

PHONOLOGICAL ACQUISITION IN GREEK SIGN LANGUAGE

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Abstract

Introduction

The majority of studies on phonological acquisition of deaf children of deaf parents provide evidence on errors in early sign formation. These errors may concern handshape (Whitworth 2011; Boyes-Braem 1990) and/or place substitution and movement repetition (Meier et.al. 2008; Meier 2006; Karnopp 2002; Conlin et.al 2000). Most errors occur on handshapes, whereas place and movement articulation errors are rarely observed (Meier et. al. 2008; Meier 2006; Cheek et.al. 2001; Conlin et.al. 2000; Boyes-Braem 1990).

Purpose

The present study focuses on the formation of first signs acquired by a deaf child of deaf parents exposed to Greek Sign Language, through the investigation of (1) the first handshapes that appear in the child's early signs, (2) the phonological errors observed in first lexicon and (3) the likely existence of an error pattern.

Method

The data comes from a previous study on Greek Sign Language acquisition of pointing signs (Hatzopoulou 2008) and concerns the first one hundred and fifty six (156) spontaneous signs of the deaf child aged 16 to 24 months.

Results

The results showed that between 16 to 24 months: (1) the child's first handshapes were L, 5, B, O A, S, bO and G¹, (2) handshape errors were more frequent compared to movement and place and (3) error patterns occurred in all three parameters.

Conclusion

The phonological errors of handshape in Greek Sign Language acquisition show many similarities with those mentioned in other signed languages (Meier et.al. 2008; Boyes-Braem 1990), whereas regarding movement and location errors some differences have been observed.

1. INTRODUCTION

This study on phonological acquisition of Greek Sign Language investigates the formation of early signs and the errors that a deaf child of deaf parents makes regarding handshapes, movement and location articulation.

1.1 Handshapes

Boyes-Braem (1990) was the first to suggest four stages of handshape acquisition by young deaf children. At the first stage, until the age of 12 months, deaf children tend to produce specific handshapes such as 5, G, C, A, L, S and Bo due to anatomical factors (Boyes-Braem 1990). Handshapes of Stage II are: B, F and O, usually acquired by the age the child is mature enough for functional communication (Boyes-Braem 1990). Acquisition of Stage III predisposes fingers' separated utilization and includes handshapes I, Y, D, P, 3, V, H and W. Stage IV requires the child to be aware of the position and the series of the fingers. The last acquired handshapes are 8, 7, X, R and T (Boyes-Braem 1990).

1.2 Movement

Movement does not change much through child's sign language development but progress occurs, regarding the number and the complexity of movements over time, through vocabulary enrichment (Bonvillian and Siedlecki 2000). Siedlecki (1991) and Bonvillian and Siedlecki (2000) state that children used more often the movements

¹See handshapes in appendix.

with contact action. Other frequent sign movements were downwards (Cheek et.al. 2001; Bonvillian and Siedlecki 2000), closing action and open-close action movements (Bonvillian and Siedlecki 2000).

1.3 Location

Location acquisition does not require fine distinction among places of articulation. Due to that, most often, children tend to produce the location aspect accurately from a very young age (Bonvillian 1999; Bonvillian and Siedlecki 1996). Overall, the accuracy of sign location in early signs can be calculated to 83% (Bonvillian and Siedlecki 2000).

However, children tend to prefer specific places in sign formation. Most of the children's signs are articulated in front of the face, close to the head and at neutral place. Contacting the trunk is also preferred by children (Conlin et.al. 2000; Bonvillian 1999; Bonvillian and Siedlecki 1996).

1.4 Errors in the three parameters

Deaf children's early signs are not always accurate and do not always have a pattern or consistency. Children tend to make phonological errors when signing and compared to their parent's signs, they tend to present differences (Bonvillian 1999). The greatest amount of errors is on handshapes and a lesser amount regards movement and location (Carmo et.al.2009; Conlin et.al.2000).

1.4.1 Errors and error patterns in handshape acquisition

Handshape is the last phonological feature that deaf children acquire because it is the most complex of all parameters (Carmo et.al.2009; Karnopp 2002). However, it improves through vocabulary enrichment (Bonvillian 1999) by developing from simple to complex forms (Carmo et.al.2009).

A significant handshape substitution pattern is that less marked handshapes (B, A, S, G, C, O, 5) (Battison, Markowicz and Woodward 1975) substitute highly marked handshapes (e.g. W) (Takkinen 2003; Marentette and Mayberry 2000; Boyes-Braem 1990). Concerning Greek Sign language Hatzopoulou (2008) reports the substitution of handshape G from L in early pointing signs.

1.4.2 Errors in Movement acquisition

With respect to movement, children tend to use repetitive movements in place of non-repetitive, tend to present "sympathy" and sign movement proximalization (Chen Pichler 2012; Meier et.al 2008; Meier 2006). In addition, similar to handshape acquisition, already acquired movements tend to replace new or later acquired (Bonvillian and Siedlecki 2000). Bidirectional movements are previously acquired compared to unidirectional movements (Meier 2006; Bonvillian and Siedlecki 2000) and "contact" action sign movements are preferable compared to other movements (Siedlecki 1991).

1.4.3 Errors in signs' Location acquisition

Conlin et.al. (2000) report that errors made in location constituted 12% of total amount of sign errors (Conlin et.al. 2000). When children make errors in location, most of the times, these are adjacent to the adult's model. So, the adult model plays a major role on location substitution (Bonvillian 1999).

1.5 Rationale

The features of early sign formation as well as the quantity and quality of errors on handshape, location and movement articulation, constitutes an interesting area of investigation concerning Greek Sign Language. The study aims to address similar issues with those raised in previous studies on phonology acquisition by posing the following questions: 1) which are the first handshapes, sign locations and sign movements that appear in the child's early lexicon, 2) which are the articulatory errors in sign production and 3) whether there are specific error patterns. The hypothesis is that (1) Boyes-Braem Stage I handshapes will occur first in child's early signs, (2) handshape errors will be more frequent compared to movement and location errors and (3) patterns will occur in all three parameters (Meier et.al 2008;

Karnopp 2002; Marentette and Mayberry 2000; Bonvillian and Siedlecki 1996; Boyes-Braem 1990)

2. METHOD

The present study investigates the early sign formation of a deaf child of deaf parents between the age of 1;4,00 to 2;0,21. The data were collected for another study concerning the acquisition of pointing signs in Greek Sign Language, extended until the age of 3;10 (Hatzopoulou 2008). A part of these data, 17 out of 34 videos, were elaborated for the purpose of this study.

The transcription of the child's signs productions was made by using ELAN (Max Planck Institute for Psycholinguistics). Four tiers were used, one with a gloss for the sign and three, one for each parameter handshape (HS), sign location (LC) and sign movement (MV). It has to be mentioned that 64 of the child's tokens were not clear enough so they were not included in the results.

3. RESULTS

The total number of the child's tokens between 16-24 months was 1430 and the number of signs was 156.

3.1 Early lexicon's handshapes

The data analysis revealed that the handshapes that the child used, until the age of 2;0,21 were twelve. These were handshapes L, 5, B, O, A, bO, G, S, C, F, Y and 3. At the age of 1;4,00, the boy used handshapes L, 5, B, O, A, bO and G. At the age of 1;5,10, handshapes S and C emerged. Approximately four months later, the child managed to articulate handshape F. He continued to use the same handshapes until the age of 2. At that age he started to use handshapes Y and 3. Overall, the handshapes acquired by the child pertained to Boyes-Braem (1990) Stages I, II, III of handshape acquisition. However, handshapes B and O, which belong to Stage II, occurred before handshape C of Stage I, in the boy's signs.

In terms of frequency, the L handshape constitutes the 49% (703/1430) of all tokens, whereas the next more frequent handshape is 5 (32%). High frequency of handshapes in adults' signs did not seem to play a significant role on the child's productions, since handshape B, which is the most frequent handshape of adult signs in Greek Sign Language (19.1%) (Kourbetis and Hoffmeister 2002), has only been observed in 7/1430 of boy's tokens.

3.2 Early lexicon sign movements

In alignment with previous studies, the child preferred to produce bidirectional movements rather than unidirectional (Bonvillian and Siedlecki 2000). "Up and down" and "side to side" movements were observed with high frequency. At 18 months the child was able to articulate circular movements.

Unlike previous studies on ASL (Meier et al. 2008, Meier 2006) the child mostly used non-repetitive movements (1137 tokens) instead of repetitive (293 tokens). Contrary to Bonvillian (1999) findings, sign movements with no contacting action occurred more frequently (1135), compared to sign movements with contacting action (279).

3.3 Early lexicon sign locations

Regarding the signs' location, the child signed in 20 different places. He showed preference signing at neutral space, in alignment with previous studies (Conlin et al. 2000; Bonvillian and Siedlecki 1996). The second preferable place of articulation was the mouth and the third the chest. Other sign locations were: nose, chin, ear, cheek, eyes, hand, head, face, palm, forehead, close to the trunk, neck, armpit, belly, elbow and close to the shoulders.

3.4 Articulatory errors and error patterns

The child made phonological errors in all three parameters, handshape, movement and location. He made errors mostly in handshape and less in movement and location, confirming previous studies on sign language phonology acquisition (Carmo et al. 2009; Conlin, et al. 2000). Between the age of 1;4,00 to 2;0,21, from a total number of 1430 of tokens 1149 errors were found: 986 concerned handshapes, 125 movement and 38 location.

3.4.1 Errors-error patterns in handshapes

The child made 68.75% incorrect handshape productions.

Table 1: The five most frequent substitutions

Handshape Substitution	No of Tokens	Percentage
G→L	632	44(%)
G→5	166	12(%)
S→A	46	3(%)
S→5	30	2(%)
B→5	15	1(%)

He mostly substituted handshape G for L (44%) and 5 (12%). He also used handshapes A (3%) and 5 (2%) instead of S and 5 (1%) instead of B. The L handshape was also used to substitute handshapes 5, A, C, S, V and Y and handshape 5 to substitute handshapes F, L, O, V. Handshape A less frequently substituted B, bO, G, H, O and Y. Handshape O rarely substituted F, whereas the child used handshapes S and bO alternatively. In contrast to the frequent substitutions of S to A and 5 in few cases handshape S substituted 5, F, L and O. Finally, handshape bO substituted F, G, L and O, C handshape substituted S and B and 3 handshape substituted W.

From the handshape error analysis three basic patterns seem to emerge, whereas many handshape substitutions do not belong in any of these patterns. The first pattern observed was the substitution of handshapes with adjacent ones (Baker and Woll 2009; Boyes-Braem 1990). This was observed in most cases of all handshape substitutions (79.5%) with the most frequent substitutions being the S→A, G→L and B→5. The second pattern involves the sympathetic extension of the thumb as in G→L and S→A (Baker and Woll 2009; Hatzopoulou 2008; Boyes-Braem 1990) and the third was the substitution of new handshapes with previous acquired (Baker and Woll 2009; Boyes-Braem 1990). In addition the child frequently used his hand as a whole without using his fingers individually. This ended up to the articulation of signs with fingers in series (5) or joined together (S), which has been anatomically explained by Boyes-Braem (1990). Most frequent error of "serial finger order" (Boyes-Braem 1990, 107) was G→5 and of joined fingers, the use of S instead of 5. Fingertips join has also been observed in the child's errors (L→bO) occasionally.

3.4.2 Errors-error patterns in movement

The child substituted repetitive movements for non-repetitive (103 tokens) in contrast to non-repetitive movements' substitution to repetitive which was limited to 16. In these cases, in 10/16 tokens the child seems to give emphasis on the signs. In addition, the child presented "sympathy" in sign movement. He presented difficulty to produce movement of only one hand or different movements between hands, so he tended to use the same movement for both hands.

3.4.3 Errors-error patterns in location

Errors in location existed but they were rare (38/1430) and different. The most frequent location substitutions include face instead of head (26.31%), cheek instead of ear (26.31%) and neutral space instead of a body part (23.7%).

The substitution of a sign location with an adjacent one, being the 63.15% of all cases (Bonvillian 1999), seems to constitute a specific location error pattern.

4. DISCUSSION

This study has investigated the phonological acquisition of a deaf child of deaf parents exposed to Greek Sign Language. The aim of the study was to determine 1) the first handshapes, sign movements and sign locations that appear in the child's

early lexicon, 2) the phonological errors in sign formation and 3) the child's error patterns.

4.1 Findings

In alignment with Boyes-Braem (1990) I,II,III stages of handshape acquisition it has been shown that the child's first handshapes until the age of 2;0,21 were L, 5, B, O, A, S, bO, G, C, F, Y and 3, with L (49%) and 5 (32%) handshapes being the most frequent.

The child mostly used bidirectional movements but in contrast to ASL findings repetitive movement patterns (Chen Pichler 2012; Meier et.al 2008; Meier 2006) and contacting action patterns (Conlin et.al. 2000; Bonvillian 1999; Bonvillian and Siedlecki 1996) were limited. With regard to the place of articulation a preference in neutral space (Conlin et.al. 2000; Bonvillian and Siedlecki 1996) was revealed. Overall, the child made phonological errors in all three parameters, but mostly in handshape (Carmo et.al. 2009; Conlin, et.al. 2000). The most significant error pattern were: (1) the substitution of handshapes and locations with adjacent handshapes and locations respectively,(2) the substitution of complex sign movements with more simple ones (Boyes-Braem 1990,118).

4.4 Implications

Apart from the similarities described above between the present study and those concerned the acquisition of phonology in other signed languages, the variation observed on handshape substitution and the differences reported on the formation of sign movement and location, indicate: 1) the necessity for a more accurate phonetic analysis of signed data (Whitworth 2011; Takkinen 2003), 2) a more in-depth research on phonological acquisition of signed languages including an expanded amount of data and a larger number of subjects.

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APPENDIX: HANDSHAPES

L/☞	5/☞	B/☞	O/☞
A/☞	S/☞	bO/☞	G/☞
C/☞	F/☞	I/☞	Y/☞
D/☞	P/☞	3/☞	V/☞
H/☞	W/☞	8/☞	7/☞
X/☞,	R/☞	T/☞	