Effects of the Semantic and Morphological Factors on Word Order in Simple Transitive Clauses in Three Asian Sign Languages

2. Effects of the Semantic and Morphological Factors on Word Order in Simple Transitive Clauses in Three Asian Sign Languages

Felix Sze

The Chinese University of Hong Kong, Hong Kong SAR, PRC

Abstract

This chapter explores whether and to what extent the semantic (non-)reversibility of the agent and patient referents and verbal morphology would have an effect on the constituent orders in a simple transitive event in elicited data in Sri Lankan Sign Language, Jakarta Sign Language and Hong Kong Sign Language. The agent and patient referents in a transitive event are regarded as semantically reversible if the swapping of their semantic roles results in a sentence that still makes sense, e.g. 'A boy is kissing a girl' becoming 'A girl is kissing a boy'. In some previous studies of sign languages, it has been argued that if a transitive clause involves semantically reversible agent and patient referents, signers are more likely to opt for SVO, unless morphological factors such as classifiers, spatial and agreement affixations call for a verb-final construction instead. With picture elicited data by fluent signers from the three Asian Sign Languages, this chapter will argue that semantic reversibility does not necessarily result in a specific word order only; rather, it can have a range of effect on the expression strategies adopted by signers, which in turn may affect the surface constituent order. In addition, individual differences may exist across signers within a sign language as to how potential ambiguity associated with referents in reversible contexts is resolved. Specifically, data from Jakarta Sign Language and Sri Lankan Sign Language provide evidence that semantic reversibility of the referents motivates a higher frequency of spatial anchoring of the agent referents and gives rise to a variety of expression strategies, one being an adherence to SVO. In Hong Kong Sign Language, however, semantic reversibility of referents does not appear to have much effect on surface constituent order in elicited data, as signers prefer to use multi-clausal utterances and localize referents in the signing space in both reversible and non-reversible contexts. In all three sign languages, verbs that incorporate classifier handshapes of the direct objects have a strong tendency to appear sentence-finally. However, verbs that are inflected with locative and agreement affixes without classifier incorporation do not always lead to verb-final constructions, contrary to what has been suggested in the literature.

2.1. Introduction

In one of the earliest studies of constituent orders in American Sign Language (ASL), Fischer (1974; 1975) argued that the constituent order of a transitive clause can be more flexible if the subject (i.e. agent) and object (i.e. patient) referents are semantically non-reversible; otherwise the constituent order needs to adhere to SVO (i.e. Subject – Verb – Object) to avoid potential ambiguity. On the other hand, Liddell (1980) and Kegl (1976) argue that morphological factors such as incorporation of classifier handshapes and verb agreement can affect word order in ASL as well. Since the publication of these early studies, quite a number of studies have been conducted in other sign languages to investigate the role of semantic (non-)reversibility and verbal morphological factors in determining constituent orders (Volterra et al. 1984; Johnston et al. 2007; Milković et al. 2007; Vermeerbergen et al. 2007; Kimmelman 2012, to name a few). With a set of picture-elicited data, this chapter aims at exploring whether and to what extent semantic (non-)reversibility of referents and verbal morphological factors affect the constituent orders in simple transitive clauses in three historically unrelated sign languages in Asia, namely, Sri Lankan Sign Language (SLSL), Jakarta Sign Language (JakSL) and Hong Kong Sign Language (HKSL). It will be argued that semantic (non-)reversibility of the agent and patient has a varying degree of effect on the three sign languages, and such effect may vary across signers within an individual sign language. Semantic reversibility does not necessarily lead to a specific word order. Rather, semantic reversibility may give rise to a range of expression strategies for resolving potential ambiguity, one of which is the adherence to a specific word order. In both JakSL and SLSL, semantic reversibility leads to a significant increase of spatial anchoring of agent referents, role shift and multi-clausal utterances to resolve the potential ambiguity of the referents. In contrast, HKSL signers make frequent use of multi-clausal utterances and space in representing referents regardless of their (non-)reversibility in an experimental setting, and as such it is difficult to tell whether semantic reversibility affect constituent orders in simple transitive clauses. Moreover, in all three sign languages, verbs that incorporate classifier handshapes of the direct objects have a strong tendency to appear sentence-finally. However, non-classifier verbs with locative and agreement affixes that refer to the loci of object referents do not always lead to verb-final constructions, contrary to what has been suggested in the literature.[1] [2]

This chapter is organized in the following way. Section 2.2 is the literature review. Section 2.3 is the methodology. Section 2.4 presents the findings. Section 2.5 is the discussion and conclusive remarks.

2.2. Literature Review

Early studies in ASL suggested that the basic constituent order of a simple transitive clause may be altered by at least three types of factors: semantic, morphological and syntactic. Regarding the semantic factor, Fischer (1974; 1975) proposed that in ASL, whether or not the transitive clause involves semantically reversible subject and object referents can have an effect on the constituent order. For example, in the sentence 'A boy is kissing a girl',

the two referents are human beings. If the two referents are reversed in their semantic roles, i.e. 'A girl is kissing a boy', the sentence still makes sense. In this case, the two referents are semantically reversible. In contrast, in the sentence 'A boy is eating a cake', if the semantic roles of the two referents are reversed, the sentence becomes 'A cake is eating a boy', resulting in a scenario which normally does not occur in the real world. In this case, the two referents are semantically non-reversible. Fischer (1974; 1975) argued that in ASL, if a transitive clause involves a subject (i.e. agent) and object (i.e. patient) that are semantically reversible, the order would be S (subject), V (verb), and O (object). If the subject and object referents are not semantically reversible, the order will be relatively free: apart from SVO, other patterns such as SOV, OVS, VOS, etc. are possible.[3] The constituent order can be more flexible as it is not relied on for distinguishing the grammatical relations in the clause.

Morphological features of a verb may also affect the surface constituent order in ASL. According to Kegl (1976; 1977), the presence of verb agreement can result in a freer word order. In ASL and possibly all the other sign languages, verbs can be broadly classified into three types: agreement verbs, spatial verbs and plain verbs (Padden 1983). In agreement verbs, the movement direction and/or palm orientation can express agreement with the subject and/or object referents. These agreement features correspond with where the referents are anchored in the signing space. Figure 2−1a, 2−1b and 2−1c illustrate how the direction of the verb GIVE in HKSL is modified to correspond to the person features (i.e. 1st, 2nd or 3rd) of the subject and object arguments:

Figure 2-1a (I) GIVE (you). (1st person subject and 2nd person indirect object)

Figure 2-1b (I) GIVE (him/her). (1st person subject and 3rd person indirect object)

Figure 2-1c (He/She) GIVE (him/her). (3rd person subject and 3rd person indirect object)

Kegl argued that if there are agreement markings on the verbs, all word-order combinations are acceptable to most signers of ASL, though some still prefer an SVO sequence. To capture this effect of verb agreement, Kegl proposed the *Flexibility Condition*, which postulates that the more 'inflected' the verb is, the freer the constituent order may be.

Another morphological factor that exerts an influence on constituent order is the use of classifiers. Liddell (1980) agreed with Fischer that the basic constituent order is SVO. However, from what he observed, a transitive clause with a semantically non-reversible agent and patient does not allow SOV unless the verbal predicate incorporates the classifier of the object.[4] The example provided by Liddell was 'PIE PUT-PIE-INTO-OVEN'. Since he did not provide a picture for his example, we offer here an example from SLSL to illustrate his point. In Example (1), the second sign WARDROBE is a compound consisting of two signs – CLOTHES^DOOR. The second component involves two flat palms with an outward orientation. In the final classifier predicate CL [door-close], the same handshapes that stand for the door, which are analyzed as classifier handshapes in the sign language literature, are combined with a specific location in the signing space (i.e. in front of the signer) and movement (i.e. door closing movement). Liddell argued that only under this circumstance can ASL allow SOV word order.

Example (1)
WOMAN WARDROBE (CLOTHES^DOOR) CL [=door-close]
"A woman closes the door of a wardrobe." (SOV)

| WOMAN | WARDROBE (CLOTHES^DOOR) | CL [=door-close] |

(Note: ^ indicates that the preceding word and following word form a compound; CL stands for classifier predicate, and the information enclosed in the square brackets that follows show its intended meaning.)

The surface word order in ASL may also be altered by topicalization of the grammatical object, which usually involves appropriate non-manual markers such as 'brow raise', 'head tilt', etc. (Fischer 1974; Liddell 1980; Padden 1983). With topicalization, an originally SVO sentence can become OSV, with an intonational break (e.g. a slight pause and an apparent change of non-manuals) following the fronted O.[5]

In brief, in ASL, the basic constituent order is SVO. In this sign language, constituent order is a significant device in distinguishing grammatical relations, unless there are other clues such as verb agreement and the semantic non-reversibility of the subject and object referents which can lead to other order patterns. In addition, the incorporation of object classifier in the final verbal complex and topicalization may also alter this basic constituent order.

Since the publication of these early studies in ASL, quite a number of studies on constituent orders have been conducted in other sign languages, providing a varying degree of support to the above claims (Volterra et al. 1984; Johnston et al. 2007; Milković et al. 2007; Vermeerbergen et al. 2007; Kimmelman 2012; Leeson and Saeed 2012; Minoura 2008, 2012; Fischer 2014, to name a few). First, it has been commonly observed across sign languages that agreement verbs, spatial verbs and classifier verbs tend to occur sentence finally as they incorporate morphemes (in the form of agreement affixes, locative affixes or classifier handshapes) of the corresponding arguments which precede them.[6] Based on previous studies of 42 languages, Napoli and Sutton-Spence came up with the generalization that "if an argument affects the phonological shape of the V, it precedes V" (2014: 3) (e.g. SOV, OSV) (Generalization Two). According to them, this generalization holds for classifier predicates, agreement verbs, spatial verbs, and a few more categories of verbs that are non-plain verbs. The arguments that provide the referential or spatial reference for the verbal morphology appear pre-verbally. This generalization is observed in quite a number of sign languages, e.g. American Sign Language (Liddell 1980; Kegl 1976, 1977), Russian Sign Language (Kimmelman 2012), Italian Sign Language (Volterra et al. 1984), Flemish Sign Language (Johnston et al. 2007; Vemeerbergen et al. 2007), British Sign Language (Sutton-Spence and Woll 1999), Colombian Sign Language (Oviedo 2001), Hong Kong Sign Language (Sze 2003) and Brazilian Sign Language (Quadros 2003). Note that this generalization should be taken as a general tendency rather than an absolute rule. For example, in Russian Sign Language, 20% of classifier constructions have VO order though OV (Kimmelman 2012) order is more frequent, whereas in Italian Sign Language, classifier constructions can be either in SVO or SOV order (Volterra et al. 1984).

Whether semantic reversibility has an effect on word order in sign languages in general, however, appears a bit more questionable. Napoli and Sutton-Spence proposed (2014: 5) that "in reversible sentences with plain verbs, SVO is favored" (Generalization Six). In combination with Generalization Two discussed above, and Generalization One which says "SOV is grammatical in all sign languages" (2014: 3), it follows that in a reversible sentence, the default order is SVO unless the verbal morphology calls for a verb-final construction. However, a closer look at the literature actually reveals that, although some languages do show this tendency (e.g. Russian Sign Language (Kimmelman 2012), Italian Sign Language (LIS) (Volterra et al. 1984), Flemish Sign Language (VGT) (Vermeerbergen et al. 2007), Croatian Sign Language (HZJ) (Milković et al. 2007)), there exist obvious counter examples to this generalization. Some sign languages, such as Japanese Sign Language (Nakanashi 1994) and South African Sign Language (Vemeerbergen et al. 2007), use SOV and OSV orders in the majority of cases regardless of the reversibility of arguments. In Central Taurus Sign Language, there is a systemic contrast between prevalence of SOV in non-reversible sentences, and OSV together with SV-SV in reversible contexts (Ergin et al. 2018). In Argentine Sign Language, it is observed that in reversible sentences, the subject and object "are usually placed in the basic word order (SOV)," and a separate auxiliary disambiguates the grammatical relations if the verb is plain (see Example 36, Massone and Curiel 2004: 80). In Finnish Sign Language, reversibility of arguments does not affect the word order of a transitive clause; rather, the crucial factor that determines the choice of SVO or SOV

is the presence of pointing signs (Jantunen 2008). Hence, more cross-linguistic evidence is needed to verify whether semantic reversibility of arguments affect surface word order in sign languages in general.

On top of that, how and to what extent semantic reversibility affects word order in sign languages warrants a deeper investigation as well. For previous studies that investigated the role of semantic reversibility in word order, the typical approach they adopted was to check if reversibility of arguments favors a particular word order, which was built on an underlying assumption that some word order (i.e. usually SVO) can effectively resolve the semantic ambiguity associated with reversible arguments. However, some researchers actually point out in passing that reversibility of arguments could also lead to deployment of grammatical devices other than word order for disambiguation. In VGT, a light verb GIVE is inserted between the first and second argument in some reversible sentences whereas in Auslan, some signers inserted a lexical preposition ON before the patient argument, presumably to distinguish the latter from the agent. The researchers suggest that in both sign languages "the reversible sentence elicitation task results in a greater variety of construction types than the non-reversible task" (Johnston et al. 2007: 179). This comment actually reflects that reversibility of arguments and verbal morphology, though both may affect surface word order in signing, are of distinct nature. The presence of verbal morphology that refers to the noun referents' properties, be they locative, agreeing or classifying in nature, imposes a grammatical requirement for the verbs to come last. In contrast, semantic reversibility of arguments results in potential ambiguity which needs to be resolved, and presumably there is no apriori restriction that this must be done via word order only. Hence, there is a possibility that other disambiguation strategies exist alongside with SVO order, and this is an aspect we would like to explore in this chapter.

Whether semantic reversibility of arguments affects word order in sign language is theoretically relevant to and can potentially shed light on the more recent controversies on the default, natural word order in human languages. It is a well-known typological fact that SOV and SVO are the most frequent basic word orders in the world's (nominative) languages, with the former slightly more frequent than the latter. In the past decade, on the basis of typological data, newly emerging sign languages, and elicited pantomime studies, researchers have argued that SOV is more compatible with how humans conceptualize a transitive event in the cognitive system if the referents are non-reversible (e.g. Hall et al. 2013, 2014, 2015; Meir et al. 2010, 2017; Kocab et al. 2017; Gibson et al. 2013). However, this predominance may be overridden if the referents are semantically reversible and SVO would be preferred instead. This is because in SOV both the agent and patient are placed on the same side of the verb, leading to potential ambiguity (Meir et al. 2010). Gibson *et al*. (2013) specifically considered the semantic reversibility of arguments a kind of communicative "noise" in their noisy-channel hypothesis, arguing that the shift from SVO to SVO arises from language users' sensitivity to such noise and tendency to opt for SVO which can maximize meaning recoverability. In their study, when speakers of SVO and SVO languages were asked to describe transitive events in pantomime, they used mainly SOV when the patient was non-human (i.e. non-reversible context), but would opt for SVO when both agent and patient were human (i.e. reversible context). They further pointed out that spatial-marking in gestures

can offer clues to override the noise arising from semantic reversibility, and when referents are localized in space in the gestural representation, SOV is more likely to be retained. This echoes with the typological observation that SOV languages tend to have rich case or agreement markings that differentiate grammatical relations while languages that lack such systematic morphological markings tend to shift to SVO. If the noisy-channel hypothesis of Gibson *et al*. (2013) is applicable to word-order patterns in sign languages, we would expect to see that SOV is dominant in non-reversible contexts, while SVO is preferred in reversible contexts unless there are morphological means (e.g. verb agreement) available that disambiguate the referents.[7]

2.3. Methodology

This chapter adopts the picture-based elicitation task originally designed by Volterra *et al*. (1984) for the study of constituent order in Italian Sign Language. In their study, simple line drawings were designed to elicit 12 sentences with semantically non-reversible agent and patient, 12 sentences with reversible agent and patient, and 12 sentences with locative constructions. This methodology has been adopted by quite a number of subsequent studies (Volterra et al. 1984; Johnston et al. 2007; Milković et al. 2007; Vermeerbergen et al. 2007; Kimmelman 2012; Sze 2003, to name a few). In our current study, we focus mainly on semantic (non-)reversibility. Picture stimuli for 24 sentences with non-reversible contexts and 16 with reversible contexts are designed. Table 2−1 show the complete list of target sentences used in this chapter, and Figure 2−2a and 2−2b illustrate some of the line-drawings stimuli.[8]

Table 2-1　List of picture stimuli in this chapter

| Transitive clauses with semantically non-reversible agent and patient	Transitive clauses with semantically reversible agent and patient
1.　　A boy is closing the door.	1.　　A car is towing a truck.
2.　　A boy is opening the door.	2.　　A truck is towing a car.
3.　　A woman is closing a wardrobe.	3.　　A little boy is hugging an elderly woman.
4.　　A woman is opening a wardrobe.	4.　　An elderly woman is hugging a little boy.
5.　　A girl is eating a slice of cake.	5.　　A boy is pushing a girl.
6.　　A boy is eating a slice of cake.	6.　　A girl is pushing a boy.
7.　　A man is building a wall.	7.　　A woman is brushing a child's hair.
8.　　A man is painting a wall.	8.　　A child is brushing a woman's hair.
9.　　A man is carving a statue.	9.　　An American Indian is stabbing a cowboy in the back.
10.　　A man is painting a statue.	
11.　　A girl is watching television.	10.　　A cowboy is stabbing an American Indian in the back.
12.　　A girl is looking at a painting.	
13.　　A boy is looking at the top part of a tree.	11.　　A girl is touching a boy's cheek.
14.　　A boy is looking at the root of a tree.	12.　　A boy is touching a girl's cheek.
15.　　A woman is cutting a piece of string.	13.　　A man is scolding a woman.
16.　　A man is cutting a piece of string.	14.　　A woman is scolding a man.
17.　　A man is washing a dog.	15.　　A boy is looking at a girl.
18.　　A man is washing a car.	16.　　A girl is looking at a boy.
19.　　A man is lifting up a box.	
20.　　A man is holding a food tray.	
21.　　A boy is kicking a box.	
22.　　A boy is kicking a rock.	
23.　　A woman is cleaning a table.	
24.　　A woman is cleaning a window.	
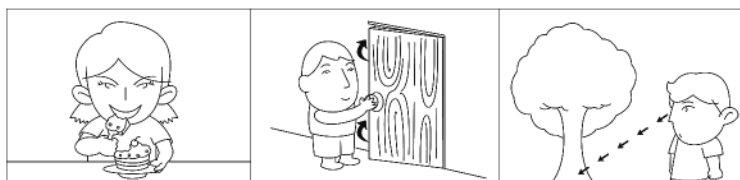
Figure 2-2a Examples of stimuli for the non-reversible contexts

Figure 2-2b Examples of stimuli for the reversible contexts

For each of the three sign languages, two male and two female signing informants were invited to participate in the picture elicitation task. For SLSL, the four participants are native signers (i.e. they acquired sign language since birth from their deaf signing parents) residing in or near Colombo, the capital city of Sri Lanka. The four HKSL signers were native signers who graduated from the same deaf school. For JakSL, two female native and two near-native male signers were invited.[9] In the elicitation experiment, each of the signers was shown the picture stimuli one after another. After looking at one picture, he/she would be asked to express the picture content to another deaf signer who was sitting next to the camera. A total of 480 responses were recorded for the 40 stimuli from the twelve signers. All the signs were transcribed in ELAN (Figure 2-3a) by deaf researchers and the data were coded by the author in ELAN as well as in an Excel spreadsheet (Figure 2-3b). When transcribing the data, attention was paid to the semantic roles of the predicates involved. Grammatical features coded include semantic (non-)reversibility, word-order patterns, localization of agents and patients, presence of classifier predicates, spatial modification due to agreement/spatial affixes, non-manual topic markers, role shift markers, etc.

Figure 2-3a A snapshot of the ELAN transcription

Figure 2-3b   A snapshot of the Excel Spreadsheet

2.4. Findings

In this section we will present the findings of the picture elicitation task. We will begin with JakSL, followed by SLSL and HKSL.

2.4.1. Jakarta Sign Language (JakSL)

In JakSL, there appears to be no single dominant constituent order for the non-reversible contexts. Table 2-2 below shows the patterns observed.[10]

Table 2-2   Constituent-order patterns in non-reversible contexts in JakSL

Patterns observed	Signer Ab	Signer P	Signer An	Signer L	Total
SOV/OV	10	6	5	4	25 (26.3%)
SVO/VO	7	7	10	1	25 (26.3%)
SVOV/VOV	4	10	1	2	17 (17.9%)
OSV			5	8	13 (13.7%)
• *O without topic marker*			(3)		
• *O with topic marker*			(2)	(8)	
Multi-clausal expressions without showing the order of O relative to S and V	1		3	9	13 (13.7%)
Others					
• *SOVOV*	1	1			2 (2.1%)
• *SV*					
Total	23	24	24	24	95

The most frequently observed orders are SOV/OV (26.3%) (Example (2)) and SVO/VO (26.3%) (Example (3)).[11]

Example (2)

FATHER STRING CL [=cut string with scissors]

"Father cuts a piece of string." (SOV, JakSL)

FATHER   STRING   CL [=cut string with scissors]

In this example, the classifier handshape of the object referent (i.e. a handling classifier) is incorporated into the predicate.

Example (3)

GIRL/WOMAN SIT WATCH TELEVISION

"A girl sits and watches television." (S…VO, JakSL)

GIRL/WOMAN   SIT   WATCH   TELEVISION

WATCH in JakSL is an agreement verb. In Example (3), the verb agrees with the location of the television.

The third frequent order is SVOV/VOV (17 instances, 17.9%) in which the target verb appears twice within the same sentence. In the literature, these types of constructions are known as verb sandwiches (e.g. Fischer and Janis 1990; Bø 2010; Engberg-Pedersen 1993; Liddell 2003; Matsuoka 2000), and the second instance of the verb typically carries a different morphological marking (e.g. additional aspectual marking). However, it is also possible to find verb sandwiches with the two verbs showing identical lexical and morphological information (e.g. Norwegian Sign Language, reported by Bø 2010). In the JakSL non-reversible data, most of the SVOV/VO involve morphologically identical verbs (15 out of 17) (Example (4)) except for two sentences in which the second verb is in a slightly modified form (Example (5)).
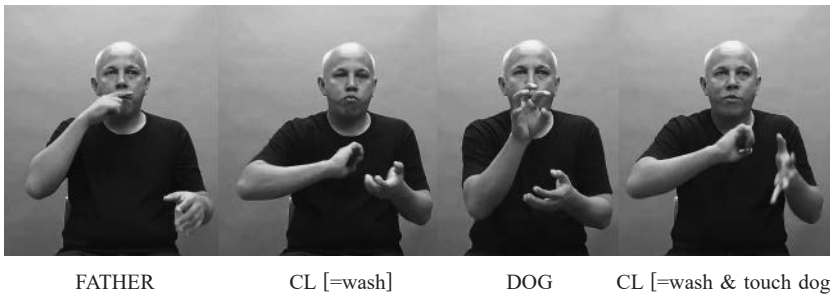
Example (4)

MAN IX [=that] WORKER MAN WORKER CL [=paint] WALL IX [=wall] CL [=paint]
"That male worker is painting the wall." (SVOV, JakSL)

| MAN | IX [=that] | WORKER | MAN | WORKER |

| CL [=paint] | WALL | IX [=wall] | CL [=paint] |
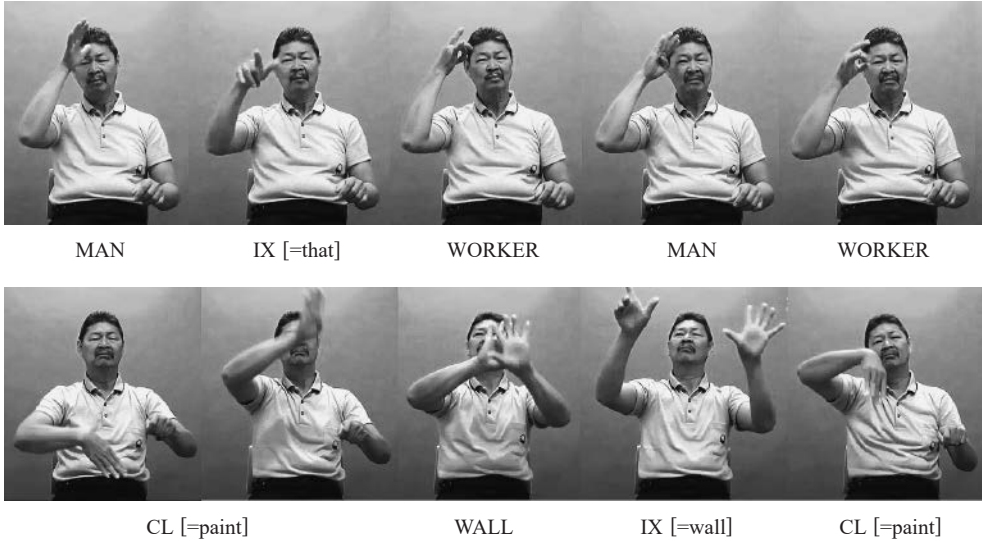
(Note: IX stands for an extended index finger.)

Example (5)

FATHER CL [=wash] DOG CL [=wash & touch dog]
"Father is washing a dog." (SVOV, JakSL)

| FATHER | CL [=wash] | DOG | CL [=wash & touch dog] |

In Example (5) above, when the classifier verb CL [=wash] was signed for the first time, the signer's left hand assumed a relaxed, non-specific handshape with no obvious intended meaning. When it is used again after the mentioning of the object referent DOG, the signer's left hand assumed a hand posture that mimics a human hand touching the body of a dog.

The three aforementioned patterns (i.e. SOV/OV, SVO/VO, SVOV/VOV) were used by all four informants. Interestingly, object-initial sentences (13 instances, 13.7%) were used only by the two younger native signers (Signer L and Signer An). In eight out of the thirteen instances of OSV, the sentence-initial object is accompanied with brow raise and/ or head tilt and followed by a blink. Given the presence of these non-manual signals, we may analyze them as topicalizations (Example (6)):[12]

Example (6)
DOOR IX [=that] CHILD MALE IX [=boy] CL [=open door]
"A boy is opening a door." (topic O, SV, JakSL)

| DOOR | IX [=that] | CHILD | MALE | IX [=boy] | CL [=open door] |

The last category in Table 2-2 are multi-clausal utterances. In these cases, the signers express a transitive event in two or more clauses, and as such the patient referent may not be realized as an overt object together with the target verb in the same clause.[13] In other words, there is no observable sequence of agent and patient within a single clause. In Example (7) below, the signer first said there was an empty box, and then said a boy kicked it. In the second clause, the object referent (i.e. the box) is implied but was not overtly mentioned again, hence providing no information on its relative order with the verb.[14]

Example (7)
BOX IX [=inside] EMPTY, MAN CL [=kick] PLAY
"There is a box that is empty. A man kicks it." (multi-clausal, JakSL)

| BOX | IX [=inside] | EMPTY |

| MAN | CL [=kick] | PLAY |
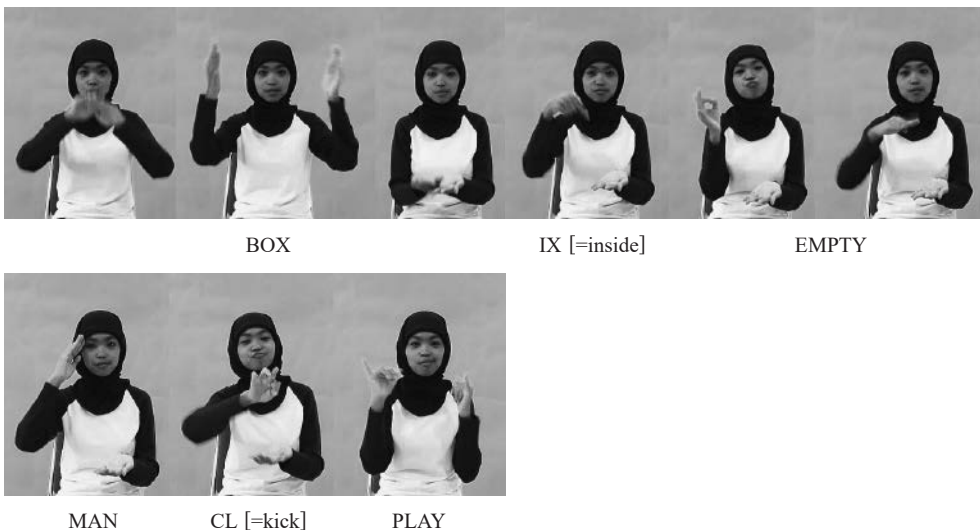
In the JakSL non-reversible data there was one instance of SOVOV, and one SV. In the sentence with only S and V, the patient referent was represented as a classifier handshape directly incorporated into the verbal complex (Example (8)):

Example (8)
FATHER CL [=open door knob] CL [=open door]
"Father is opening the door by turning the door knob." (SVV, JakSL)

FATHER	CL [=open door knob]	CL [=open door]

Overall speaking, in the non-reversible contexts, there is considerable variation across JakSL signers: Signer Ab has the stronger preference for SOV/OV; Signer P uses verb sandwiches most often; Signer An has a higher percentage of SVO/VO, but uses all the other observed patterns as well; Signer L apparently favors topicalization of objects and multi-clausal expressions.

Table 2-3 below shows the constituent orders of reversible contexts in JakSL:

Table 2-3 Constituent-order patterns in reversible contexts in JakSL

Patterns observed	Signer Ab	Signer P	Signer An	Signer L	Total
Multi-clausal expressions without showing the order of O relative to S and V	5	4	10	10	29 (46%)
SVO/VO	4	6	4	2	16 (25.4%)
SVOV/VOV	7	4	2	2	15 (23.8%)
OSV • O with topic maker				2	2 (3.2%)
Others • SV		1			1 (1.6%)
Total	16	15	16	16	63

There are several striking differences between reversible and non-reversible contexts in Jakarta Sign Language. First, while SOV/OV patterns account for more than one-fourth of the sentences in the non-reversible contexts (26.3%), there was not even a single instance of SOV in the reversible contexts. Furthermore, there were only two instances of OSV in the reversible contexts, both accompanied with topic markers (i.e. brow raise, forward head tilt, followed by a blink) (3.2%), and they were produced by the same signer. In contrast, in the non-reversible contexts, OSV sequences were produced by two signers, and topic markers are optional. Third, nearly half of the responses in the reversible contexts involve multi-clausal utterances in which the patient is not overtly expressed as a discrete object with the corresponding subject and verb in the same clause.

What these three differences have in common is that the grammatical objects and subjects are not placed side-by-side, and if they are next to each other, as in the two sequences of OSV, non-manual topic markers ae used. Based on this, we would like to propose that semantic reversibility of the arguments in a transitive event indeed has an

effect on the constituent-order patterns in Jakarta Sign Language. That is, owing to the presence of potential ambiguous interpretation of the two referents, Jakarta signers prefer not to use word orders in which subjects and objects are placed together without overt distinct differentiations. Instead, signers would mention the agent and patient referents separately, and adopt a range of strategies for further differentiation, as we will discuss below.

About one-fourth of the utterances in the reversible contexts in JakSL involve the patient appearing as the grammatical object in the post-verbal position: SVO/VO (25.4%) (Example (9)).[15] It is likely that this word order is used by JakSL signers to differentiate subjects and objects, as reported in other sign languages.

Example (9)
GIRL PUSH$_p$ BOY IX [=boy]
"A girl pushes a boy." (SVO, JakSL)

GIRL   PUSH$_p$ BOY   IX [=boy]

As mentioned above, nearly half of the responses in reversible contexts consist of multiple clauses rather than a simple transitive clause. Example (10) below shows a total of three clauses. The first two clauses localize the patient and agent in the signing space via a classifier (i.e. upward pointing extended index), and the last clause consists of an agreement verb PUSH, the palm orientation and movement direction of which agree with the referential loci of the agent and patient argument respectively.[16]

Example (10)
IX [=this CL] GIRL, CL [=person] BOY, $_a$PUSH$_p$
"This is the girl. A person standing behind the girl is a boy. (He) pushes (her)." (multi-clausal, JakSL)

IX [=this CL]   GIRL   CL [=person]   BOY
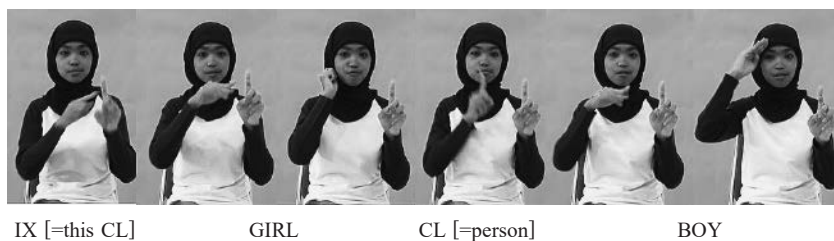
$_a$PUSH$_p$

This is a clear example showing how the agent and patient are differentiated using space and agreement verbs. In fact, among the 29 multi-clausal expressions in the reversible contexts, 20 and 15 responses involve overt localization of the patient and agent referents respectively via strategies such as classifiers, pointing signs and agreement verbs.

In the reversible contexts, it is also not uncommon to see role shift being used to differentiate the referents via a change in body shift/orientation. Example (11) below involves two clauses – the first one describing a man assuming a posture of looking at something, while the second clause shows a woman walking by with a handbag on her arm.[17] In both clauses, the signer assumed the role of the respective referents, which were reflected in the difference in body orientation. Even though the target verb (here represented by the corresponding gesture [=look at]) and the patient did not appear within the same clause, the semantic roles taken by the referents are still unambiguously shown.

Example (11)
FATHER gesture [=look at], WOMAN gesture [=walk with handbag]
"Father is looking at (something). A woman is walking by with her handbag." (SV, SV, JakSL)

FATHER   gesture [=look at]   WOMAN gesture   [=walk with handbag]

Role shift could also be marked explicitly with the use of 1st person pronoun: the signer overly stated that he/she is the agent of the action performed on the patient (Example (12)).

Example (12)
IX [=me] BOY, IX [=there] OLD-LADY TALL, IX [=me] $_a$TOUCH$_p$
"I am the boy. There is an old lady who is taller. I (the boy) touch (her)." (multi-clausal, JakSL)

IX [=me]   BOY   IX [=there]   OLD-LADY   TALL   IX [=me] $_a$TOUCH$_p$

The 1st person pronoun (IX [=me]) in Example (12) serves as an overt role shift marker that helps identify the agent referent. Note that this strategy was only used by the two

younger native signers (6 instances by Signer L, 2 instances by Signer An). All except one were used in the reversible contexts (1 instance by Signer L in a non-reversible context). Hence, we would like to propose that the role shift pronominal marker is mainly motivated by the semantic reversibility of the referents.

Another notable difference between reversible and non-reversible context in JakSL is that more localized agents are found in the former. As in other sign languages, localization of referents in Jakarta SL can be done in a variety of ways: pointing signs (e.g. IX [=there] OLD-LADY in Example (12)), agreement verbs (e.g. WATCH in Example (3)), role shift (e.g. FATHER and WOMAN in Example (11)), or classifier predicates (e.g. CL [=person] in Example (10)). Due to the space encoding properties of most verbal predicates in the elicited data, the majority of the patient referents in both contexts are localized in the signing space, as shown in Table 2-4:

Table 2-4   Localization of patient referents in reversible and non-reversible contexts in JakSL

	Localization of Patient referents	Signer Ab	Signer P	Signer An	Signer L	Total
Non-reversible contexts	No localization	2	0	1	0	3 (3.2%)
	Localization	21	24	23	24	92 (96.8%)
Reversible contexts	No localization	0	1	0	1	2 (3.2%)
	Localization	16	15	16	14	61 (96.8%)

(Note: One non-reversible response from Signer Ab and one reversible response from Signer P failed to contain the target verbs.)

On the other hand, localization of agent referents can be found in both contexts, too (see Table 2-5). However, the percentage of localization is significantly more frequent in reversible contexts than in non-reversible ones. A Chi-square test of independence was calculated comparing the frequency of agent localization in the two contexts. A significant interaction was found ($\chi^2(1)=30.9596$, p<.05), that is, agents are more likely to be localized in reversible contexts (87.3%) than in non-reversible contexts (43.2%). We would like to argue that localization of agents becomes more necessary in reversible contexts as there is a stronger need to spatially differentiate agents from patients to avoid potential semantic ambiguity.

Table 2-5   Localization of agent referents in reversible and non-reversible contexts in JakSL

	Localization of Agent Referents	Signer Ab	Signer P	Signer An	Signer L	Total
Non-reversible contexts	No localization	22 (95.7%)	3 (12.5%)	22 (91.7%)	7 (29.2%)	54 (56.8%)
	Localization	1 (4.3%)	21 (87.5%)	2 (8.3%)	17 (70.8%)	41 (43.2%)
Reversible contexts	No localization	3 (18.8%)	1 (6.7%)	4 (25.0%)	0 (0%)	8 (12.7%)
	Localization	13 (81.3%)	14 (93.3%)	12 (75.0%)	16 (100%)	55 (87.3%)

Overall speaking, as in the non-reversible contexts, there exists some degree of individual variation in the constituent patterns in the reversible contexts. Signer Ab and Signer P prefer a single clause representation (i.e. SVO/VO or SVOV/VOV), while Signer L and Signer An prefer a multi-clausal representation. In the reversible contexts, no tokens of SOV are

found. In addition, the reversibility of the subject and object results in a range of differentiation strategies across signers. These include an adherence to SVOV or SVO, spatial loci and classifier predicates, and role shifts marked by body orientation change or 1st person pronouns. Signers vary in whether and how often they adopt these strategies. Seen in this light, we may suggest that reversibility of the subject and object referents leads to a variety of strategies that aim at resolving the potential ambiguity, and adherence to SVO is just one of them.

To what extent can the differences in word-order patterns in the two contexts be attributed to verbal morphology? Table 2-6 and 2-7 below show how the position of an object relative to the verb interact with verbal morphology in non-reversible and reversible contexts respectively. As discussed in the literature review, verbal morphology covers two major types: (a) incorporation of the classifier handshape of a direct object into the verbal predicates and (b) spatial modification by agreement or spatial affixes.[18)]

Table 2-6   Object-classifier incorporation and spatial modification of verbs in non-reversible contexts in JakSL

Word-order patterns	No object-classifier incorporation/ spatial modification	Spatial modification of the verb only	Object-classifier incorporation only	Object-classifier incorporation plus spatial modification of the verb	Total
Multi-clausal utterances	2	2	3	6	13
O-after-V	5	21	6	3	35
O-before-V, V-final	1	8	12	24	45
Others		1		1	2
Total	8	32	21	34	95

Table 2-7   Object-classifier incorporation and spatial modification of verbs in reversible contexts in JakSL

Word-order patterns	No object-classifier incorporation/ spatial modification	Spatial modification of the verb only	Object-classifier incorporation plus spatial modification of the verb	Total
Multi-clausal utterances		19	10	29
O-after-V	3	25	3	31
O-before-V, V-final		2		2
Others		1		1
Total	3	47	13	63

In both contexts, when there is neither classifier incorporation nor spatial modification of the verb, objects tend to occur after V, particularly in reversible contexts (5 out of 8 in non-reversible contexts, 3 out of 3 in reversible contexts). This lends supportive evidence to Generalization Six proposed by Napoli and Sutton-Spence (2014), that is, reversible contexts favor V-O order when the verb is plain without agreement or locative affixes. However, when there is only a spatial modification without direct object-classifier incorporation, objects also tend to occur after V (21 out of 32 in non-reversible contexts, 25 out of 47 in

reversible contexts). Only a few instances of pre-verbal objects are found (8 out of 32 in non-reversible contexts, 2 out of 47 in reversible contexts). This provides counter evidence to Generalization Two by Napoli and Sutton-Spence (2014). On the other hand, when object classifiers are incorporated in the verb, there is a strong tendency for O to occur pre-verbally (12 out of 21 and 24 out of 34 in non-reversible contexts) ONLY in nonreversible contexts, but NOT in reversible contexts. Hence, we would like to argue that incorporation of object classifiers into the verbal predicates would lead to O-V order in JakSL, which supports Generalization Two, but this becomes dis-preferred in reversible contexts, and as such other options, such as multi-clausal utterances and V-O orders are opted for. Given these observations, we would like to argue that verbal morphology can only explain a small portion of constituent-order patterns in JakSL, and that the differences in constituent orders and expression strategies between the two contexts are to a significant extent attributed to the (non-)reversibility of the agent and patient referents.

2.4.2. Sri Lankan Sign Language (SLSL)

Table 2-8 shows the constituent orders used by four SLSL signers in the non-reversible contexts.[19]

Table 2-8   Constituent-order patterns in non-reversible contexts in SLSL

Patterns observed	Signer A	Signer M	Signer N	Signer V	Total
SOV/OV	18	21	22	18	79 (82.2%)
SVO	2	1		5	8 (8.5%)
SVOV/SVOVOV	3	1		1	5 (5.3%)
OSV (V+OCL)			1		1 (1.1%)
Others					
• SV (V+OCL)	1	1			2 (2.2%)
Total	24	24	23	24	95

As shown in Table 2-8, SOV is the predominant constituent order for non-reversible contexts in SLSL (82.2%). Example (13) is one such example in which the object classifier is incorporated into the predicate.

Example (13)
MAN (MALE^PERSON) BRICK CL [=stack up bricks]
"A man is stacking up the bricks." (SOV, SLSL)

MAN (MALE^PERSON)   BRICK

CL [=stack up bricks]

The next two frequent order patterns are SVO (8.5%, Example (14)) and SVOV/SVOVOV (5.3%, Example (15)), though they are far fewer than SOV.[20]

Example (14)
WOMAN (FEMALE^PERSON) $_a$LOOK-AT$_p$ PICTURE (COLOUR^FRAME)
"A woman looks at a picture." (SVO, SLSL)

WOMAN (FEMALE^PERSON) $_a$LOOK-AT$_p$

PICTURE (COLOUR^FRAME)

In Example (14), the verb LOOK-AT is an agreement verb which agrees with the assumed location of the picture.

Example (15)
MAN (MALE^PERSON) WATCH TV WATCH CL [=press remote control]
"A man is watching TV." (SVOV, SLSL)

          MAN (MALE^PERSON)   WATCH

          TV   WATCH   CL [=press remote control]

A closer look at the verbs involved in these SVO or SVOV/SVOVOV reveal that a significant portion of them are the sign SEE/LOOK/WATCH.[21] Among all the 13 sequences of SVO and SVOV/SVOVOV, 7 were SEE/LOOK/WATCH. Actually, among the 16 instances of SEE/LOOK/WATCH in the SLSL non-reversible data, nearly half (7 instances) are expressed in SVO or SVOV/SVOVOV.[22] This provides some preliminary evidence that certain verbs allow SVO as an alternative to SOV in SLSL.

On top of the prevalence of SOV, individual variations are observed. Signer M and Signer N had the most consistent use of SOV (over 20 tokens). Signer A and Signer N sometimes used SVO or SVOV patterns. There is only one instance of OSV, and the object is neither accompanied with any non-manual markers nor followed by a prosodic break. There are also two instances of SV in which the object referent was not overtly stated within the same clause but their classifiers are incorporated into the predicate directly. Both involve the meaning of opening/closing a door with an SASS representing the door.

Table 2-9 below shows the constituent patterns observed for the reversible contexts in SLSL.

**Table 2-9** Constituent-order patterns in reversible contexts in SLSL

Patterns observed	Signer A	Signer M	Signer N	Signer V	Total
SOV	8	11	14	4	37 (57.8%)
SVO		4		12	16 (25%)
Multi-clausal expressions without showing the order of O relative to S and V	7				7 (10.9%)
OSV			2		2 (3.1%)
SVOV/SVOVOV		1			1 (1.6%)
Others					
• SOSV	1				1 (1.6%)
Total	16	16	16	16	64

When compared to the non-reversible contexts, there is a noticeable drop of SOV in the reversible contexts though it remains predominant across all signers (57.8%). The shift from SOV to other constituent orders possibly suggests that SLSL signers need to find ways to resolve the potential ambiguity associated with the agent and patient referents, but the four signers differ in their choice of strategies. For Signer A, 7 out of 16 utterances involve multiple clauses with localization of referents in the signing space, followed by an utterance-final clause containing the target predicate (Example (16)).

Example (16)
TRUCK CL [=large truck be located] CAR CL [=car be located] $_a$TOW$_p$
"A truck is here. A car is at the back. (The truck) is towing (the car)." (multi-clausal, SLSL)

TRUCK   CL [=large truck be located]

CAR   CL [=car be located] $_a$TOW$_p$
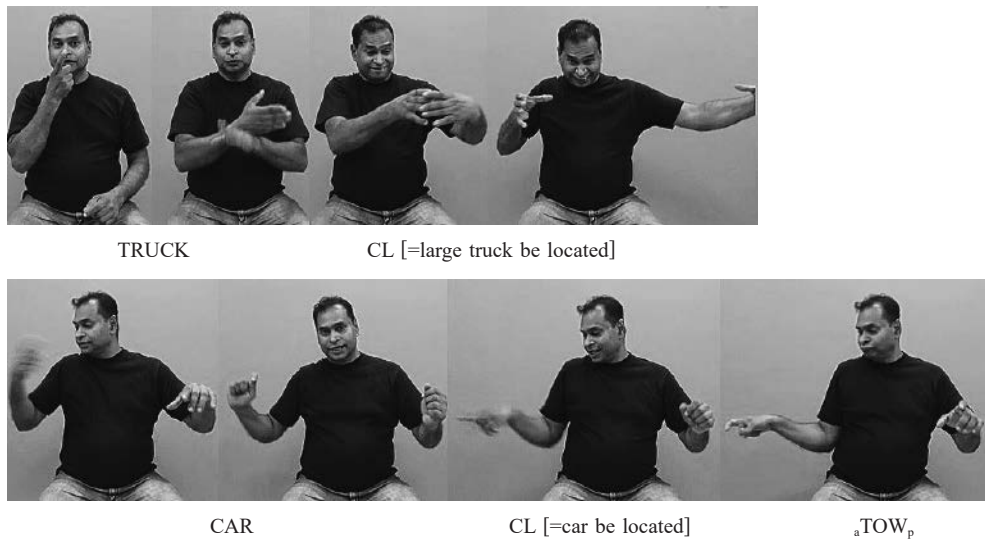
This multi-clausal strategy was already mentioned in our former discussion of JakSL data. Nonetheless, Signer A was the only signer that adopted this strategy.[23)] Signer M continued to use SOV in most cases with a few tokens of SVO and SVOV. For Signer V, however, SVO becomes the dominant order. In other words, the semantic reversibility of the subject

and object referents results in a significant shift from SOV to SVO for this signer. Signer N continued to use SOV consistently, except for two instances of OSV where the object NP was not accompanied with any potential topic marker. Instead, the two NPs are localized in space which helps disambiguate their semantic roles.

Example (17)
MAN (MALE^PERSON) WOMAN (FEMALE^PERSON) $_a$LOOK-AT$_p$
"A girl is looking at a boy." (SOV, SLSL)

MAN (MALE^PERSON)   WOMAN (FEMALE^PERSON) $_a$LOOK-AT$_b$

In Example (17), the noun phrases MAN and WOMAN both consist of a gender-indicating noun (i.e. MALE, FEMALE) as well as the optional suffix PERSON (i.e. a C-handshape with outward palm and fingertip orientation plus a downward path movement). This suffix is signed on the ipsilateral side in the signing space as the citation form (as in Example (13)), but it can also be anchored at a specific locus in the signing space. In Example (17), the PERSON suffix for MAN was signed slightly on the left, whereas that for WOMAN was signed slightly to the right. The agreement verb LOOK-AT is inflected to indicate that the MAN was looked at by the WOMAN.

Interestingly, spatial anchoring of PERSON is only found in the reversible contexts in our SLSL data. Of the 51 instances of PERSON in the non-reversible contexts, all were signed at the default location. In contrast, 32 out of 36 instances (88.9%) of PERSON in the reversible contexts ware anchored to a specific point in the signing space other than the default location. A similar pattern is also observed for certain nouns that can be spatially anchored when signed. In the current data, the signs CHILD and YOUNGER-BROTHER appeared 8 times in the non-reversible contexts and all were signed neutrally in the signing space. In contrast, 8 out of 12 such instances in the reversible contexts were spatially anchored. The two examples below show YOUNGER-BROTHER in the citation form (Example (18)) and spatially-modified form (Example (19)) in the non-reversible and reversible context respectively.

Example (18)
YOUNGER-BROTHER STRING CL [=cut string with scissors]
"The younger-brother cuts a piece of string." (SOV, SLSL)

          YOUNGER-BROTHER   STRING   CL [=cut string with scissors]
(Note: the second sign of the compound YOUNGER-BROTHER is signed at the default location
at the center of the signing space.)

Example (19)
ELDER-BROTER YOUNGER-BROTHER $_a$SCOLD$_p$
"The elder brother scolds the younger brother." (SOV, SLSL)

          ELDER-BROTHER   YOUNGER-BROTHER $_a$SCOLD$_p$
(Note: the second sign of the compound YOUNGER-BROTHER is signed slightly to the contralateral side of
the signing space.)

Localization of referents via the PERSON suffix or CHILD/YOUNGER-BROTHER in the reversible contexts is used by all signers though with varying frequency. This provides evidence that in SLSL, locus assignment of referents is optional and this can be motivated by the need to differentiate potentially ambiguous referents due to semantic reversibility.

Another strategy that is only observed in the reversible but not non-reversible contexts in the use of PERSON suffix with an inward palm orientation to indicate first person role shift, which is similar to the 1st person role shift pronoun we discussed earlier regarding the Jakarta Sign Language data. There were three instances, one by Signer A and two by Signer N. Example (20) is an example:

Example (20)

WOMAN (FEMALE^PERSON) PERSON$_{1st-person}$ MAN (MALE^PERSON) $_a$PUSH$_p$
"A woman, being me, pushes a man." (SOV, SLSL)

WOMAN (FEMALE^PERSON)   PERSON$_{1st-person}$

MAN (MALE^PERSON) $_a$PUSH$_p$
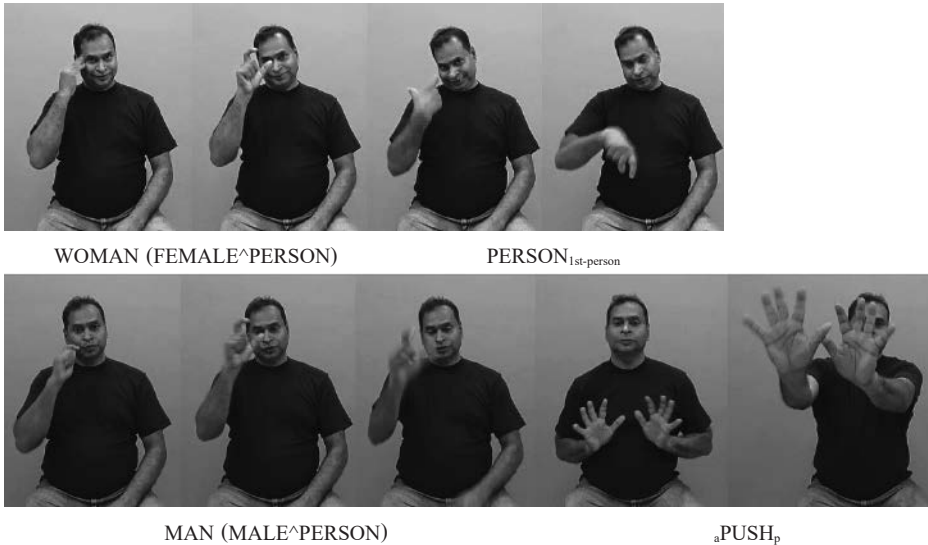
Apart from these spatial strategies, referents can also be localized in the signing space in SLSL with classifiers, agreement verbs, and spatial verbs, similar to JakSL. In our earlier discussion of JakSL, we highlighted that localization of referents, in particular agent referents, was one important means for signers to differentiate potentially ambiguous referents in reversible contexts. A similar tendency is found in SLSL too, but to a lesser degree. Table 2-10 below shows the localization of the agents in non-reversible and reversible contexts in SLSL. In non-reversible contexts, no agent referents were assigned specific loci in the signing space. In reversible contexts, all four signers localized some of the agents in the signing space, with Signer A having the highest percentage of localization and Signer V the least. Note that for Signer V, the dominant order becomes SVO in the reversible contexts. She produced 12 instances of SVO, but only 3 involve localization of the agents. This suggests that for this signer, SVO order was more preferred than the use of space to resolve potential ambiguity in reversible contexts.

Table 2-10   Localization of agent referents in reversible and non-reversible contexts in SLSL

	Localization of Agent Referents	Signer A	Signer M	Signer N	Signer V	Total
Non-reversible contexts	No localization	24 (100%)	24 (100%)	23 (100%)	24 (100%)	95 (100%)
	Localization	0	0	0	0	0 (0%)
Reversible contexts	No localization	3 (18.8%)	7 (43.8%)	10 (62.5%)	13 (81.2%)	33 (51.6%)
	Localization	13 (81.2%)	9 (56.3%)	6 (37.5%)	3 (18.8%)	31 (48.4%)

A Fisher Exact Test was performed to compare the frequency of agent localization in the two contexts and the statistic value is <0.00001. Hence, the result is significant at p<0.01.

In sum, SOV is the most dominant constituent order in simple transitive clauses in non-reversible contexts (82.2%) in SLSL except for a few verbs that also allow SVO. In contrast, the frequency of SOV drops to 57.8% if the referents are semantically reversible. This suggests that semantic reversibility of referents indeed has an effect on the constituent word order and expression strategies adopted by signers in SLSL. The four SLSL signers used a range of strategies to disambiguate potentially ambiguous referents in reversible contexts, including multi-clausal utterances, localization of referents in the signing space, 1st person role shift markers, and a shift to SVO. Individual differences are found with regard to these strategies.

To what extent can these observed differences between reversible and non-reversible contexts be explained in terms of verbal morphology? To what extent do the elicited SLSL data support Generalization Two and Six proposed by Napoli and Sutton-Spence (2014)? Table 2-11 and 2-12 below show how word order interacts with the incorporation of direct object classifiers and spatial modifications of the verbs in the two different contexts.

Table 2-11 Object-classifier incorporation and spatial modification of verbs in non-reversible contexts in SLSL

Word-order patterns	No object-classifier incorporation/ spatial modification	Spatial modification of the verb only	Object-classifier incorporation only	Object-classifier incorporation plus spatial modification of the verb	Total
O-after-V	5	7	1		13
O-before-V, V-final	10	9	24	37	80
Others				2	2
Total	15	16	25	39	95

Table 2-12 Object-classifier incorporation and spatial modification of verbs in reversible contexts in SLSL

Word-order patterns	No object-classifier incorporation/ spatial modification	Spatial modification of the verb only	Object-classifier incorporation only	Object-classifier incorporation plus spatial modification of the verb	Total
Multi-clausal utterances		4		3	7
O-after-V	10	7			17
O-before-V, V-final	9	23	3	5	40
Total	19	34	3	8	64

As shown in Table 2-11 and 2-12, in both contexts, when the object classifiers are incorporated in the verbs, the order is overwhelmingly SOV (24 out of 25, 37 out of 39, 3 out of 3, 5 out of 8). The tendency is particularly evident in non-reversible contexts. When there is spatial modification without any classifier incorporation, post-verbal objects are still preferred, particularly in reversible contexts. Given these observations, we suggest that SLSL elicited

data offer positive evidence for Generalization Two with classifier incorporation and pre-verbal objects having a particularly strong link. When there is neither classifier incorporation nor spatial modifications, objects appear either pre-verbally and post-verbally. Specifically, in the reversible contexts, pre-verbal and post-verbal objects are of more or less the same frequency. Given this observation, we suggest that there is no strong evidence from SLSL to support Generalization Six because in reversible contexts without specific verbal morphology, nearly half of the utterances are still SOV. Taken these observations together, we would like to propose that unlike JakSL, SLSL has a general preference for O-V, and this preference is lessened to some degree when the arguments are reversible in the absence of classifier incorporation, spatial and agreement morphology. In addition, reversibility of arguments leads to multi-clausal utterances and an increase of SVO.

2.4.3. Hong Kong Sign Language (HKSL)

For the non-reversible contexts, nearly 70% of the responses involve no observable sequence of S, V and O within a single clause (Table 2-13).[24] In these utterances, either one or both of the referents are localized in the beginning, followed by a separate clause featuring the transitive verb. Signer K and Signer P make considerable use of SOV as well. Example (21) and (22) provided below illustrate how the same picture stimulus is expressed by a multi-clausal structure and SOV respectively. In both cases, the direct object classifier is incorporated in the verb.

Table 2-13 Constituent-order patterns in non-reversible contexts in HKSL

Patterns observed	Signer B	Signer C	Signer K	Signer P	Total	
multi-clausal expressions without showing the order of O relative to S and V within a single clause	18	21	14	13	66	(68.8%)
SOV	1	1	5	6	13	(13.5%)
SVO/VO	1	1	1	1	4	(4.2%)
topic O, SV	3	1	2	1	7	(7.3%)
SVOV[25]	1			2	3	(3.1%)
Others:						
• SOSV			2		2	(2.1%)
• SV				1	1	(1.0%)
Total	24	24	24	24	96	68.8%

Example (21)

CAR CL [=car _be_located_] MAN CL [=stand] CL [=wash car]

"A car is here. A man is next to it. (He) washes the car." (multi-clausal, HKSL)

| CAR | CL [=car _be_located_] | MAN | CL [=stand] | CL [=wash car] |

Example (22)

MAN CAR CL [=wash car]

"A man washes a car." (SOV, HKSL)

| MAN | CAR | CL [=wash car] |

There are a number of other observed patterns, each with a few tokens. Example (23) shows a sentence with a topicalized object which was marked with brow raise and head tilting forward:

Example (23)

WINDOW GLASS WINDOW IX [=that] FEMALE CLEAN

"A girl is cleaning a window." (OSV, HKSL)

| WINDOW | GLASS | WINDOW | IX [=that] | FEMALE | CLEAN |

Similar to the non-reversible contexts, the vast majority of the responses in the reversible contexts in HKSL involve no observable sequence of S, V and O within a single clause, as shown in Table 2-14.[26)] In Example (24), the signer set up the loci of the two referents in space by using classifier predicates in the first two clauses. In the third clause, the subject and the target agreement verb are used.

Table 2-14 Constituent-order patterns in reversible contexts in HKSL

Patterns observed	Signer B	Signer C	Signer K	Signer P	Total
Multi-clausal expressions without showing the order of O relative to S and V within a single clause	16	16	13	14	59 (92.2%)
SVO			2	1	3 (4.7%)
SVOV (same verb)				1	1 (1.6%)
SOSV			1		1 (1.6%)
Total	16	16	16	16	64

Example (24)
BOY (MALE^CHILD) CL [=stand], OLD FEMALE CL [=two-persons stand], IX [=boy]
HUGₚ
"A boy stands here. An old woman stands next to him. He hugs (her)." (multi-clausal, HKSL)

| BOY (MALE^CHILD) | CL [=stand] | OLD | FEMALE |

CL [=two-persons stand]   IX [=boy]   HUGₚ

Three instances of SVO are found, and they all involve verb agreement (Example (25)):

Exampe (25)
MOTHER SCOLDₚ   IX [=that] SON
"Mother scolds the son." (SVO, HKSL)

MOTHER   SCOLDₚ   IX [=that]   SON

Similar to JakSL, there is not even a single instance of SOV in the reversible contexts in HKSL. This suggests that SOV is indeed disfavored when referents are semantically reversible. On top of that, we observed two instances of 1ˢᵗ person pronouns used as overt role shift markers in the reversible data, as in Example (26).

Example (26)

MAN CL [=stand] IX [=I] WOMAN IX [=I] $_a$PUSH$_p$

"A man stands here. I am a woman. I push (him)." (multi-clausal, HKSL)

| MAN | CL [=stand] | IX [=I] | WOMAN | IX [=I] | $_a$PUSH$_p$ |

In sum, in HKSL, signers frequently localize referents in space in both contexts. In reversible contexts, such use of space appears to be a crucial tool for disambiguating the referents. Word order is less relied on in HKSL for distinguishing agents from patients (or grammatical relations) when compared to JakSL and SLSL. However, semantic reversibility indeed leads to avoidance of SOV, as in JakSL.

Table 2-15 and 2-16 show the interaction of verbal morphology with the positions of objects and verbs in the non-reversible and reversible contexts:

Table 2-15   Object-classifier incorporation and spatial modification of verbs in non-reversible contexts in HKSL

Word-order patterns	Spatial modification of the verb only	Object-classifier incorporation only	Object-classifier incorporation plus spatial modification of the verb	Total
Multi-clausal utterances	2	6	58	66
O-after-V	4		3	7
O-before-V		2	20	22
Others			1	1
Total	6	8	82	96

Table 2-16   Object-classifier incorporation and spatial modification of verbs in reversible contexts in HKSL

Word-order patterns	Spatial modification of the verb only	Object-classifier incorporation plus spatial modification of the verb	Total
Multi-clausal utterances	45	14	59
O-after-V	4		4
O-before-V	1		1
Total	50	14	64

As shown in Table 2-15 and 2-16, when object classifiers are incorporated in the verbs, the majority of them occur in multi-clausal utterances or O-V sequences. Only four tokens of post-verbal objects are found in the reversible contexts. There are fifty-six tokens of verbs with spatial modifications with agreement/spatial verbs without classifier incorporation in the two contexts, and only one involves a preverbal object. Hence, we would like to conclude

that Generalization Two by Napoli and Sutton-Spence is supported by the classifier data but not agreement/spatial verb data in HKSL. Since there are no instances of verbs without either type of verbal morphology, there is no data to verify if Generalization Six by Napoli and Sutton-Spence holds in HKSL.

2.5. Discussion and Conclusive Remarks

Given the findings of the three sign languages discussed above, what can we say about the effect of semantic (non-)reversibility and verbal morphology on surface constituent orders?

In JakSL, semantic reversibility of agents and patients results in different differentiation strategies across signers. Some signers resort to a stronger adherence to SVOV or SVO. Some adopt a spatial anchoring of the referents followed by the use of classifier predicates and agreement verbs. First-person pronoun is sometimes used as an overt role shift marker. SOV is avoided entirely, and there is a notable increase of localization of referents, particularly agents, in the signing space to disambiguate the referents. Given these observations, we would like to argue that the semantic reversibility of agents and patients is regarded as having a noticeable effect on word order and expression strategies in JakSL. Individual variations are observed in SLSL. Except for one signer, reversibility of the referents does not result in a marked increase of SVO. SOV remains predominant across both contexts. Overall speaking there is a significant increase of agent localization across signers, but only one signer adopted multi-clausal structures to express a reversible event. Overt 1st person role shift is occasionally used. Based on these observations, we may conclude that while SOV remains the dominant word order in both contexts in SLSL, semantic reversibility has a notable effect on the expression of transitive events – some signers resort to the use of space to avoid ambiguity, some adopt multi-clausal structures, and some would turn to SVO. Hence, instead of positing a direct link between semantic reversibility and SVO, it is actually more appropriate to argue that semantic reversibility of referents creates a pressing need for signers to differentiate agents from patients. A range of options are available at the signers' disposal, and adherence to SVO is only one of these means chosen by some rather than all signers. For HKSL, we observed no dominant word order in either context. Signers frequently assign loci to the referents in both contexts, which becomes an important means to disambiguate the referents. Since HKSL signers avoid SOV in reversible contexts, we can interpret the absence of SOV as an indicator that this order is potentially confusing in reversible contexts. Hence, there is still some effect of the semantic reversibility on word-order options, however indirect it is. Overall speaking, our findings here suggest that semantic reversibility of agent and patient referents have a varying degree of effect on the constituent order in SLSL, JakSL and HKSL. However, the effect takes a variable form within and across sign languages.

Regarding the noisy-channel hypothesis proposed by Gibson *et al*. (2013), our data provide support to some but not all of its predictions. According to this hypothesis, language users adopt SOV as the default word order, but shift to SVO in semantically reversible contexts, unless additional clues such as case/agreement markings in spoken languages or use of space in gestural representation are present. In our data, only the SLSL signers show

a strong adherence to SOV in non-reversible contexts. In JakSL, SOV is acceptable in non-reversible contexts but it only accounts for 26% of the data. However, reversible data from JakSL and HKSL do show a noticeable avoidance of SOV, which is in line with the noisy-channel hypothesis. On the other hand, there is only a slight shift to SVO in the JakSL and Sri Lankan reversible data, providing partial support to the prediction made by the hypothesis. However, we did not observe an obvious link between the use of locative/agreement markings and the retention of SOV in reversible contexts.

With regard to the role of verbal morphology in determining word order in sign languages, the evidence from elicited data in the three sign languages are inconclusive. Generalization Two proposed by Napoli and Sutton-Spence (2014) states that "if an argument affects the phonological shape of the V, it precedes V" (2014: 3). In all three sign languages, when the direct object classifiers are incorporated into the verbs, objects precede the verbs in the vast majority of cases, thus providing supportive evidence to this generalization. However, agreement/spatial affixations without classifiers do not always result in a verb-final construction in HKSL and JakSL. Hence, overall speaking, Generalization Two is only partially confirmed in our data. On the other hand, Generalization Six by Napoli and Sutton-Spence (2014) states that "in reversible sentences with plain verbs, SVO is favored" (2014: 5). We don't have relevant data from HKSL to verify it. Supportive evidence is found only in JakSL but not SLSL. Given this, we would like to argue that more typological data are needed to verify these two generalizations, and that verbal morphological cannot fully explain the word-order patterns we have so far observed in the three sign languages.

In our data we observed some interesting phenomena that warrant further investigations. First, in both SLSL and JakSL, significant individual variations are observed in their constituent-order preferences. Since we have analyzed only a small amount of data, and have only four signers for each sign language in our study, it is not entirely clear at this stage what underlies these individual variations, and how extensive these variations are in the respective deaf communities. The existence of constituent-order variations has not yet been dealt with in detail in the literature, though we believe that this probably can be found in other sign languages as well. Such individual variations have a far-reaching implication concerning the typological status of constituent order of sign languages, and needs to be investigated in more depth if one would like to find out what the basic word order is in a sign language. A large data pool is certainly needed to find out how verb types may influence surface constituent orders. Another noteworthy observation is that all three Asian sign languages appear to have similar devices at their disposal for disambiguating referents (word order, initial localization of referents, 1st person role shift markers, classifier predicates, verb agreements, etc.), but they differ in how frequently these devices are employed. Whether these strategies are indeed universally available for disambiguating grammatical relations, and whether sign languages exhibit quantitative rather than qualitative differences in the adoption of these strategies, would be a possible future research direction.

Our study is limited in several ways. The analysis is only based on elicited data, which are useful for eliciting targeted verbs and contexts but may not fully reflect how the language is used in real, authentic discourse. In future studies, discourse data, such as conversations and narratives, should be included. Due to limited time and resources, only four signers

were invited for each sign language. A larger pool of data from more informants would be needed for a future study. Furthermore, our design of the experiment did not impose a strict control on the degree of transitivity involved in the verbs, and we need to look into the interaction of the animacy of the referents and reversibility of the contexts. These factors may potentially affect the word-order patterns, and more research is needed to find out if this is the case in sign languages.

Notes

1) This research was supported by the General Research Fund of the Research Grant Council, Hong Kong SAR Government (Project title: Basic Word Order in Asian Sign Languages: A Cross-Linguistic Perspective, Ref.: 450113).

2) This chapter will not directly address what is the basic word order in these sign languages. In the literature, several criteria have been proposed for identifying the basic word order in a language. These include frequency of occurrence, the word order in simple declarative clause with no complex words, the order with the least morphological markings, and the order used in pragmatically neutral contexts. This chapter only analyzes elicited data from the three sign languages in question, and as such does not provide sufficient data for determining the basic word orders using these criteria. Hopefully, the findings of this chapter will provide a point of departure for further analysis of word-order phenomena in these languages.

3) In the earliest discussion of word order in ASL, researchers held an implicit assumption that the agent in a transitive clause is by default the grammatical subject, and the patient the grammatical object. Some subsequent researchers deliberately avoided the notions of 'subject' and 'object' due to the fact that the two grammatical concepts may be hard to pin down despite their long-standing usage in the literature. We are fully aware of the controversies concerning the universality of these two notions. However, to facilitate our discussion of the original proposal by Fischer on semantic (non-)reversibility, and to help readers relate our findings to the typology literature on basic word order, we decide to follow Vermeerbergen *et al*. (2007), Johnston *et al*. (2007) and Kimmelman (2012) in using S to stand for the most agent-like argument, and O for the patient-like argument.

4) Liddell did not use the term 'classifier' in his analysis, because when his study was published the notion of classifiers in sign language literature was not yet established. In his writing, he said SOV was permissible when the handshape representing an object became part of the final verbal predicate. From his description it is apparent that he had in mind what we currently call "classifiers" in the literature.

5) Topicalization is usually more frequent in discourse data because it is mostly motivated by pragmatic factors. Since the analysis in this chapter is based on elicited short sentences, topicalization will not be our focus here, though their occurrences will also be noted in our data coding.

6) Note that recent literature suggests that agreement verbs tend to occur sentence-finally. This is different from Kegl's earlier claim that verbs with agreement features allow freer word order in ASL.

7) Several recent studies (e.g. Kocab, Lam and Snedeker 2017; Meir et al. 2017) proposed that the animacy of referents outweighs semantic reversibility in the determination of word-order alternation.

Kocab *et al.* (2017) argued that the observed avoidance of SOV order in gesture production in events that include animate agents and patients is actually driven by animacy of the participants rather than reversibility of the event. Meir *et al.* (2017) argued that the saliency of the arguments in terms of their human/animacy properties is a major factor in determining word order. Since the stimuli in our current study were designed to evaluate semantic reversibility rather than animacy, this issue will not be further addressed here and we will leave it for future research.

8) Table 2-1 shows the intended meanings conveyed by the picture stimuli. However, some signers responded to the pictures by using non-target nouns and verbs. Reponses with non-target nouns were included in the analysis (e.g. signing FATHER instead of BOY). However, responses without the target verbs will be excluded because the target verbs are crucial for conveying semantic (non-)reversibility. The signing examples presented later in this chapter were based on the actual productions of the signers which may not fully match the original stimuli.

9) Native signers born to deaf signing parents are difficult to find in Jakarta. We made an extensive search through our local deaf organization network and could only identify two suitable signers (Signer L and Signer An) for this chapter. The two near-native signers are fluent users who started to learn sign language when they entered a deaf primary school (Signer Ab and Signer P).

10) One non-reversible stimulus (A girl is look at a painting) failed to elicit the target verb from one signer. He only described the painting on the wall. Hence, the total number for non-reversible sentences for JakSL is only 95. For the reversible contexts, one signer failed to produce the target verb 'scold' for the stimulus 'A woman is scolding a man'. Hence the total number of valid responses is 63 instead of 64.

11) When classifying the order patterns, we assumed that instances of OV and VO without an overt subject within the same clause would constitute evidence in favor of SOV (unless the O is marked with a non-manual topic marker) and SVO respectively. For the OV data reported here, the objects were not accompanied with any potential markers for topicalization (e.g. accompanying brow raise or head tilt; followed by a blink or pause). There are two instances of SVO with the objects being a subordinate clause. Both involve the verb SEE with the sentences meaning 'A boy/girl saw a girl/boy walking on the street' (i.e. reversible contexts 15 and 16).

12) There has been no systematic analysis of topic markings in Jakarta Sign Language. Previous studies in other sign languages usually suggest that topics can be optionally marked with brow raise, head tilt and followed by a blink. A more in-depth analysis, particularly of discourse data, is warranted if one wants to confirm whether these non-manual markers serve a topic-marking function.

13) In the literature, these multi-clausal utterances are known as "split sentences" (Volterra et al. 1984; Johnston et al. 2007). Typically, the initial clauses are used for setting up the location of the referents in the signing space, and the last clause is the target predicate. We prefer to use the more neutral label "multi-clausal utterances," without an a priori assumption that the expressions have undergone a splitting process.

14) Among the 13 instances of multi-clausal expressions produced by JakSL signers in non-reversible contexts, 10 involved the signer mentioning the patient before the agent (or entities performing the action) in the clauses preceding the final verbal predicate.

15) In Example (9), the subscript "p" represents verb agreement with the patient referent. Agreement with the agent referent is represented by the subscript "a," as in Example (10).

16) In Example (10), the patient was mentioned before the agent. Among the 29 instances of multi-clausal expressions in JakSL reversible context, 17 instances involve signers mentioning patients before agents. In the remaining 12 instances, the agent was mentioned first.

17) Here the utterance is analyzed as two separate clauses because there is a noticeable pause and blink after gesture [=look at].

18) Since this chapter investigates the relative order of S, O, and V in simple transitive clauses, we would not consider other types of incorporated classifiers, e.g. locatives/instruments.

19) Signer N failed to produce the target verb in one of the non-reversible contexts.

20) All of the SVOV/SVOVOV involve repetition of the same verbs.

21) The other verbs were KICK, CARVE, CUT, PAINT and STACK-UP, each with one or two instances.

22) There were two signs with the meaning of SEE/LOOK/WATCH – a C-handshape variant and a V-handshape variant. Both are agreement verbs and can be accompanied with a path movement that indicates the direction of seeing. There seems to be a stronger tendency to use the V-variant when the patient referent is a human. Both verbs can be expressed in SOV, or SVO/SVOV.

23) Among the 7 instances of multi-clausal expressions provided by Signer A for reversible contexts, 6 involved him mentioning the agent first in the clauses preceding the final verbal predicate.

24) Among the 66 instances of multi-clausal expressions in non-reversible contexts in HKSL, the majority (58 out of 66) involve mentioning the patient before the agent in the clauses preceding the final predicate.

25) Among the three instances of SVOV, two involve repetition of the same verb. The third one consists of CL [=paint] and CL [=paint the brick wall], with the second verb incorporating the classifier for bricks.

26) Among the 59 instances of multi-clausal expressions in reversible contexts in HKSL, 34 involved the agent being mentioned before the patient in the clauses preceding the final verbal predicate.

References

Bø, V.
    2010   Verb Sandwich Constructions in Norwegian Sign Language: A Syntactic Analysis. MA thesis, University of Oslo, Oslo.

Engberg-Pedersen, E.
    1993   *Space in Danish Sign Language: The Semantics and Morphosyntax of the Use of Space in a Visual Language*. Hamburg: Signum.

Ergin, R., I. Meir, D. Ilkbaşaran, C. Padden, and R. Jackendoff
    2018   The Development of Argument Structure in Central Taurus Sign Language. *Sign Language Studies* 18(4): 612−639.

Fischer, S.
    1974   Sign Language and Linguistic Universals. In N. Ruwet and C. Rohrer (eds.) *Actes du Colloque Franco-Allemand De Grammaire Transformationale, Band II: Étude De Semantiques et Autres,* pp. 187−204. Tübingen: Niemeyer.
    1975   Influences on Word Order Change in American Sign Language. In C. Li (ed.) *Word Order and Word Order Change,* pp. 3−25. Austin, TX: University of Texas Press.

2014   Constituent Order in Sign Languages. *Gengo Kenkyu* 146: 1–12.

Fischer, S. and W. Janis

1990   Verb Sandwiches in American Sign Language. In S. Prillwitz and T. Vollhaber (eds.) *Current Trends in European Sign Language Research*, pp. 279–293. Hamburg: Signum Verlag.

Gibson, E., S. Piantadosi, K. Brink, L. Bergen, E. Lim, and R. Saxe

2013   A Noisy-channel Account of Crosslinguistic Word-order Variation. *Psychological Science* 24(7): 1079–1088.

Hall, M., D. Ahn, R. Mayberry, and V. Ferreira

2015   Production and Comprehension Show Divergent Constituent Order Preferences: Evidence from Elicited Pantomime. *Journal of Memory and Language* 81: 16–33.

Hall, M., V. Ferreira, and R. Mayberry

2014   Investigating Constituent Order Change with Elicited Pantomime: A Functional Account of SVO Emergence. *Cognitive Science* 38(5): 943–972.

Hall, M., R. Mayberry, and V. Ferreira

2013   Cognitive Constraints on Constituent Order: Evidence from Elicited Pantomime. *Cognition* 129(1): 1–17.

Jantunen, T.

2008   Fixed and Free: The Order of the Verbal Predicate and Its Core Arguments in Declarative Transitive Clauses in Finnish Sign Language. *SKY Journal of Linguistics* 21: 83–123.

Johnston, T., M. Vermeerbergen, A. Schembri, and L. Leeson

2007   Real Data Are Messy: Considering Cross-linguistic Analysis of Constituent Ordering in Auslan, VGT, and ISL. In P. Perniss, R. Pfau, and M. Steinbach (eds.) *Visible Variation: Comparative Studies on Sign Language Structure*, pp. 163–206. Berlin: De Gruyter Mouton.

Kegl, J.

1976   Relational Grammar and American Sign Language. Unpublished manuscript, MIT, Cambridge, MA. [It was published in 2004, Sign Language & Linguistics 7(2): 131–170.]

1977   ASL Syntax: Research in Progress and Proposed Research. Unpublished manuscript, MIT, Cambridge, MA. [It was published in 2004, Sign Language & Linguistics 7(2): 173–206.]

Kimmelman, V.

2012   Word Order in Russian Sign Language. *Sign Language Studies* 12: 414–445.

Kocab, A., H. Lam, and J. Snedeker

2017   When Cars Hit Trucks and Girls Hug Boys: The Effect of Animacy on Word Order in Gestural Language Creation. *Cognitive science* 42(3): 918–938.

Leeson, L. and J. Saeed

2012   Word Order. In R. Pfau, M. Steinbach, and B. Woll (eds.) *Sign Language: An International Handbook*, pp. 245–264. Berlin: De Gruyter Mouton.

Liddell, S. K.

1980   *American Sign Language Syntax*. The Hague: Mouton.

2003   *Grammar, Gesture, and Meaning in American Sign Language*. Cambridge: Cambridge University Press.

Massone, M. I. and M. Curiel
    2004   Sign Order in Argentine Sign Language. *Sign Language Studies* 5: 63‒93.

Matsuoka, K.
    2000   The Lexical Verb Sandwich in American Sign Language and the Hybrid Feature. In R.
          Daly and A. Riehl (eds.) *The Proceeding of Eastern States Conference on linguistics
          (ESCOL) 99,* pp. 142‒148. Storrs: Cornell University.

Meir, I., M. Aronoff, C. Börstell, S-O. Hwang, D. Ilkbasaran, I. Kastner, R. Lepic, A. Lifshitz
Ben-Basat, C. Padden, and W. Sandler
    2017   The Effect of Being Human and the Basis of Grammatical Word Order: Insights from
          Novel Communication Systems and Young Sign Languages. *Cognition* 158: 189‒207.

Meir, I., A. Lifshitz, D. Ilkbasaran, and C. Padden
    2010   The Interaction of Animacy and Word Order in Human Languages: A Study of Strategies
          in a Novel Communication Task. In A. D. M. Smith, M. Schouwstra, B. de Boer, and K.
          Smith (eds.) *The Evolution of Language: Proceedings of the 8ᵗʰ International Conference
          (EvoLang8)*, pp. 455‒456. Singapore: World Scientific Publishing.

Milković, M., S. Bradarić-Jončić, and R. Wilbur
    2007   Information Status and Word Order in Croatian Sign Language. *Clinical Linguistics and
          Phonetics* 21: 1007‒1017.

Minoura, N.
    2008   Word Order in Malagasy Sign Language (TTM). *Area and Culture Studies* 77: 47‒69.
    2012   More on Word Order in Malagasy Sign Language (TTM). *Area and Culture Studies*
          84:159‒184.

Nakanashi, K.
    1994   The Influence of Japanese Word Order on Japanese Sign Language. In M. Brennan and
          G. Turner (eds.) *Word-order Issues in Sign Language*, pp. 171‒192. Durham: International
          Sign Linguistics Association.

Napoli, D. J. and R. Sutton-Spence
    2014   Order of the Major Constituents in Sign Languages: Implication for All Language. *Frontiers
          in Psychology* 5: 376. DOI: 10.3389/fpsyg.2014.00376

Oviedo, R. de A.
    2001   *Apuntes Para una Gramática de la Lengua de Señas Colombiana.* Cali: Universidad del
          Valle/ INSOR.

Padden, C.
    1983   Interaction of Morphology and Syntax in American Sign Language. Ph.D. dissertation,
          University of California, San Diego. [It was Published as Padden, C. (1988) *Interaction
          of Morphology and Syntax in American Sign Language*. New York and London: Garland
          Publishing, Inc.]

Quadros, R.
    2003   Phrase Structure of Brazilian Sign Language. In A. Baker, B. van den Bogaerde, and O.
          Crasborn (eds.) *Cross-linguistic Perspectives in Sign Language Research: Selected Chapters
          from TISLR 2000*, pp. 141‒161. Hamburg: Signum Press.

Sutton-Spence, R. and B. Woll
    1999   *The Linguistics of British Sign Language: An Introduction*. Cambridge: Cambridge

University Press.

Sze, Y. B. F.

2003   Word Order of Hong Kong Sign Language. In A. Baker, B. van den Bogaerde, and O. Crasborn (eds.) *Cross-linguistic Perspectives in Sign Language Research: Selected Chapters from TISLR 2000*, pp. 163–191. Hamburg: Signum Press.

Vermeerbergen, M., M. Van Herreweghe, P. Akach, and E. Matabane

2007   Constituent Order in Flemish Sign Language (VGT) and South African Sign Language (SASL): A Cross-linguistic Study. *Sign Language and Linguistics* 10: 25–54.

Volterra, V., A. Laudanna, S. Corazza, E. Radutzky, and F. Natale

1984   Italian Sign Language: The Order of Elements in the Declarative Sentence. In F. Loncke, P. Boyes Braem, and Y. Lebrun (eds.) *Recent Research on European Sign Language*, pp. 19–46. Lisse: Swets & Zeitlinger B. V.