Infant Behavior & Development 32 (2009) 216–225

Contents lists available at ScienceDirect

Infant Behavior and Development

Infant sign language program effects on synchronic mother–infant interactions☆

Ximena Góngora*, Chamarrita Farkas

Pontificia universidad catolica de Chile, Escuela de Psicologia, Vicuña Mackenna 4860, Mackul, Santiago, Chile

ARTICLE INFO

Article history:
Received 6 March 2008
Received in revised form 21 August 2008
Accepted 31 December 2008

Keywords:
Symbolic gestures
Infant signs
Early interaction
Mother–infant dyads

ABSTRACT

The effects of an intentional infant sign language program on mother–infant interactions were studied. Design was quasi-experimental, longitudinal, descriptive and comparative. The sample was composed of 14 mother–infant dyads, with the infants being between 5 and 9 months at the beginning of the study. The participants were middle or upper-middle socio-economic status. The interactions were evaluated through observations of free play and analyzed using a Grid to analyze early interactions. The frequency and duration of synchronic interactions were compared across experimental and control groups at 12–14 and 18–20 months of age using non-parametric Mann–Whitney tests. The results suggested significant differences between groups on visual and tactile synchronic interactions, and a tendency for vocal interactions, in the direction of higher frequencies in the experimental group.

1. Symbolic gestural communication

Gestural communication is based on the use of non-verbal gestures or simple physical actions that can be used to symbolically represent objects, events, needs and desires, in order to communicate (Acredolo & Goodwyn, 1988). This paper refers specifically to symbolic gestures, a type of gesture which can be used as a vehicle for communication between children and their families from a very early age. These gestures are communicative in function and carry their meaning in their form. They serve nominal functions and substitute for, rather than accompany, speech. Symbolic gestures appear between the ages of 10 and 24 months and are consistent over time, remaining in the child's repertoire until verbal equivalents are available (Acredolo & Goodwyn, 1985, 1988) (Table 1).

Symbolic gestures play an important role in communication because, for both parent and child, the goal of being able to communicate motivates both parties to work hard in a reciprocal fashion. On the one hand, children seem to be quite vigilant about associating specific actions with specific contexts and actively imitate these actions. On the other hand, parents not only model relevant actions, but also provide feedback in response to their children's use of the symbolic gestures to communicate (Goodwyn, Acredolo, & Brown, 2000).

Symbolic gestures contribute to the infant's development both indirectly, communicating non-verbal aspects of the child's cognitive condition, and directly, offering him or her an easier form of expressing and exploring ideas that are difficult to process in a verbal format (Goldin-Meadow, 2000). They allow the child to explore beyond the language that he or she is speaking and offer an opportunity to observe his or her abilities as language "creator" (Goldin-Meadow, 2002).

☆ This paper was prepared with support from the *Fondo Nacional de Desarrollo Científico y Tecnológico* support, FONDECYT No. 1060778.

* Corresponding author. Tel.: +57 1 6190780; fax: +57 1 3134184.
E-mail address: xgongora@uc.cl (X. Góngora).

0163-6383/$ – see front matter © 2009 Published by Elsevier Inc.
doi:10.1016/j.infbeh.2008.12.011

Table 1
Baby signs acquisition in the experimental group at 18 month of age.

Subjects	Number of baby signs
1	18
2	12
3	9
4	14
5	7
6	10
7	2
Average (*M*)	10.3

Symbolic gestures also have communicative intention, or intentionality; in that they are used by the child specifically to communicate something to another person. The use of such gestures by preverbal children often arises out of parental modeling of the gestures in the context of child-oriented routines, games, or songs. In this way, often without the parent intending to, infants receive lessons in associations between gestures and their verbal and real world referents. In their eagerness to communicate, children abstract the gestures from the routines and use them as symbols to refer to those referents (for example, using a sniffing gesture to label flowers). Other symbolic gestures are borrowed from actions that a child observes an object produce (for example, panting to label dogs) or actions a child routinely does with an object (for example, a throwing gesture to label balls). All of these symbolic gestures enable infants to communicate even when vocal communication is difficult or impossible, allowing the child to describe a reference (name, object, quality or concept) (Acredolo & Goodwyn, 1985, 1988).

Instead of relying solely upon symbolic gestures that children come up with on their own, Linda Acredolo and Susan Goodwyn have developed a program to purposefully teach children simple symbolic gestures to communicate with their parents and caregivers. The gestures or "signs" as they are referred to within the program, represent items or concepts such as "cat," "food," or "let's go." Parents teach them to their children by intentionally and consistently modeling them in combination with the corresponding verbal word as parent and child proceed naturally through daily life. Because the physical movements involved are so much less complex than those needed to articulate words, these signs enable infants to communicate successfully about the world around them, their needs and their emotions, well before they are able to do so with words (Acredolo & Goodwyn, 1985). By encouraging parents to purposefully model sign–word combinations, the Acredolo–Goodwyn program of infant sign language expands children's communication repertoires beyond just those signs they might develop spontaneously.

In terms of the relationship between this type of gesturing and other areas of development, Acredolo and Goodwyn report evidence of positive correlations between the use of infant sign language and both verbal language and cognitive development. Such symbolic gestures has also been reported to have a positive effect on "joint attention" (i.e., both child and parent attending to the same event) between children and their caregivers, increasing the frequency of such episodes and facilitating the development of more complex strategies for achieving it (Acredolo & Goodwyn, 1985, 1988; Gómez, Sarriá, & Tamarit, 1993; Goodwyn et al., 2000; Moore et al., 2001; Namy et al., 2000; Spitz, 1966; Tomasello & Farrar, 1986). Researchers also have begun observed benefits in socio-emotional development, benefits that arise from the fact that infant sign language allow preverbal children to communicate their needs in a simple and quick manner, thereby lowering their frustration level and eliciting appropriate and timely responses from adults because they are better able to understand the message the children are trying to convey (Acredolo & Goodwyn, 2001). Finally, in addition to enabling preverbal children to identify concrete needs, recent evidence demonstrates that this type of communication also enables them to represent and label emotional states such as anger or sadness (of self *and* others) in a symbolic way at earlier ages than is possible when children must depend on verbal words to do so (Vallotton, 2008).

In summary, a growing number of studies have demonstrated the benefits of communication via symbolic gestures – or signs – for children's development, particularly in the areas of language and cognition. The present study seeks to expand this literature, with special emphasis on the effects of this type of preverbal communication in the socio-emotional area, specifically in regard to interactions within the mother–infant dyad.

2. Synchronic interactions

An overarching characteristic of bond-enhancing interactions is "synchrony" between the actions of the infant and the mother, a quality that, by definition, evolves in a mutual relationship when, for example, the mother and child engage in face-to-face or eye-to-eye contact. The result of behavioral synchrony is that the parent and child are emotionally linked, leading to or constituting what Field (1985) terms a "psycho-biologically synchronized" pair. From the very earliest days of life, the presence of synchrony within parent–infant interactions provides an interlinking of the internal states of mother and child.

The nature of the bond between parent and child is determined by the quality of their interaction and varies according to the sensitivity and responsiveness of the caregiver and the level of reciprocity – or synchrony – between him or her and the

infant. The more frequently the child's signals generate an appropriate response and become coordinated (or synchronized) in exchanges with a caregiver, the more likely it is that both emotional regulation and a positive bond will be established (Sroufre, 2000).

According to Daniel Stern (1991), affective synchrony between mother and child actually goes beyond simple imitation by the mother or the child's expressions to perception of the child's underlying emotional state and expressions that reflect that underlying state—thereby establishing a shared emotional moment (Bonavita, Cerutti, & Defey, 1995).

Furthermore, synchrony allows for reciprocity, an essential aspect for optimum interaction in that the mother–child relationship is the link that unites their behavior. As they "find" each other, their behaviors become not only in motor acts, but also in communicative acts. This encounter implies that each member of the pair influences the other, producing affective modifications in both, an agreement or mutuality, and mutual regulation (Oiberman, 2001).

The quality of the interaction and particularly its synchrony speak to the level of dyadic emotional regulation at the service of exploration and mastery; this will be relevant for the formation of infants, who by nature are social beings. From here on out they will be open to the construction and creation of new interactions with their parents and other adults, which will be framed at times by moments of separation or rejection, for which they need to possess strong self-esteem and autonomy. This will allow them to handle situations in which they may become immersed in both the social context and at school (Moneta, 2003).

This set of directly observable exchanges between mother (or others significant caregivers) and child – early interactions – can take place in a variety of modalities: visual interactions or mutual gaze, vocal interactions or proto-conversations, tactile interactions and affective interactions or mirroring of expressions. These modes combine to support development of an affective link, thereby facilitating the development of an attachment bond (Oiberman, 2001).

3. Visual interaction

The gaze is a primary mode of communication between mother and infant. What's more, the reciprocal or "shared" gaze is considered a potent interpersonal event that evokes intense positive feelings (Oiberman, 2001) in both members of the dyad. On the maternal side, the establishment of eye-to-eye contact encourages in the mother positive feelings of connection with the child and helps her to recognize herself in the role of "mother" and identify that child as her own (Lamour & Lebovici, 1991). The infant in turn, receives information from the mother's gaze that indicates he or she is important to the mother, thereby adding to the infant's own developing sense of security and connection.

4. Vocal interaction

The infant's contribution to this type of interaction includes all of the babbling, gurgling and other sounds that infants emit in order to express their needs and emotions, making vocalization an important contributor to facilitating close proximity between mother and child (Oiberman, 2001).

Vocal interactions between mother and child that involve words are, for many, many months, not shared ones. Rather, they are monologues issued by the mother that frequently takes the form of an imaginary conversation in which her own verbal contribution is followed by a pause to receive an imagined verbal response from the child, a response which is then followed by an appropriate response on the mother's part (Oiberman, 2001). Such pseudo-conversations indicate that the mother considers the child to be a potential interlocutor rather than an extension of herself (Lamour & Lebovici, 1991) and also indicate a desire on the part of the mother to forge a positive connection between the two. In this way, the presence of vocal interactions of this type within mother–child interactions bodes well for the establishment of a positive affective bond.

It is also important to consider that each individual word an infant heard is initially encountered within interactions that include variables such as tone of voice, facial expression, and gaze. As a result, the child's perception of the world is inevitably colored by his or her reading of the speaker's attitude, posture and gestures. As a result, verbal language is constructed by the child in a way that actions and manipulations are not (García, 1983).

5. Tactile interaction

Tactile communication is probably the most basic and primitive form of contact (Knapp, 1982). Interactions that involve touching can communicate a wide variety of positive emotions, including enthusiasm, tenderness, support and affection. In addition, it is through this type of interaction that both mother and child attempt to gain corporal proximity (caresses, touching the face, hands, hair or clothing) to the other member of the dyad. The other half of the equation, of course, is the degree to which the other member of the dyad accepts and responds to these tactile stimuli (Oiberman, 2001). It is important, therefore, in evaluating a mother–child relationship, to carefully observe all of the tactile behaviors emitted by both the mother and the child (Farkas, 2004).

The importance of mother–infant tactile interactions also lies in the fact that their prominence in the establishment of an attachment bond means that they are strong contributors to later mental and emotional adaptation. All of these factors support the conclusion that some of the first and most influential information we learn about ourselves, others and the world

in which we live reaches us through touch. In other words, the act of touching or being touched is a critically important variable in understanding and evaluating the impact on the child of interactive behavior (Knapp, 1982).

6. Affective interaction

Affective communication refers to facial expression of emotions in both members of the dyad (i.e., happiness, sadness). Another important dimension is the degree to which the mother mirrors or "reflects" in her own affective expressions the emotions being expressed by her child. Such mirroring requires that the person who cares for the infant share his or her pleasurable discoveries, as well as reflects his or her negative emotions. These discoveries are expressed or manifested with big smiles and vocalizations (Sroufre, 2000).

In summary, this research has been designed to investigate the effects of encouraging mothers and their preverbal infants to communicate using infant sign language. It decided to study the effects on the early interactions between mothers and infants because how was presented earlier, many authors considers that these interactions represent a behavioral way to approach to the communicational process through with the bond or the attachment is built between significant figures and infants (see for example for more references, Moneta, 2003 and Oiberman, 2001).

We expected that this type of communication should benefit the first bonds built between mothers and infants, which is a topic that has received scant attention thus far. This hypothesis is based on the idea that the encouragement of an additional way of communication between mothers and infants – not just verbal – should benefit others modes of interaction; in this case, the use of symbolic gestures may enhance the visual interactions, vocal interactions, tactile interactions and finally, the way that mothers and infants enjoy this type of communication, as can be reflected in their emotional expressions. Thus, this research explored the effects of baby sign language on the frequency and duration of the synchronic interactions with specific attention to the following modes of interaction: visual, vocal, tactile and affective.

Have to be mentioned that there are different ways to approach to the study of early interactions. Some researches considered the types of interactions, for example who initiated the interaction, in what way, with what resources and what different aspects are involved. Another researches considered the types of interactive behaviors that conducted from one member of the dyad (mother or infant), and their frequencies or qualities in relation with the other member' response. A third group, which what this research agree, refers to the "synchrony" of the interactions.

Why synchrony? Because how was mentioned earlier, the presence of synchrony within the parent/infant interactions provides an interlinking of the internal states of mother and child (Field, 1985) and generated a significant shared emotional moment (Bonavita et al., 1995). The synchrony speaks too about the level of dyadic emotional regulation of the dyad (Moneta, 2003). How Sroufre mentioned (2000), the nature of the bond parent–infants is determined by the quality of their interactions. This bond varies according the sensitivity and responsiveness of the caregiver, or in relation of the level of synchrony between the caregiver and the infant. This second aspect was choosing to be considered in this research.

7. Method

7.1. Design

This study was based on a quasi-experimental longitudinal, descriptive and comparative design. The goal was to describe the influence of an intentional infant sign language program on synchronic mother–infant interactions. The dyads were assigned randomly to the baby sign or to the control groups, and evaluated on three separate occasions.

7.2. Participants

The sample for this study was compounded of 14 mother–infant dyads (7 in the experimental group and 7 in the control group). All were middle and upper-middle socio-economic status and resided in the city of Santiago, Chile. Participants were enrolled during a regular visit to their pediatrician. The socio-economic status of the sample was representative of the health center, a private outpatient facility.

Participation in the study was voluntary, and the criteria for inclusion in the sample were as follows: the child was between the ages of 5 and 9 months of age at the time of enrollment, the dyads had to be biologically related, and the mother and infant had to reside together. The criteria for exclusion included the presence of infant developmental problems and the maternal psychiatric or psychological conditions. This information was corroborated using the pediatrician's chart and a socio-demographic questionnaire that was completed at the beginning of the evaluation.

7.3. Procedure

The mothers were contacted during their regular visit to the pediatrician. They were informed that participation in the study would be voluntary and were asked to sign a letter of consent. Those who agreed to participate were randomly assigned to the experimental or control group. Completion of a demographic questionnaire was followed by the first of three free play observations.

7.4. Free play interactions

Observation of free play within the mother–infant dyad lasted 15 min. The participants were provided with a set of novel toys and instructed simply to "do whatever you would normally do with your infant" (Farkas, 2004). These sessions were videotaped for later analysis using the AIT grid. The process was repeated during the second and third evaluations that took place when the infants were between 12–14 and 18–20 months of age, respectively. The first free play observation functioned as a baseline and was followed by implementation of the baby sign language program in the experimental group.

7.5. Baby signs program

The program is based on the Infant Signs©Program that was designed by Professors Linda Acredolo and Susan Goodwyn based on research conducted with U.S. government support at the University of California. The program instructs mothers to encourage the use of symbolic gestures by their preverbal children by consistently modeling them, accompanied by the corresponding words, during daily interactions. Information about the success of each family's efforts is obtained in follow-up sessions held by phone. The program was adapted for Chile by Chamarrita Farkas, and consisted of two phases. The first phase involved a psycho-educational workshop for the parents of participating children (two weekly sessions, one explanatory and the other practice), while the second phase consisted of monitoring the subjects at home every 15 days by a visit of a team member, until the infant turned 18 months old.

At the same time two talks focused on language development were held for the parents of children participating in the control group. No mention of communication through signing was included in these situations.

7.6. Interaction coding

AIT Grid (*Early Interaction Analysis, in Spanish*): The primary tool used to assess mother–child interactions in this study was the AIT Grid. This observational tool, developed by Farkas (2004) within a Chilean sample and evaluated by expert judges during its design phase, was created to help researchers evaluate early interactions between infants from birth to age 2 and their mothers. The goal of the grid is to provide a fine-grained analysis of dyadic interactions by identifying individual modes of interactions (i.e., visual, vocal, tactile, holding and affective behaviors) and by differentiating among interactive behaviors of the infant, the mother, and synchronic interactions involving both.

The grid was developed for use specifically in free play settings, enabling researchers to obtain frequency data pertaining to individual interactive behaviors of the mother and child and the frequency and duration of synchronic interactions involving both. The choice of the grid for use in the present study was inspired both by its availability in Spanish and by its applicability to the type of free play in which the mothers and infants were asked to engage.

Because "holding" is not typical of free play situations, that dimension of the AIT Grid was not included in the present study. Related with the goals of this research, the modes of interactions considered were vocal, visual, tactile and affective synchronic interactions.

The characteristics of an interaction to be considered "synchronic" were: (a) one member of the dyad (mother or infant) initiate the interaction, and the other member have to follow it; (b) both members manifest an active and intentional search of interaction with the other; (c) the interaction mode has to be the same (visual, vocal, tactile or affective); (d) the affective tone of the interaction has to be positive; and (e) the goal to interact with the other member has to be an end by itself, not a mean for another activity (for example, the mother touch the infant to enjoy the contact, not because the infant can felt down and then she put her hand on the infant's back to support him or her).

In synchronic interactions, the grid generated information translated to scores in the fourth modes considered (visual, vocal, tactile and affective) related to:

a) *Frequency*: considered 7 categories from "never" to "always", and latter they are rated in a scale of 1 to 7.
b) *Duration*: considered 5 categories from "less than 5 seconds" to "more than 20 seconds", and latter they are translated to scores of 1 to 5. Can be mentioned that each synchronic interaction is rated for duration.

The videotapes of the free play sessions were analyzed using the AIT grid. As was noted before, the data obtained included scores for visual, vocal, tactile and affective synchronic interactions in regard to both frequency and duration. Considering that 15 min is a long period of time, to facilitate the scoring process and its objectivity, each 15 min of free play were divided into three 5-min segments. These three scores were later used to get an average that represent the general performance of the dyad and then arrive at a final descriptive score for each mode of interaction.

In order to guarantee the objectivity of the scoring, three independent observers participated in the process. As these three observers were rating the interactions, they where naïve to group membership. Their scoring was compared and revised by an expert in case of disagreement, until they reached 100% agreement on their coding.

7.7. Data analysis

The first analysis consisted of a comparison of the baseline measurements of the experimental and control groups in order to determine whether or not they were comparable at the beginning of the study. Because of the small size of the sample ($N = 14$), the non-parametric Mann–Whitney test was used to analyze the data (Sampieri, Collado, & Lucio, 1999).

Subsequently, scores for the experimental and control groups from the second and third free play observations were compared in a repeated measures design, in order to determine differences that resulted from the intervention. These analyses also were conducted using the Mann–Whitney test, with a significance value of $p < .05$.

8. Results

8.1. Preliminary descriptive analysis

8.1.1. Baseline analysis

The analysis of the baseline sessions indicated no significant differences between the experimental and control groups in terms of frequency or duration of visual, vocal, or affective modes of interaction. These suggest that groups were similar on these modes.

The groups differ however, showing that the control group had greater frequency and duration tactile interaction scores (Frequency: GE mean: 1.2, CG mean: 1.9; *U*-Mann–Whitney $Z = -2.816$, $p < .05$; Duration: GE mean: 3.7, CG mean: 2.3; *U*-Mann–Whitney $Z = -2.211$, $p < .05$).

8.1.2. Acquisition of symbolic gestures

In order to verify if the intervention generated the learning expected in relation to the baby signs program, the mothers had to report periodically the symbolic gestures that the children were manifesting, on a written report. This information showed that the children of the experimental group learned in average 10.3 signs at 18 months of age, with a range variation of 2–18 signs. This indicated that the intervention generated the learning expected, considering that in a study reported by Acredolo and Goodwyn (1988), the average signs acquisition between 38 children of 16–18 months of age was 3.9.

8.2. Analysis of synchronic interactions

8.2.1. Visual interactions

When the experimental and control groups were compared across the initial evaluation (5–9 months of age) and 12–14 months, no significant differences in visual synchronic interactions were found, but a significant difference was observed on the final measurement (18–20 months of age) in both frequency, GE mean: 2.9, CG mean: 2.1; *U*-Mann–Whitney ($Z = -1.752$; $p = .097$) and duration, GE mean: 2.4, CG mean: 1.1; *U*-Mann–Whitney ($Z = -2.433$; $p < .05$).

The dyads that participated in the intervention had more frequent synchronic visual interaction behaviors at 18–20 months of age as compared to dyads from the control group. The visual interaction behaviors also were longer duration in the experimental group. The opposite was observed in the control group, in which the duration of visual interaction behavior decreased over time (see Figs. 1 and 2).

8.2.2. Tactile interactions

When the two groups were compared over time, no significant differences were noted between groups during the second observation (12–14 months of age) but the groups differed on the third observation (18–20 months of age) in both

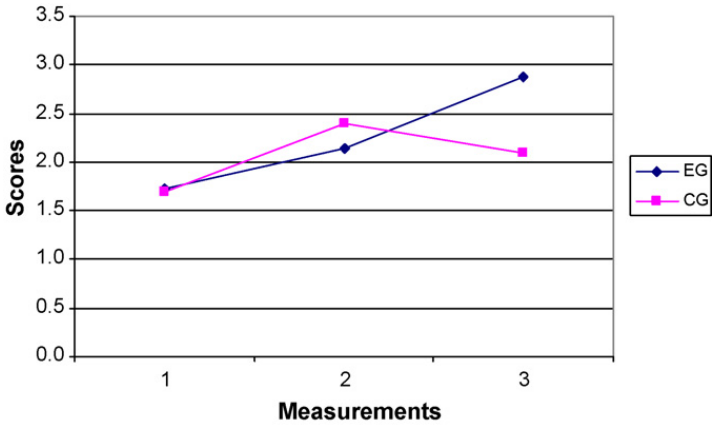

Fig. 1. Synchronic visual interactions frequency.

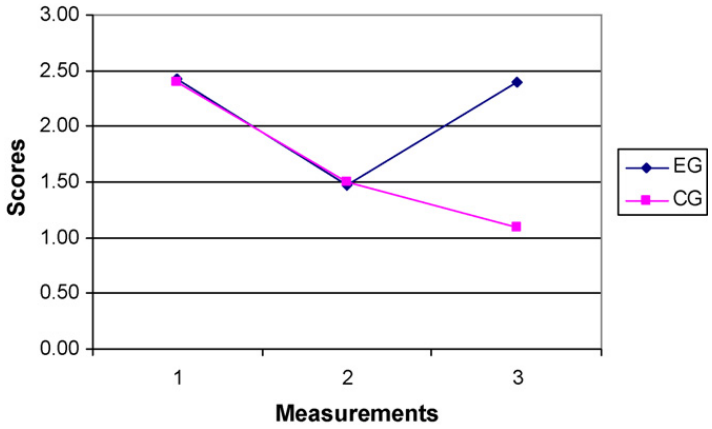

Fig. 2. Synchronic visual interactions duration.

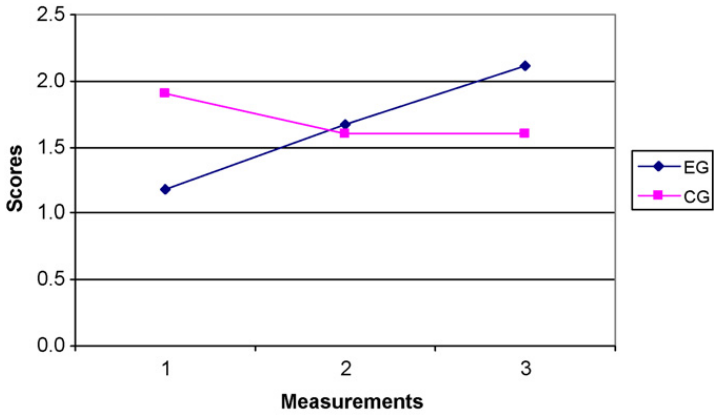

Fig. 3. Synchronic tactile interactions frequency.

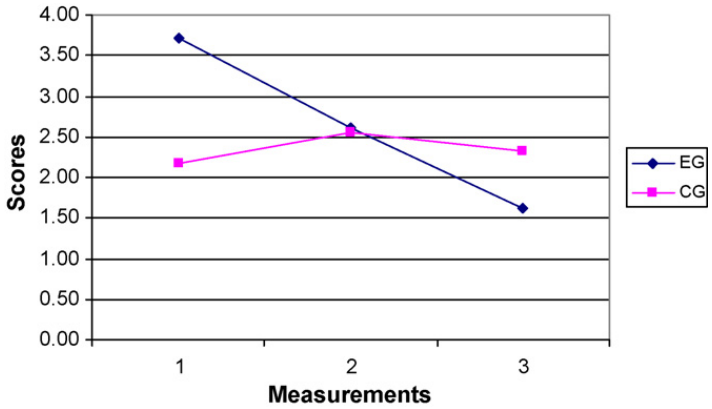

Fig. 4. Synchronic tactile interactions duration.

frequency (GE mean: 2.1, CG mean: 1.6; *U*-Mann–Whitney, $Z = -2.965$; $p < .05$) and duration (GE mean: 1.8, CG mean: 2.3; *U*-Mann–Whitney, $Z = -2.377$; $p < .05$) on the tactile behaviors.

Regarding frequency, the dyads in the experimental group showed more frequent synchronic tactile interaction behaviors while the control group dyads decreased in frequency as the infants approached the 12 months, but remained steady subsequently. A similar tendency was recorded for the duration, but in an inverse manner. The experimental dyads showed significant decreases in the duration in tactile interaction behaviors while the control group dyads remained relatively stable (see Figs. 3 and 4).

8.2.3. Vocal interactions

When the dyads from both groups were compared, no significant differences in the duration of the interactions were observed. However, the frequency of these interaction behaviors in the experimental group tended to increase during the

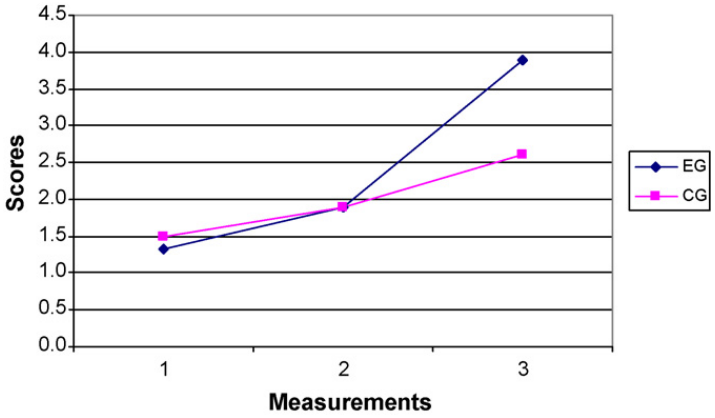

Fig. 5. Synchronic vocal interactions frequency.

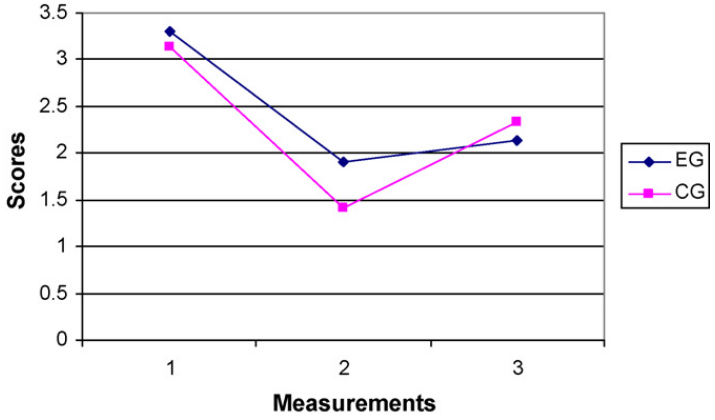

Fig. 6. Synchronic vocal interactions duration.

third period (18–20 months of age) in the expected address (GE mean: 3.9, CG mean: 2.6). This was not statistically significant, maybe related with the small sample what affect the analysis robustness, but that suggest a promising direction for further exploration (see Figs. 5 and 6).

8.2.4. Affective interactions

No significant differences were found between the two groups (see Figs. 7 and 8) for frequency or duration of affective synchronic interaction behaviors at either of the two older ages.

9. Discussion

According to both theory and existing research evidence, early synchronic interactions are crucial to the construction of a positive relationship between mother and child. For that reason, any light that can be shed on the developmental trajectory

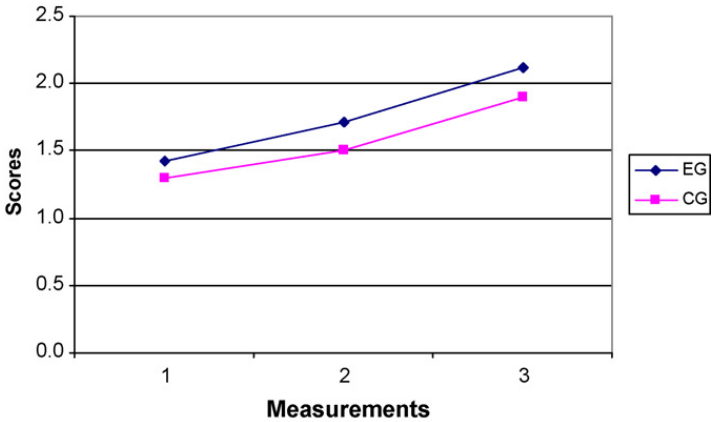

Fig. 7. Synchronic affective interactions frequency.

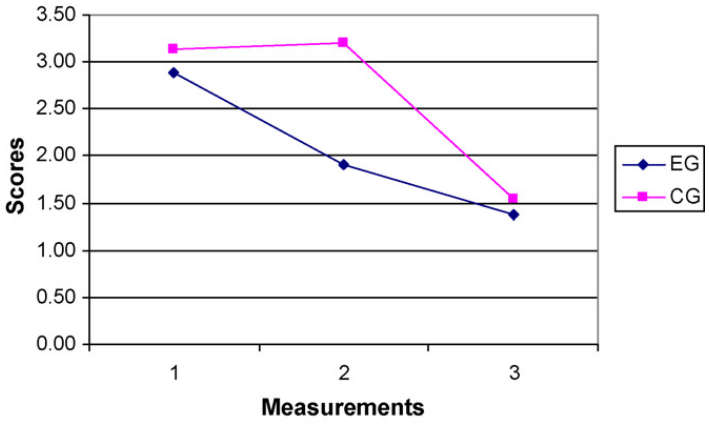

Fig. 8. Synchronic affective interactions duration.

of such interactions is welcome. From this perspective, an important contribution of the present study was the finding that, across both groups of infants, there was a tendency towards an increase in the *frequency* of specific synchronic interaction behaviors (visual, vocal, tactile and affective) from 5 to 7 up until 18–20 months of age, while the *duration* of those behaviors tended to decrease. In other words, as the infant grows older, the number of synchronic interaction behaviors with the mother increases. This increase in frequency may reflect the growing ability of the infant to initiate such interactions. The increase may also be understood from the perspective of the desire of both parties to obtain information from each other to help maintain coordination and mutual understanding within the dyad. At the same time, the duration of these interactions tended to decrease, perhaps due to the necessity for the child to gradually increase his or her attention to and exploration of the environment as well as his or her independence.

The second set of results from the present study speaks to the effects of the infant signs language program on the dyads studied. The intervention leads to a statistically significant increase in the frequency of synchronic interaction behaviors at the visual and tactile modes in comparison to the control group. Although not statistically significant, a tendency toward a greater frequency of vocal interaction behaviors was also observed, a pattern worthy of further investigation with a larger sample. Finally, no significant differences between the two groups were found on the frequency of affective interaction behaviors.

It is interesting that both, the visual and tactile synchronic interaction behaviors increased in the experimental group, given that baby signs language must be seen, not heard. The establishment of communication through symbolic gestures requires that each member of the dyad is constantly observing the other, the infant paying attention to the mother and the mother paying attention to her child. In other words, the requirement of greater visual attention when communication is non-verbal may help explain the increase in the frequency of synchronic visual behaviors.

Although not statistically significant, there was a trend toward more vocal interaction behaviors in the experimental group when the children were between 18 and 20 months of age. The failure to achieve statistical significance may have been due to the small size of the samples or, perhaps, to the fact that verbal communication is just beginning at this age and many of the children are still focusing on other forms of communication. Probably vocal interaction will have greater importance in the child's interactions with others as he or she grows more competent in verbal language. A third hypothesis is that in the synchronic interactions in the mother–child dyad, most of what is being communicated is emotional in nature, messages which are easier to transmit by non-verbal channels.

Tactile behaviors also increased in the experimental group. Considering that this kind of language includes principally the use of hands to communicate, can be understand that hands become an important vehicle for communication with the other, where not only concepts, ideas and needs are communicated, but also emotions. Emotional information is not only transmitted through symbolic gestures, but also through behaviors such as touching, caressing or kissing the other person, all of which could explains the increase in the frequency of tactile synchronic interactions over time, as observed in this study.

The baby signs language program led to longer synchronic visual interaction behaviors in the experimental group at 18–20 month of age, while the duration of tactile interaction behaviors decreased significantly. There were no differences between the groups in regard to vocal and affective interactions.

The synchronic tactile interaction behaviors may have grown shorter as the child grows, leaving space for active exploration of the environment and the development of gradual autonomy. This idea is supported in all the literature related to attachment studies, where the increase in autonomy and the separation from the caregivers had been demonstrated.

The increasing synchronic visual behaviors may be related to the intervention. As noted earlier, infant signs language implies active visual interaction with the other in order to understand and make oneself understood. It is possible that the effects of this type of communication in the dyad are still weak when the child is only 12 months of age. This is supported by the fact that no significant differences were observed between the two groups at this age in any of the modes studied, and observation that could be related to the brief period during which the program was applied. In contrast, when the children

reached 18 months of age, the dyad had been exposed to this type of communication for a longer period of time. This is accompanied by the child's greater development, which allows communication to be more fluid and frequent. This increase in communicative exchanges through symbolic gestures in the dyad was corroborated by more frequent and prolonged synchronic visual interactions.

It is important to note that this study was carried out with a very small sample. Its results should, therefore, be considered promising but preliminary, and additional research should be undertaken. Even so, the data do provide important information in an area not previously analyzed in regard to the effects of the use of intentional and symbolic gestures in mother–infant communication. The results suggest that encouraging this type of communication may have significant positive effects on children's future socio-emotional development through its impact on one-on-one interactions. Specifically, these results support the hypothesis that infant signs language positively influences mother–infant interactions by increasing synchronic visual and tactile interaction behaviors, thereby possibly making the relationship within the dyads stronger and more intimate. This type of intervention, therefore, can be used as a tool that allows mothers and infants to enrich a channel of communication while they develop more secure bonds that allow the infants to perform in a better way in the future.

References

Acredolo, L., & Goodwyn, S. (1985). Symbolic gesturing in language development. *Human Development*, *28*, 40–49.

Acredolo, L., & Goodwyn, S. (1988). Symbolic gesturing in normal infants. *Child Development*, *59*, 450–499.

Acredolo, L., & Goodwyn, S. (2001). Baby Signs: How to talk with your baby before your baby can talk. U.S.A.

Bonavita, F., Cerutti, S., & Defey, D. (1995). Las primeras etapas del vínculo, los diferentes lenguajes. In D. Defey (Ed.), *El bebé, sus padres y el hospital*. Uruguay: Roca viva.

Farkas, C. (2004). *Manual "Observación del vínculo madre- bebé"*. Non-publish manuscript. Pontificia Universidad Católica de Chile, Santiago, Chile.

Field, T. (1985). Attachment as psychobiological attunement: Being on the same wavelength. In M. Reite & T. Fields (Eds.), *The psychobiology of attachment and separation* (pp. 415–545). Orlando, USA: Academic Press.

García, E. (1983). El apego o vínculo afectivo, un llamado de atención para estrategias de intervención de estimulación temprana. *Siglo Cero*, *96*, 24–30.

Goldin-Meadow, S. (2000). Beyond words: The importance of gesture to researches and learners. *Child Development*, *71*, 231–239.

Goldin-Meadow, S. (2002). Constructing communication by hand. *Cognitive Developmente*, *17*, 1385–1406.

Gómez, J. C., Sarriá, E., & Tamarit, J. (1993). El estudio comparado de la comunicación temprana y la teoría de la mente: Ontogénesis, filogénesis y patología. *Siglo Cero*, *24*(6), 47–62.

Goodwyn, S., Acredolo, L., & Brown, C. (2000). Impact of symbolic gesturing in early language development. *Journal of Nonverbal Behaviour*, *24*, 81–103.

Knapp, M. L. (1982). *La comunicación no verbal, el cuerpo y el entorno*. Barcelona: Paidós Ibérica.

Lamour, M., & Lebovici, S. (1991). Les interactions du nourrison avec ses paternaires: Evaluation et modes d'abord thérapeutiques. *Revue Psychiatrie de L'enfant*, *XXXIV*(1).

Moneta, M. E. (2003). *El Apego. Aspectos clínicos y psicobiológicos de la díada madre-hijo*. Santiago de Chile: Cuatro vientos.

Moore, B., Acredolo, L., & Goodwyn, S. (2001). Symbolic gesturing and joint attention: Partners in facilitating verbal development. *Paper presented at the meetings of the International Society for Infant Studies*.

Namy, L., Acredolo, L., & Goodwyn, S. (2000). Verbal labels and gestural routines in parental communication with young children. *Journal of Nonverbal Behaviour*, *24*, 63–79.

Oiberman, A. (2001). *Observando a los bebés: Estudio de una técnica de observación de la relación madre-hijo*. Buenos Aires: Lugar.

Sampieri, R., Collado, C., & Lucio, P. (1999). *Metodología de la investigación*. Bogotá: McGraw-Hill.

Spitz, R. A. (1966). *El primer año de vida del niño: génesis de las primeras relaciones objetales*. Madrid: Aguilar.

Sroufre, A. (2000). El apego: la regulación diádica de la emoción. In A. Sroufre (Ed.), *Desarrollo emocional y adaptación individual*. México: Oxford.

Stern, D. (1991). *El mundo interpersonal del infante: una perspectiva desde el psicoanálisis y la psicología evolutiva*. Buenos Aires: Paidós.

Tomasello, M., & Farrar, M. (1986). Joint attention in early language. *Child Development*, *57*, 1454–1463.

Vallotton, C. D. (2008). Signs of emotion: What can preverbal children "say" about internal states? *Journal of Infant Mental Health Journal*, *29*, 234–258.