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FROM ICONICITY TO ARBITRARINESS: HOW DO GESTURES BECOME SIGNS IN PEER-GROUP PIDGIN

The research encompassed preschool age Polish deaf homesigners who were subjected to a spoken language teaching program. Its curriculum excluded applying both Polish Sign Language and Manually Coded Polish in communication with a child and was not concerned with social-linguistic identification of a deaf child with adult native signers. Peer-group pidgin was included in the data analysis that follows: a group of homesigners comprised of 6 deaf children of hearing parents: 4 boys and 2 girls. The children ranged in age from 5;2 to 5;6 years. The criteria for inclusion to the participants' group were among others: (1) sibling context – none of the research subjects had deaf siblings nor any previous contact with PJM; (2) hearing impairment – at the level of 80-100 dB; (3) prelingual deafness – deafness occurred prior to language acquisition; (4) intelligence quotient – nonverbal intelligence within the normal range (as estimated by preschool records); (5) no additional known handicaps (e.g., blindness, cerebral palsy); (6) kindergarden context – the research included kindergardens which did not neighbor with elementary schools so that there was no contact with older deaf children.

At the moment, the research concerning the linguistic competence of homesigners is being carried out in school isolated kindergartens. Beginning with each school year, consecutive language interaction sessions were video-recorded every two-three months in the natural play-time situation; gestural pidgin could arise from spontaneous conversations in the day-room, play-room or the play ground, not from a lesson book. There were five sessions, the last session arranged a year after the fourth session. Such a procedure enabled us to observe the process of conventionalization of the signs commonly created by peer-group pidgin and to identify how the home signs could become more arbitrary and symbolic. The videotapes were later analyzed and transcribed by two deaf individuals. The transcriptions served as a basis for characterizing the structural changes in signs belonging to peer-group pidgin.

Are Sign Languages real languages?

Up to the 1960s sign languages had not been viewed as natural languages on a par with spoken languages. Some linguists considered sign language to be a concrete system of gestures with a limited vocabulary and primitive grammar, incapable of expressing abstract ideas. Bloomfield (1933) noted that sign languages were primitive

and transparent gesture systems. Hockett (1960) presented a list of thirteen key design features in human language which are absent in animal communication systems. The first feature on the list is the vocal-auditory channel. These design features are based on spoken languages which are produced by the mouth and perceived by the ear. This approach suggested that none of the sign languages could be numbered among full-fledged languages because they make use of the gestural-visual channel – produced by the hands and perceived by the eyes. Hence at this time sign languages were thought to be nothing more than pantomimic systems lacking linguistic structure.

The American linguist, William Stokoe, started serious research on sign languages. He radically changed the approach to sign language: in his view it was a language like any other and he maintained that it could be analyzed as a language. In *Sign Language Structure: An Outline of the Visual Gestural Communication System of the American Deaf* (1960), he argued that the signs of American Sign Language (ASL) are not global pantomimic wholes, but rather are composed of discrete meaningless units, akin to phonemes, and that ASL has grammatical properties. His studies were further advanced by Klima & Bellugi (1979) and Liddell (1980). The research on sign languages over the past forty years has come to a shared conclusion: Sign Languages are natural and fully grammaticized languages produced and perceived through gestural-visual means.

Like any spoken language, sign languages are structured at syntactic (Liddell, 1980; Lillo-Martin & Klima, 1990), morphological (Klima & Bellugi, 1979; Liddell, 1990), and phonological (Liddell & Johnson, 1989; Stokoe, 1960) levels. Neurolinguistic findings also suggest that the brain's left hemisphere is dominant for sign language, just as it is for spoken language (Poizner et al., 1987).

In Poland, till now, Polish Sign Language (PJM) is not fully accepted as a full-fledged language in the general sense. PJM is quite frequently regarded either as a deviant version of spoken Polish or deficient “language” with no full grammatical organization (Rakowska, 2003). However, it has been also shown that PJM is a visual-spatial language with its own grammatical and linguistic structure. The grammar of PJM differs structurally from that of spoken languages – it relies on space, handshape and movement (Farris, 1994; Świdziński, 1998; 2005; Tomaszewski, 2004, 2005 a, b; Tomaszewski & Rosik, 2002). It also may be expressed by nonmanual components that play an important linguistic role in creating visual-spatial utterances (Mikulska, 2003; Tomaszewski & Rosik, in print, a, b). Moreover, PJM is a language of the Polish Deaf Community whose members are culturally and socially Deaf¹. Hence – differences between Deaf and Hearing people should be seen as cultural differences, not as deviations of deaf from the norm (Tomaszewski, in print; Woll & Ladd, 2003).

¹ Deafness is a complex case because many adults who are deaf view themselves as members of an ethnic or cultural subgroup rather than a disability group, and prefer the term *Deaf adults* who are members of a *Deaf community*. This is why the term *Deaf* refers to sociological deafness; the term *deaf* refers to audiological deafness (Woodward, 1983).

Iconicity and arbitrariness in sign and spoken languages

It is important to note that traditional definitions concerning the nature of language acknowledge the arbitrary mapping between words and meanings as a hallmark of human language (Hockett, 1960). In Saussure's (1916/1991) view there is a fundamental principle of linguistic sign: The bond between the signifier and the signified is arbitrary. *Arbitrary* means that the actual form of the symbol does not reflect the form of the thing or activity it symbolizes. *Iconic* means that the form of the symbol is an icon or picture of some aspect of the thing or activity being symbolized.

This is why researchers are concerned that iconicity bears a stigma to the status of natural language of which the form-meaning pairing have long been assumed to be arbitrary (Liddell, 2002). It is claimed that, because of gestural-visual modality effects, sign languages have iconic forms. For example, the iconic structure of PJM sign BOOK looks as follows:



Figure 1. Iconic form of the PJM sign BOOK

The PJM sign BOOK (Fig.1) resembles iconically the action of opening a book (beginning with the palms of both *open hands* together in front of the chest, fingers angled forward, bringing the hands apart at the top while keeping the little fingers together). Also the shape of the hands in this sign can resemble the shape of a book as referent. That is, there is a relation between the form of the PJM sign BOOK and its meaning. In any case, there are countless examples of iconic forms in PJM. Unfortunately, this fact contributed to mythologizing the iconicity of sign languages: They are clearly iconic and have no arbitrary symbols (Tomaszewski, 2004). Some linguists had a definite sense that to admit the existence of iconicity in sign languages was admitting that sign languages were not as were real languages as spoken languages whose linguistic symbols were supposedly arbitrary (Armstrong et al., 1995; Valli & Lucas, 2000). However, even though there are many iconic signs in a sign language, others definitely exhibit an arbitrary mapping between their form and meaning. For exam-



Figure 2. Arbitrary form of the PJM sign PSYCHOLOGIST

ple, the PJM sign PSYCHOLOGIST (Fig.2) does not resemble the psychologist; this symbol is arbitrary.

Do spoken languages have any iconic symbols? Not only sign languages but also spoken languages have examples of arbitrary and iconic forms – words that resemble the sounds associated with their referents (e.g., onomatopoeic words; Liddell, 2002; Taub, 2001). For example, the Polish word *trzask* ('crack') resembles the sound of slamming the door or breaking the stick, and word *tupot* ('stamp') resembles the sound of the stamping of feet. In English, there are such iconic forms as: *knock* (knocking on the door or window), *swish* (whistle, rustle). The sounds in these symbols try to imitate the sounds made by the things they represent.

One should not claim that some sign/spoken languages' signs/words have *pure* iconic form. As Shenk & Cokely (1980) and Kurcz (1992) have suggested, iconicity is not the total opposite of arbitrariness; rather, there are degrees of arbitrariness and iconicity. That is, from a point of view of the arbitrariness-iconicity continuum linguistic symbols in spoken/sign languages can be iconic in some ways and arbitrary in other ways. This thesis is confirmed by studies in which iconic signs or words were presented to persons who had never studied sign language or any other spoken language and who were asked to guess what they mean. As it turned out most signs/words are not transparent and their meanings are not correctly identified by naïve persons (Klima & Bellugi, 1979, Pizzuto & Volterra, 2000). Other researchers have pointed out that signs for the same concept are different in various sign languages. For instance, Battison & Jordan (1976) and Jordan & Battison (1976) determined the ability of native signers from various countries to comprehend signs from other countries' sign languages. Native users of American Sign Language, Danish Sign Language, French Sign Language, Chinese Sign Language, Italian Sign Language, and Portuguese Sign Language viewed videotapes in their own and five other languages. The fact that representations of concepts which are universally understood differ in various sign languages – argues that linguistic symbols are relatively arbitrary even though they can also be somewhat iconic.

What do Sign Languages tell us about language evolution?

Recently, some researchers have looked for an answer to an interesting question: How does human language evolve? Christiansen & Kirby (2003) have noted that, even though the problem seems to be very complex, there are more and more studies which have been describing factors influencing language emergence from different perspectives: psycholinguistics, psychology, linguistics, biology, anthropology. It is important to note that sign languages could be treated as a “piece of the puzzle” of language evolution theory. Indeed, new research trends in developing language evolution theories taking into account sign language have come into existence. First of all, there is the gestural origin of language theory. Some researchers suggest that, because vocal communication in primates is largely affective in nature and with little voluntary control, language is likely to have emerged from manual gestures rather than primate calls (Armstrong, 1999; Corballis, 2003; Stokoe, 2001). Second, we have evidence from deaf communities where complex sign language emerges quickly and spontaneously. A recent study in Nicaragua has tracked the emergence of a complex sign language, and has shown that the most fluent and creative users of the language were children (Senghas & Coppola, 2001).

Some researchers have argued that in language evolution processes proto-language constituted a set of linguistic symbols without syntax (Bickerton, 2000). Aitchison (1996/2002) and Donald (1999) have stressed that, well before full-fledged modern language, there must have been a voluntary use of symbolic vocalizations or other signals such as gestures. How did these symbols emerge? It is said that the nature of iconicity ruled out originally linguistic symbols based on the gestural modality which could have preceded the use of the vocal-auditory channel (Armstrong, 1983; Armstrong et al. 1995; Stokoe, 2000). From the point of view of iconicity, gestural symbols could be produced more easily than sound signals. On the grounds of the visual perception of reality our ancestors could have created iconic forms which resembled gestures associated with their referents. This was a cognitive circumstance that could have led hominids to see a resemblance between external events and gestural actions. However, language developed to such extent that symbols were conventionalized in their regular usage and gradually lost their iconic features, finally assuming an arbitrary form. This proceeded under the influence of the vocal-auditory channel and its advantage over the gestural modality. Indeed, in our times linguistic symbols that have large iconic components are naturally rare in the world's spoken languages; that is, there is an obvious limit as to what sounds made by the voice can resemble. In contrast, the visual-gestural modality is a rich medium for creating iconic forms; visual imagery can motivate the form of signs because the hands and face are directly observable and many referents can invoke visual images.

It is difficult to provide a description of words' conventionalization processes in spoken languages from the point of view of an arbitrariness-iconicity continuum. However, some researchers have conducted research in this area on the analogy of sign languages. They have described how manual signs were conventionalized and changed in groups of deaf individuals. Frishberg (1979) examined historical changes of signs in American Sign Language (ASL) and so showed that the iconic signs which were used frequently by deaf signers, became less iconic and more conventionalized and arbitrary. The results suggest that iconic signs in every conventional sign language are somehow more transparent, and tend to eventually become purely arbitrary signs. Can one relate this phenomenon to the situation of deaf homesigners belonging to peer-group pidgin? We answer this question in the next parts of this paper.

People as potential peer-group language

The very existence of a deaf population born to hearing parents who do not know PJM and who try to communicate orally with their children provides an opportunity to verify not only the hypothesis about the biological human capacity for language, but also language evolution theories.

Deaf children of hearing parents (DCHP) who know neither PJM nor sign Polish often have great difficulty acquiring any language naturally; since these children cannot hear their parents' speech, and the parents do not know sign language, they invent linguistic systems of their own based on spontaneous gestures. Their gestural language has been the subject of extensive research by Goldin-Meadow (Goldin-Meadow & Feldman, 1975). Gestural language created by DCHP is called "home signs".

By studying deaf children who had received little or no usable linguistic input, Goldin-Meadow & Mylander (1984, 1991) showed that subjects did indeed develop systematic means of communicating gesturally, and that home signs exhibit structure at lexical, syntactic, and morphological levels. Their studies found that homesigners produced many pointing and iconic gestures and combined gestures into strings. The majority of homesigners' gestures were, however, quite transparent and closely linked to their references (Goldin-Meadow, 2003a). This suggests that developing gestural forms without a model but in a group of homesigners can lead to a more structured linguistic system than does developing gestures without a model but by individual homesigners. Hence, Goldin-Meadow's subjects were exposed to idiosyncratic gesture input in the visual modality, and thus home signs alone could not undergo structural change if they are not repeatedly used by symmetrical groups of homesigners such as peer-group pidgin.

When surveying gestural communication development among homesigners it is advisable to include two dyadic forms influencing the process of a deaf child's linguistic development. Considering the variety of language modalities of both

parents and children, these include symmetrical as well as asymmetrical dyads. An asymmetrical dyad includes a deaf child and a hearing parent, whereas a symmetrical dyad refers to a pair of deaf children.

Kindergarten environment is critical for the homesigners' language development. Even in an oral preschool didactic model, a child gets involved in peer relations with their deaf mates; to some extent these relations do not conform to a standard linguistic model. Hence, two different means of communication may appear. One, as a gestural–manual form of communication, will merely function among deaf preschoolers. The other, an oral–gestural form, which has a limited capability of expressing oneself, will be adopted in contacts with the hearing. As Tervoort (1961) states, orally educated deaf children create two languages: *esoteric* and *exoteric*. *Esoteric* language is developed and used by these children among themselves. On the other hand, *exoteric* language serves as a form of communication with outsiders – including hearing parents and hearing teachers who do not know sign language. We could assume that the exoteric language is a spoken language or something like a simplified spoken language completed with nonverbal cues: facial expression, natural gestures, etc.

There are still different kinds of visual input to which homesigners might potentially be exposed: home signs or non-native signing (Morford & Kegl, 2000; Tomaszewski, 2001). Hence, it would be interesting to look into further language development of homesigners within their peer context, particularly in the case of symmetric dyadic situations. This might open the door to observing transition from the exoteric home sign systems to a more advanced and clear-cut esoteric gestural language, which may function and be created among homesigners as joint precursors of linguistic constructs in peer-group pidgin, and not in their contacts with hearing persons who do not know PSL or signed Polish.

A study was made on the emergence of sign language among deaf homesigners who came together in schools in Managua (in Nicaragua) in the early 1980s (Kegl, 1994). Researchers had discovered that there was a stage of development that mediated between homesign systems and the emergence of a full-fledged sign language. Over the course of two decades out of this set of home-sign systems, sign language has evolved that appeared to have much of the grammatical complexity of well-established sign language (Kegl et al., 1999; Senghas & Coppola, 2001). This newly emergent language is referred to as Lengua de Signos Nicaraguense, Nicaraguan Sign Language. It has appeared far more complex than any of the home-sign systems of the homesigners described by Goldin-Meadow. However, it was not clear how home signs could transform from their pantomimic forms to more arbitrary symbols in peer-group pidgin. Indeed, some researchers admit that theoretically the signs in early peer-group pidgin could be more conventional and less pantomimic than the gestures belonging to the home-sign systems (Kegl et al., 1999, Morford & Kegl, 2000).

Hence, the purpose of the present study was a preliminary analysis of the changes of conventional signs which are repeatedly used by homesigners as peer group pidgin. Specifically, it was designed to investigate the following questions: How far could a peer-group pidgin move toward arbitrariness and a more complex phonological system without a conventional language as a model but *with* a willing communication partner (homesigner) who enters into and shares an arbitrary gestural-visual system with the child? How could home signs change from their pantomimic origins to more arbitrary forms?

Method

Subjects

The research encompassed preschool age Polish deaf homesigners who were subjected to a spoken language teaching program. Its curriculum excluded applying both Polish Sign Language and Manually Coded Polish² in communication with a child and was not concerned with social-linguistic identification of a deaf child with adult native signers. Peer-group pidgin was included in the data analysis that follows: a group of homesigners comprised of 6 deaf children of hearing parents: 4 boys and 2 girls. The children ranged in age from 5;2 to 5;6 years. The criteria for inclusion to the participants' group were among others: (1) sibling context – none of the research subjects had deaf siblings nor any previous contact with PJM; (2) hearing impairment – at the level of 80 – 100 dB; (3) prelingual deafness – deafness occurred prior to language acquisition; (4) intelligence quotient – nonverbal intelligence within the normal range (as estimated by preschool records); (5) no additional known handicaps (e.g., blindness, cerebral palsy); (6) kindergarden context – the research included kindergardens which did not neighbor with elementary schools so that there was no contact with older deaf children.

Procedures

At the moment, the research concerning the linguistic competence of homesigners is being carried out in school isolated kindergartens. Beginning with each school year, consecutive language interaction sessions were video-recorded every two-three months in the natural play-time situation; gestural pidgin could arise from spontaneous conversations in the day-room, play-room or the play ground, not from a lesson book. There were five sessions, the last session arranged a year after the fourth session. Such a procedure enabled us to observe the

² Signed Polish or Manually coded Polish (MCP) refers to any constructed signing system that represents words in Polish sentences with signs from conventional sign language, along with invented signed translation equivalents for Polish grammar words. In Poland, MCP is used in deaf education, where many teachers and parents communicate with deaf children by means of this artificial system.

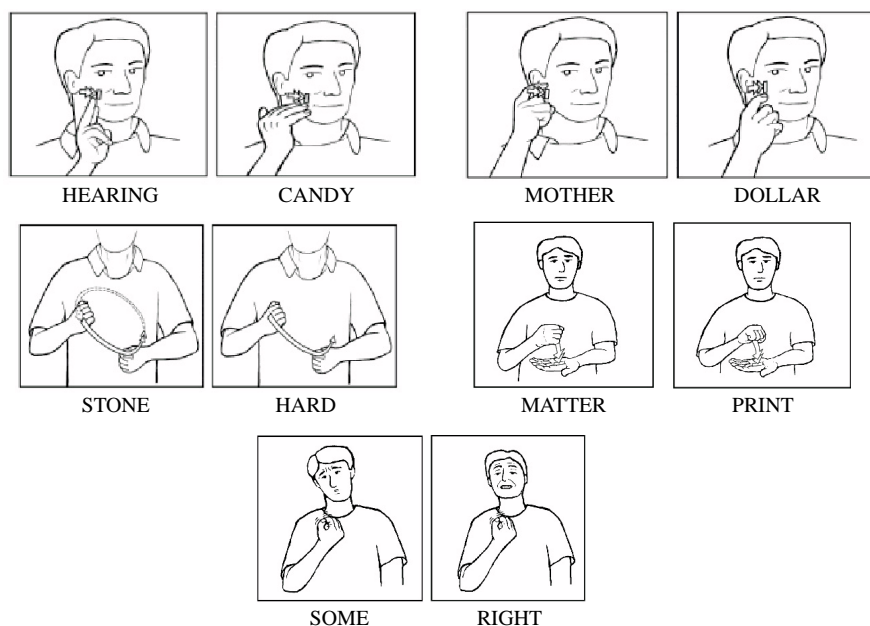


Figure 3. Minimal pairs of PJM signs that differ only in parameter

process of conventionalization of the signs commonly created by peer-group pidgin and to identify how the home signs could become more arbitrary and symbolic. The videotapes were later analyzed and transcribed by two deaf individuals. The transcriptions served as a basis for characterizing the structural changes in signs belonging to peer-group pidgin.

Analysis of some aspects of development of signs in peer-group pidgin

To examine carefully the phenomenon of structural changes in signs created by homesigners in a group versus on their own, we applied Stokoe's (1960) and Liddell & Johnson's (1989) models concerning phonological structure and organization of signs. Research on the structure of lexical signs has shown that, like the words of spoken languages, signs are divisible into sublexical elements. Signs have five basic parts – (1) *handshape*, (2) *movement*, (3) *location*, (4) *orientation*, and (5) *nonmanual signals* (facial expression)³. These parameters are responsible for the difference in meaning of the signs. Thanks to these parts there are minimal pairs in sign languages. Figure 3 shows minimal contrasts

³ The phonology of conventional sign language, particularly Polish Sign Language, is described in detail in Tomaszewski's (2005a) paper *On certain morphological elements in Polish Sign Language: compounds (Part 1)*.



Figure 4. FORGET

involving handshape, location, movement, orientation and nonmanual signals in Polish Sign Language (PJM).

The signs meaning HEARING and CANDY have the same handshape, involve the same movement, but contrast minimally only in location. MOTHER and DOLLAR are a minimal set contrasting only in handshape, STONE and HARD only in movement. MATTER and PRINT differ minimally only in the palm orientation and SOME and RIGHT in nonmanual signals.

Stokoe (1960) suggested that signs are composed of three simultaneously produced parameters – location, handshape, and movement. This researcher demonstrated simultaneous but not sequential contrast. However, Liddell and Johnson (1989) discovered that signs are composed of sequentially produced movements (M) and holds (H) and that the handshape, location, orientation, and nonmanual information is contained in bundles of articulatory features. Sequential contrast can be demonstrated. For example, the structure of PJM sign FORGET in the Movement-Hold model consists of two hold segments and one movement segment that are produced sequentially (H-M-H). The sign FORGET has a change of both handshape and location, and this change takes place during the movement segment (Fig.4). The sign FORGET begins with a hold (H) at the level of the right eye and then moves left and ends in a hold near the left cheek. This sign begins with a C handshape and ends with an A handshape, and the palm orientation begins with the palm facing left and ends with the palm facing downward.

In sum, sign language phonology parallels spoken language phonology. Spoken languages as well as sign languages divide the segments that make up the words or signs into two major types of units: (1) consonants and vowels in spoken languages and (2) holds and movements in sign languages (Liddell & Johnson, 1989).

The description of the nature of iconic conventionalization of gesture signs in peer-group pidgin has centred mainly around the three sublexical parameters: handshape, movement, and location. These parts have undergone visible change when homesigners became skilled at using the gesture signs. Moreover, the body language was taken into consideration because this category has participated in the change of gesture signs. The research has selected and described only those signs that changed perceptibly and became less iconic and pantomimic.

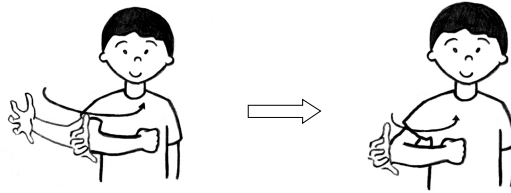


Figure 5. Minimization of movement of the sign TAKE-AWAY

In the homesigners' language, *narrowing of the signing space in the form of minimization of movements at the performance of some gesture signs* was observed. One of such signs is the gesture TAKE-AWAY. In the first session, the children used this gesture in a mime manner, doing a large horizontal movement over the entire signing space. Comparison of the first session with the last one shows gradual minimization of movement in the gesture sign TAKE-AWAY (Fig. 5).

In the first session, the gesture TAKE-AWAY was of a mime nature, the movement overdone and taking up much of the signing space. However, in the last session, the movement of this sign was minimized, and its tempo was faster. In general, the shorter a sign movement becomes, the faster its tempo. The same applied to the sign ARRIVE that was done in the first session with a larger arched movement than in the last one (Fig. 6).

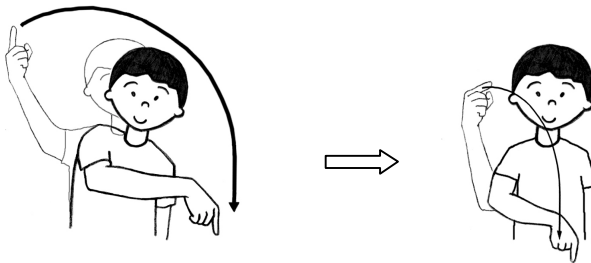


Figure 6. Minimization of movement of the sign ARRIVE

The same reduction in movement was observed for the gesture BLACK (Fig. 7). In the second session with art works, some of the homesigners used a gesture denoting the black color when looking for a black colored pencil in the box. The gesture was made with a one-hand vertical repetitive movement, from top (face level) to bottom (waist level). Semantically, this sign can function as a metaphor as its movement is associated with scribbling with a black colored pencil in a coloring book. In the next sessions, the movement of the BLACK gesture shortened to such an extent that it was done from the face level down to the chest (or



Figure 7. The change in the gesture sign BLACK and its resemblance to the PJM sign for BLACK

even to the neck), but not to the waist level. It gets to resemble the BLACK sign of the Polish Sign Language (PJM) that is made with a very short one-hand movement by the right region of the forehead (Fig. 7). Some time ago (perhaps in the first years after the Warsaw Deaf Mute Institute opened in 1817) the sign for BLACK was used in a manner similar to that made by the homesigners but that was minimized over time.

It might be useful to add that an earlier analysis of the development of the American Sign Language (ASL) revealed similar minimization of movements of some signs, e.g. LONG. The modern ASL sign LONG is made with the extended right index finger of one hand moving along the back of the wrist of the extended left arm to near the shoulder. The 1913-ASL sign LONG was made in following way “the signer expressed himself in an exaggerated rendition of the sign, elongating it from his left toe up across his body and ending above his right shoulder.” (Klima & Bellugi, 1979, p.33).

The changes in the form of minimization of the sign movement in the homesigners’ language imply that one of the properties of gradual development of the language system in the visual modality is the reduction in the movement of signs, which favors the narrowing of the signing space (e.g. from the head level down to the waist level). Due to this, gesture signs do not so much lose their feature of pantomime over time, since they are subject to reduction in the degree of iconicity. It is likely that an additional factor that has a certain influence on minimization of the sign movement is improvement of the processing of visual spatial language information.

One of the features of pantomime is an „overdone” use of the body language for a visual demonstration of various acts. A change in the structure of some gestures in the form of *a transfer of movement from the body language to the hands* was observed. The homesigners use such modified gestures to demonstrate signs deprived of the characteristics of pantomime. In the first and second sessions, the children used certain signs, whose movement was done more often

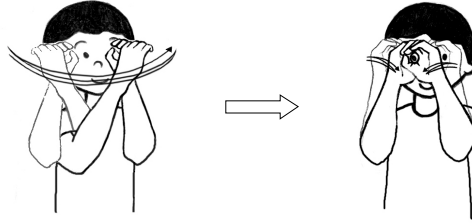


Figure 8. A transfer of movement from the head to the hands in the gesture sign for RECORD-WITH-CAMCORDER

within the area of the body or the head than on the hands, as it happens in a conventional sign language (e.g. PJM, ASL). The sign for RECORD-WITH-CAMCORDER is an example to support this. At the beginning of the session, the sign was demonstrated with two hands of the same shape (O letter) at the eyes level, and with the head moving twice to the sides (Fig. 8). The form of the sign for RECORD-WITH-CAMCORDER is motivated iconically on the basis of the form of a camcorder.

In the beginning, the use of the RECORD-WITH-CAMCORDER sign included the physical contact rule: one of the hands was close to the body, especially to a part of the face (an eye). The vanishing of the physical contact of the hand with the body was not observed until the last session. This process enabled the movement to be transferred from the head (side-to-side movements) to the hands. According to the model of dimensionality of signing developed by Supalla and Newport (1978), such a movement has a feature characteristic for a conventional sign language, since it was repetitive, multidirectional and moderate.

The gesture sign for DOG, which was done in the first session in a mime manner, has undergone a similar process of structural transformation, remaining with its meaning unchanged. This sign is done with both hands with all fingers bent and raised up to the face level, moving forward, and with a menacing facial expression. This iconic gesture can be associated with a dog's growling or with an attack on an opponent (Fig. 9).

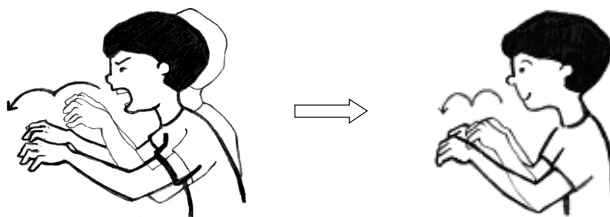


Figure 9. A transfer of movement from the body to the hands in the gesture sign for DOG

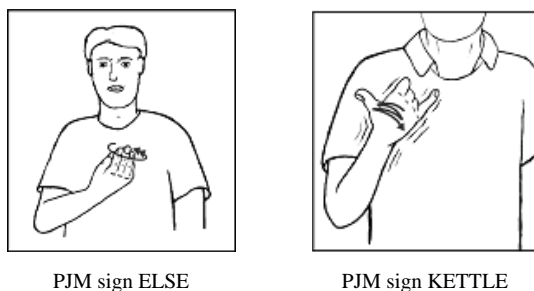


Figure 10. The structure of the signs in the Polish Sign Language

A change in the phonological structure of the sign for DOG was registered in the fourth session. In this case, the movement completely moved from the body to the hands, acquiring special characteristics: it was repetitive (done twice forward), round and moderate, and at the same time, it was short, fast and stiff (Fig. 9). In this process it was observed that the facial expression of anger (dog's growling) no longer accompanied the movement.

According to Liddell and Johnson's Movement-Hold model, the modified structure of the homesigners' gesture sign for RECORD-WITH-CAMCORDER is composed of movement and hold segments, the sequence of which is the M-M-M-H pattern, whereas the sign for DOG has a one-segment movement structure (M). Such combinations of hold and movement segments apply also to some signs of the Polish Sign Language (e.g. the structure of the sign for ELSE includes only one movement segment (M); in the sign for KETTLE there are three movement segments and one hold segment (M-M-M-H) (Fig.10).

It might be useful to mention that the evolutionary feature of the transfer of movement from the body language to the hands in the process of the phonological change in some ASL signs was previously described in Frishberg's work (1979). She showed an example that illustrates the difference between the usage of the sign for BORING as of 1918 and that of today, and so the evolutionary process of the transfer of movement from the head to one hand in the ASL sign for BORING. The 1918-ASL sign BORING was made in the following way "the forefinger pressing against the end of the nose, and the head bending forward as if in obedience to the pressure of the finger. Today the forefinger touches the end of the nose, and a turn of the wrist has been substituted for the head movement." (Frishberg, 1979, p.71).

Battison (1974), in turn, emphasized that some signs of sign languages are made with two hands: if both palms are involved in the performance of a sign, their configuration, direction and movement are identical and symmetric. This

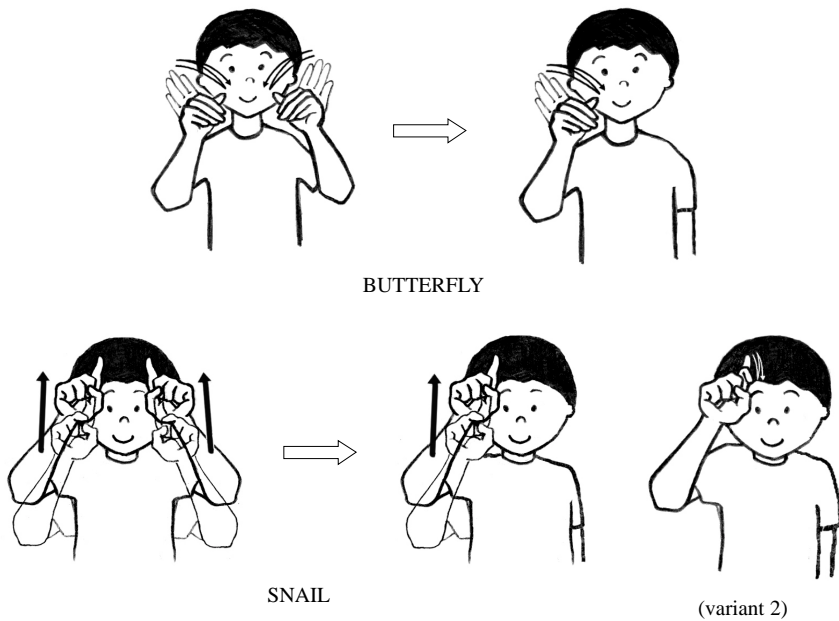


Figure 11. The homesigners' symmetric gesture signs for BUTTERFLY and SNAIL, and the loss of the feature of symmetry through the elimination of one hand

phenomenon is defined as the principle of symmetry. There is also another principle, called the law of dominance, which refers to the expressing of some signs. It becomes apparent when one hand dominates while in motion, and the other non-dominant hand is subordinated to the dominant one.

As to the principle of symmetry, another feature reflecting certain changes in the structure of homesigners' gesture signs was observed. It is the tendency to *eliminate one hand* that was previously used for the performance of a two-hand sign, so that the sign takes on a one-hand form. Such a process occurs in relation to the principle of symmetry and the location of the gesture sign within the peripheral field. BUTTERFLY and SNAIL can be model signs here. In the first and the second sessions they were done with two hands and in accordance to the principle of symmetry. However, in the fourth session they lost the feature of symmetry, and through the elimination of one hand they became one-hand signs (Fig. 11).

The reason why one hand of gesture signs was eliminated after some time is the degree of clarity of perception. These signs were first made by the face, thus they were so visible that they tended to lose their feature of symmetry. It might be useful to say that some PJM signs made in another location (e.g., below the face) at the chest or the waist level) retain their symmetry, and this is associated with a low degree of clarity. Similarly, in the homesigners' language there were sym-



Figure 12. The homesigners' symmetric gesture sign for BE-IN-A-HURRY in accordance with the principle of symmetry

metric signs performed at the waist level, e.g. BE-IN-A-HURRY (also FAST), which corresponded to the principle of symmetry in each session (Fig. 12).

The above reports are ground for drawing a conclusion that during the exchange of visual information the deaf child does not concentrate only on the signer's hands but also on his face. In addition, the child is able to use the peripheral vision to facilitate simultaneous perception of information communicated via gesture signs, the body language, facial expression, etc.

The evidence in support of this thesis is the performance of the PJM sign for CAT that was at one time expressed by the face according to the principle of symmetry, and at present it is performed with one hand only (Fig. 13).

It is worth noting here that the sublexical parameters of the gesture signs used by the homesigners in the process of visual communication may change. The characteristic of the gradual development of a sign language is the minimization of sign movements accompanied by the narrowing of the signing space. It was also observed that the phenomenon of "delayed" inclusion of movement in the structure of some gesture signs can be found in the homesigners' language. For some time these signs were devoid of this sublexical element, despite including other elements, like the handshape or the location. The structure of every sign is

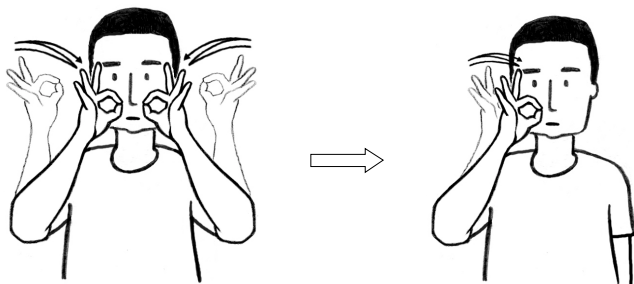


Figure 13. The symmetric sign for CAT and the loss of its feature of symmetry

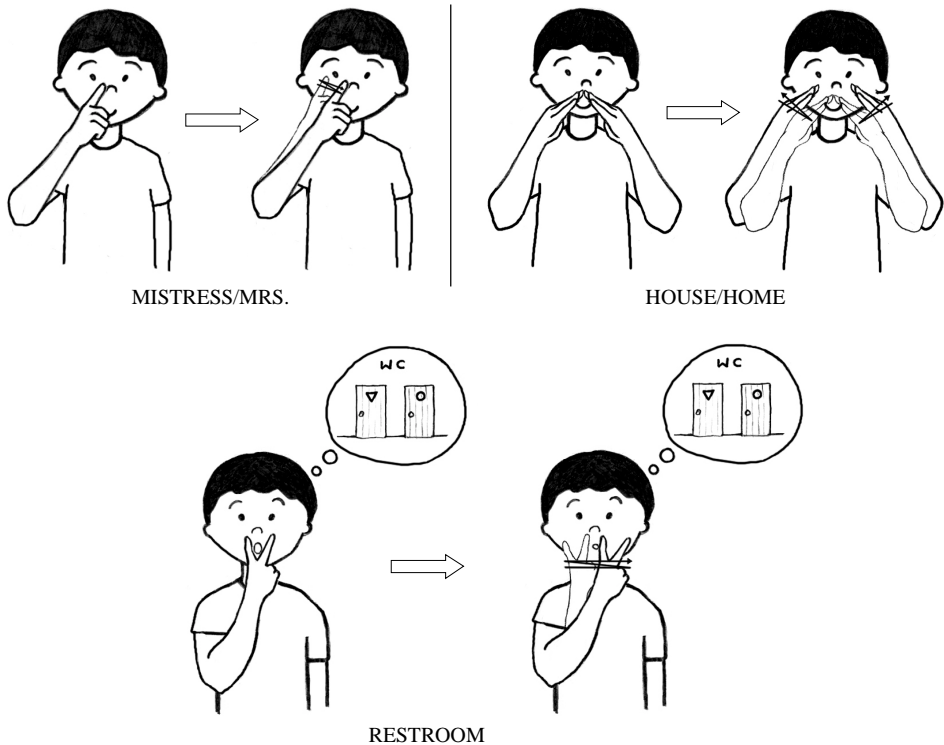


Figure 14. Transformation of proto-signs into full signs: MISTRESS/MRS., HOUSE/HOME and RESTROOM through inclusion of movement

composed of three basic parameters: handshape, location and movement. It can be assumed that the gestures, which at first did not include the movement parameter, functioned as proto-signs, in which not all obligatory sublexical elements were present. Only when they were conventionalized through inclusion of the movement parameter, they became full signs.

Let's consider the processes of conventionalization of such gesture signs as MISTRESS/MRS. and RESTROOM, which in the first session were missing movement as the sublexical element (Fig. 14).

The gesture sign for MISTRESS/MRS. was at first performed in such a manner that the index finger (the other fingers were clenched) touched the right side of the nose in a static way. It was only in the last session that the inclusion of movement in the structure of this sign was observed: the index finger touched this location twice, which, according to the Suppala's and Newport's (1978) model for analysis of the dimensionality of signing, can be called a specific movement, since it was repetitive, multidirectional and moderate. The same happened to the sign for RESTROOM, in which the V-shaped hand touched the signer's mouth. The sign had a metaphori-

cal meaning: with this handshape and a round mouth it imitated in an iconic and simultaneous way the two symbols ∇ (for men) and \bigcirc (for women) that are found on restroom doors in Poland. After some time the hand of the RESTROOM sign lost contact with the mouth and was involved in movement in front of this part of the face, which is characteristic for a conventional sign language. It is worth adding that such movement occurs mainly in noun signs. Another sign, HOUSE/HOME was in the first sessions devoid of any movement. The sign was just represented by the palms shaped like a part of a house, as if such a handshape functioned as a classifier for the shape of a house roof. But in the last session there was a structural change in this sign: one movement segment (M) was added to the sign, and so the HOUSE/HOME structure with M-H (movement – hold) pattern formed. This sign informs the “visual listener” that it is about an entire house, not just a part of it - the roof. Generally, this sign in its modified form looks like the PJM sign for HOUSE/HOME, but the structure of the latter differs from the homesigners’ gesture in the segment pattern that is M-M-M-H (movement-movement-movement-hold). So there are two more movement segments in the PJM sign for HOUSE/HOME than in the homesigners’ relevant sign.

In the course of analysis of the homesigners’ language other structural changes were also observed that pertained to one of the three basic sublexical parameters, i.e. location. Some of such signs are POLITE and DAD (Fig. 15).

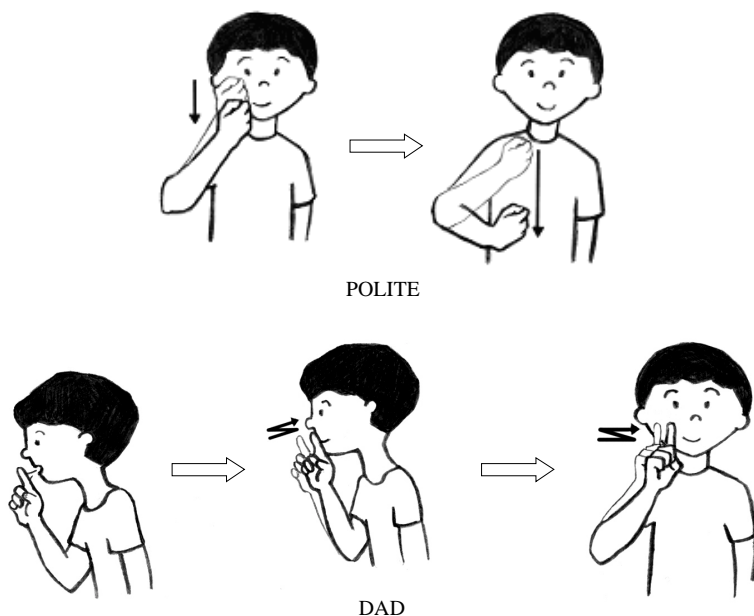


Figure 15. A location change of gesture signs POLITE and DAD in the homesigners’ language

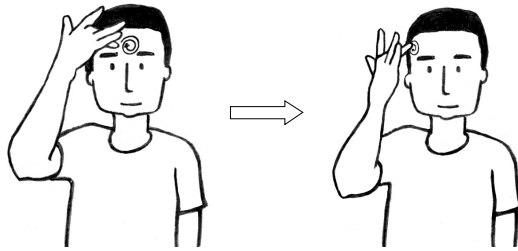


Figure 16. A change of location in the PJM sign for RELIGION

The sign for POLITE in sessions 1, 2, 3 and 4 was performed by rubbing the right cheek with the back of the hand. In the last session the location of this sign changed: it was done not on the face but on the chest, by stroking it with the same handshape. As for the sign for DAD, in session 2 it was done with the index finger touching the chin twice, and in session 4 it was only the location that changed: the sign was done at the right cheek level (Fig. 15). Moreover, it often happens that signs of a conventional sign language (e.g. PJM), which are at first done in the face region, change their location after some time: they move to a side of the face. The sign for RELIGION can be an example of such “phonological” change. Since the deaf children who used this sign were in frequent contact with PJM, they were influenced by it and moved the location from the middle part of the forehead to the right side of it (Fig. 16)⁴. It is important to remember that deaf participants of the communication based on the visual modality must maintain eye contact, and it is very important for them to perceive information communicated not only by the hands but also by the expression of the whole face. Therefore, a sign covering the face interferes with the effective maintenance of eye contact.

The third sublexical parameter (handshape) was also involved in the process of structural changes in the homesigners’ gesture signs. This phenomenon was found e.g. in signs WALK and GO (see Fig. 17).

In sessions 1 and 2, the use of the sign for WALK was inaccurate as all the fingers of the relevant handshape were unbent and spread, and two of them, the index and middle fingers, made an inward movement combined with an outward movement of the entire hand. It was only in session 3 that the transformation of this handshape was observed: that is to say, three fingers (the thumb, the ring finger and the little one) were clenched, and the other ones remained unchanged. This sign is identical to the relevant PJM sign and is characterized by a high degree of iconicity: the two fingers with the tips pointed down look very much like human legs. In sessions 1 to 4 the sign for GO was done by waving one hand

⁴ The relevant phonological change in the structure of the sign for RELIGION was observed by the author of this work during everyday interactions with deaf children who used PJM.

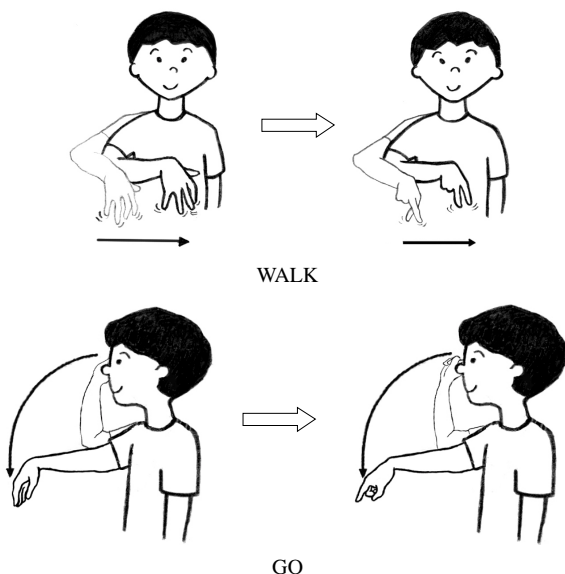


Figure 17. A change in the handshape of the gesture signs WALK and GO of the homesigners' language

forward, whereas all its fingers were unbent and spread. The structure of this sign did not change until the last session: the thumb, the middle finger, the ring finger and the little one were clenched, whereas the index finger was unbent, so the whole handshape was just the gesture used to point at something.

Apart from the three basic sublexical parameters (handshape, location and movement) there are also additional categories: palm orientation and non-manual signals. Due to these categories some of PJM signs can be semantically different. As far as the palm orientation is concerned, it also contributed to the process of structural modification of gesture signs in the homesigners' language, but to a minor degree. This phenomenon was found in the sign for YEARS (in the sense of age), which was developed in the fourth session (Fig. 18). One should note that this sign is an iconic metaphor assuming another meaning in a vivid way, which is associated with the literal meaning. The homesigners used the sign for YEARS with reference to the real meaning: they said/asked how old the person they spoke about/with was. The literal meaning of this sign is blowing out the candles on a birthday cake. The handshape of the sign for YEARS symbolizes a birthday cake, and the relevant facial expression imitates the blowing out of the candles (Fig. 18). This way, the homesigners used the cognitive parallel between the number of cake candles and the human lifespan from the birth up to the present time, usually counted in years. The sign for YEARS was subject to gradual changes: not only the palm orientation changed, but also outward movement was included. In the

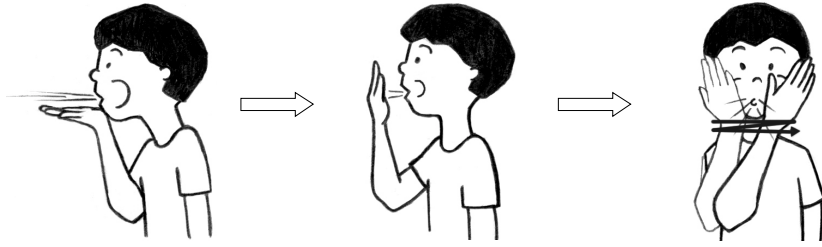


Figure 18. A change of the figurative sign YEARS in the homesigners' language

fourth session this sign consisted of inward movement and mime in the form of expelling air (the imitation of blowing out candles), and the palm orientation was such that the palm of the hand was up. In the last session, it looked different: the palm of the hand in the sign for YEARS was directed toward the signer, and a new movement typical of a conventional sign language was added (it was repetitive, short and moderate). One can say with certainty that the sign for YEARS has become arbitrary to the extent that a non-homesigner would not be able to guess the meaning of this sign.

As for the latter sublexical parameter (non-manual signals), no detailed analysis of the structural changes in conventional signs of the homesigners' language in terms of this sublexical element occurred. However, a change in the use of facial expression in the sign for DOG was noticed (Fig. 9): when performing this sign the homesigners did at first demonstrate a menacing facial expression (as dog's growling), but later they abandoned this expression.

The forming of new lexeme compounds through combining two lexical signs that already existed in the homesigners' language also contributed to the process of conventionalization or modification of the degree of the gesture sign iconicity. Such compounds imply that the children's gesture language not only has the characteristics of iconicity but also of arbitrariness. But, as it was noticed, the processes of combining two gesture signs into one of a different meaning did not appear until the last session.

In order to examine the mechanism of forming compounds in the homesigners' language it is important to discuss some morphological rules responsible for the production of lexical compounds that already exist in PJM. We will present here a description of how the PJM compound sign for SATURDAY SUNDAY ('week-end') (the symbol '⌢' between the glosses means a new compound sign) was formed (Tomaszewski, 2005a). According to Liddell's model (1984) the following morphological rules were involved in the forming of the 'weekend' compound. (1) *the first contact rule*, (2) *the single sequence rule* and the phonological rule (3) *the rule of inclusion of additional movement*. The first contact rule consists in that the segment of a static configuration, or the hold (H) of one of two

basic signs remains in contact with the signer’s body through the other hand (+C). This means that the physical contact of the hold segment for one sign is maintained in the sign combining process. Here is an example of the use of the first contact rule to form the ‘weekend’ compound (Fig. 19, 20):

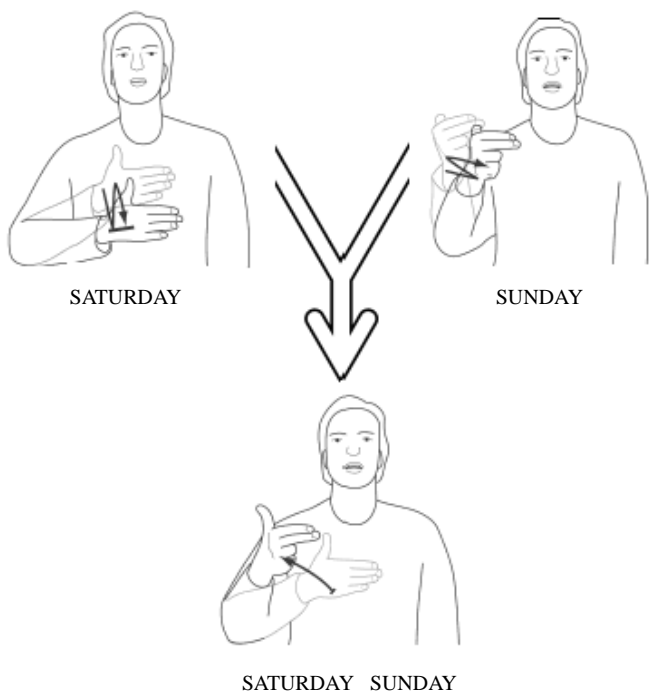


Figure 19. The outline of the process of forming the compound SATURDAY SUNDAY

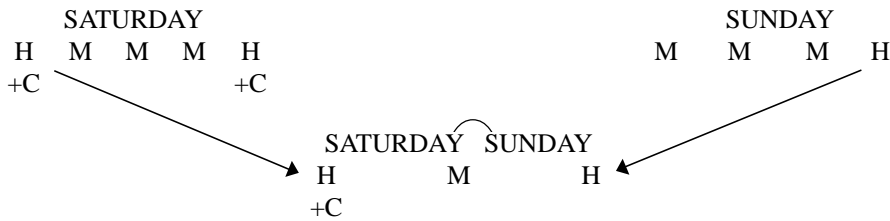


Figure 20. Graphical representation of the process of forming the compound SATURDAY SUNDAY

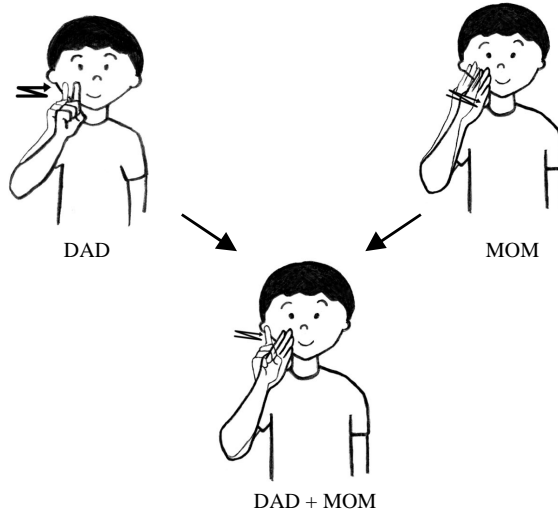


Figure 21. Graphical representation of the process of forming the compound DAD MOM

As you can see in the outline, the contact of the SATURDAY sign static configuration (hold segment) with the body (the chest) has been kept in the combination of the SATURDAY and SUNDAY signs.

In the signs SATURDAY with H–M–M–M–H pattern and SUNDAY with M–M–M–M–H pattern there are movement repetitions. But after the signs had formed the ‘weekend’ compound (the simple sequence rule), the repetitions vanished, and at the same time, additional movement appeared between the static configuration segments (the rule of inclusion of additional movement). The new segmental structure is different: H–M–H, and in the additional movement there occurs a sequential change of the handshape.

The processes of forming arbitrary compounds in the homesigners’ language occurred in a similar way. In order to show them we will use a compound formed in the last session. It is a combination of two previously used gesture signs MOM and DAD, which acquired a new semantic meaning, ‘parents’ (Fig. 21). At first, the signs MOM and DAD were of a purely gesture nature and they were borrowed from hearing people, especially those who gave speech-therapy classes to the homesigners.

The gesture sign for DAD had previously a form of a pure gesture. Such a gesture was developed by speech therapists who work with the Deaf, and it involved moving the index finger to the mouth when pronouncing the sound of *t*. The therapists’ intention was to familiarize a deaf child with the phonetic characteristics of this (occlusive) sound with the use of this speech-therapy gesture⁵.

⁵ The occlusive *t* is pronounced with occlusion followed by dilation (plosion).

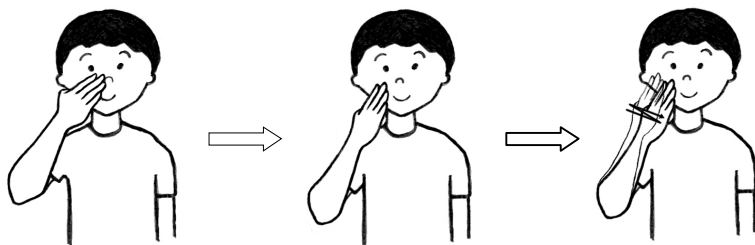


Figure 22. A change of gesture sign MOM in the homesigners' language

The homesigners often practiced pronouncing this sound through voicing the word *tata* (dad) with the use of their index finger (under pressure from the speech therapist) the way they were taught so that they could feel the dilation of this sound (see Fig.15). The same happened to the sign for MOM that originally was a gesture: when pronouncing the nasal consonant *m* the children put their M-shaped hand to the nostrils so that they could feel the vibration of the stream of air escaping through the nostrils (Fig.22).

The speech-therapy gestures developed by hearing people were used by the homesigners in their communication interactions to form signs for DAD and MOM, the form of which changed with time: the children added movement to the gestures and changed their locations (for DAD: mouth → cheek; for MOM: nostrils → cheek). Once these signs had taken on structural features, typical of a conventional sign language, an opportunity arose to form a compound of a new meaning. That is to say, with reference to the terms DAD and MOM, the relevant two signs, which previously existed within the repertoire of the homesigners' language behavior, were combined into one sign (Fig. 21, 23). As it was remarked, this compound was formed in accordance with the morphological rules: (1) the first contact rule, (2) the simple sequence rule and (3) the rule of elimination of the static configuration (Fig. 23).

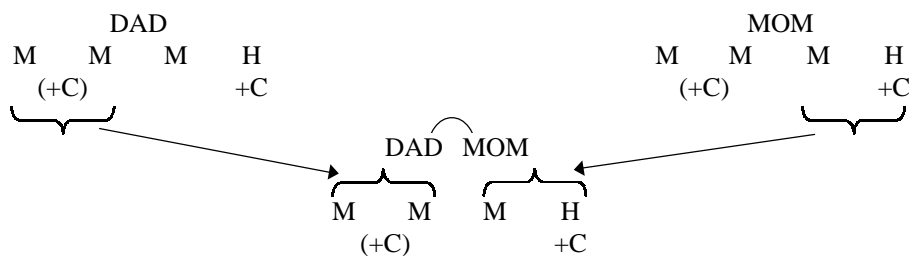


Figure 23. The process of forming of the compound DAD MOM

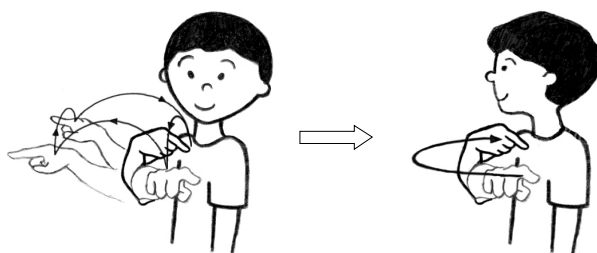


Figure 24. The process of lexicalization of the sign for WE in the homesigners' language

During lexical analysis of the homesigners' language it was observed that demonstrative gestures played a significant role in forming the signs, since some of them are of demonstrative nature. This category includes such signs as WE, SAME, IDEA, SEE, and the like. We will now discuss the process of conventionalization of two gesture signs: WE and SAME. The first of them in the first session was characterized by pure iconicity and consisted of several demonstrative personal signs used "here and now". The homesigners pointed at themselves first and then at their peers, one by one, and finally, at themselves again. In this way they expressed the pronoun WE composed of several demonstrative signs. $I + YOU_1 + YOU_2 + \dots + YOU_n + I$ (Fig. 24). In the third session the sign for WE was modified, taking on the feature of arbitrariness: it was used in such a way that somebody (another person: YOU_1), was pointed at, and then the index finger moved fast along the circle in the signing space, after which it was directed at the signer (the first person: I). The modified gesture sign looks like the PJM sign for WE.

The source of the gesture sign for SAME is in the use of demonstrative gestures pointed at present objects. Exploring the world, the homesigners noticed sameness of objects (O_1 , O_2) or resemblances between them. In the beginning they pointed with their right index finger at O_1 , and with the left index finger – at O_2 , and then they brought these fingers together. In the next sessions, they brought these fingers together without pointing at the objects; the sign was performed in the signing space.

Conclusions

A pidgin-like system as a form of communication may emerge at the point when the homesigners begin interacting with each other. The emergence of such a system results from a clash of home sign systems. Under such circumstances a pidginization process occurs: the homesigners spontaneously make new visual language products of different home signs to fulfill their social needs. This may, as a result, cause emergence and formation of a pidgin-like sign system. It may include new lexical items that are not observed in the early home sign systems. It

seems that social contacts between the homesigners are required for these systems to develop. The new lexical products are just conventionalized signs that take on an iconic and arbitrary form in social circumstances, and some of the signs violate the principle of phonological symmetry.

The home sign systems are made up of a limited number of lexical signs that differ from each other in terms of sublexical components; they can have a role of distinctive features that enable forming minimal pairs of signs (Goldin-Meadow, 2003a). It so happens that young deaf children brought up in a family environment, which does not provide them with a sufficient number of stimuli for their language activity, remain “passive users” of their own home sign system. Such conditions are not favorable for development of this language with respect to social behavior. Data in the form of video clips with some utterances made of home signs, collected by Goldin-Meadow (available on the Internet at: www.psypress.com/goldinmeadow) show how such systems function from a linguistic point of view. Most of the signs from those utterances are of mimetic and iconic nature and they take up much signing space. The body language is also completely involved in forming these gestures. However, the “pidgin sign language” as a means of communication between the homesigners has in principle a greater number of socially conventionalized signs than home sign systems. These signs were so often used in the communication process that they contributed to minimization of the signing space.

As this research has shown, in the beginning, especially in the first sessions, many gestures of the homesigners’ repertoire of language behavior functioned as “proto-signs”, which, according to Jackendoff’s (1999) theory of language evolution, may reflect the phenomenon of “proto-phonology”. There were two kinds of such components: (1) proto-signs in the form of a demonstrative gesture and (2) structurally incomplete proto-signs. The first were in the shape of an unbent index finger and were used both for naming objects in terms of their appearance and for defining acts. These gestures had a wide meaning, were dynamic and included at least two sublexical components: movement and location (or shape and location). Due to this they could be a “lexical base” for complete lexemes that had three basic internal parameters as a rule: movement, location and shape. The latter parameter could be gradually transformed from the demonstrative form to a more sophisticated one, and so resembling the external appearance of an object or a determined act. Thus, complex combinations of sublexical components transformed with time into symbols defining names of the objects or events. Moreover, some authors take the use of demonstrative gestures POINT-AT-___ for one of the main sources of development of formal signs (Armstrong et al., 1995). For example, the homesigners used such signs as: BOOK, BALLPEN, KNOW/CAN, LOOK, SHOW, the basis for which was a demonstrative gesture. As for the other type of incomplete “proto-sign”, in structural terms it is based on mimetic and iconic components. Iconic motivation can be seen in phonological processes of homesigners’s language in which

the form of the sign (e.g. the shape of the hand) for a referent can resemble the form of this referent. In the beginning, iconic components are in principle devoid of at least one sublexical parameter, e.g. the movement. But, with a dynamic development of the pidgin sign language in the communication between the homesigners, the proto-signs change and become phonologically complex signs (e.g. complementing the sign structure with one internal component) used by these children in an economical manner. It is worth adding here that in the process of “lexical evolution”, if obligatory sublexical components are joined to form phonologically complete signs, the parameters overlap. One parameter influences the other (or vice versa) to an extent that the language symbols are economical and favor the increase of communication effectiveness.

The inherent regulation of the phonological system in a pidgin sign language establishes the autonomy of the original language aspect built in any natural language. The analysis of phonological changes in the sign structure carried out in terms of evolutionary dynamics implies that the homesigners’ language based on the visual modality may take on the feature of arbitrariness through conventionalization of signs by the principle of iconicity. Frequent use of signs causes such phonological changes as: (1) narrowing of the signing space, (2) transfer of movement from the body language to the hands, (3) structural changes in signs in terms of sublexical parameters: elimination of one hand, inclusion of movement in the signs and a change of their location and handshape. It is because of the fact that, as the homesigners use the signs more and more often, the tendency to communicate in an easy and economical manner prevails. So, the changes in the language result from the tendency to spare effort and to facilitate the communication process. Actually, this occurs not only in the sign languages but also in any other language (Mufwene, 2001). Thus, the phonological changes in a pidgin sign language are controlled by universal rules the children themselves are not aware of. Linblom et al. (1984) prove this theory. In their opinion, the phonology, in the full sense of the word, is *independent* not from the users of whatever language but of other systems (e.g. semantic, syntax) and these users are basically unaware of its rules. Therefore, one can assume that within the evolution of sound patterns (not only in spoken languages but also the sign ones) processes of phonological self-organization have occurred that made the development of symbols economical. Of course, this applies to both aural and visual modality. But it is worth adding here that the Polish Sign Language can become more dynamic compared to spoken Polish, which can be associated with the mere nature of the visual-gestural modality. This modality is considerably better than the aural one in respect of forming iconic signs and changing their structure. The iconicity does play an important role in language creation. This thesis was supported by the research carried out by Lillo-Martin (1988). Deaf children were shown pictures of senseless objects that were in fact useless. It turned out that under such circumstances they utilized the iconicity rule, forming new signs that were to symbolize the objects.

This proves a positive effect of the visual-gestural modality on the lexical development in the visual code.

As the signs of a pidgin sign language become conventionalized, they undergo both phonological and semantic modifications, which can result in less iconic and more arbitrary signs. Homesigners as peer-group pidgin users were able to modify gradually the homesigns away from an iconic representation of their referents and toward an arbitrary representation of their referents. Therefore, a feature favoring word formation can be attributed to this system, because it includes morphological means for forming new lexemes in the form of not only individual signs but also, e.g., compound signs.

An additional facet of the homesigners' lexical development is the use of natural gestures adopted from hearing teachers or tutors during their interactions with the children. It has been recently remarked that gestures as non-language components of the communication remain in any spoken language, composing together with the language an integrated language system, and moreover they can represent the reality in the language user's mind (McNeill, 1992). This is because gesturing used by hearing people while speaking plays a significant role in complementing the language information (Goldin-Meadow, 2003b). Adults too often use gestures when speaking and they do it in a special way when narrating or when they are asked to explain the ways to solve different problems (Goldin-Meadow, 2003b; Doherty-Sneddon, 2003). However, the results of the present research have shown that children not only create their own signs but that they tend to "borrow" some natural and idiosyncratic gestures used by their hearing teachers and tutors. Yet they "phonologically" modify the borrowed components in their own way, creating a form for a formal sign on the basis of the visual-gestural modality. Moreover, some authors have remarked that in sign languages there are a number of signs that were previously performed differently and might belong to the repertoire of hearing people's gesture behavior (Janzen & Shaffer, 2002; Currie et al., 2002).

Apart from the signs, the homesigners use conventional gestures that differed from the signs. Such gestures play a pragmatic role, regulating the course of the visual discourse. This means that the gestures (and not the signs) do not stop functioning when the subject children begin using a sign system (like pidgin) and become able to build more and more complex utterances. The gesticulation is a significant component of communication both for hearing and deaf children, from the beginning of their first year of life until adulthood (McNeill, 1992; Marschark, 1994). Moreover, not only children but also adults have a tendency to use individual and selected gestures when uttering sentences in spoken language (McNeill, 1992). The same applies also to a conventional sign language (Emmorey, 1999).

The occurrence of iconic metaphors in the homesigners' language received only a fragmentary account in this work. This points to the ability of children to use metaphors for naming objects or phenomena with reference to other similar

things. Similar research carried out by Marschark et al. (Everhart & Marschark, 1988; Marschark et al., 1986) has shown that deaf children are able to use as many or even more figurative expressions when they narrate in sign language than their hearing peers in spoken language. Deaf children's ability to use figurative language proves their language creativity and flexible thinking. But so far it has not been determined to what extent deaf children's competence to use metaphors shows their cognitive flexibility or is a result of potentially greater plasticity of a conventional sign language. A chance to examine this problem would come up if it is possible to carry out a semantic analysis of the base for the development of the homesigners' competence to use metaphors irrespective of the language model.

To sum up, one can say that the homesigners' language developed as a dynamic system characterized not only by extension of the lexis but also by variability (structural changes in the signs), through the phenomenon of social interactions in the homesigners' peer environment.

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