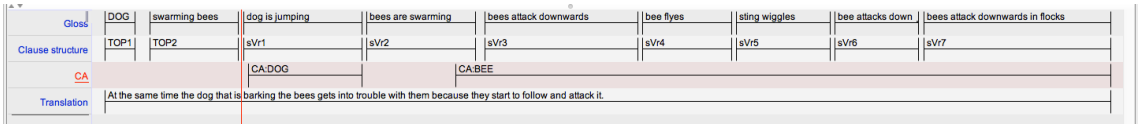

Figure 5. ELAN screenshot showing a complex sentence involving a flat linkage of seven Type 3 verbals/clauses in the data of Signer 5.

The example shown in Figure 5 is treated as a complex sentence consisting of several independent clauses that have a Type 3 verbal predicate. The first of the chained clauses is preceded by two frame-setting clause-external topics that identify the main participants in the event (Jantunen 2008). Of the two topics, the first is a simple nominal phrase referring to the dog and the second an intransitive presentational clause (see Lambrecht 1994) referring to the swarming or swarm of bees. After the production of the two topics, the actual description of the very dynamic event unfolds. In practice, the narration proceeds with seven

intransitive Type 3 verbals/clauses that cannot be properly distinguished from each other. In terms of CA, the event is described from two perspectives, first from that of the dog and then from that of a bee (or a swarm of bees). The fact that the longest bit of CA in which the signer enacts the bee is layered over six clauses altogether (i.e. binding the string of clauses together) constitutes formal evidence for the analysis that the clauses are, in fact, linked to each other in a chain-like pattern.

3.3 Non-manual activity

3.3.1 The effect of CA on non-manual activity

Non-manual activity, or non-manuality, is a general term used in sign language research to refer to any kinds of bodily actions that are not produced with the hands (e.g. Puupponen et al. 2015). In the present study, non-manuality was investigated from the perspective of head and body movements, which were annotated in classes, as described in Section 2. In sign languages, both the head and the body can be considered to be independent articulators, i.e. one can move while the other does not. However, as the head is connected to the rest of the body through the spine, the movements of the *body* in particular often include some sort of movement of the head (Puupponen 2018).

As far as the movements of the head and body are concerned, the present data suggests that the prototype of clauses that occur without CA differs from the prototype of those occurring with CA. On the basis of the annotations, it is evident that clauses without CA are associated with increased activity of the head, while clauses with CA involve relatively more activity from the whole body. This is to be expected because, as a form of enactment, CA is defined by the exploitation of different bodily stances and movements (e.g. Hodge & Ferrara 2013; Ferrara & Johnston 2014; Cormier et al. 2015a).

Table 8 below seeks to partially encapsulate these trends by presenting the frequencies of different head and body movements in the main data. In the table, we can observe firstly that Signer 1, whose story includes the smallest amount of CA (16%; see Table 2), produces approximately eight head movements for each body movement. On the other hand, Signer 5, who has the largest amount of CA in the story (53%), produces approximately three head movements for each body movement. The ratio of head to body movements thus seems to change in line with the increase in CA. The average head to body movement ratio in the main data is 5:1.

Table 8. Movements of the head and body in the main data.

Signer	1	2	3	4	5	Total
No. of head movements	207	167	463	375	255	1467
- no. of nods	29	16	63	44	15	167
No. of body movements	25	72	45	58	77	277

The information in Table 8 regarding the number of nods suggests a similar pattern: the number of nods seems to increase as the amount of CA in the narrative decreases. It is argued here that the logical reason for this is that when signers do not use CA, the movements and positions of the head, such as nods, can be used to serve other functions, such as the prosodic function of indicating clause boundaries (e.g. Puupponen et al. 2015; Puupponen et al. 2016). Head nods also function as signals for emphasis and affirmation, both traditional ingredients of reporting discourse (Puupponen et al. 2015). Therefore, nods should be expected, especially among clauses that do not involve CA.

However, the frequencies in Table 8 regarding the number of head and body movements with respect to the presence or non-presence of CA need to be interpreted with caution. The non-manual behavior of Signers 1 and 5 fits the logically grounded pattern, but that of Signer 2, for instance, does not. For example, the share of CA in the story of Signer 2 is the second lowest of the five signers (i.e. 28%, see Table 2),

yet Signer 2 produces only two head movements for one body movement in the story. Consequently, as argued also by Puupponen et al. (2015) and Puupponen (2018), the activity of the head and body is highly individual, and thus very variable.

3.3.2 On the cohesive function of head movement contours

In the study, data on FinSL head movements produced through computer-vision and visualized in ELAN, was used in the investigation of head movement contours, i.e. in the investigation of the "line" the movement of the head draws relative to manually produced utterances. On the basis of this data, an asymmetry was found between the function of the head movement contours in the bits of narrative with and without CA: in narratives without CA, the head movement contour tended to bind together syntactic units (e.g. clauses, sentences) whereas in narratives with CA, the head movement contour tended to bind together larger chunks of discourse, if anything. These two functions are demonstrated below in Figures 6 and 7, respectively.

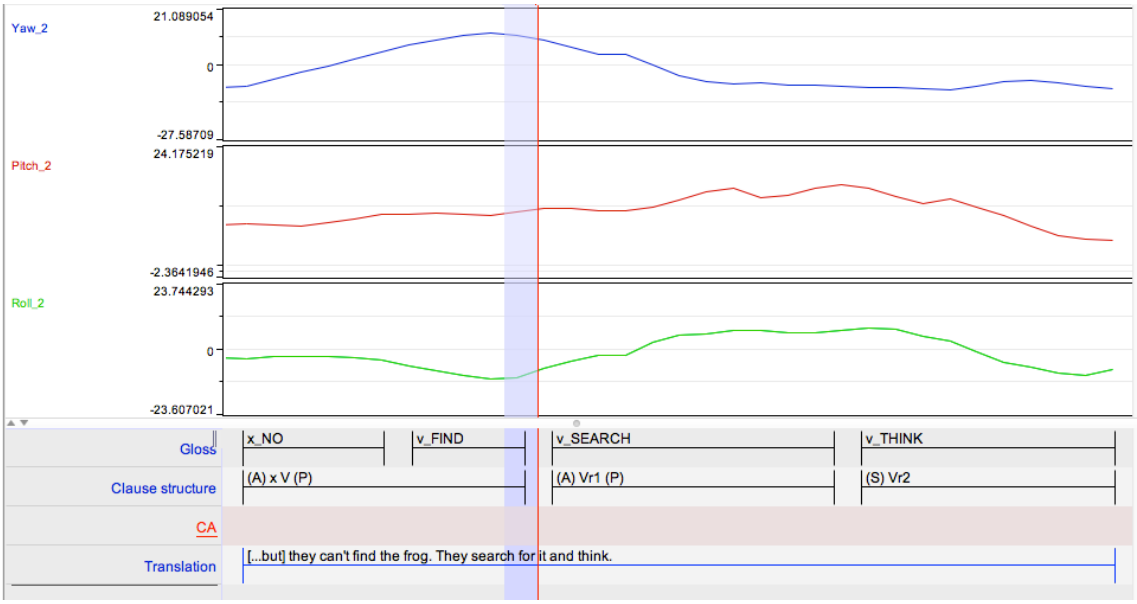

Figure 6. ELAN screenshot showing visualized head movement data for a two-sentence sequence.

The example in Figure 6 represents a bit of narrative with no CA and includes three syntactically incomplete clauses, of which the second and third (after the crosshair that marks the sentence boundary) are coordinated conjunctively. From the perspective of manual structure, the behavior of the head movement contour in the dimension captured by the roll descriptor (the lowest panel) is more systematic than in the others. In practice, the roll value describes the sideways, tilting-like movements of the head. In Figure 6 we see that the syntactic juncture between the two sentences is associated with the lowest roll value, the descriptor thus forming a valley-shape over the juncture. In practice, with regard to the roll angle, the data tells us that the head position at the moment of the juncture is close to neutral whereas during the production of both sentences the head is tilted to the signer's right (indicated by the increasing roll value in the positive direction). The two deviations in the roll dimension of the head position from the value of the juncture in the roll dimension are not random but align temporarily so that they last the exact duration of each of the two sentences and, thus, function to bind the two units together cohesively.

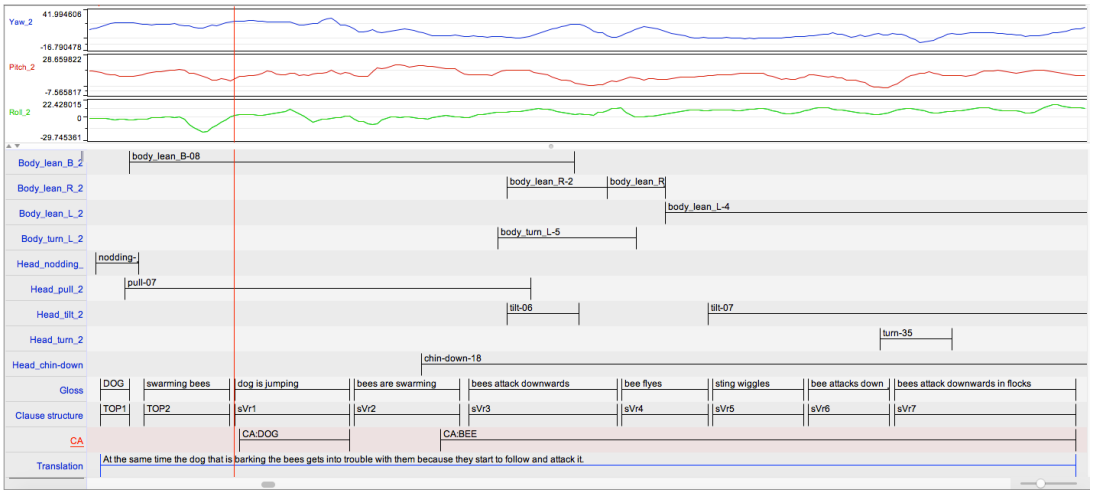

Figure 7. ELAN screenshot of Figure 5, with added computer-vision data and non-manual annotations.

Figure 7 depicts the same example as in Figure 5, to which computer-vision data and annotations for non-manual phonetic activity have now been added. In Figure 7, the computer-vision data for the yaw, pitch and roll angles of the head position do not show any significant head movement contours which could align temporarily with any of the chained clauses – or with any bits of discourse (the two topics, on the other hand, seem to be layered with a specific contour). Instead, from the computer-vision point of view, the head moves relatively erratically and is guided primarily by the signer's intention to portray, firstly, the activities of the dog and, secondly, the activities of the bee(s). However, when we look at the non-manual annotations, we can see the cohesive binding effect of the head movements at discourse level. This is particularly salient for the part of the discourse that consists of the six final clauses of the clause chain occurring with the CA in which the signer represents the bee(s): all six clauses are associated with a continuous chin-down head posture, and the three final clauses of the chain also occur with a continuous head tilt. As noted at the beginning of Section 3.3.1 (and discussed more specifically, for example, in Puupponen 2018), the movement of the head is closely linked to the movement of the whole body. This connection is exemplified in Figure 7 by the two longest lasting body annotations, which are nearly time-aligned with the two longest head annotations.

4 On the nature of syntax in (sign) languages

The syntax of sign languages has been an object of investigation since the 1970s. While it is far beyond the scope of this article to provide even a cursory overview of the research into sign language syntax – in particular what motivations lie behind the different theoretical approaches and how the various studies have contributed to successive advances in scientific development – it is still fair to say that the syntax of sign languages, like the syntax of all languages, has often been *conceptualized* as a confined set of monovalent rules or constraints that signers employ either regardless of the context or on the basis of it. However, the work on CA in different sign languages (e.g. Liddell & Metzger 1998 for American Sign Language, Hodge & Ferrara 2013 for Auslan, and Cormier et al. 2015a for British Sign Language), presented from the perspective of FinSL clauses in this article, suggests the possibility of conceptualizing syntax in a slightly different way: it may be construed as a set of norms distributed on a continuum between a categorial–conventional end and a gradient–unconventional end. This suggestion is directly motivated by the gesturality-in-language view, presented in Section 1, according to which the gradient and unconventional characteristics of language use are an integral part of the language itself, not a phenomenon that is added on top of language. Table 9 shows how the issues discussed in this paper may be fitted on the continuum.

Table 9. Features of sign language syntax discussed in this paper associated with the continuum.

More categorial–conventional syntax	More gradient–unconventional syntax
- No CA	- Extensive use of CA
- Preference for clauses built around Type 1 and 2 verbals	- Preference for clauses that are built with Type 3 verbals
- Clausal linkage may also be hierarchical	- Clausal linkage is primarily flat
- Non-manual activity contributes to the clausal level (the role of the head is relatively salient)	- Non-manual activity contributes to the discourse level (the role of the whole body is relatively salient)

The points in Table 9 associated with the different ends of the continuum conceptually forming sign language syntax, should be seen as contributing to the formation of prototypes of two different kinds of syntactic structures. However, as is the case with all prototypes, they are typically not manifested in an either–or fashion but as an overlapping and fuzzy selection of the features they are comprised of. In essence, this means that a syntactic unit in sign languages can share properties at both ends of the continuum and, consequently, can be very difficult to analyze in terms of its structure. The continuum interpretation of syntax also suggests that the degree to which signers lean toward either end in their language production, is highly individual and that, in fact, this degree depends ultimately on every signer's personal intentions (see Vermeerbergen 2006). This interpretation is supported by the FinSL data on CA and clauses presented in this paper.

The bi-polar picture of syntax including a continuum, which we have outlined in Table 9 and above, is by no means unique: it has been present, either covertly or overtly, in the works of many researchers. An overt example is Vermeerbergen (2006) who, building on the work of Cuxac (2000), uses the metaphor of 'still water' and 'sparkling water' (*de l'eau plate* and *de l'eau pétillante*) to characterize a similar type of distinction, mostly with respect to the lexicon, but also with respect to syntax. The use of the metaphor is illustrated in the quote below in which the notion of 'still water' (*de l'eau plate*) can be taken to refer to the categorial–conventional features summarized in Table 9 while the notion of 'sparkling water' (*de l'eau pétillante*) refers to the gradient–unconventional features (Vermeerbergen 2006: 183–184).

> The 'de l'eau pétillante/de l'eau plate' contrast is not limited to the lexical level. VGT [Flemish Sign Language] word order studies [...] for instance, show that there are different ways of indicating the relationship between a verb and its arguments. When there are no clear reasons (e.g. a certain grammatical mechanism) for a different reading, the argument-verb-argument constituent patterning in declarative sentences needs to be interpreted as subject-verb-object [author note: this refers to the 'still water' syntax]; however, especially in spontaneous discourse, only a limited number of clauses consist of a verb and two overtly expressed arguments. The relationship between a verb and its arguments here [i.e. in the 'sparkling water' syntax] is generally indicated by means of mechanisms such as 'role-taking' [i.e. CA], the use of space, simultaneity, etc.

Work on spoken languages suggests that the idea of syntactic norms forming a continuum between categorial–conventional features and gradient–unconventional features (i.e. gesturality) also applies outside the domain of sign languages. For example, Ladewig (2014) discusses how manual gesture and gestural enactment may fill syntactic gaps left by either nouns or verbs in German. One of her examples involves a story describing how a girl is pushed through a window by relatives. The story proceeds in spoken German until the end of the second clause of a two-clause coordinated structure, *und wir hinten* ('and we from behind'), at the end of which a two-handed gestural action describing the pushing movement replaces speech (Ladewig 2014). Concerning this replacement, Ladewig argues that the pushing gesture fills a syntactic slot that would normally be occupied by a finite verb following the subject *wir* ('we') in the construction. In the framework outlined in this section, Ladewig's example is a syntactic structure in which the categorial and conventional features of spoken language are mixed with the gradient and unconventional features of manual gesturing.

From a broader perspective, Gil (2008) presents a typological distinction among spoken languages based on *associational semantics*, the varying degree to which the interpretation of a combined linguistic

expression is maximally vague. With respect to this notion, Gil draws a further continuum-like distinction between compositionally associational languages and compositionally articulated languages. By using the notion of a semantic rule as an additional means of demonstrating the idea, Gil argues that in *compositionally associational languages* (such as Riau Indonesian), the number of additional semantic rules is relatively low and their combined effect relatively insignificant (cf. the gradient–uncategorial end of the syntax continuum): combined expressions are interpreted by simply juxtaposing the basic meanings of linguistic units in a given context, which ultimately results in the meaning being naturally vague with respect to its various possible interpretations (Gil 2008). On the other hand, in *compositionally articulated languages* (such as Latin), occupying the other end of the scale, the number of additional semantic rules is relatively large and their combined import much more substantial (cf. the categorial–conventional end of the syntax continuum). In such languages, combined expressions are not interpreted solely with the help of lexical meanings and context, but their interpretation is also heavily dependent on grammatical morphemes and the order of elements, for example.

In Gil's framework, languages differ in the position they occupy on the associational–articulational scale. As far as the syntax of FinSL is concerned, features at both ends of Gil's scale seem to be in use: constructs closer to the gradient–unconventional end are typically associational while constructs closer to the categorial–conventional end are typically articulational.

5 Conclusion

Using multi-dimensionally processed corpus data, this paper has analyzed the interplay of CA and clauses in FinSL. As its main findings, the paper has shown, firstly, that there are differences in how FinSL signers use CA with clauses when they are narrating a story. Secondly, the paper has described differences in the structure, linkage type and non-manual activities of clauses, depending on the presence or non-presence of CA. With respect to the internal structure of clauses, the paper has argued that, in signing with CA, signers prefer clauses with a Type 3 verbal predicate and use fewer clauses with a Type 1 or Type 2 verbal predicate. Moreover, with respect to clausal linkage, the paper has shown that flat clausal linkages become more common, and linkage chains longer, when the share of CA in the narrative increases. Finally, with respect to non-manual activity, the paper has suggested that clauses without CA are associated with relatively more activity on the part of the head, while clauses with CA involve relatively more activity of the whole body.

From a conceptual point of view, this article has discussed the nature of sign language syntax and, on the basis of data relating to FinSL, it has proposed a conceptualization of syntax as a continuum of norms between gradient–unconventional and categorial–conventional ends. It has been suggested that this conceptualization can also extend to the domain of spoken languages.

The present work has been the first study on FinSL that has approached its syntax and related phenomena from the perspective of corpus-based frequencies. In general, the frequency-based approach has contributed considerably to the charting of the interplay between CA and clause in FinSL. The present work has also suggested that many of the phenomena addressed here may operate similarly across signed and spoken languages. In future, this should be one of the main general hypotheses to be tested with comparative corpus data.

Acknowledgments: The main contents of this paper are based on a plenary lecture given by the author at the *43rd Annual Conference of Finnish Linguistics* at the University of Oulu, Finland, on May 25, 2016. Subsequently, on January 26, 2017, a version of the paper was presented by invitation at the Department of Linguistics at the University of Stockholm, Sweden. The author wishes to thank the two anonymous reviewers of *Open Linguistics* for their extremely helpful comments as well as Eleanor Underwood for checking the English of the text. The study has been supported financially by the Academy of Finland under grants 269089 and 273408.

References

Cormier, Kearsy, Sandra Smith, Martine Zwets. 2013. Framing constructed action in British Sign Language narratives. *Journal of Pragmatics* 55. 119-139.

Cormier, Kearsy, Sandra Smith, Zed Sevcikova Sehyr. 2015a. Rethinking constructed action. *Sign Language & Linguistics* 18. 167-204.

Cormier, Kearsy, Jordan Fenlon, Adam Schembri. 2015b. Indicating verbs in British Sign Language favour motivated use of space. *Open Linguistics* 1. 684-707.

Crasborn, Onno, Han Sloetjes, Enhanced ELAN functionality for sign language corpora. In: Crasborn, Onno, Eleni Efthimiou, Thomas Hanke, Ernst D. Thoutenhoofd, Inge Zwitserlood (eds.), Proceedings of the 3rd Workshop on the Representation and Processing of Sign Languages: Construction and Exploitation of Sign Language Corpora, 1 June, Marrakech, Marocco. Paris: ELRA 2008. 39-43.

Cuxac, Christian. 2000. *La Langue des Signes Française. Les Voies de l'Iconicité*. Paris: Ophrys.

Dixon, R. M. W., A. Y. Aikhenvald. 2000. Introduction. In: Dixon, R. M. W., A. Y. Aikhenvald (eds.), *Changing Valency: Case Studies in Transitivity*, 1-29. Cambridge: Cambridge University Press.

Dixon, R. M. W. 2006. Complement clauses and complementation strategies in typological perspective. In: Dixon, R. M. W., A. Y. Aikhenvald (eds.), *Complementation: A cross-linguistic typology*, 1-48. Oxford: Oxford University Press.

Dixon, R. M. W. 2010. *Basic Linguistic Theory, vol. 1: Methodology*. Oxford: Oxford University Press.

Dryer, Matthew. S. 2006. Descriptive theories, explanatory theories, and Basic Linguistic Theory. In: Ameka, F. K. Ameka, A. Dench, N. Evans (eds.), *Catching Language: Issues in Grammar Writing*, 207-234. Berlin: Mouton de Gruyter.

Emmorey, Karen. 1999. Do signers gesture? In: Messing, Lynn S., Ruth Campbell (eds.), *Gesture, speech and sign*, 133-159. New York: Oxford University Press.

Enfield, Nick. 2009. *The anatomy of meaning: Speech, gesture, and composite utterances*. Cambridge: Cambridge University Press.

Ferrara, Lindsay, Trevor Johnston. 2014. Elaborating who's what: A study of constructed action and clause structure in Auslan (Australian Sign Language). *Australian Journal of Linguistics* 34. 193-215.

Gil, David. 2008 How complex are isolating languages? In: Miestamo, Matti, Kaius Sinnemäki, Fred Karlsson (eds.), *Language complexity: Typology, contact, change*, 109-131. Amsterdam: John Benjamins.

Haspelmath, Martin. 2007a. Pre-established categories don't exist: Consequences for language description and typology. *Linguistic Typology* 11. 119-132.

Haspelmath, Martin. 2007b. Coordination. In: Shopen, Timothy (ed.), *Language typology and syntactic description: Complex constructions*, 1-51. Volume 2. Second edition. Cambridge: Cambridge University Press.

Haspelmath, Martin. 2010. Comparative concepts and descriptive categories in cross-linguistic studies. *Language* 86. 663-687.

Hodge, Gabrielle. 2013. Patterns from a signed language corpus: Clause-like units in Auslan (Australian sign language). PhD thesis. Sydney: Macquarie University, Australia.

Hodge, Gabrielle, Lindsay Ferrara. Showing the story: Enactment as performance in Auslan narratives. In: Gawne, L., J. Vaughan (eds.), Selected Papers from the 44th Conference of the Australian Linguistic Society. Melbourne: University of Melbourne 2013. 372-397.

Hodge, Gabrielle, Trevor Johnston. 2014. Points, depictions, gestures and enactment: Partly lexical and non-lexical signs as core elements of single clause-like units in Auslan (Australian sign language). Pre-publication manuscript.

Jantunen, Tommi. 2008. Fixed and free: Order of the verbal predicate and its core arguments in declarative transitive clauses in Finnish Sign Language. *SKY Journal of Linguistics* 21. 83-123.

Jantunen, Tommi. 2009. *Tavu ja lause: tutkimuksia kahden sekventiaalisen perusyksikön olemuksesta suomalaisessa viittomakielessä* (Syllable and sentence: Studies on the nature of two sequential basic units in FinSL). Jyväskylä: University of Jyväskylä.

Jantunen, Tommi. 2010. Suomalaisen viittomakielen pääsanaluokat (The main parts of speech in FinSL). In: Jantunen, Tommi (ed.), *Näkökulmia viittomaan ja viittomistoon* (Perspectives on sign and lexicon), 57-78. Jyväskylä: University of Jyväskylä.

Jantunen, Tommi. 2013. Ellipsis in Finnish Sign Language. *Nordic Journal of Linguistics* 36. 303-332.

Jantunen, Tommi. 2015a. Gesture in (Finnish) Sign Language. Paper presented at the *Language–gesture connection* -seminar in the University of Oulu, Finland, October 22, 2015.

Jantunen, Tommi. 2015b. How long is the sign? *Linguistics* 53. 93-124.

Jantunen, Tommi. 2016. Clausal coordination in Finnish Sign Language. *Studies in Language* 40. 204-234.

Jantunen, Tommi. 2017. Elliptical phenomena in Finnish Sign Language. In: van Craenenbroeck, Jeroen, Tanja Temmerman (eds.), *The Oxford Handbook of Ellipsis*, in preparation for publication with Oxford University Press, to appear in summer 2017.

Jantunen, Tommi, Outi Pippuri, Tuija Wainio, Anna Puupponen, Jorma Laaksonen. Annotated video corpus of FinSL with Kinect and computer-vision data. In: Efthimiou, Eleni, Fotinea Stavroula-Evita, Thomas Hanke, Julie Hochgesang, Jette

Kristoffersen, Johanna Mesch (eds.), Proceedings of the 7th Workshop on the Representation and Processing of Sign Languages: Corpus Mining, 28 May, Portoroz, Slovenia. Paris: ELRA 2016. 93-100.
Johnston, Trevor. 2016. Auslan Corpus annotation guidelines. Macquarie University (Sydney) & La Trobe University (Melbourne). February 2016 version.
Karppa, Matti, Ville Viitaniemi, Marcos Luzardo, Jorma Laaksonen, Tommi Jantunen. SLMotion: An extensible sign language oriented video analysis tool. In: Calzolari, Nicoletta, Khalid Choukri, Thierry Declerck, Hrafn Loftsson, Bente Maegaard, Joseph Mariani, Asuncion Moreno, Jan Odijk, Stelios Piperidis. (eds.), Proceedings of the Ninth International Conference on Language Resources and Evaluation (LREC'14), 28-30 May, Reykjavik, Iceland. Paris: ELRA 2014. 1886-1891.
Kendon, Adam. 2004. *Gesture: Visible action as utterance*. Cambridge: Cambridge University Press.
Kendon, Adam. 2008. Some reflections on the relationship between 'gesture' and 'sign'. *Gesture* 8. 348-366.
Ladewig, Silwa. 2014. Creating multimodal utterances: The linear integration of gestures into speech. In Müller, Cienki, Fricke, Ladewig, McNeill, Bressem (eds.), *Body–Language–Communication*, 1662–1677. Berlin: De Gruyter.
Lambrecht, Knud. 1994. *Information structure and sentence form: Topic, focus, and the mental representations of discource referents*. Cambridge: Cambridge University Press.
Liddell, Scott K., Melanie Metzger. 1998. Gesture in sign language discourse. *Journal of Pragmatics* 30. 657-697.
Liddell, Scott K. 2003. *Grammar, gesture, and meaning in American Sign Language*. Cambridge: Cambridge University Press.
Lukasczyk, Ulrika. 2008. SANOTTUA, AJATELTUA JA TEHTYÄ. Referointi kolmessa suomalaisella viittomakielellä tuotetussa fiktiivisessä kertomuksessa (Said, thought, and done: Referencing in three fictive FinSL narratives). MA thesis. Jyväskylä: University of Jyväskylä, Finland.
Luzardo, Marcos, Ville Viitaniemi, Matti Karppa, Jorma Laaksonen, Tommi Jantunen. Estimating head pose and state of facial elements for sign language video. In: Crasborn, Onno, Eleni Efthimiou, Stavroula-Evita Fotinea, Thomas Hanke, Julie Hochgesang, Jette Kristoffersen, Johanna Mesch (eds.), Proceedings of the 6th Workshop on the Representation and Processing of Sign Languages: Beyond the Manual Channel, 31 May, Reykjavik, Iceland. Paris: ELRA 2014. 105-112.
Mayer, Mercer. 1969. *Frog, Where Are You?* New York: Dial Press.
McNeill, David. 1992. *Hand and mind: What gestures reveal about thought*. Chicago: University of Chicago Press.
McNeil, David. 2000. *Language and gesture*. Cambridge: Cambridge University Press.
Nichols, Johanna. 1986. Head-marking and dependent-marking grammar. *Language* 62. 56-119.
Okrent, Arinka. 2002. A modality-free notion of gesture and how it can help us with the morpheme vs. gesture question in sign language linguistics (or at least give us some criteria to work with). In: Meier, Richar P., Kearsy Cormier, David Quinto-Pozos (eds.), *Modality and structure in signed and spoken languages*, 175-198. Cambridge: Cambridge University Press.
Padden, Carol. 1990. The Relation Between Space and Grammar in ASL Verb Morphology. In Lucas, Ceil (ed.), *Sign Language Research: Theoretical Issues*, 118-132. Washington, D.C.: Gallaudet Press.
Puupponen, Anna. 2018. The relationship between the movements and positions of the head and the torso in Finnish Sign Language. To appear in *Sign Language Studies* 18.
Puupponen, Anna, Tommi Jantunen, Ritva Takkinen, Tuija Wainio, Outi Pippuri. Taking non-manuality into account in collecting and analyzing Finnish Sign Language video data. In: Crasborn, Onno, Eleni Efthimiou, Stavroula-Evita Fotinea, Thomas Hanke, Julie Hochgesang, Jette Kristoffersen, Johanna Mesch (eds.), Proceedings of the 6th Workshop on the Representation and Processing of Sign Languages: Beyond the Manual Channel, 31 May, Reykjavik, Iceland. Paris: ELRA 2014. 143-148.
Puupponen, Anna, Tuija Wainio, Birgitta Burger, Tommi Jantunen. 2015. Head movements in Finnish Sign Language on the basis of Motion Capture data: A study of the form and function of nods, nodding, head thrusts, and head pulls. *Sign Language & Linguistics* 18. 41-89.
Puupponen, Anna, Tommi Jantunen, Johanna Mesch. The alignment of head nods with syntactic units in Finnish Sign Language and Swedish Sign Language. In: *Proc. Speech Prosody* 2016, 31 May-3 June, Boston, USA. 168-172.
Salonen, Juhana, Ritva Takkinen, Anna Puupponen, Outi Pippuri, Henri Nieminen. Creating the corpus of Finland's sign languages. In: Efthimiou, Eleni, Fotinea Stavroula-Evita, Thomas Hanke, Julie Hochgesang, Jette Kristoffersen, Johanna Mesch (eds.), Proceedings of the 7th Workshop on the Representation and Processing of Sign Languages: Corpus Mining, 28 May, Portoroz, Slovenia. Paris: ELRA 2016. 179-184.
Sandler, Wendy, Diane Lillo-Martin. 2006. *Sign language and linguistic universals*. Cambridge: Cambridge University Press.
Suomalaisen viittomakielen perussanakirja [The basic dictionary of FinSL]. 1998. Helsinki: KL Support Oy.
Van Valin, Robert D. 2005. *Exploring the syntax-semantics interface*. Cambridge: Cambridge University Press.
Van Valin, Robert D., Randy J. LaPolla. 1997. *Syntax: Structure, meaning and function*. Cambridge: Cambridge University Press.
Velupillai, Viveka. 2012. *An introduction to linguistic typology*. Amsterdam: John Benjamins.
Vermeerbergen, Myriam. 2006. Past and current trends in sign language research. *Language & Communication* 26. 168-192.