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**Child visual discourse: The use of language, gestures, and vocalizations  
by deaf preschoolers**

Piotr Tomaszewski

Faculty of Psychology, University of Warsaw

Correspondence to:  
Piotr Tomaszewski  
Faculty of Psychology  
University of Warsaw  
Stawki 5/7  
00-183 Warsaw

## **Abstract**

This exploratory study examined the linguistic activity and conversational skills of deaf preschoolers by observing child-child dyads in free-play situations. Deaf child of deaf parents – deaf child of deaf parents (DCDP–DCDP) pairs were compared with deaf child of hearing parents – deaf child of hearing parents (DCHP–DCHP) pairs. Children from the two groups were videotaped during dyadic peer interactions in a naturalistic play situation. The findings indicated that deaf children were able to engage in successful communicative interaction. However, statistically significant differences were found between the two groups of deaf preschoolers with regard to some categories of communicative behaviors from the point of view of sign and spoken languages (Polish Sign Language and Polish). For example, DCHP were found to be less active than DCDP through using speech. The results of this study suggest that intervention efforts should be focused on improving the language learning environment by facilitating signing by the parents and increasing their skills in visual-gestural strategies.

**Key words:** deaf children, language development, sign and spoken languages, gestures, vocalizations.

## Changes in looking at a deaf child's language development

Some researchers showed that the process of spoken language acquisition among the deaf children is very slow. Many of the children surveyed at the preschool age were speaking at the level of their hearing two-year old peers (Schlesinger & Meadow, 1972; Gregory & Bishop, 1982). Some researchers are also concerned with the ability of deaf toddlers to acquire systems of manually coded English<sup>1</sup>. They pointed out that this system was too difficult for these children to acquire through producing visual phrases based on a spoken language. They were spontaneously coming up with visual-spatial constructions which were typical for American Sign Language (ASL) (Supalla, 1991).

These findings and other investigations on sign language development of deaf children have revealed that visual modality plays a role of one of the main factors that enable them to achieve linguistic and communicative competence in conventional sign language. Hence, systematical studies on deaf children's language development focus increasingly on the process of their sign language acquisition. In short, the goal of these researches is to focus on monitoring and stimulating the process of linguistic and communicative creativity, which deaf children develop naturally, and not to indicate apparent linguistic deficiencies and emphasize the significance of the model of spoken language acquisition process.

In Poland, until recently, some observers considered Polish Sign Language (PSL) to be a concrete system of gestures with a limited vocabulary and primitive grammar, incapable of expressing abstract ideas. This is why this visual language is not fully accepted as a full-fledged language in general sense. PSL is quite frequently regarded either as a manual version of spoken Polish or deficient pseudo-language with no grammatical organization. However, research demonstrates that PSL is a visual – spatial language with its own grammatical and linguistic structure. The grammar of PSL differs structurally from spoken languages – it relies on space, handshape and movement (Farris, 1994; Świdziński, 1998, 2005; Tomaszewski & Rosik, 2002; Tomaszewski, 2004, 2005a, b). It may also be expressed by nonmanual components that play an important linguistic role in creating visual-spatial utterances (Mikulska, 2003; Tomaszewski & Rosik, in press a, b). American researches have demonstrated some time ago that just as spoken languages, American Sign Language (ASL) is structured at syntactic (Liddell, 1980; Lillo-Martin, 1990), morphological (Klima & Bellugi

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<sup>1</sup> Manually Coded English (or Polish) (MCE) refers to any constructed signing system that represents words in English (or Polish) sentences with signs from conventional sign language, along with invented signed translation equivalents for English (or Polish) grammar words. In Poland, Manually Coded Polish (MCP) is used in deaf education, where many teachers and parents communicate with deaf children by this artificial system.

1979, Liddell 1990), and “phonological” (Stokoe 1960, Liddell & Johnson, 1989) levels. Every natural sign language constructed on the basis of the visual mode differs from a spoken language, which is based on auditory mode. Moreover, PSL is a language of Polish Deaf Community, whose members are culturally and socially Deaf<sup>2</sup>. Hence – differences between Deaf and Hearing people should be seen as cultural differences, not as deviations (Woll & Ladd, 2003; Tomaszewski, 2005c).

The data on the grammatical structure of sign languages gathered throughout linguistic research are a starting point for psycholinguistic surveys on the process of acquiring visual language by young deaf children.

### **Sign language development in young deaf children**

The population of deaf children is a *more* heterogeneous group than the population of hearing children with respect to the age of language acquisition and social experience. Hence it is important to be aware of this difference while investigating the creative language abilities of deaf children. There are two groups within the population of these children – deaf children of deaf parents (DCDP) and deaf children of hearing parents (DCHP).

In fact, only about 10% of all deaf children have deaf parents. They appear to have normal psychological, cognitive, linguistic, and familial development (Meadow, 1968; Vernon & Koh, 1970, Schelsinger, Meadow, 1972). DCDP exposed to a conventional sign language from birth have been found to acquire it naturally; that is, they progress in sign language through similar stages as hearing children acquiring a spoken language (Hoffmeister & Wilbur 1980, see also Tomaszewski, 2003). In other words, signed and spoken language acquisition follow identical stages of development: babbling (7-10 months), first-word stage (12-18 months), two-word stage (18-22 months), stage of word modification and rules for sentences (22-36 months) (Newport & Meier, 1985).

The majority of deaf children are born to nonsigning, hearing parents who do not know sign language and try to communicate orally with their children. A number of deaf children of hearing parents (DCHP) who know neither PSL nor signed 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

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<sup>2</sup> Deafness is a complex phenomenon 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, 1989).

research by Goldin–Meadow (Goldin–Meadow & Feldman 1975, Goldin–Meadow, 2003). Gestural language created by DCHP is called “home signs”.

By studying deaf children who received little or no usable linguistic input, Goldin–Meadow and Feldman (1975) showed that subjects did indeed develop a systematic means of communicating gesturally, as well as gestural names for objects and actions. The children also invented syntactic codes between actions and objects. Further research studies have demonstrated that deaf children’s home signs exhibit structure not only at lexical and syntactic, but also morphological levels (Goldin–Meadow & Mylander 1984, Mylander, Goldin–Meadow, 1991).

Reports on the acquisition of sign language by DCHP are not fully available because hearing parents usually do not have extensive access to sign language when their child is first diagnosed as deaf. However, some parents of young deaf children have had the opportunity to learn sign language and use this mode when interacting with their children. It so happens that hearing parents learn manually coded Polish rather than conventional sign language (e.g. PSL) because they have such a short period of time to learn the natural sign language of Deaf community. Studies of Schlesinger and Meadow (1972) and Schlesinger (1978) pointed out that DCHP’s vocabulizing does not appear to decrease when signs are learned but actually increases in frequency. Those who learn signing from the beginning appear to be parallel to young DCDP, whereas those who learn signing at later ages display emerging knowledge of both conventional sign language and signed Polish, albeit not fluency (Schlesinger, 1978; Livingston, 1985; Morford, 1998, see also Tomaszewski, 2006a).

The interest in conversational and pragmatic uses of sign language by deaf children among researchers is growing. Some studies on deaf/deaf interactions show that deaf parents as native signers are able to communicate with their deaf child through sign language and respond to their child’s developing language appropriately. Social interactions with not only deaf adults but also older deaf children may help the young deaf child acquire communicative competence in sign language (Tomaszewski, 2001). Meadow et al. (1981) examined social interactions of deaf and hearing mothers and their deaf preschoolers. The results indicated that deaf and hearing mothers using oral-only communication interacted less than mothers and children using sign language alone or simultaneous communication (speech plus sign). The deaf mother/deaf child dyads and the hearing mother/hearing child dyads exhibited most elaborate, complex, and child-initiated communicative exchanges. Prinz and Prinz (1985) found that although the visual modality may have an effect on very early aspects of conversation for deaf children, the development of discourse strategies for regulating and maintaining conversations is very similar

for both signing and speaking children. In one study, profoundly deaf children of hearing parents between four and seven years of age were found to be just as competent as their hearing peers in responding to requests for clarification in conversation (Ciocci & Baran, 1998). Similarly, in studies of social interactions between deaf and hearing preschoolers, Łukaszewicz (1999) describes some interesting findings: deaf children exposed to a bilingual program display the ability to repair communication breakdown when they interact with hearing peers who do not know sign language. When some deaf children realized that their messages which they conveyed to their hearing peers in sign language were not understood, they revised their statements by making a shift from sign language to “gestural language”.

Although we know that deaf children are as effective communicators in sign language as their hearing peers in spoken language, there is a definite dearth of research that could show if there are differences in the discourse skills of DCDP and DCHP and in the creative use of sign language by these children in a social context. Therefore, the purpose of the present study was a to conduct a preliminary analysis of linguistic and conversational skills in profoundly deaf preschoolers who communicate primarily in natural sign language. Specifically, it was designed to investigate the following questions: Are there qualitative differences in the linguistic activity and conversational skills of DCDP and DCHP in a dyadic situation? What expressive language behavior could be of frequent occurrence in these children?

## **Method**

### **Subjects**

The following two groups of child–child dyads were included in the data analysis: Group 1 was comprised of 8 deaf children of deaf parents (DCDP); Group 2 included 8 deaf children of hearing parents (DCHP). All the children were evaluated in DCDP-DCDP and DCHP-DCHP dyads. The children ranged in age from 5.6 to 6.2 years. The mean age was 5.9 years. Eight of the children were female, and 8 male. These children met the following criteria: nonverbal intelligence within the normal range (as estimated by school records); hearing level no better than 80-90 decibels average in the speech range (500 to 4000hz) in the better ear; deafness occurred prior to language acquisition; no additional known handicaps (e.g. blindness, cerebral palsy). They attended a kindergarten program at the Institute of the Deaf in Warsaw. This program emphasized a bilingual approach: teachers and parents utilized sign communication with deaf children who were taught both Polish Sign Language (PSL)

and Polish (PSL, the natural language of deaf preschoolers, is the language of instruction; Polish is taught as a second language through a unique combination of signing, reading and writing methods).

## Procedures

Each child–child dyad (DCDP-DCDP pairs and DCHP-DCHP pairs) was ushered into a playroom – familiar room at the school for the deaf. This playroom contained a large variety of toys: dishes, costumes, dress-up clothing, dolls, blocks, and trucks. The interactions were recorded on videotape. The situation was as follows: the children were instructed by a deaf researcher in sign language to play and converse together while the researcher was busy. After a warm-up session, the children were videotaped for approximately 25 minutes. The videotapes were later transcribed by two individuals and its reliability was established at .97. The transcriptions served as a basic for characterizing children’s communicative behaviors.

## Coding categories of communicative behaviors

The coders distinguished communicative behaviors from other behaviors. Communicative behaviors were defined as *visual action* (i.e. signs, gestures, facial expressions, or attentional touch) or *oral action* (i.e. speech, vocalizations). These actions were done intentionally for the sole purpose of communicating something to the partner. Two criteria according to Goldin-Meadow and Mylander (1984) were used to discriminate communicative behaviors from other social behaviors. First, the behavior had to be intentionally directed at the partner. Second, the act could not be an action with an object that served a purpose other than communication. Communicative behaviors were divided into utterances using pause boundaries. Each utterance was coded for type of communication used by deaf children.

The following thirteen categories were coded:

- **Pointing gestures (PG)** – these gestures typically were deictic gestures which are produced with the index finger extended, closed fist, to draw someone’s attention toward objects, points in space or events in the environment. According to Coulter (1980), all pointing utterances that consisted of one or more deictic elements were classified as nonlinguistic deictic gestures, a nondeictic signs which belong to linguistic category of manual signs. Thus, points were coded as gestures only if they were not accompanied by manual signs.

- **Showing gestures (SG)** – these gestures also were deictic gestures which were coded as showing when an object was held up in the center of the gesture space and oriented toward the interactive partner (Capirci et al., 2002). Showing gestures also express communicative intent by presenting an object for another’s attention.
- **Direction demonstrative gestures (DDG)** – these gestures were stylized pantomimes whose iconic forms varied with the intended meaning of each gesture. DDG were performed through directly *using* objects to show the partner how manipulate them.
- **Imitation demonstrative gestures (IDG)** – these gestures were also defined as pantomimic gestures whose iconic forms varied with the intended meaning of each gesture. IDG were performed to represent actions and actions on objects – *without* using them. IDG were demonstrated to imitate more directly, as well as in cases where there is no conventionalized sign. IDG include a number of thematic images, the regular PSL signs only one. As Klima and Bellugi (1979) noted, the pantomime gestures are much longer and more varied in duration, whereas individual citation-form manual signs are all far shorter and more uniform in duration.
- **Conventionalized gestures (CG)** – these manual gestures (not signs) appear to be communicative. They serve as effective conversation regulators in the Polish Sign Language (PSL). Signers use different gestures rather than those of speakers: signers produce conventional hand gestures serving as regulators in PSL conversations; speakers, instead, produce idiosyncratic manual gestures which form an integrated system with the speech they accompany (Tomaszewski, 2001).
- **Attentional vocalizations (AV)** – these vocalizations are performed for the sole purpose of attracting someone’s attention. Attentional vocalizations may accompany attentional gestures such as touching or waving.
- **Imitational vocalizations (IV)** – these vocalizations constitute vocal imitation. A child using vocal imitation imitates nonlinguistic sounds produced by various real-life objects (e.g. car, truck, airplane) or sounds of speech.
- **Emotional vocalizations (EV)** – these vocalizations were defined as non-linguistic emotional vocal expression, which may be produced by young children. The affective vocalizations set consists of non-linguistic vocal expressions of anger, disgust, fear, happiness, sadness, surprise.
- **Linguistic vocalizations (LV)** – these vocalizations were coded as oral components in signed production. The production of some manual signs was accompanied by articulatory movement of the mouth with voice (e.g. by performing manual sign PIŁKA one deaf child produced forms with consonant deletion /pi/ for Polish word *piłka*).

- **Speech (S)** – The category of speech included any word recognizable as spoken language. Words with or without voice may semantically accompany manual signs (e.g. the production of manual Polish sign TAK may be accompanied by word *tak* with voice: manual sign TAK plus word *tak*).
- **Manual signs (MS)** – these signs were all conventional linguistic signs belonging to various lexical categories (e.g. verbs, nouns, adjectives) occurring in the Polish Sign Language (PSL). All deictic utterances that occurred together with lexical signs in elementary sentence patterns were classified as deictic signs and further linguistically categorized as manual signs.
- **Nonmanual signs (NS)** – there are PSL signs that are produced without the use of hand, handshape, or hand configuration. Signs produced without the use of hand were defined as nonmanual signs whereas signs produced with the use of hand were classified as manual signs. Investigations have indicated that conventional sign language has three categories of free morphemes: nonhanded signs, manual signs, and fingerspelled signs (Dively, 2001).
- **Attentional behaviors (AB)** – these behaviors are performed for the sole purpose of getting someone’s attention in visual discourse. Deaf adult signers employ specific strategies to attract the attention of the addressee in a conversation. These typically include waving a hand or arm in front of the addressee, and/or touching the addressee. The two attention-getting strategies were coded.

## Results

Statistical analyses of group differences were performed using the Mann-Whitney *U* test. This test determines the significance of group differences between deaf children of deaf parents (DCDP) and deaf children of hearing parents (DCHP) in the frequency of occurrence of their communicative behaviors. The dependent measures in the investigation were summed occurrences of communicative behaviors. All categories of the latter were documented as either present or absent in the DCDP/DCDP and DCHP/DCHP dyads.

Table 1 shows the number of different types of communicative behaviors in the DCDP/DCDP dyads.

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Table 1 about here

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Table 2 shows the number of different types of communicative behaviors in DCHP/DCHP dyads.

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Table 2 about here

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Table 3 presents the Mann-Whitney  $U$  test results and indicates the significance of group differences in the frequency of occurrence of these behaviors.

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Table 3 about here

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For total communicative behaviors, no significant differences were found between the two groups of children. That is, both groups of children – DCDP and DCHP – engaged in total behaviors at about the same frequency [ $n=2726$  for DCDP,  $n=2675$  for DCHP;  $Z(16) = -0,210$ ,  $p = 0,834$ ]. However, the two groups of children differed significantly in some distinct categories of communicative behaviors. For all gestures, there were significant differences between the DCDP/DCDP dyads and the DCHP/DCHP dyads [ $Z(16) = -2,316$ ,  $p = 0,021$ ]. DCDP used significantly more showing gestures [ $Z(16) = -3,050$ ,  $p = 0,002$ ] and conventional gestures [ $Z(16) = -2,892$ ,  $p = 0,004$ ] than did DCHP. However, DCHP performed significantly more pointing gestures than did DCDP [ $Z(16) = -3,376$ ,  $p = 0,001$ ].

DCHP used significantly more total vocalizations than DCDP [ $Z(16) = -2,785$ ,  $p = 0,005$ ]. In particular, DCHP/DCHP dyads tended to use higher number of attentional [ $Z(16) = -3,398$ ,  $p = 0,001$ ] and emotional vocalizations [ $Z(16) = -3,411$ ,  $p = 0,001$ ] than did DCDP/DCDP dyads. However, DCDP used linguistic vocalizations significantly more frequency than DCHP [ $Z(16) = -3,167$ ,  $p = 0,002$ ]. There were no significant differences between dyadic groups in the frequency of occurrence of the imitational vocalizations [ $Z(16) = -1,427$ ,  $p = 0,154$ ].

For language productions, no significant differences were found between the two groups of subjects in the category of manual signs [ $Z(16) = -0,840$ ,  $p = 0,401$ ]. However, DCDP tended to produce significantly more nonmanual signs during play interaction with each another than did DCHP [ $Z(16) = -3,213$ ,  $p = 0,001$ ]. Also, there were significant differences between DCDP and DCHP groups in the frequency of using words (with or without voice) that were

recognizable as spoken Polish: DCDP produced more words than DCHP [ $Z(16) = -3,411$ ,  $p = 0,001$ ].

For attentional behaviors, significant differences were found between the two groups of children [ $Z(16) = -1,952$ ,  $p = 0,051$ ]. DCDP employed more attention-getting strategies to attract the attention of the partner in visual discourse than did DCHP.

## Discussion

The results of this study indicated that deaf children are able to engage in successful communicative interactions by using a different modality of language. The finding that the two groups of DCDP and DCHP differed significantly in several categories of communicative behaviors suggests that there are several factors which play an important role in the development of communicative competence in deaf children. These include (1) the natural mode of communication at home and/or school (i.e. oral, manual, or simultaneous communication), (2) the hearing status of the parents and teachers, and (3) the possibility that Polish Sign Language is the first and primary language for communication. Unfortunately, these factors were not taken into account in other studies which concluded that deaf children lack well-developed communicative competence at all ages (Kretschmer & Kretschmer, 1978; McKirdy, Blank, 1982).

Deaf children of hearing parents were able to explain how their invented gesture systems affect later acquisition of the conventional sign language. The results of this study showed that those children who had developed home sign systems to communicate with their hearing families, performed significantly more pointing gestures in DCHP/DCHP dyads than did deaf children of deaf parents in DCDP/DCDP dyads. This finding is further supported by the research of Goldin-Meadow and Mylander (1984), who demonstrated that home signs contain among other things pointing gestures which refer to entities that are typically referred to by nouns in conventional languages. DCHP, who were exposed to conventional sign language [e.g. American Sign Language (ASL), Polish Sign Language (PSL)], can replace many of their pointing gestures with ASL or PSL nouns (Morford, 1998; Tomaszewski et al., 2001). The present study showed that DCDP used socially pointing gestures only to direct a partner's attention to actual objects and places in the environment rather than to use them as linguistic symbols. Instead, DCHP used pointing gestures linguistically and socially – to replace them with manual signs as nouns and to draw someone's attention toward objects, places or events in the environment. The results indicated that DCDP used more showing

gestures than did DCHP. The deaf children held up objects in the center of the interlocutor's sign space. A showing gesture is a social behavior which precedes the use of objects as a means of obtaining the partner's visual attention.

Significant difference between DCDP and DCHP in discourse strategy concerning the use of conventional gestures results from the absence of early exposure of DCHP to PSL. By contrast, DCDP have an opportunity to develop conversational skills by interacting with their parents from birth. It is not possible, though, for DCHP to acquire PSL naturally from their parents, they can effectively acquire language from peers, older children, and deaf adults. This is supported by other research which suggests that DCHP acquire many of their sign communication discourse skills from their deaf peers and from older deaf children (Prinz & Prinz, 1985). The findings of this study showed that conventional gestures play a major role in taking turns to speak/sign. They were used as effective conversation regulators in PSL. The deaf children often produced conventional gestures which helped coordinate turn-taking during a visual conversation: e.g. one child first conveyed a message in PSL and then transferred a turn by producing a hand gesture towards the addressee with the palm up to request that his peer confirm the information. Also, young children produced interactive gestures by moving their hands away from the signing space as the specific area in which manual signs are made; it means the addressee may now take a turn. Also, they produce hand gestures towards themselves or into the signing space to take or continue the turn. To sum up, because of the visual modality through which sign language is produced and received, signers use gestures different from those of speakers. This corroborates the findings of Emmorey (1999) that deaf signers perform gestures which differ from those of speakers in that they tend to be more conventional and are not tied to a particular lexical sign.

The results of research on differential types of vocalizations used by deaf children in play interactions indicated significant differences between DCDP and DCHP. DCHP produced more attentional vocalizations to get their partner's visual attention in a conversation. They used more these vocalizations without attentional gestures which accompanied them (within attentional behaviors – AB). DCDP used attentional vocalizations very rarely but they produced more attentional gestures than did DCHP. Sign language relies on the visual channel, and spoken language on the auditory channel. Therefore, conversational elements – attention-getting, eye gaze and turn-taking – used in PSL differ somewhat from those used in Polish spoken language. However, the general structure of deaf adults' sign language conversation appears to be similar to that of conversations in spoken languages (Baker, 1977). This is why DCDP learn earlier from their parents to use visual

components of conversation and so acquire discourse strategies similar to those of adult PSL users than do DCHP. Specific attentional behaviors are an integral and important part of the Deaf culture and visual communication system. Thus, DCDP show earlier development of metacognitive awareness of attention-getting mechanisms, which are essential for transmitting linguistic information through visual modality of language. Conversely, DCHP who were exposed to spoken language until such time as they came into contact with PSL and Deaf culture, acquired conversational elements of the Polish spoken language artificially from their parents. This fact brought about delays in the development of DCHP's metacognitive awareness of the need for attention-getting strategies (e.g. attentional gestures, non-attentional vocalizations).

The linguistic vocalizations which DCDP used more often than DCHP were oral components in PSL. It is relevant to the finding of this study that DCDP also performed significantly more general spoken words with or without voice than did DCHP (within category *speech*). DCDP produced more simultaneous sign/word utterances than words not accompanying signs. The results suggest that the use of signs with deaf children *does not* prevent them from developing speech. This supports other research findings, which showed that early experience with sign language might be expected to have positive effects on spoken language development, regardless of hearing status (Schlesinger & Meadow, 1972; Gardner & Zorfass, 1983; Lederberg & Everhart, 1998; van den Bogaerde & Baker, 2001). Moreover, if deaf parents are bilingual they can help their deaf children develop communicative competence in both the sign language and the Polish language. This is supported by van den Bogaerde's (2000) research on social interactions in deaf families, where it was found that in the language deaf mothers addressed to their deaf children, the proportion of utterances consisting only of manual signs of Sign Language of the Netherlands (SLN) was on the average 34%, whereas the largest proportion of signed utterances (65%) which still followed a SLN structure consisted of simultaneous productions of signs and spoken words. In the children's language, SLN utterances predominated, but simultaneous sign/word utterances tended to increase over time.

It is important to note that recent research on sign languages offers insights into mouth patterns used in those languages; the production of manual signs is frequently accompanied by articulatory movements of the mouth that present word fragments which may be derived from spoken language (Sutton Spence & Boyes Braem, 2001). On account of this finding, it is worthwhile to conduct research on the effects of the form of mouth movements in sign language on spoken language development. This study could establish how far visual-gestural

phonics code in sign language may allow deaf children access to provide a more in-depth metalinguistic awareness of the Polish language.

The finding that DCDP have more significantly better scores in speech than DCHP gives no reason to support continuing dedication to an oral-only approach. Deaf children who are exposed to early manual input could develop more adequate inner language – with no reduction in their abilities to use speech for communication – than deaf children who are not so exposed.

The results of this study indicated that DCHP produced more frequently emotional vocalizations than did DCDP. Affective vocal expressions in DCHP included more negative emotions such as anger, disgust, sadness, fear. This may be related to socialization for impulse control. Many deaf children, particularly DCHP, seem to require special help in the acquisition of impulse control. It is supported by an earlier study that showed that deaf children with hearing parents were found to be more impulsive than those with deaf parents (Harris, 1978). DCHP's problems may stem from the absence of early communication with their hearing parents who do not know sign language and parents' consequent inability to encourage the ability to delay gratification (Meadow–Orlans, 1996; Tomaszewski, 2002). It must be noted that in this study, DCDP manifested the ability to delay gratification; they effectively used linguistic behaviors to adjourn partner's requests, demands, and wishes. They produced PSL utterances to modulate impulses more constructively. For example, child A requested a sweet from child B. Child B constructed PSL conditional clause to delay child A's request: "If we clear (play) room, I will give a sweet to you". Conditional statements in PSL are a combination of linguistic information provided by signs, syntax or ordering of signs, and nonmanual grammatical signals (Tomaszewski & Rosik, in press/b). Deaf children with deaf parents learn from parents to produce cognitively syntactic utterances that facilitate development of ability to control or modulate impulses. Instead, deaf children with hearing parents may expose themselves *more* to their lack of adequate communicative modalities to express and control their needs and feelings.

The results of research on PSL manual signs used by deaf subjects indicated no significant differences between DCDP and DCHP. However, it was found that DCDP used significantly more nonmanual signs than did DCHP. Nonmanual (nonhanded) signs consists of differential facial expressions which play an important grammatical and pragmatic role in sign communication between deaf partners. The significant difference mentioned above is related to the child's cognitive and processing limitations in the acquisition of language. Reilly et al. (1991) noted that deaf children acquire first handed signs, and then nonhanded signs. They argued

that the hands are the primary linguistic articulators and perceptually more salient. Thus, if DCHP learn the conventional sign language from deaf peers, older deaf children and deaf adults late (in preschool period), they will produce manual signs before they add less salient nonmanual signs.

The results of this study suggest that early intervention programs for deaf children and their parents should include emphasis *not only* on the use of the sign language mode of communication, *but also* on increasing hearing parents' awareness of the important role of visual-gestural strategies in language acquisition. Since, as researches showed, parents and teachers often sign or speak to deaf children without first getting the children's visual attention (Mather, 1987, Swisher, 1991), they should be taught to incorporate attention-getting, eye-gaze, and turn-taking mechanisms into their regular communication with deaf children effectively. Hence, any early intervention program should utilize deaf parents as resources for hearing families to help them learn to communicate with their deaf child (Tomaszewski, 2006b). Moreover, hearing parents should be informed that early exposure to sign language might have positive effects on spoken language development. Unfortunately, some parents think that the use of signs with deaf children prevent them from developing speech. If we deprive a deaf child of gestures, signs, and nonmanual behaviors, we would lead to over-expectations for verbal competence and thus reduce creative, relaxed, playful interaction with him/her. This pressure could in turns cause the personal and social problems of deaf children. The deaf child may develop creatively linguistic, communicative, and social-emotional competence, as long as he/she is exposed not only to spoken language, but also to sign language, which is the natural language of deaf people.

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**TABLE 1**

DCDP	Categories of communicative behaviors											Speech and signs				Total	THE NUMB ER OF COMM UNICA TIVE BEHAV IORS IN DCDP-
	PG	SG	Gestures		CG	Sum	Vocalizations				Sum	S	MS	NS	AB		
			DDG	IDG			AV	IV	EV	LV							
ch1	2	21	5	1	13	<b>42</b>	1	1	25	7	<b>34</b>	17	119	35	49	<b>296</b>	
ch2	4	15	4	10	21	<b>54</b>	1	4	10	34	<b>49</b>	34	117	29	15	<b>298</b>	
ch3	6	17	23	1	18	<b>65</b>	—	2	4	5	<b>11</b>	7	74	21	26	<b>204</b>	
ch4	4	27	22	2	14	<b>69</b>	2	3	15	32	<b>52</b>	19	166	39	29	<b>374</b>	
ch5	2	10	—	—	15	<b>27</b>	1	4	7	14	<b>26</b>	10	273	17	75	<b>428</b>	
ch6	4	22	2	—	28	<b>56</b>	—	8	13	24	<b>45</b>	28	220	35	58	<b>442</b>	
ch7	5	12	1	—	24	<b>42</b>	—	17	4	3	<b>24</b>	8	29	47	37	<b>187</b>	
ch8	3	24	1	—	41	<b>69</b>	1	10	2	18	<b>31</b>	27	253	31	86	<b>497</b>	
Total	<b>30</b>	<b>148</b>	<b>58</b>	<b>14</b>	<b>174</b>	<b>424</b>	<b>6</b>	<b>49</b>	<b>80</b>	<b>137</b>	<b>272</b>	<b>150</b>	<b>1251</b>	<b>254</b>	<b>375</b>	<b>2726</b>	

**DCDP DYADS**

PG - pointing gesture; SG - showing gestures; DDG - direction demonstrative gestures; IDG - imitation demonstrative gestures; CG - conventionalized gestures; AV - attentional vocalizations; IV - initiational vocalizations; EV - emotional vocalizations; LV - linguistic vocalizations; S – speech; MS - manual signs; NS - nonmanual signs AB - *attentional behaviors*

**TABLE 2**  
**THE NUMBER OF COMMUNICATIVE BEHAVIORS IN DCHP-DCHP DYADS**

DCHP	Categories of communicative behaviors															
	PG	SG	Gestures			Sum	Vocalizations				Sum	Speech and signs			Total	
			DDG	IDG	CG		AV	IV	EV	LV		S	MS	NS		AB
ch1	16	6	—	2	7	<b>31</b>	37	—	39	3	<b>79</b>	—	287	11	15	<b>423</b>
ch2	12	1	—	—	—	<b>13</b>	17	5	29	1	<b>52</b>	—	143	8	18	<b>234</b>
ch3	13	10	—	3	11	<b>37</b>	37	3	76	5	<b>121</b>	1	252	6	30	<b>447</b>
ch4	10	5	—	—	2	<b>17</b>	9	4	27	—	<b>40</b>	—	77	2	7	<b>143</b>
ch5	16	11	1	2	3	<b>33</b>	15	5	43	1	<b>64</b>	—	70	21	12	<b>200</b>
ch6	8	12	7	2	5	<b>34</b>	11	1	35	—	<b>47</b>	3	178	6	21	<b>289</b>
ch7	27	7	1	6	21	<b>62</b>	18	2	35	1	<b>56</b>	2	384	13	29	<b>546</b>
ch8	24	3	1	6	3	<b>37</b>	44	—	37	2	<b>83</b>	—	235	8	30	<b>393</b>
total	<b>126</b>	<b>55</b>	<b>10</b>	<b>21</b>	<b>52</b>	<b>264</b>	<b>188</b>	<b>20</b>	<b>321</b>	<b>13</b>	<b>542</b>	<b>6</b>	<b>1626</b>	<b>75</b>	<b>162</b>	<b>2675</b>

PG - pointing gesture; SG - showing gestures; DDG - direction demonstrative gestures; IDG - imitation demonstrative gestures; CG - conventionalized gestures; AV - attentional vocalizations; IV – imitative vocalizations; EV - emotional vocalizations; LV - linguistic vocalizations; S – speech; MS - manual signs; NS - nonmanual signs AB - *attentional behaviors*

**TABLE 3**

The group differences in the frequency of occurrence of different types of communicative behaviors in DCDP/DCHP dyads.

<b>Communicative behaviors</b>	<b>Z</b>	<b>Significance (p= )</b>	<b>Description of differences</b>
Pointing gestures (PG)	- 3,376	0,001	DCDP < DCHP *
Showing gestures (SG)	- 3,050	0,002	DCDP > DCHP
Direction demonstrative gestures (DDG)	- 1,949	0,051	DCDP ≈ DCHP
Imitation demonstrative	- 1,361	0,174	DCDP ≈ DCHP

gestures (IDG)			
Conventionalized gestures (CG)	- 2,892	0,005	DCDP > DCHP
<b>Gestures total</b>	- 2,316	0,021	DCDP > DCHP
Attentional vocalizations (AV)	- 3,398	0,001	DCDP < DCHP
Imitational vocalizations (IV)	- 1,427	0,154	DCDP ≈ DCHP
Emotional vocalizations (EV)	- 3,411	0,001	DCDP < DCHP
Linguistic vocalizations (LV)	- 3,167	0,002	DCDP > DCHP
<b>Vocalizations total</b>	- 2,785	0,005	DCDP < DCHP
Speech (S)	- 3,411	0,001	DCDP > DCHP
Manual signs (MS)	- 0,840	0,401	DCDP ≈ DCHP
Nonmanual signs (NS)	- 3,213	0,001	DCDP > DCHP
Attentional behaviors (AB)	- 1,952	0,051	DCDP > DCHP
<b>Behaviors total</b>	- 0,210	0,834	DCDP ≈ DCHP

\* DCDP – deaf children of deaf parents; DCHP – deaf children of hearing parents