Sign languages and second language acquisition research: An introduction

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ABSTRACT

In recent years there has been a growing interest in sign second language acquisition (SSLA). However, research in this area is sparse. As signed and spoken languages are expressed in different modalities, there is a great potential for broadening our understanding of the mechanisms and the acquisition processes of learning a (second) language through SSLA research. In addition, the application of existing SLA knowledge to sign languages can bring new insights into the generalizability of SLA theories and descriptions, to see whether they hold true for sign languages. In this paper I give a brief overview of sign language and SSLA research, together with insights from the research on iconicity and gestures and its role for SSLA, including examples from my own studies on L2 signers. The paper concludes with a discussion of both the potential and challenges of combining sign language and SLA research, providing some notes towards directions for future research.

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1. INTRODUCTION

The possibility of learning a sign language (SL) has, in some countries, expanded in recent decades. In my country, Sweden, there are many opportunities for a hearing individual, often with no previous experience with deaf people or an SL, to learn Swedish Sign Language, *Svenskt teckenspråk* (STS) as a foreign/second language (L2) for various purposes, many times with the aim to become an SL interpreter. In Sweden the advent and growth of STS linguistic research in the 1970s contributed to a greater understanding of and attention to STS as a language of its own, with the first official recognition of STS as the language of the deaf in Sweden in 1981 (e.g., Haualand & Holmström, 2019). Parallel with the advancements related to accessibility for services directed to the deaf and hard-of-hearing population (e.g., the right to use SL interpreters), the new and increased knowledge of STS provided an impetus which led to a number of STS as L2 programs (e.g., SL and interpreting programs, parental SL programs) and other courses throughout Sweden (Nilsson & Schönström, 2014). The development of sign L2 programs is crucial for increased equality in a society that involves both deaf and hearing people. The output of skilled L2 signers is crucial in order to overcome the communication barriers between hearing and deaf people. This includes SL interpreters, teachers of the deaf and ultimately, hearing parents who need to learn an SL in order to be able to communicate with their deaf children.

Despite the relatively long tradition of SL as L2 education in Sweden and many other countries, there is almost no research regarding the learning or acquisition of an SL, especially within the theoretical frameworks in second language acquisition (SLA). At the same time, the field of SL as an L2 has in the past decade been booming, as the burgeoning publication rate for the area shows. There is now a variety of research related to L2 signers within areas including language teaching and learning, language acquisition and neurolinguistics. However, the overall body of research on L2 signers from a developmental perspective is still in its infancy. To date, very few studies on L2 signers have considered the learners' interlanguages during development. Research on sign second language acquisition (SSLA) is crucial not only for theory to inform practice (i.e., transition of essential knowledge from sign L2 research to sign L2 teaching), but ultimately to making teaching more effective. It also has the potential to inform SLA research more generally, as well as SL research, through studies on an L2 that operates in a different modality (i.e., the visual modality and whether this learning process is the same as learning a spoken L2).

The aim of this paper is to present a contemporary introduction to existing research on SSLA. This will be framed in the context of some areas of SLA, specifically crosslinguistic influence or transfer and in research on gestures and iconicity. First, I will provide a brief and general overview of SL research in order to present some key issues for readers unfamiliar with the area. As it is not possible to give a full overview of the area, I will only include findings of relevance for this paper. Thereafter, I will provide a comprehensive overview of the current status of SSLA research. The paper will end with a discussion of some possible benefits and challenges of combining SL and SLA research, as well as some notes on directions for future research.

2. SL RESEARCH – A BRIEF OVERVIEW

A common belief among many people is that there is only one SL used in the world and that SL is international. In fact, just like spoken languages, there are a number of natural SLs. According to Glottolog (Hammarström et al., 2020), there are 135 deaf SLs, that is native SLs used by deaf communities. Some countries also have more than one SL. For example, in Finland, there are two: Finish SL and Finland-Swedish SL.

Fundamentally, in comparison to spoken languages, research on SLs is young and relatively undeveloped. The first linguistic description of an SL, American Sign Language (ASL), came in 1960 with William Stokoe's Sign Language Structure (see McBurney, 2012, for an overview). But it was not until the 1970s that the field really emerged, and several SLs were described by linguists. In particular, research on STS began in 1972.

At the advent of sign linguistics research, it was crucial to acknowledge the linguistic status of SLs as fully-fledged human languages, upending earlier assumptions that SLs were not real languages. In order to do so, sign linguists worked with finding similarities with spoken

languages. Using existing linguistic theories (that were based on spoken language data), they provided descriptions and examples of phonology, morphology and syntax in SLs. That provided evidence that SLs were real languages just like spoken languages, despite the modality difference (McBurney, 2012). This later moved to a liberation from linguistic theories based on spoken languages, to more focus on studies on SL-specific aspects such as the role of non-manuality and signing space for linguistic information. The current research has been characterized by investigations on variation within and across SLs, cross-linguistic studies and comparisons and research on emerging SLs and rural SLs. This scholarship also includes development and construction of different SL corpora. In parallel with sign linguistic research, scholarship has grown in other disciplines too, especially psycholinguistic and neurolinguistic studies on SL acquisition and research on SLs in various contexts (e.g., education, social sciences, anthropology, deaf studies and health). One of the most important outcomes from SL acquisition research is the fact that there is evidence that there is a parallelism with regard to early first-language (L1) child development for signed and spoken languages (i.e., languages share similar linguistic milestones, regardless of modality; Chen Pichler, 2012, for an overview).

2.1. STRUCTURE OF SLS

Findings from sign linguistics research have identified many fundamental similarities between signed and spoken languages regarding basic linguistic structure. Fundamental shared elements include certain linguistic properties, such as vocabulary and grammar, and linguistic categories such as phonology, morphology and syntax. Certainly, there are some differences too. The most obvious difference lies in the modalities of perception and production. While spoken languages are oral-aural (i.e., based on sound), SLs are gestural-visual (i.e., based on vision). This has clear implications for the linguistic structure.

Meier (2002) discusses the effects and non-effects of modality on linguistic structure and provides suggestions of linguistic similarities and differences between spoken and signed languages, some of which are listed in *Table 1*.

SIMILARITIES	DIFFERENCES
Conventional vocabularies	Features of the articulators
Sub-lexical level	Perception mode
Productivity	Iconicity and gesture
Syntactic structure	Age and documentation
Acquisition milestones	
Brain lateralization	

Table 1 Some similarities and differences between spoken and signed languages.

SLs and spoken languages have conventional vocabularies that are built on units below the level of meaning (i.e., phonology). While vocabularies of spoken languages are based on a particular combination of particular sounds (that differ for different languages), the vocabularies of SLs are based on a combination of, in general, three manual parameters: Location (where on the body the signs are performed), hand configuration (the shape and orientation of the hand) and movement (how the hand(s) moves in relation to the body). These three parameters are virtually counterparts to spoken languages' phonemes, in the sense that changing the form (i.e., the phoneme) in any of the parameters would change the meaning of the sign. Through the principle of phonological minimal pairs, one of the parameters can differ in order to distinguish signs in phonological organization. *Figure 1* shows the phonological organization of the STS signs BAD, CLOSE and SCHOOL.[1] In the pair BAD and CLOSE, the handshape parameter differs between the signs, using a flat hand for BAD and a point hand for CLOSE. In comparison, the pair BAD and SCHOOL differs in the hand orientation parameter: BAD comes with palm down orientation, whereas SCHOOL comes with palm up orientation. If we compare SCHOOL with

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1   Following the standard for linguistic description and glossing of signs in sign languages, all signs are capitalized with corresponding meaning written in any language. Typically, STS signs are written with corresponding Swedish words. However, here I have written those directly in English to simplifier the reading of the text.

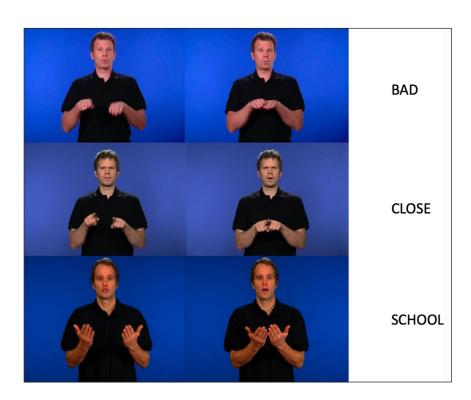CLOSE, two sub-parameters of the hand configuration differ (handshape and hand orientation), and thus there is a greater difference between these signs phonologically compared to the two pairs described above.

With regard to productivity, SLs do establish and construct new signs in different ways following basically the same principles as spoken languages, as, for example, through loaned signs from other SLs or signs derived from spoken languages. For instance, compound signs are often borrowed from spoken languages. One example in STS is the sign for 'blueberry' which consists of the compounding of signs BLUE and BERRY based on the Swedish word *blåbär,* hence the STS sign *BLÅBÄR*. Furthermore, some researchers have described SLs as having different lexical categories, consisting of lexical and partly lexical signs as part of the vocabulary (Johnston & Schembri, 2010). A lexical sign basically corresponds to the notion of word in spoken languages. For example, with CAR for 'car', the citation of the sign CAR has a definite meaning independent of context. These are typical dictionary entries. However, there are also signs that get their meaning depending on context (i.e., partly-lexical signs). Johnston and Schembri (p. 32) describe these signs as "though conventionalized at the level of the meaningfulness of their components, do not have associated with them a meaning which is additional to or unpredictable from the value of those components when the sign is produced and used in various contexts." Depicting signs are an example of such signs, which are a prominent feature in SLs. Depicting signs (or classifiers) have been the subject of intensive debate and different labels in SL research. The fundamental issue is that depicting signs often function as verbs to describe handling, entities or specifying size or shape. They are often somewhat inconsistent in form, so the meanings of the use of depicting signs are highly contextualized.

Figure 1 Phonological organization of the lexical signs BAD, CLOSE and SCHOOL (images from Swedish Sign Language Dictionary, teckenspråkslexikon.su.se).
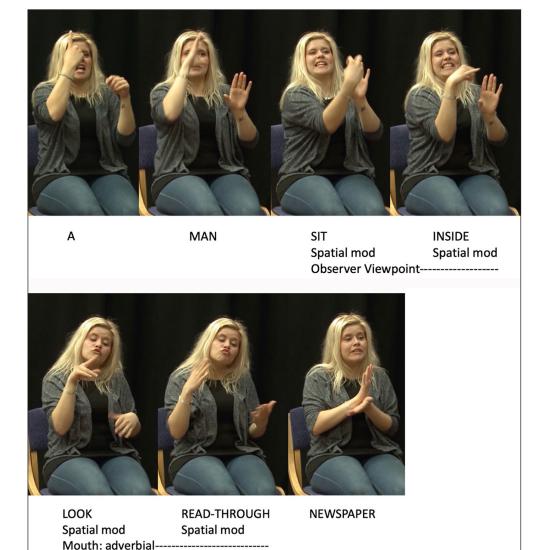
Morphosyntactic structure in SLs is a particularly interesting and complex area, widely examined and discussed within sign linguistics. The key issue relates to the fact that articulators of SLs use the space in front of and around the signer to create reference and meaning and to contribute to morphosyntactic structure. The description of this area depends on one's theoretical point of departure (i.e., whether one has a formal or a cognitive/functional approach). Regardless of theoretical preference, though, the spatial use of SLs is seen as a core element in SL grammar, as an outcome of the modality effect. In order to mark grammatical information such as person, number or aspect, signs can be modified in the signing space (see, for example, Perniss, 2012; Sandler & Lillo-Martin, 2006). Also, signs can be placed differently in the signing space in order to provide referential information such as location of the referent. For example, the sign

SIT in *Figure 2* is modified spatially in order to mark the location of a referent in the utterance ('a man') and its position from the observer's perspective. First, the orientation of the sign has been modulated from forward direction to inward direction, signaling that the referent is sitting in opposition to the observer's perspective. Also, the sign SIT is modulated to a higher position on the location parameter to mark the higher position of the referent in relation to the observer. The predicated LOOK and READ-THROUGH is modulated aspectually, through reduplication of the LOOK and READ-THROUGH to mark a continuous situation in this utterance. It is important to note the simultaneous use of the adverbial mouth action, which contributes to gradual marking. Sign space is also used for semantic and pragmatic purposes and for discourse cohesion. For example, space is a critical component for text cohesion and structure (Perniss, 2012). Another specific structure of SL related to the use of sign space is the use of perspectives or viewpoints, often labeled 'constructed action' (Quinto-Pozos & Parrill, 2015; Cormier et al., 2015). This component is especially prominent in narratives, in which the signer adopts the viewpoint of a character or an observer during the narrative and consequently uses the body, face and/or the hands in order to portray different information (e.g., the actions or reactions of the character in the narrative, or describing events from an observer's viewpoint). Similar devices can also be found in co-speech gestures in speakers of spoken languages (Quinto-Pozos & Parrill, 2015). However, while those gestures are optional in spoken languages, they are conventionalized in SLs (Perniss et al., 2015).

Figure 2 Example of an STS utterance performed by an L1 signer that is sequential and simultaneous expressing 'A man was sitting inside the house reading a newspaper'. Data and images from Swedish Sign Language L2 Corpus (Schönström & Mesch, 2018).

2.2. ICONICITY IN SPOKEN AND SIGN LANGUAGES

A prominent and common part of all languages is the relation between form and meaning (i.e., the degree of arbitrariness). It is often said that SLs are highly iconic compared to

spoken languages (Ortega, 2017). According to Dingemanse et al. (2015, p. 604), iconicity is "the resemblance-based mapping between aspects of form and meaning" and it relies on "which aspects of the form and meaning of words are related by means of perceptuomotor analogies." In other words, something in the meaning of a word or sign motivates the form of a word or sign. Iconicity appears not only on the lexical level but also in the structure, such as in phonology and morphology. In spoken languages there are, for example, onomatopoetical words that are motivated by sounds (e.g., the sounds of animals). In contrast, SLs are merely visually motivated (e.g., the forms of signs can depict any aspect of an entity or handling). There are degrees of iconicity (i.e., level of transparency between form and meaning). The meaning of some signs is easily recognizable for the observer (i.e., they have a high degree of perceived/perceptual similarity between form and meaning — absolute iconicity), while some signs may be recognizable first upon further analysis and explanation — relative iconicity (Dingemanse et al., 2015; Ortega, 2017). To illustrate, the signs CLOSE and SCHOOL in *Figure 1* are iconic in the way the movement of CLOSE represents the distance of 'close' and SCHOOL, which is phonologically similar or close to another relative sign READ, represents 'reading' (i.e., refereeing to a book on table in front of the signer). Thus, there is a motivation for the phonological organization of these signs (i.e., transparency between the signs' form and meaning). BAD, however seems to be relatively arbitrary due to its non-transparent mapping between form and meaning. Thus, the modality of SL actually allows for a higher transparency between the sign and its meaning. Iconicity has consequences for language acquisition, as preserved iconicity helps the learners to remember words as well as signs (Perry et al., 2015; Ortega, 2017). A common strategy among sign L2 learners is to ask for the motivation of the signs' form, which spoken L2 learners usually do not do, and this signalizes that they have identified SLs as highly iconical.

2.3. NATIVENESS IN SL ACQUISITION

Possibly the foremost major issue related to SL acquisition concerns nativeness and the natural acquisition of SL among deaf children (i.e., the degree of exposure to SL and transmission of SL from parents to children). Here, there lies a pedagogical challenge, as most deaf children are born into hearing non-signing families. There is a rough estimation that only 5–10% of deaf children are born into deaf signing families (Mitchell & Karchmer, 2004). Therefore, the conclusion has been that 90–95% of deaf children are at risk of inadequate or no SL exposure during childhood, unless language intervention is actively promoted, through parent SL education programs and SL immersion in kindergarten and school. Without adequate language exposure during childhood, many deaf children are reported to exhibit symptoms of delayed language acquisition that in turn will have effects on cognitive development. Some researchers label this as language deprivation (Glickman & Hall, 2019). In contrast to most spoken languages, the number of native signers is small and there is great variability in the linguistic background of the overall group of deaf signers that is related to their age of acquisition as well as degree of exposure to SL during childhood.

The issue of nativeness within the deaf signing community is clearly relevant for SSLA research in several respects. It raises some questions related to the theories and models within language acquisition in general and its consequences for L2 acquisition. For instance, it raises questions around the concept of target language and its consequence for L2 teaching and input, which is still an unexplored area to date. Worth mentioning in this context is also the fact that SL learning is characterized by a merely formal/teaching-extensive learning. For informal learning, the learner needs to find contexts with deaf L1 signers to socialize with on a daily basis, which is hard because deaf communities are small. This makes it a challenge for sign L2 learners to acquire some level of nativeness (i.e., ultimate attainment in SL). First, the main input of the target language is based on the language provided and used by SL instructors and through a variety of SL texts delivered through video in classrooms, as a result of input almost exclusively from formal teaching. Second, the exposure to the variability of nativeness that L2 signers received during their L2 learning will constitute their input of the target language, which may have an effect on the constructions of their interlanguage. This diversity in the input probably complicates the possibilities of ultimate attainment in an L2 SL.

3. RESEARCH ON SSLA

International research on the L2 acquisition of SLs is in a very early phase and is a small and emerging field (for overviews, see Boers-Visker, 2020, amd Chen Pichler & Kouldidobrova, 2016). Most of the previous studies that have concerned any kind of research question related to L2 signers have in fact not been based on the typical questions derived from SLA theoretical or methodological frameworks. So far, most studies concerning L2 signers have in fact been based on an L1 perspective, and L2 signers have often served as comparison group (control group) in order to investigate particular patterns in L1 signers. Thus, the L2 signer group has served as a source to better understand different questions related to general SL processes and knowledge from a variety of perspectives. In previous research, there has been an overrepresentation of naïve signers or beginners and of research based on experimental design. There is an underrepresentation of research on intermediate-level or advanced-level learners and studies based on naturalistic ecological data. In addition, investigations and developmental descriptions of L2 signers' interlanguages are very rare.

Most L2 signers have no prior knowledge of any SL, which means that their new task is not only to learn a new language but also a new modality. Therefore, in some recent literature, this has been referred to as L2M2 (or M2L2) learning, adding a second modality (M2) concept to L2 learning, in order to distinguish this from a unimodal learning situation (L2M1). L2M1 is the more typical situation for L2 acquisition (e.g., a Spanish speaker learning spoken Swedish as an L2), but this could also apply to a situation where an ASL speaker is learning a second SL (e.g., STS, see, for example, Boers-Visker, 2020, and Chen Pichler, 2010).

3.1. SIGN PHONOLOGY AND MANUAL PRODUCTION OF SIGNS

Interestingly, much of the research related to L2 signers has focused on sign phonology and the phonological errors made by L2 learners. This research has focused on articulation/phonological studies, specifically with regard to ASL (Bochner et al., 2011; Mirus et al., 2001; Rosen, 2004) and British Sign Language (BSL) (Ortega & Morgan, 2015, see also Rosen, 2010, for a summative commentary).

Regarding the acquisition order of the phonological parameters of hand configuration (handshape and orientation), movement and location, studies arrive at similar results, despite their different methodological approaches (and SLs). The location parameter seems to be acquired first, whereas there is variation with regard to what is acquired last. Some studies mention handshape as the hardest parameter to acquire (Ortega & Morgan, 2015, for BSL), whereas others claim movement is acquired last (Bochner et al., 2011, for ASL).

Rosen (2004), who examined L2 signers' phonological acquisition more qualitatively, claims that there are patterns in phonological production that are specific for L2 signers, not found in L1 signers. Rosen suggests that errors are shaped by perception and motor dexterity, and these in turn lead to different types of errors. For example, errors such as mirrorization and deletion of features are linked to perception, whereas errors such as substitutions, displacements and switches are linked to poor motor dexterity.

Ortega and Morgan (2015) found that phonological accuracy in sign production of adult L2 signers was related to iconicity and that this exhibits different effects. The high degree of iconicity of SLs (see section 2.2) adds an advantage to the learning of signs for L2 signers in that they help learners to memorize or understand the signs. However, it has a disadvantage too: The learner's gestural knowledge seems to affect phonological production of the signs, resulting in L2 forms of phonological parameters such as non-targetlike handshape forms.

Other factors influencing phonological production have been suggested, such as motor skills (i.e., articulation). Mirus et al. (2001) reported proximilization of movement in L2 signers, observing that L2 signers tend to use more proximal joints compared to L1 signers' more distal joints (i.e., the production of lexical signs tends to involve the torso, shoulder and elbow rather than distal points such as forearm and wrist).

Hilger et al. (2015) studied path movement, namely production variability, in L2 ASL signers compared with L1 ASL signers, using a spatiotemporal index (STI) as variable. STI represents stability of production and is normally employed by speech researchers to observe the stability

of speech articulators. Hilger et al. adopted a motion capture methodology to observe the STI variable in ASL signers, measuring kinematic variability in utterances during different conditions and complexity. As hypothesized, L1 signers exhibited lower STI values (i.e., lower variability and stronger production stability), whereas L2 signers exhibited higher STI values (i.e., higher variability and weaker stability in production). However, with increased experience of ASL, the L2 signers exhibited less variability and stronger stability (i.e., lower STI values).

In sum, the modality switch from oral-auditory language to gestural-visual language obviously presents some challenges for L2 signers, including motoric skills to produce signs with hands, although some transfer from gestural knowledge may be possible for these learners, which will be discussed further below.

3.2. SL-SPECIFIC STRUCTURES

Some studies have looked at how L2 signers learn and acquire different structures that are modality-specific for SLs, related to spatiality and simultaneity (i.e., use of signing space, constructed actions, depicting signs and mouth actions). I will discuss some of the most recent studies here.

Partly lexical signs such as depicting signs (or classifier signs) have been investigated by several researchers. Using an experimental design, Marshall and Morgan (2015) elicited the use of depicting signs (in their terms 'entity classifiers') in controlled contexts from L2 learners with one to three-year experience of BSL and compared the responses to those of L1 signers. They found that the subjects responded with depicting signs to 70% of the responses, which indicates an awareness of the use of depicting signs. They also found that many of the depicting signs contained errors, mostly handshape substitutions and other errors, while there were fewer errors within the location parameter.

One recent study on Norwegian Sign Language as an L2, based on elicited naturalistic data from L2 second-year SL interpreter students and focusing on the use of depicting signs, found that L2 signers rely more on lexical signs in favor of partly lexical signs, such as depicting signs (Ferrara & Nilsson, 2017). The proportion of depicting signs was around 10% for L2 signers as opposed to 20% for L1 signers. Furthermore, Ferrara and Nilsson observed non-targetlike use of the depicting signs produced by L2 signers. They followed up this observation with a phonological analysis, which revealed that L2 signers struggle with the orientation parameter at first, providing a somewhat different picture compared to earlier findings (for BSL and ASL). Ferrara and Nilsson also showed that L2 signers struggle with the description of spatial arrangement (i.e., the ability to place signs in the signing space) and with the coordination with the signs in the signing space.

Research on the SL of the Netherlands has examined the L2 acquisition of the sign space in L2 signers, specifically the development of the use of space and depicting signs (labeled as classifier predicates) (Boers-Visker & van den Bogaerde, 2019) and agreement verbs (Boers-Visker, 2020). These studies concluded that these structures were a challenge for L2 learners to acquire. However, with regard to depicting signs, they arrived at different conclusions, perhaps as a matter of methodology. On the one hand, in the free production data of two L2 signers, the use of depicting signs was absent in the beginning (Boers-Visker & van den Bogaerde, 2019). On the other hand, the use of depicting signs was present relatively early in elicitation data (Boers-Visker, 2020).

Earlier research has also looked at the use of viewpoints in L2 signers. Gulamani et al. (2020) investigated the production of viewpoints in intermediate L2 learners of BSL in comparison to L1 signers. They found that character viewpoint was less used in L2 learners and concluded that character viewpoint was harder than observer viewpoint to learn. Blended or mixed viewpoints were rarely used. Blended viewpoints were also rarely used by beginning-level L2 ASL signers according to by Kurz et al. (2019). They were unable to arrive at any conclusions based on quantitative analysis. However, their qualitative analysis showed a great deal of variability in the use of viewpoints (or 'constructed actions' in their terminology), suggesting that viewpoint constructions are a complex linguistic skill to acquire for sign L2 learners.

Another area where use of space is used entails reference control, which has been a prominent area of study within SLA, especially with regard to reference forms. Over-explicitness is a known

tendency among spoken L2 learners (i.e., the learners tend to overuse explicit forms when referencing in the narration). That is, they prefer using fuller reference as lexical noun phrases instead of reduced forms like pronouns or zero anaphora. The interesting thing here is that many SLs have structures that are modality-dependent (i.e., the use of space and constructed actions as well as depicting signs [classifiers], which include referential information). How does this apply to previous conclusions found for L2 acquisition? In a study on Catalan SL, Bel et al. (2014) found evidence of an over-explicitness of pronominal forms over zero anaphora. However, this was contrasted by Frederiksen and Mayberry (2018), for ASL, which compared and discussed the degree of over-explicitness in reference accessibility between spoken L2 learners and ASL L2 learners. In their study, they expected L2 signers to overuse nouns over pronouns and pronouns over zero anaphora compared to L1 signers. However, the authors found limited evidence on over-explicitness in L2 signers (i.e., no significant difference between L1 and L2 signers in the use of reference categories and reference function). They did notice several differences between the groups when reintroducing the referents in the narrative: L2 signers used depicting signs whereas L1 did not.

3.3. CROSSLINGUISTIC INFLUENCES ACROSS MODALITIES AND THE IMPACT OF GESTURAL KNOWLEDGE

To date, there is a considerable body of knowledge on the role of gestures for language comprehension and production from different perspectives. From being marginalized in the description of language, as nonverbal or paralinguistic, gestures are more and more considered tightly linked with language. SLA research on the role of gesture has, for example, found a link between language fluency and gesture frequency (i.e., gestures are used by L2 learners as communication strategies to compensate for lesser language fluency and to overcome communicative obstacles, Gullberg, 1998). Furthermore, gestures together with speech have been shown to be crucial in spoken L2 learners' acquisition of meaning (e.g., Gullberg, 2009; Gullberg et al., 2008).

The theoretical framework derived from SLA that has been regularly used and discussed broadly in the research of SSLA is transfer or crosslinguistic influence. This discussion has been tightly linked to the role of gesture and iconicity in SSLA. Obviously, testing the concept of transfer with respect to the different modalities of spoken and sign languages is a highly interesting and crucial question. One fundamental factor within the crosslinguistic influence framework with respect to transferability is the degree of linguistic similarity between an L1 and an L2 (e.g., Jarvis & Pavlenko, 2008; Ringbom & Jarvis, 2009). Chen Pichler & Koulidobrova (2016) discuss the possibility of the application of L1 transfer on sign phonology, as phonology is suggested to be one exception to transfer. Bochner et al. (2011) and Rosen (2004) suggest that phonology cannot be physically transferred across modalities (i.e., from a system based on a sequential construction of sounds [phonemes] to a system based on simultaneous construction of phonological parameters), nor can there simply be a transfer of sounds/phonemes to visual properties of, for example, a handshape (a phoneme), as a consequence of the modality effect. And thus, limitations in the application of the concept of L1 transfer to L2 learning of SL, especially in phonology, have been suggested in the literature (Bochner et al., 2011; Ortega & Morgan, 2015).

Other researchers treat phonology more abstractly and conceptually in the context of transfer and have suggested gesture knowledge as a pathway for transfer to sign phonology. That is, L2 sign learners may have access to a merely unconscious gestural repertoire in their production of handshape choice, movement choice and so on. The gestures may be similar to the signs but not identical, leading to L2 variants in the phonology of the signs (Chen Pichler, 2010; Ortega & Morgan, 2015). Chen Pichler suggests that gesture transfer leading to errors in handshape made by L2 signers can be explained through the markedness of handshapes (that is, the errors that L2 signers made were linked to the overuse of unmarked handshapes at first). For example, the signers used the unmarked 🖐 handshapes instead of more marked ✊ handshapes (for the target sign YES, for example). On the other hand, positive transfer was observed where gesture handshapes were identical to signs' handshapes, even those more marked like 🤟. With regard to the handshape parameter, Chen Pichler suggests there is an effect of markedness for handshape accuracy among L2 signers.

Furthermore, Ortega & Morgan (2015), among others, compared L2 learners' production of arbitrary and iconic signs and found that L2 learners did more phonological L2 forms in the iconic signs compared to arbitrary signs, suggesting that they relied more on their gestures when producing iconic signs leading to gesture transfer. Ortega et al. (2019) suggest an explanation linked to the concept of cognates. From spoken SLA, it is well-known that spoken L2 learners' comprehension of new L2 words are scaffolded by cognates (i.e., where the words are similar in form and meaning of L1 words). Ortega et al. suggest that the learners' gestural repertoire can serve as manual cognates allowing them to scaffold their learning of the SL lexicon (i.e., where the form and meaning of gestures overlap with the form and meaning of signs). However, while providing a scaffold, gesture can also contribute to L2 variations in sign production (Ortega et al., 2019). At the same time, gestural knowledge seems not to affect all areas of SL structure; Frederiksen and Mayberry (2019) investigated reference control and found no such evidence for that in ASL L2 signers.

3.4. L2 CORPUS RESEARCH

Until now, research on STS as an L2 has been very sparse, limited to a small number of student theses. It was not until 2013 that a first unfunded effort to study STS as L2 was established, leading to the funded 2017–2019 project "From speech to sign – learning Swedish Sign Language as a second language". The project had two aims: To construct a corpus of STS as an L2 consisting of longitudinal data from adult STS L2 signers and to describe different development stages.

The STS as an L2 corpus (Schönström & Mesch, 2018) consists of longitudinal data from a total of 38 L2 signers of various proficiency levels, collected on four occasions during a period of 1.5 years. Using a design from an earlier STS corpus, the participants were video recorded during different tasks at approximately 50, 120, 240 and 350 hours of instruction. The tasks consisted of conversations with an L1 signer and different elicitation tasks, such as picture descriptions, and cartoon and video retellings. For a control group, similar data from nine L1 signers were collected.
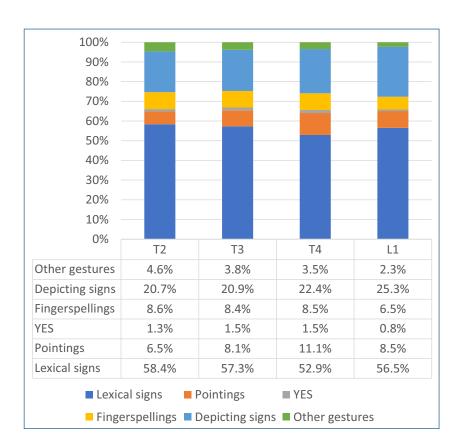
As widely reported in the literature, corpus-based research on SLs requires a lot of time and resources, due to the manual annotation of the signs and other linguistic properties (e.g., nonmanual markers) where applicable, depending on research questions.

Two main areas related to this corpus have been studied so far: The acquisition of the sign lexicon and mouth actions in STS. Methodologically, the studies departed from the Contrastive Interlanguage Analysis framework (Granger, 2015), that is, comparing outcomes from L2 signers at different stages in development with control group signers. Following corpus-based approach, frequency and distribution of the studied categories were presented.

3.4.1. Acquisition of sign types

In an ongoing study on the acquisition of the sign lexicon (Schönström & Mesch, submitted), the question was whether there was a difference in the frequency and distribution between L1 and L2 signers, especially with regard to the acquisition of SL-specific structures, such as partly lexical signs (e.g., depicting signs). Furthermore, a developmental view of the acquisition of the sign types was added and how the frequency and distribution change in L2 signers over time was compared to L1 signers.

The analysis showed that L2 signers used depicting signs to a lesser degree compared to L1 signers (see *Figure 3*). This confirms earlier findings by Locker McKee and McKee (1992), Ferrara and Nilsson (2017) and Boers-Visker (2020). However, the longitudinal corpus data indicated that there was a tendency for L2 signers to develop toward target-language norms through less use of lexical signs, in favour of other sign types such as pointing signs and depicting signs. Furthermore, the data showed a relatively high frequency of depicting signs after half of a year of instruction, which confirmed earlier findings by Boers-Visker that depicting signs may not be as hard to acquire as hypothesized. It was discussed in the context of a possible influence from gestural repertoire, as many of the depicting signs depicted handling rather than entities. Additionally, for the entity category, it was found that the learners tend to use handshape choices more linked to gestures than more conventionalized handshape choices, similar to the findings in Boers-Visker's investigation.

	T2	T3	T4	L1
Other gestures	4.6%	3.8%	3.5%	2.3%
Depicting signs	20.7%	20.9%	22.4%	25.3%
Fingerspellings	8.6%	8.4%	8.5%	6.5%
YES	1.3%	1.5%	1.5%	0.8%
Pointings	6.5%	8.1%	11.1%	8.5%
Lexical signs	58.4%	57.3%	52.9%	56.5%

■ Lexical signs ■ Pointings ■ YES
■ Fingerspellings ■ Depicting signs ■ Other gestures

Figure 3 Distribution use of sign types (*N* = 10). T2–T4 represent time of recording, where T2 = 1/2 year, T3 = 1 year and T4 = 1.5 years of instruction.

3.4.2. Acquisition of mouth actions

As part of the simultaneity of SLs, mouth actions are (more or less) used simultaneously with manual signing, contributing to the lexicon and the grammar. In the literature, mouth actions in SLs have been divided into two main categories. One category is mouth gestures, or the unique mouth movements of SLs. Examples are the specific syllabic mouth actions linked to specific lexical signs and the mouth actions expressing adverbial content. The second category is mouthings, or the visual mouth movements based on visual properties of a spoken language word or phrase (Bank et al., 2016; Crasborn et al., 2008). From a crosslinguistic influence perspective, mouthings are of particular interest. Mesch and Schönström (2021) investigated the use and acquisition of mouth actions from up to 16 L2 STS learners of various proficiency levels using data from the STS L2 corpus. The results showed that L2 STS learners' ratio of mouth actions to signs was higher compared to L1 signers, and that they used mouthings to a greater extent compared to L1 signers, demonstrating crosslinguistic influence of L1 Swedish on L2 STS and an overgeneralization of the use of mouthings. The overgeneralization is understandable as mouthings are the most frequent mouth category in STS, which calls for positive transfer from their knowledge of the mouth articulation of Swedish words. Qualitatively, the L2 learners also tended to use full mouthings (i.e., articulate the Swedish words fully), whereas L1 signers tend to reduce the mouthings to mono- or bisegmental mouth movements representing the most prominent phonetic elements of the Swedish words, regardless of word length. The different usage of mouth gestures in L2 learners also suggested that some mouth gesture categories seemed to be harder to acquire than others, especially the use of adverbial mouth gestures. In sum, the study of mouth actions in L2 learners provided not only new knowledge about the L2 acquisition of mouth actions, but also new insights into the role of mouth actions in STS and how L1 signers use mouth actions.

4. CONCLUDING REMARKS

The overview provided above clearly shows that research on SL as an L2 is still in its infancy. Although there are many interesting and important studies that have been carried out so far, there is still some discrepancy between results and general conclusions. Studies on sign phonology and reference control summarized above illustrate this. Various theoretical motivations, methodologies data from different SLs clearly contribute to the diverse picture of the acquisition in L2 signers. On the other side, one firm conclusion from these SSLA studies is that some modality-specific structures of SLs seem to be a challenge for L2 learners. Another conclusion is that the high degree of iconicity of SLs can be scaffolding the learners and can be a possible pathway to sign L2 learners' gestural repertoire, especially on lexical level.

Different studies consistently report a link between the gestural knowledge and iconicity on the interlanguage structures of L2 signers.

With few exceptions, most of the studies carried out so far have been based on a small dataset of around 10 learners or fewer. The coding process is a critical part of SL research, but time-consuming. Here a constructed learner corpus could aid future research to be open, reproducible, transparent and available for other researchers, in order to generate more data and results, in turn contributing to a better understanding of the SSLA processes.

The fact that sign linguistic research is still relatively young contributes to a challenge for applied SLA research on SLs. There is still a lack of knowledge and robust description regarding some linguistic structures in SLs, specifically on the SL-specific structures. Therefore, it can be a challenge to apply some of the existing spoken SLA theories and models on SL, as there are gaps in the linguistic description of some SLs. On the other side, there is a rich body of research related to gesture and language and iconicity. This multimodal aspect of language and communication obviously is an important source for comparison with SSLA. A greater focus on meaning-based constructions made by L2 signers would be an area of interest for future research in order to generate fruitful conclusions about semantic representations across languages and modalities.

Another key question that pertains to SSLA is the issue of bimodality for L2 acquisition. How can the issue of bimodality and the study of SSLA relate to the generalizability of existing SLA theories? To what areas can research on SSLA contribute new insights into SLA and into the variability in human language acquisition in general? So far, findings, although limited, presented here show that there are many similarities shared between spoken SLA and SSLA in terms of the challenge of learning a new language. Obviously, there are some challenges related to the comparison of modality-dependent structures and mapping those to previous generalizations made for spoken SLA. More research on this area would teach us a lot about the diversity within language acquisition, no matter whether spoken or sign language and would contribute to a more complete picture of the human capacity for language acquisition.

ETHICS AND CONSENT

Data from the Swedish Sign Language as an L2 corpus were ethically approved by Regionala etikprövningsnämnden in Stockholm 2013-09-12 (EPN 2013/5:8).

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REFERENCES

Bank, R., Crasborn, O., & **van Hout, R.** (2016). The prominence of spoken language elements in a sign language. *Linguistics*, 54(6), 1–25. DOI: *https://doi.org/10.1515/ling-2016-0030*

Bel, A., Ortells, M., & **Morgan, G.** (2014). Reference control in the narratives of adult sign language learners. *International Journal of Bilingualism*, 19(5), 608–624. DOI: *https://doi.org/10.1177/1367006914527186*

Bochner, J. H., Christie, K., Hauser, P. C., & **Searls, J. M.** (2011). When is a difference really different? Learners' discrimination of linguistic contrasts in American Sign Language. *Language Learning*, 61(4), 1302–1327. DOI: *https://doi.org/10.1111/j.1467-9922.2011.00671.x*

Boers-Visker, E. (2020). *Learning to use space: A study into the SL2 acquisition process of adult learners of Sign Language of the Netherlands* (LOT 569). LOT. DOI: *https://doi.org/10.1111/modl.12676*

Boers-Visker, E., & Van Den Bogaerde, B. (2019). Learning to use space in the L2 acquisition of a signed language: Two case studies. *Sign Language Studies*, *19*(3), 410–452. DOI: *https://doi.org/10.1353/sls.2019.0003*

Chen Pichler, D. (2010). Sources of handshape error in first-time signers of ASL. In G. Mathur & D. J. Napoli (Eds.), *Deaf around the world: The impact of language* (pp. 96–126). Oxford University Press. DOI: *https://doi.org/10.1093/acprof:oso/9780199732548.001.0001*

Chen Pichler, D. (2012). Acquisition. In R. Pfau, M. Steinbach & B. Woll (Eds.), *SignlLanguage: An international handbook* (pp. 647–686). Walter de Gruyter.

Chen Pichler, D., & Koulidobrova, H. (2016). Acquisition of sign language as a second language. In M. Marschark & P. E. Spencer (Eds.), *The Oxford handbook of deaf studies in language (Oxford Library of Psychology)* (pp. 218–230). Oxford University Press. DOI: *https://doi.org/10.1093/oxfordhb/9780190241414.001.0001*

Cormier, K., Smith, S., & Sevcikova-Sehyr, Z. (2015). Rethinking constructed action. *Sign Language and Linguistics*, *18*(2), 167–204. DOI: *https://doi.org/10.1075/sll.18.2.01cor*

Crasborn, O. A., van der Kooij, E., Waters, D., Woll, B., & Mesch, J. (2008). Frequency distribution and spreading behavior of different types of mouth actions in three sign languages. *Sign Language and Linguistics*, *11*(1), 45–67. DOI: *https://doi.org/10.1075/sll.11.1.04cra*

Dingemanse, M., Blasi, D. E., Lupyan, G., Christiansen, M. H., & Monaghan, P. (2015). Arbitrariness, iconicity, and systematicity in language. *Trends in Cognitive Sciences*, *19*(10), 603–615. DOI: *https://doi.org/10.1016/j.tics.2015.07.013*

Ferrara, L., & Nilsson, A.-L. (2017). Describing spatial layouts as an L2M2 signed language learner. *Sign Language and Linguistics*, *20*(1), 1–26. DOI: *https://doi.org/10.1075/sll.20.1.01fer*

Frederiksen, A. T., & Mayberry, R. I. (2018). Reference tracking in early stages of different modality L2 acquisition: Limited over-explicitness in novice ASL signers' referring expressions. *Second Language Research*, *35*(2), 253–283. DOI: *https://doi.org/10.1177/0267658317750220*

Glickman, N. S., & Hall, W. C. (2019). *Language deprivation and deaf mental health* (1st ed.). Routledge. DOI: *https://doi.org/10.4324/9781315166728*

Granger, S. (2015). Contrastive interlanguage analysis. *International Journal of Learner Corpus Research*, *1*(1), 7–24. DOI: *https://doi.org/10.1075/ijlcr.1.1.01gra*

Gulamani, S., Marshall, C., & Morgan, G. (2020). The challenges of viewpoint-taking when learning a sign language: Data from the 'frog story' in British Sign Language. *Second Language Research*, 026765832090685. DOI: *https://doi.org/10.1177/0267658320906855*

Gullberg, M. (1998). *Gesture as a communication strategy in second language discourse: A study of learners of French and Swedish* (Vol. 35). Lund University.

Gullberg, M. (2009). Gestures and the development of semantic representations in first and second language acquisition. *Acquisition et Interaction En Langue Étrangère*, *Aile... Lia 1*, 117–139. DOI: *https://doi.org/10.4000/aile.4514*

Gullberg, M., De Bot, K., & Volterra, V. (2008). Gestures and some key issues in the study of language development. *Gesture*, *8*(2), 149–179. DOI: *https://doi.org/10.1075/gest.8.2.03gul*

Hammarström, H., Forkel, R., Haspelmath, M., & Bank, S. (2020). *Glottolog 4.2.1*. Jena: Max Planck Institute for the Science of Human History. (Available online at *http://glottolog.org*, Accessed on 2020-07-13.)

Haualand, H., & Holmström, I. (2019). When language recognition and language shaming go hand in hand – sign language ideologies in Sweden and Norway. *Deafness & Education International*, *21*(2–3), 99–115. DOI: *https://doi.org/10.1080/14643154.2018.1562636*

Hilger, A. I., Loucks, T. M. J., Quinto-Pozos, D., & Dye, M. W. G. (2015). Second language acquisition across modalities: Production variability in adult L2 learners of American Sign Language. *Second Language Research*, *31*(3), 375–388. DOI: *https://doi.org/10.1177/0267658315570648*

Jarvis, S., & Pavlenko, A. (2008). *Crosslinguistic influence in language and cognition*. Taylor & Francis. DOI: *https://doi.org/10.4324/9780203935927*

Johnston, T., & Schembri, A. (2010). Variation, lexicalization and grammaticalization in signed languages. *Langage et société*, *131*(1), 19–35. DOI: *https://doi.org/10.3917/ls.131.0019*

Kurz, K. B., Mullaney, K., & Occhino, C. (2019). Constructed action in American Sign Language: A look at second language learners in a second modality. *Languages*, 4(4), 90. DOI: *https://doi.org/10.3390/languages4040090*

Locker McKee, R., & McKee, D. (1992). What's so hard about learning ASL?: Students' & teachers' perceptions. *Sign Language Studies*, *1075*(1), 129–157. DOI: *https://doi.org/10.1353/sls.1992.0000*

Marshall, C. R., & Morgan, G. (2015). From gesture to sign language: Conventionalization of classifier constructions by adult Hearing learners of British Sign Language. *Topics in Cognitive Science*, *7*(1), 61–80. DOI: *https://doi.org/10.1111/tops.12118*

McBurney, S. (2012). History of sign languages and sign language linguistics. In R. Pfau, M. Steinbach & B. Woll (Eds.), *Sign language: An international handbook* (pp. 909–948). Walter de Gruyter. DOI: *https://doi.org/10.1515/9783110261325.909*

Meier, R. P. (2002). Why different, why the same? Explaining effects and non-effects of modality upon linguistic structure in sign and speech. In R. P. Meier, K. Cormier & D. Quinto-Pozos (Eds.), *Modality and structure in signed and spoken languages.* (pp. 1–25). Oxford University Press. DOI: *https://doi.org/10.1017/CBO9780511486777.001*

Mesch, J., & Schönström, K. (2021). Use and acquisition of mouth actions in L2 sign language learners - A corpus-based study. *Sign Language & Linguistics, 24*(1), 36–62. DOI: *https://doi.org/10.1075/sll.19003.mes*

Mirus, G., Rathmann, C., & Meier, R. P. (2001). Proximalization and distalization of sign movement in adult learners. In V. Dively, M. Metzger, S. Taub & A. M. Baer (Eds.), *Signed languages - Discoveries from international research* (pp. 103–119). Gallaudet University Press.

Mitchell, R. E., & Karchmer, M. A. (2004). Chasing the mythical ten percent: Parental hearing status of deaf and hard of hearing students in the United States. *Sign Language Studies*, 4(2), 138–163. DOI: *https://doi.org/10.1353/sls.2004.0005*

Nilsson, A.-L., & Schönström, K. (2014). Swedish sign language as a second language: Historical and contemporary perspectives. In D. McKee, R. S. Rosen & R. Locker McKee (Eds.), *Teaching and learning of signed languages: International perspectives and practices* (pp. 11–34). Palgrave Macmillian Publishers. DOI: *https://doi.org/10.1057/9781137312495_2*

Ortega, G. (2017). Iconicity and sign lexical acquisition: A Review. *Frontiers in Psychology, 8*, 1280. DOI: *https://doi.org/10.3389/fpsyg.2017.01280*

Ortega, G., & Morgan, G. (2015). Phonological development in hearing learners of a sign language: The influence of phonological parameters, sign complexity, and iconicity. *Language Learning, 65*(3), 660–688. DOI: *https://doi.org/10.1111/lang.12123*

Ortega, G., Schiefner, A., & Özyürek, A. (2019). Hearing non-signers use their gestures to predict iconic form-meaning mappings at first exposure to signs. *Cognition, 191*, 103996. DOI: *https://doi.org/10.1016/j.cognition.2019.06.008*

Perniss, P. (2012). Use of sign space. In R. Pfau, M. Steinbach & B. Woll (Eds.), *Sign language: An international handbook* (pp. 412–431). Walter de Gruyter. DOI: *https://doi.org/10.1515/9783110261325.412*

Perniss, P., Özyürek, A., & Morgan, G. (2015). The influence of the visual modality on language structure and conventionalization: Insights from sign language and gesture. *Topics in Cognitive Science*, 7(1), 2–11. DOI: *https://doi.org/10.1111/tops.12127*

Perry, L. K., Perlman, M., & Lupyan, G. (2015). Iconicity in English and Spanish and its relation to lexical category and age of acquisition. *PLOS ONE, 10*(9), e0137147. DOI: *https://doi.org/10.1371/journal.pone.0137147*

Quinto-Pozos, D., & Parrill, F. (2015). Signers and co-speech esturers adopt similar strategies for portraying viewpoint in narratives. *Topics in Cognitive Science*, 7(1), 12–35. DOI: *https://doi.org/10.1111/tops.12120*

Ringbom, H., & Jarvis, S. (2009). The importance of cross-linguistic similarity in foreign language learning. In M. H. Long & C. J. Doughty (Eds.), *The handbook of language teaching* (pp. 106–118). John Wiley & Sons. DOI: *https://doi.org/10.1002/9781444315783.ch7*

Rosen, R. S. (2004). Beginning L2 production errors in ASL lexical phonology: A cognitive phonology model. *Sign Language & Linguistics*, 7(1), 31–61. DOI: *https://doi.org/10.1075/sll.7.1.04beg*

Rosen, R. S. (2010). Modality and language in the second language acquisition of American Sign Language. In G. Mathur & D. Napoli (Eds.), *Deaf around the world: The impact of language*. Oxford University Press. DOI: *https://doi.org/10.1093/acprof:oso/9780199732548.003.0006*

Sandler, W., & Lillo-Martin, D. (2006). *Sign language and linguistic universals.* Cambridge University Press. DOI: *https://doi.org/10.1017/CBO9781139163910*

Schönström, K., & Mesch, J. (2018). Dataset. The project *From speech to sign – learning Swedish Sign Language as a second language*. Department of Linguistics, Stockholm University.

Schönström, K., & Mesch, J. (submitted). Second language acquisition of sign language lexicon: A corpus-based account.