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First verbs in British Sign Language development[1]

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ABSTRACT

This paper describes the development of the verb lexicon and argument structures in one child's British Sign language (BSL) during the period 1;10 – 3;2. The data are discussed with reference to current models of lexical and grammatical development. Before 2;1 verbs produced by the child - which lag behind nouns in the early stages of vocabulary development - appeared initially as single signs without productive morphological inflections. After this period when verbs are combined with other signs the verbs consist of citation forms. The first morphological inflections appeared on a verb by verb basis from 2;9 onwards. A consistent preference for producing verb utterances from the perspective of the signer was identified. No preference for iconic signs in the first stage of language development was found. The results indicate that before 3;0 there is little evidence for the acquisition of a generalised verb frame.

INTRODUCTION

The aim of this study is to report and discuss the findings which emerge from a longitudinal study of the development of BSL by one native signer with respect to four issues. The lexical categories which first emerge in children's early vocabulary development have been investigated from a cross-linguistic perspective: while the early studies on English revealed a bias towards the early acquisition of nouns versus verbs, more recent cross-linguistic studies have cast doubts on the universal validity of this pattern. Secondly the pattern which the early production of verbs exhibits has also received the attention of researchers, for it addresses the issue of the productivity of children's early word combinations, i.e. whether it is underpinned by abstract principles leading to generalizations or whether it is built around specific lexical items.

The two other issues addressed here are modality-specific and have been documented mostly/mainly on the acquisition of American Sign Language (henceforth ASL) and remained to be explored for other signed languages, namely a) the role of iconicity in the early development of signed languages and b) the course of development of sign space which in BSL- like in ASL- mark agreement morphology.

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The emergence of lexical categories

Early studies on the components of the early vocabulary of English have revealed that nouns emerge earlier in children's lexicon than verbs (Benedict, 1979, Gentner, 1982, Bates, Bretherton & Snyder, 1988, Clark, 1993, Bates, Marchmanm Thal, Fenson, Dale, Reznick, Reilly & Hartung, 1994, Barrett, 1995). First nouns are typically found to refer to names of objects. Gillette, et al (1999) have conducted an experiment during which adults watch videos of children and carers interacting with the sound cut off and they are asked to guess the word the mother is uttering. The excellent performance of the subjects on the most common nouns suggest that these can be predicted with accuracy on the basis of contextual cues. This pattern does not apply to verbs which seem to be harder to identify on the basis of the same cues. Thus one possible account of the difference between the use of nouns and verbs in children's early vocabulary is best characterised as a 'mapping explanation'. However, explanations with respect to this phenomenon have been met by two challenges, namely: a) in the languages in which verbs lag behind nouns, interindividual variation has been reported (Nelson, 1973, 1975, Fenson, Dale, Bates, Reznick & Thal, 1994, Bassano, 1998) and b) in some languages, such as Korean, the proportion of nouns and verbs in children's early vocabulary is reversed to that reported in the studies carried on English (Choi & Gopnik, 1995) and this is thought to reflect the formal properties of Korean and/or the input. This study contributes to the cross-linguistic characterization of children's early vocabulary by examining this aspect of development in a native BSL signer.

The role of iconicity

There are many signs in BSL, which have a link between form and meaning (Pizzuto & Volterra, 2000). Do these visual links affect acquisition of BSL as a first language? It has been shown that it is easier to learn and recall signs that have a clear motivational link to their referents for second language learners (Baker, Dye & Woll, 1998). In the present study the role of iconicity in first language acquisition is investigated.

The development of sign space grammar

Research on spoken language acquisition shows that children begin producing verbs and their arguments at the same age that they are producing multi-word utterances. This is also reported in languages where morphology is quite complex (Hirsh-Pasek & Golinkoff, 1996).

Research on signing children (mainly on American Sign Language) has shown that young children do not initially have control of verb agreement morphology when they use multi-sign utterances. Newport & Meier (1985) have demonstrated that children initially use word order without inflections. They mark grammatical relations in a sequential way. Thus sign space is not used at the earliest stage of grammatical development. The first uses of sign inflections to indicate arguments begin with reference to present participants. Newport & Meier (1985), found that children only begin to use agreement morphology at about 2;0 – 2;6 with many verbs remaining uninflected up till 3;6 and for more complex morphology, acquisition continues beyond 5 years. Whether this pattern of late development -compared to spoken languages- applies to other signed languages, including BSL, remains to be investigated.

The acquisition of verb argument structure

In current research on the acquisition of grammar, one area of exploration has focused on questions concerning the conceptual representation of events and how they come to be mapped onto semantic and grammatical structures (Pinker, 1989; Theakston, Lieven, Pine & Rowland, 2001). The most systematic work in this area has looked at children's acquisition of verbs and argument structures and when children can be said to have at their disposal an abstract set of verb frames.

The semantic core of a sentence in any language is its verb. Conceptual categories and the verbs which encode them involve participants, which carry thematic roles, such as agent, theme, source, goal, patient and experience. Constituents combine with the main verb in the form of arguments. In contrast to nouns, where mostly single concepts are mapped onto names for single objects, the mapping of action concepts onto verbs is more varied across languages. Verbs label actions that are often relational, short-lived and carried out by different actors (Tomasello, 1992).

Children must learn which concepts may be appropriately mapped onto which verbs and also which arguments are needed and how the arguments combine with the verb. Verbs can take different argument structures e.g. transitive frames obligatorily take objects e.g. 'Sue lifted the chair' while intransitive frames have no object e.g.' The chair fell'. In English much meaning is derived from the order in which the constituents appear in a sentence. In other languages word endings and inflections can also relate events and arguments.

Children developing spoken language between ages 2;6 and 4;0 are reported to produce the different verb argument structures of their language with very few errors (Pinker, 1989). They do occasionally apply systematic argument structure alternations from the adult language to verbs whose meanings and structures do not fit that pattern e.g. 'Daddy go me round'. The early correct mapping of concepts onto verbs and their argument structures has been explained by theories of 'bootstrapping', where knowledge of semantic cues (e.g. Gropen, Pinker, Hollander & Goldberg, 1991) or syntactic structure (Gleitman, 1989; Fisher, Hall, Rakowitz & Gleitman, 1994) enables the child to break into the relationship between concept and linguistic form. The semantic bootstrapping approach assumes that the child is endowed with abstract grammatical knowledge such as subject, object, transitive and intransitive verb frames. The child links previously entertained conceptual representations to new verbs in order to assign them appropriate semantic representations. In contrast, according to the syntactic bootstrapping approach the arguments with which the verbs appear enable the child to identify the argument structure of the verb. The findings which emerge from naturalistic and experimental investigation remain contradictory with respect to the nature of the cues used by children.

Another, more conservative view maintains children's knowledge of verb semantics and argument structure initially develops around individual verbs (Tomasello, 1992) and individual lexical frames (Lieven, Pine & Baldwin, 1997). Children do more general learning, based on specific experiences, rather than possessing abstract categories from the start of grammar development. Some time later in development, once several verbs and lexical frames have been learned, the child may begin to apply

a productive word formation rule, deriving specific meanings from the use of an abstract verb frame such as intransitive and transitive.

Whatever the theoretical perspective taken, the task for the child is far from straightforward, in part due to the differences in how languages license different mappings. Children have to work out the specific way their target language links meaning to form.

The study of the acquisition of BSL brings a relevant contribution to the lexically-driven versus principle- based debate discussed above for reasons briefly outlined below.

The semantic distinction between eventive and stative meanings in BSL verbs, interacts with the transitive / intransitive verb frame pattern. Transitive eventive verbs (ASK, GIVE, PUSH, BITE, HIT) can be inflected for subject / object agreement, while transitive stative verbs (KNOW, LIKE, WANT, BELIEVE) cannot[2]. Intransitive frames can be filled with both eventive and stative verbs e.g.

BOY WALK
GIRL SLEEP

With eventive verbs in transitive frames, BSL uses a spatial grammar. Subject and object arguments are assigned spatial locations in sign space. The verb is inflected between locations to express intended meaning. What marks the use of verbs in transitive frames is the signer's own body is normally associated with the agentive role in the event being described. As a consequence subjects are less overtly marked than objects in BSL sentences. When a participant is physically present, the verb is moved between either the signer's own body location and the present participant (e.g. 'you asked me/ I asked you') or between an abstract third person indexed location and the present participant (e.g. '3rd person asked you/you asked 3rd person').

Signed sentences that appear in the text follow standard notation conventions. Signs are represented by UPPER-CASE English glosses. Non-linguistic gestures are represented by lower-case *italicised* English glosses. When a sign is inflected morphologically and more than one English word is required, this is shown by hyphenated glosses e.g. YOU-PUSH-ME. When no hyphenation occurs it is because the signs were produced as citation forms e.g. YOU PUSH ME. Repetition of signs is marked by '+'. 'IX' is a pointing sign. Semi circles represent the sign space with the flat edge nearest to the signer's perspective. Arrows indicate the direction of the verb's movement.

METHOD

Subjects

The subject is a boy referred to by the pseudonym 'Mark', he has been exposed to BSL from his parents and older siblings since infancy. His parents and siblings are native signers. He was filmed in naturalistic interaction in the home from 1;10 to 3;2.

Data collection and transcription

Trained Deaf and Hearing investigators filmed Mark in 2-3 hour sessions at least once a month. The data recordings are described in table 1. Subsequently the videos were transcribed and coded by trained Deaf and Hearing investigators in the Sign Language and Gesture Lab at City University. All Mark's signed utterances were transcribed.

Recording session	Length (hours)	Age of child (Year; month, day)
	2	1;10,5
	3	1;10,19
	2	1;11,8
	2	2;1,18
	3	2;2,24
	3	2;3,2
	3	2;3,16
	2	2;4,13
	3	2;5,13
	2	2;6,23
	3	2;8,13
	2	2;9,19
	2	2;10,9
	2	2;11,0
	3	3;2,1

Table 1 Data collection

DATA ANALYSIS

Emergence of lexical categories

Subsequently any utterances interpreted as describing typical 'verb' meanings such as actions, states and events were coded as 'Verb' in the transcription. This was a conservative categorisation based on the existence of the sign's noun pair e.g. FISH/FISH in Mark's lexicon, the use of a phonological contrast between formationally similar noun/verb pairs e.g. CAR/DRIVE or contextual cues based on the interlocutor responses.

Data analysed up to now indicates that from 1;10 to 2;5, a clear pattern of development of the lexical categories of noun and verb emerges from the data samples with verbs lagging behind in number at all stages. This is shown in figure 1.

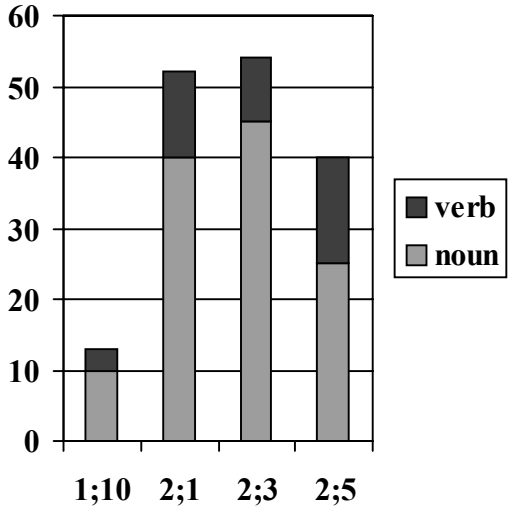

Figure 1 Frequency of nouns and verbs

The role of iconicity

As a related issue we also assessed the role of iconicity in these first signs. Signs were rated as 'iconic' or 'non-iconic' by their guessability as labelled by hearing university students who were not familiar with BSL. Those signs guessable with no knowledge of BSL were rated iconic and unguessable signs rated as non-iconic. As shown in figure 2 the iconicity rating does not constitute a relevant factor in the early vocabulary development of this child.

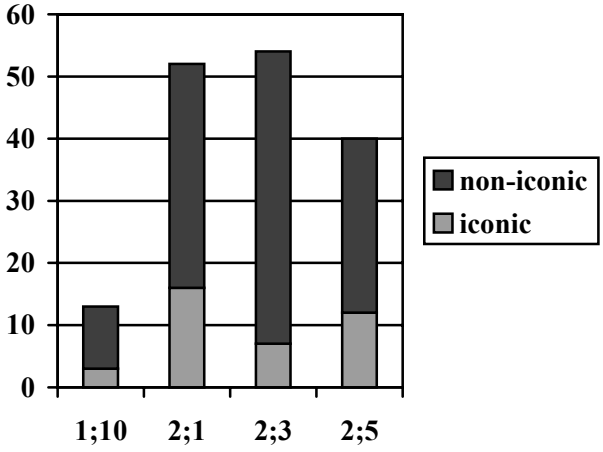

Figure 2 Frequency of iconic and non-iconic signs

The development of sign space grammar

Turning to the age at which grammatical functions appear in BSL. The use of sign space was initially absent in multi-sign utterances. Between the ages of 1;10 to 2;1, although two and three nouns were being combined, almost all verbs were produced

in single sign utterances. From a total of 60 verb tokens recorded during this period, there was one combination of a verb with another sign: PUSH ME (1;10,19). As in previous studies of ASL, all the verbs appeared in citation form i.e. there was no use of sign space for grammatical purposes. Descriptions of actions included verbs classified as intransitive in the adult language: FLY, CRY, SLEEP and JUMP. Transitive verbs included BITE, CLOSE, EAT and THROW. All verbs were produced without an overt subject or object. At this early age the child used himself as the subject, in keeping with the BSL preference for using the signer in the subject location. In the adult language, the inflection of verbs from the signer's own location is normally accompanied with subject and object NPs.

At 2;1 there was one attempt to provide information about the object of an event through the combination of a verb and a holistic (whole-body) gesture. When describing a boy biting a girl, the child signed BITE in the citation form, followed by a depiction of the bitten girl's reaction (a shudder of the body and a startled facial expression). Through this combination the child went some way in mapping out the concept of cause and affect through quasi argument structure. Although the child is using the correct subject, marked through the own body option, the obligatory morphological inflection of the verb sign in sign space is absent.

From 2;2 – 3;0 the child's use of sign space increased in complexity. Meier states that this is the time period for the first uses of sign space in ASL. At this age the BSL signing child began to introduce verbs into multi-sign combinations. The first uses of sign space with verb inflections were for simple agreement relations without expressed objects. The first object and action concepts to be mapped out through verb inflections in sign space involved visual perception, object transfer and causality. These inflections occurred with only a small number of verbs:

LOOK-AROUND, BOY GIVES-FOOD, BOY PUSH-OUT, LOOK-AT-ME (2;9,21)

Lexically-based versus principle-driven acquisition of verb argument structure

The other issue was the availability of generalised knowledge of argument structure. There was no evidence in the productive data for the generalised use of frames for the newly acquired transitive or intransitive verbs at this age. Although sign space inflections began to be used at this age, the majority of transitive verbs continued to be produced as citation forms e.g. MAN KICK, DUCK BITE, ICE-CREAM POUR, MUMMY BREAK or in single sign utterances: BREAK, SCRATCH, CUT, SEE. Some intransitives already in the child's lexicon appeared with subject NPs, e.g. DRIVE MUMMY, BOY CRY, BIRD FALL; however new verbs entering his vocabulary were signed in one-sign utterances e.g. DRAW, VOMIT, WEE-WEE, SLEEP, BUMP-OWN-HEAD, CYCLE, WAKE-UP.

CONCLUSION

The analysis of data collected on Mark reveals that in the early stages of vocabulary development, verbs lag behind nouns as it has been reported for English, French, Spanish and Italian. However, given that our findings are based on the speech

production of one subject, it is not possible to determine whether this pattern characterises native BSL development or whether it is subject to individual variation. Iconicity although important in adult second language learning plays no role in first language acquisition. Supporting previous literature on young children's use of sign space in ASL, extensive use of verb agreement morphology, or productive use of transitive and intransitive verb categorisation is not seen before 3 years (Newport & Meier, 1985). In comparison with the acquisition of verb morphology, verb agreement and verb categorisation in spoken languages studied to date, signing children take longer to master these particular linguistic devices but development follows the same sequence of milestones.[3]

There was a consistent preference for producing verb utterances from the perspective of the signer, a language option tuned into early. Before using sign space, children express concepts through sequential ordering of signs and points, as well as some combinations of verb signs and holistic gestures (e.g. BITE get-bitten at 2;1).

There was no evidence in the productive data of the child's use of generalized abstract frames for the newly acquired transitive or intransitive verbs at this age. It is important to stress that what has been described up to now is based on sign production data collected on one child. The hypotheses on the acquisition of argument structure have been tested on spoken languages on the basis of additional research strategies including those attempting to tap children's comprehension (see for instance Pinker, 1989 and Naigles, 1996, among others). Future investigations on the acquisition of argument structure in BSL should make use of these complementary strategies.

The studies described so far show that, as in the acquisition of spoken languages, children developing signed languages begin with a bias towards simple conceptual-linguistic mappings in their first verbs. Single arguments are used with verbs before two argument structures. Children start with a preference for expressing the subject or agent of the sentence on their own body and objects are left unexpressed.

[3] We are talking about language production data here, the possibility exists that verb categorisation is acquired significantly earlier, but the demands on articulation of using sign space may delay the appearance of inflections in children's signing. This empirical question could be answered by sentence comprehension studies.

REFERENCES

Baker, A.E., Dye, M. & Woll, B. (1998). Psycholinguistics and iconicity : Implications for transcription databases. Paper presented at the 2nd Intersign Workshop Leiden, December. 1998 Manuscript

Barrett, M.(1995) Early lexical development. P.Fletcher & B.MacWhinney (eds) The Handbook of Child Language. Oxford: Blackwell.

Bates, E., Bretherton, I. & Snyder, L. (1988) From first words to grammar: individual differences and dissociable mechanisms. NY: CUP.

Bates, E., Marchman, V., Thal, D., Fenson, L., Dale, P., Reznick, S., Reilly, J. & Hartung, J. (1994) Developmental and stylistic variation in the composition of early vocabulary. Journal of Child Language, 21, 1, 85-124.

Benedict, H. (1979) Early lexical development: comprehension and production. Journal of Child Language, 6, 183-200.

Choi, S. & Gopnik, A. (1995) Early acquisition of verbs in Korean: a cross-linguistic study. Journal of Child Language, 22, 497-529.

Clark, E. (1993) The lexicon in acquisition. Cambridge: CUP.

Fisher, C., Hall, D., Rakowitz, S., & Gleitman, L. (1994). When it is better to receive than to give: syntactic and conceptual constraints on vocabulary growth. Lingua 92, 333-375

Gentner, D. (1982) Why nouns are learned before verbs: Linguistic relativity versus natural partitioning. In S. Kuczaj (ed.) Language development, Volume 2. Hillsdale: Erlbaum.

Gleitman, L.R. (1989) The structural sources of verb meaning. Papers and reports on Child Language Development, 28, 1-48.

Gillette, J., Gleitman, H., Gleitman, L., & Lederer, A. (1999). Human simulations of lexical acquisition. Cognition, 73, 135-176.

Gropen, J., Pinker, S., Hollander, M., & Goldberg, R. (1991). Affectedness and direct objects: the role of lexical semantics in the acquisition of verb argument structure. Cognition 41, 153-195

Hirsh-Pasek, K., & Golinkoff, R.M. (1996). The origin of grammar: evidence from early language comprehension. Cambridge, MA: MIT press.

Lieven, E., Pine, J. & Baldwin,G. (1997) Lexically-based learning and the development of grammar in early multi-word speech. Journal of Child Language, 24, 1, 187-219

Newport, E. L., & Meier, R. P. (1985). The acquisition of American Sign Language. In D. I. Slobin (ed.), The crosslinguistic study of language acquisition. Volume 1: The data. Hillsdale, NJ: Erlbaum, 881-938.

Tomasello, M. (1992). First verbs: a case study of early grammatical development. Cambridge: CUP.

Pinker, S. (1989). Learnability and cognition: the acquisition of argument structure. Cambridge: CUP.

Pizzuto, E. & Volterra, V. (2000). Iconicity and transparency in sign languages: A cross-linguistic cross-cultural view. In: K. Emmorey & H. Lane (eds). The signs of language revisited : an anthology to honor Ursula Bellugi and Edward Klima. Mahwah, NJ : Erlbaum. pp. 261-286