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An Advanced Framework for Verbal Communication and Nonverbal Gestures in Parent–child Interactions

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Abstract

A key issue in interpersonal communication is the interrelation of verbal communication and nonverbal gestures (VCNGs). This study expands the theoretical framework for VCNGs by presenting an advanced framework for VCNGs in parent–child interactions. The study explored both parents and children and explains the effect of a wide range of social and situational contexts: child's sex, parent's sex, socioeconomic status, and task difficulty on VCNGs. Parent–child interactions (n=160) in structured joint game sequences were filmed in their homes and analyzed using a mixed multivariate design. Findings exposed unexpected VCNGs interrelations and reciprocal patterns for parents and children. Social and situational contexts effected VCNGs significantly. The study contributes composite theoretical accounts for VCNGs from receptive and expressive perspectives.

Keywords: verbal communication, non-verbal communication, gestures, parent-child interaction

1. Introduction

Verbal communication and nonverbal gestures (VCNGs) are central in the context of interpersonal communication. This study expands the theoretical framework for VCNGs, by presenting an advanced framework for VCNGs in parent–child interactions. The theoretical framework develops the multimodal communication approach, which argues that communication expressivity is based on verbal communication and nonverbal gestures.

Scholars from communication and allied fields have long recognized the need to analyze both modes of communication. However, most of the previous studies have focused on either verbal communication or nonverbal gestures. The proposed framework establishes a two-fold perspective for the multimodal approach that explains the importance of VCNGs from receptive and expressive perspectives. There is a paucity of studies that attended VCNGs from both perspectives.

Moreover, this framework contributes by analyzing VCNGs of both partners, the parents and the children. This is based on the premise that both partners play an active role in the interaction. Most previous studies have concentrated on either the parents or the children. Exploring both partners exposes mutual relationships and reciprocal patterns of VCNGs. Herein lies this study's contribution.

The proposed framework expands VCNGs into a communication context approach, which is based on the assumption that social and situational contexts effects VCNGs. There is a gap in studies that delineate the effect of social and situational contexts on VCNGs. The present study examines a wide range of social and situational contexts – parents and children's sex, socioeconomic status (SES), and task difficulty – and delineates the effect of these contexts on VCNGs. The present framework advances composite theoretical accounts into a set of propositions of social and situational contexts that activate VCNGs. The theoretical framework proceeds in three main stages that constitute its contribution to the existing research. Stage I develops the multimodal communication approach from receptive and expressive perspectives, Stage II presents reciprocity process of VCNGs, and Stage III expands VCNGs into a communication context approach.

2. Stage I: Multimodal Communication Approach

The theoretical framework of this study draws on a multimodal communication approach (Buck & VanLear, 2002; Grebelsky-Lichtman, 2014a; Jones & LeBaron, 2002) and action assembly theory (AAT), (Greene, 2007). A multimodal communication approach assumes that the two communication modes (verbal and nonverbal) play an important role in

communication expressivity. Research in this area has shown that systematic differences exist in communication processes, interpretations, and other outcomes associated with the utilization of or exposure to various communication modes (Burgoon et al., 2002; McNeill, Cassell, & McCullough, 1994; Streeck, 1994). A multimodal communication approach is not about verbal or nonverbal communication per se, but does offer potentially valuable insights into the interrelations between these forms of communication (Birdwhistell, 1971; Ekman, 1997; Mehrabian, 1981). Multimodal communications are very important for educational organizations (Riasi & Asadzadeh, 2015) and marketing firms (Ansari & Riasi, 2016); because in both cases verbal and nonverbal communication modes play an important role in communication expressivity.

AAT explains the formulation and production of verbal and nonverbal messages (Greene, 2007). According to AAT, communication skills are defined as the ability to assemble verbal and nonverbal procedural records; that is, long-term memory units that contain three types of information: feature of action, outcome, and situation. The present study aims to expand AAT and multimodal communication approach by providing composite theoretical perspectives on both the parent's and the child's VCNGs during their mutual interactions. It aims to offer one facet of explanation to the intriguing question of the interrelations of VCNGs:

RQ1: Do VCNGs display positive or negative correlation, i.e. is increased verbal communication accompanied by increased or decreased nonverbal gestures?

2.1 VCNGs from Receptive and Expressive Perspectives

The current study develops an explanation of the process of VCNGs from receptive and expressive perspectives. The study contributes a theoretical framework of VCNGs that constitutes the accounts of the process from two-fold perspectives. Figure 1 aggregates VCNGs importance in enhancing interpersonal communication, exposing the outcomes from receptive and expressive perspectives including the accounts of these outcomes. From the receptive perspective (see Figure 1), a message that contains VCNGs enhances the receiver's understanding of the message and prevents communication shortcuts (Streeck, 1994). This outcome is explained based on the process that VCNGs clarify the message and was supported in studies indicating that children between the ages of four and nine had a better understanding of verbal messages that included nonverbal gestures (Driskell & Radtke, 2003; Singer & Goldin-Meadow, 2005).

Using both modes of communication clarifies the message and improves understanding, even in children younger than four. Children learn more when messages are accompanied by nonverbal gestures (Morford & Goldin-Meadow, 1992). In this way, VCNGs enhance the perception of the receiver of the message. This is explained by the process that VCNGs add information, which contributes to the acquisition of new concepts. Such expressions that include both verbal communication and nonverbal gestures increase the receiver's attention to the mutual interaction because VCNGs involve movement (McNeill, 1992).

Speech accompanied by gestures is symbolically richer and supplies information on certain aspects of the content that is not expressed in spoken language (Calbris, 1990; Morris, 1971). Moreover, speech together with gestures enhances recalling the message, because the message is received through both senses: hearing and seeing. Nonverbal gestures fit closely with the speech (Kendon, 1994). They are performed by the speaker to demonstrate his/her words or to clarify the message, particularly when describing objects of a special shape or size, thus enabling a better recollection of the message (McNeill, 1992).From the expressive perspective, as illustrated in Figure 1, VCNGs contribute to the sender. Grounded in AAT (Greene, 2007), VCNGs can increase the individual's involvement in an interaction (Goodwin, 1986; Streeck, 1994). This is explained based on the process that when both communication channels are used, the transfer of the message is characterized by a higher cognitive, emotional, and behavioral intensity. As one partner's involvement increases, his/her use of VCNG increases (McNeill et al., 1994). In addition, VCNGs include a behavioral facet that increases the activity and vitality from the expressive perspective.

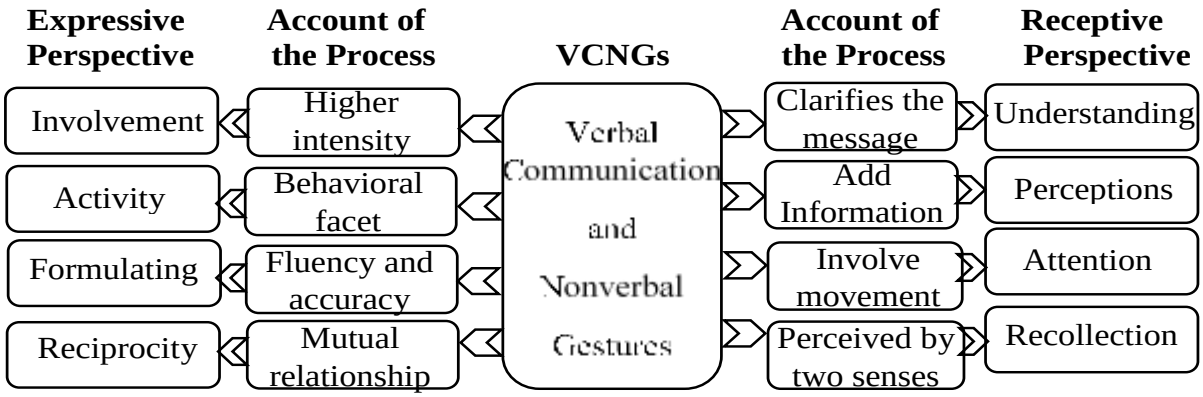

Figure 1. Accounts of the Process of Verbal Communication and Nonverbal Gestures from Receptive and Expressive Perspectives

VCNGs contribute to the sender formulizing the message (see Figure 1). Using nonverbal gestures accompanied by verbal communication increases the accuracy and fluency of the message. Developmental theories argue that children often start to gesture before they produce their first words (Bates & Dick, 2002; Driskell & Radtke, 2003; Volterra, Caselli, Capirci, & Pizzuto, 2005; Iverson & Goldin-Meadow, 2005). Gestures are incorporated into language and reinforce speech from an early age (Morford & Goldin-Meadow, 1992). Recent studies by Rowe and Goldin-Meadow (2009a; 2009b) found that children between the ages of one and two who produced more gestures with different meanings had larger vocabularies between the ages of four and six years. The changes in children's gestures expand the repertoire of nonverbal gestures and represent the ability of gestures to indicate a child's linguistic development (Goldin-Meadow & Singer, 2003; Oscaliskan & Goldin-Meadow, 2005).

3. Stage II: Reciprocal Patterns of VCNGs

VCNGs expressions may lead to a reciprocity process in which the involvement of one partner in the interaction results in greater involvement on the part of the other. The mutual relationship that develops during the joint interaction increases the involvement of the partners. The current study aims to develop one answer to the complex question of reciprocal patterns of VCNGs:

RQ2: Do VCNGs display a positive or negative correlation between the partners, i.e., is increased VCNGs of one partner accompanied by increased or decreased VCNGs among the other?

4. Stage III: Communication Context Approach for VCNGs

The current study offers a communication context approach for VCNGs. Grounded in AAT (Greene, 2007), this study attributes significance to the context on VCNGs. According to AAT, social and situational contexts influence the process of assembling verbal and nonverbal action features. The procedural records that tend to be most highly activated at any particular time are those that are relevant to the context. The current study expands AAT by exploring the effects that a wide range of social and situational contexts – the child's sex, the parent's sex, socioeconomic status (SES), and task difficulty – have on VCNGs. This analysis makes it possible to evaluate the effect of these social and situational contexts on VCNGs in parent–child interactions. It also expands the theoretical framework, suggesting that these variables may drive parent–child communication differences (Adams, Kuebly, Boyle, & Fivush, 1995; Davidson & Snow, 1996; Fivush, Brotman, Buckner, & Goodman, 2000; Grebelsky-Lichtman, 2015).

4.1 The Effect of Social Contexts of Parents' Sex and Child's Sex on VCNGs

Social learning theory stresses the impact that different forms of parental communication among mothers and fathers have on socialization in childhood (Bandura, 1986; Fivush et al., 2000). The current study contributes to our knowledge about this topic by analyzing the communication of both mothers and fathers in an attempt to attain a holistic view of parents' VCNGs (Adams et al., 1995; Davidson & Snow, 1996; Richards & Gallaway, 1994).

There is a social stereotype that women talk more than men (Broverman, Vogel, Broverman, Carlson, & Rosenkrantz, 1972). Tannen (1990) argued that women tend to talk more than men in private and intimate circumstances, whereas men talk more than women in groups and wider forums. Other studies found that women communicate nonverbally more than men (LaFrance & Mayo, 1978; Hall, 1985). In light of AAT, mothers should display greater VCNGs because the activation level of verbal and nonverbal procedural records is higher among mothers when interacting with their children. In keeping with AAT, findings from previous studies, and the proposed theoretical framework, the following hypotheses were formulated:

H1a: Mothers will exhibit higher degree of expressivity of verbal communication and nonverbal gestures than fathers.

H1b: Children will demonstrate greater VCNGs toward mothers than fathers.

Regarding the child's sex, the present study analyzed both boys' and girls' communication. Girls were found to produce slightly more words than boys from ages two to five (Wilson, Roberts, Rack, & Delaney, 2009). Fenson et al., (1994) reported that girls had a slight advantage in terms of gesture production, word comprehension, and word production. A recent study showed that girls were slightly ahead of boys in terms of early communicative gestures, productive vocabulary, and combining words (Eriksson et al., 2012). Grounded in AAT, girls have more procedural records, which enhances their ability to formulate and assemble verbal and nonverbal communication. Accordingly,

H2a: Girls will show higher expressivity of verbal communication and nonverbal gestures than boys.

H2b: Parents will demonstrate greater VCNGs toward girls than boys.

4.2 The Effect of Social Context of SES on VCNGs

Family discourse theories explain differences in parental VCNGs in terms of socioeconomic status (SES) and maintain that parental SES effects children's verbal competence and learning abilities (Dickinson & Snow, 1987; Heath, 1983). However, research on SES and the interrelations between VCNGs is insufficient. High-SES mothers were found to talk more and to expect greater verbalization from their children than low-SES mothers (Barratt, 1995). SES-related differences were found in measures of children's comprehension and their production vocabularies. Rowe and Goldin-Meadow (2009a) found that high-SES parents used more gestures when communicating with their children than their low-SES counterparts, and that this pattern was positively related to their children using more gestures.

Based on the premises of AAT, high-SES parents have a large number of action features and have a greater ability to organize the appropriate action features into a coherent configuration of verbal and nonverbal cues (Greene, 2007). However, other research has failed to support the effect of parental SES on children's verbalization and gestures during the initial stages of language development. For instance, Fenson et al. (1994) found no significant SES-related differences in infants' early word and gesture production. Other studies showed that low-SES parents were more nonverbal than high-SES parents (Blaney & Quay, 1992). Grounded in AAT and findings from previous studies, the following hypotheses were formulated:

H3a: The degree of parents' verbal communication will increase during interactions among high-SES. Low-SES parent will exhibit greater nonverbal gestures.

H3b: Children of high-SES will demonstrate greater verbal communication. Low-SES children will demonstrate more nonverbal gestures.

4.3 The Effect of Situational Contexts on VCNGs

Situation-specific aspects of parent–child interaction tasks influence parents' and children's communication (Ginsburg, Grover, Cord, & Ialongo, 2006). The current study contributes by comparing VCNGs across parent–child interaction tasks of varying types and difficulty. Examining interactions of different levels of difficulty enables the observation of patterns of communication that do not otherwise occur (Grebelsky-Lichtman, 2014b). In particular, high levels of difficulty force participants (parents and children) to use VCNGs to manage the challenge (Ekman & Friesen, 1969; Rogers & Sawyers, 1990).

AAT has argued that situational contexts influence the process of assembling verbal and nonverbal action features. Action features tend to be most highly activated at a point in time when they are relevant to the situational context (Greene, 2007). Therefore, as the complexity of an assignment increases, the activation level of verbal and nonverbal procedural records increases, which means that greater VCNGs will be displayed as attempts to assist both the sender and the receiver. The present study expands AAT and the multimodal communication approach by delineating and explaining the effect that situational context has on VCNGs. Hence, the following hypotheses:

H4a: The degree parents' of expressivity of verbal communication and nonverbal gestures will increase during difficult tasks than during free play.

H4b: Children will demonstrate greater VCNGs during difficult tasks than during free play.

5. Methods

5.1 Participants

The study included 160 interactions between parents and children. Eighty parents were involved (40 mothers and 40 fathers), with each parent engaged in two series of interactions. The mothers' ages ranged from 29 to 45, and the fathers' ages ranged from 31 to 53 (M=33.2, SD=2.1; M=37.5, SD=3.5, respectively). All of the fathers and mothers who

participated in the study were Israelis. Each family filled out a demographic questionnaire to characterize the participants. The SES measure is based on the theoretical and empirical arguments that a composite measure is comprehensive and preferable (Bornstein & Bradley, 2003; Marks, 2010; Sirin, 2005). In high-SES families, both parents had at least a college education, above-average income, and above-average number of rooms in the home, and lived in at least an upper-middle-class neighborhood. In low-SES families, both parents had no more than a 12th-grade education, below-average income, and below-average number of rooms in the home, and lived in a disadvantaged neighborhood.

The families were recruited through preschools. In each family, the mother, father, and one child were studied. First-born children were excluded from the sample to avoid the influence of additional variables (Berglund, Eriksson, & Westerlund, 2005; Suitor & Pillemer, 2007). The study contained an equal number of sons and daughters. The children's average age was 4.2 years (range: 3.9 to 4.6 years), an age at which children demonstrate verbal and nonverbal communication skills, a range of play skills, the ability to plan ahead, the capacity for representational thinking and imagination, social cognition, and motor skills (Fasulo, Liberti, & Pontecorvo, 2002). Moreover, parental influence at this stage plays a significant role in a child's developmental, cognitive, emotional, social, and communicative abilities (Hughes, 1995). We contacted families with children who had no developmental, cognitive, or motor problems, as confirmed by their teacher.

5.2 Procedures and Research Sites

The researchers observed parents and children engaged in short, structured play sessions in order to compare everyday interactions (Borrego, Timmer, Urquiza, & Follett, 2004; Wilson et al., 2009). We observed and videotaped mother–child and father–child interactions in the family homes. We met twice with each family. On the first occasion, we videoed an interaction between the child and one of his/her parents; on the second occasion, we videoed an interaction between the child and the other parent. Each parent engaged in the entire interaction series. To neutralize a potential order effect, mothers were observed first in half of the interactions and fathers were observed first in the other half. A Latin square analysis for an order effect was conducted. The test revealed no order effect on parental response to child's incongruent patterns, $F(1,306) = 1.07$, $p > .05$).

Participants were told that they were participating in a study on how parents and children play together. All of the interactions involved cooperative play with an *Etch A Sketch* drawing screen (Ginsburg et al., 2006). This toy has two knobs, one producing vertical lines and the other producing horizontal lines, to create lineographic images. The toy is suitable for the cognitive, motor, and social skills of a four-year-old. The parent and child were asked to play together, with each assigned one of the two controls. This unique game structure created a situation that implied equal status of the interactive role for each participant. The game is characterized by interdependence between parent and child: the task can only be completed successfully by cooperating. All of the subjects were familiar with *Etch A Sketch*, but none had ever played with it in this manner.

5.3 Instrumentation

Coding the interactions was based on the videos filmed in the families' homes and transcriptions of the dialogue, and was related to both verbal and nonverbal communication. Two series of interactions were coded: (1) free play and (2) the execution of a difficult task. Two advanced undergraduate research assistants who were blind to the family's SES coded the first 10 minutes of each of the 160 interactions. Training of each coder took approximately eight hours.

5.4 Coding Procedures: Verbal Communication

The coding of verbal communication and the categories of analysis are based on discourse analysis (Blum-Kulka, 1997). The dialogue transcriptions were divided into utterances, the basic unit of semantic content (Stiles, 1992). Intercoder reliability was conducted on the division of the interactions into utterances, u=.02 (Guetzkow, 1950). Using an utterance as a unit of analysis enables preservation of the meanings conveyed in the dialogue. An utterance may be smaller than a turn, and a turn may include several utterances. Note that because this study addresses spoken language – characterized by many shortcuts, particularly within family conversations – some utterances may appear lacking or incomplete. However, they stand on their own and derive their meaning from the flow of the interaction. For instance, an utterance such as "more" stands on its own and indicates, "continue turning your knob." The following example illustrates the division into utterances:

Father: "What have we drawn?[1] A castle?[2] Now go down,[3] wait,[4] I'll carry on up.[5] More,[6] more,[7] that's it.[8] Enough.[9] Go down.[10] What have we drawn?[11] What does it look like?[12] Like a boat?[13]"

Boy: "Like a truck.[14]"

As this example shows, the dialogue is divided into 14 utterances: 13 for the parent's verbal communication and one for the child.

5.5 Coding Procedures: Nonverbal Communication

The coding of nonverbal communication was based on gestures (Afifi, 2007). A gesture is defined as a form of nonverbal communication in which visible bodily actions communicate particular messages, either in place of or parallel to words (Rowe & Goldin-Meadow, 2009b). Gestures include movement of the hands, face, or other parts of the body (Ekman & Friesen, 1969; Schultz, Tulviste, & Konstabel, 2012). Inter-coder reliability using Guetzkow's (1950) U was conducted on the division of the interactions into nonverbal expressions, u=.03. The gestures examined expressed direction, instruction, guidance, a circular motion, finger pointing (representing a warning or a threat), shaking the head in approval or negation, positive physical contact, negative physical contact and takeover, cutting hand movements, closed fist, and touching external objects or the body.

5.6 Study Design

The study used a mixed multivariable/multifactorial design consisting of two between-subject independent variables (the child's sex and parents' SES) and two within-subject independent variables (the parent's sex and task difficulty). The parent's sex constitutes a within-subject variable for the analysis given the interdependence between parents who react to the same addressee in the collaborative activity. The dependent variables were VCNGs. Analyses of the distribution of the dependent variables were conducted (Courtright, 2014; Fink, 2009). These analyses demonstrated no departure from normality (skewness=.560, standard error of skewness=.134 for verbal communication and skewness=.340, standard error of skewness=.121 for nonverbal communication).

5.7 Analyses

Analyses of variance with repeated measures (MANOVAs) were conducted. The VCNGs of both parents and children were analyzed. The analyses referred to the study's independent variables: the parent's sex, the child's sex, parents' SES, and task difficulty. Moderation analyses were explored in addition to Scheffé post hoc tests at $p < .01$ that were used to this end.

6. Results

6.1 Interrelations of VCNGs

Following RQ1, an analysis of the interrelations between the two modes of communication found a positive correlation between usages of VCNGs among parents. An increased of parents' verbal communication was accompanied by an increase of their nonverbal gestures (among the parents, r=.59; p<.0001). For example, this strong positive correlation among the parents was seen in the manner in which a parent verbally guided his/her child, saying, "Turn the knob to the right corner," when making a gesture to demonstrate the direction of the required movement. The accompanied gesture improved the child's understanding of the instruction. However, in a diverse manner, parents who spoke less with their children also expressed fewer nonverbal gestures.

Significantly, the findings revealed that parents spoke more than twice as much as children in their joint interactions (parents' talk constituted about 70% of all verbal behaviors), ($\chi^2(1)=943.6$, p<.0001). These gaps are particularly interesting given that the structure of the study implied equal status for the interactive role of each participant. However, the parents were verbally dominant.

Among the four-year-old children, a positive correlation was found between use of VCNG (r=.39; p<.0001). This result indicated that the interrelations of VCNGs among the children was weaker than among the parents. In particular, among the four-year-old children, nonverbal gestures sometimes compensated for periods of little verbal communication. Among children, this compensation could be seen, for instance, in children using nonverbal gestures to indicate where they wanted to draw rather than saying so in words.

Unexpectedly, the findings showed that young children used more nonverbal gestures than their parents. The children displayed 53% of all gestures expressed during the interactions ($\chi^2(1)=54.6$, p<.01). In addition, children were found to use gestures in all interactions, whereas some parents used very few. One father did not gesticulate at all throughout the entire interaction.

6.2 Reciprocal Patterns of VCNGs

Following RQ2, a positive correlation was found between parents' and children's VCNGs in their mutual interactions (r=.31; p<.0001). This finding indicated that an increase of parents VCNGs was accompanied by an increase of the children VCNGs. Mutual interrelations developed during the joint interaction, indicating possible ways to increase each partner's VCNGs. For instance, by talking more and using more nonverbal gestures, one partner could heighten the behaviors displayed by the other partner during the shared interaction, expressed through an increase in VCNGs.

6.3 The Effect of Parent's Sex on VCNGs

The findings revealed, as Figure 2A shows, a significant effects of parent's sex on VCNGs. In line with H1a, VCNGs interrelation displayed greater expressivity for both modes of communication in mothers' interactions. Mothers used more verbal communication in their interactions (M=121.9, SD=30.8) than fathers (M=114.5, SD=29.8). Moreover, the findings for nonverbal gestures revealed a significant effect for mothers and fathers (univariate $F(1,144)=7.67$, $p<.001$, partial $\eta^2=.37$). As H1a hypothesized, mothers also used more nonverbal gestures (M=51.8, SD=23.7) than fathers (M=46.1, SD=20.2). This greater VCNGs for mothers indicated involvement in mutual interactions with their children, which led to the conclusion that involvement activated VCNGs, as demonstrated in the following example:

Mother: "Now turn it this way" (accompanied by an illustrated nonverbal gesture).

Girl: "How far?"

Mother: "Keep going… further… further. I'm putting my hand on the screen, follow it" (the mother provided constant illustrated nonverbal gestures alongside her verbal instructions).

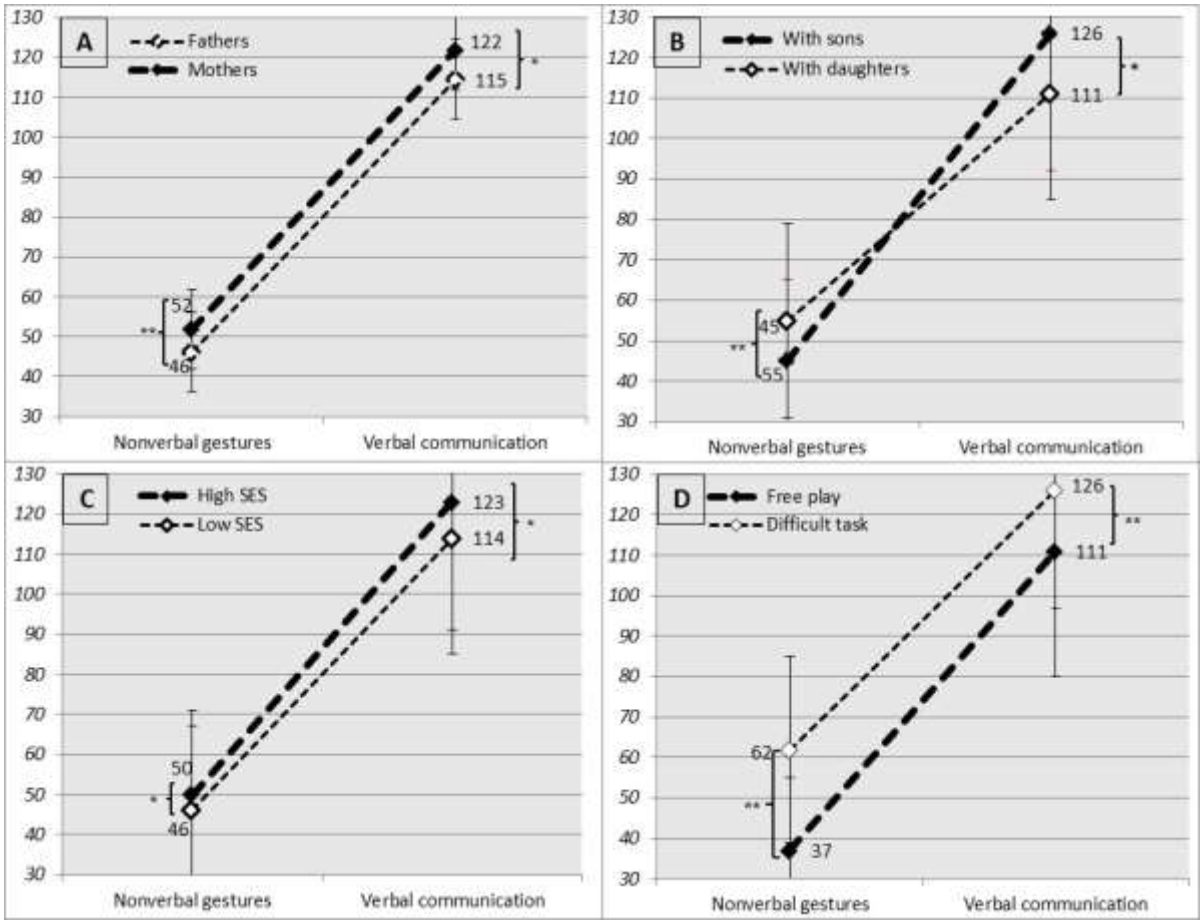

Figure 2. Main Effects for Parents' Verbal Communication and Nonverbal Gestures

Note: Figures 2A–2D illustrate parents' VCNGs: A. Fathers and mothers. B. With sons and daughters. C. High SES and low SES. D. Free play and difficult task. Shown are mean values +/- SD. Asterisk denotes *$p<.05$; **$p<.001$.

Analysis of the children's verbal communication exposed a reciprocal pattern which supported H1b that expressed a significantly different behavior of children with each parent (univariate $F(1,144)=3.15$, $p<.05$, partial $\eta^2=.12$). As Figure 3A demonstrates, the children spoke more to their mothers (M=51.6, SD=14.9) than to their fathers (M=46.1, SD=17.7). This finding points to a relationship between the verbal expressivity of parents and children. According to these findings, the mothers and their children spoke more to one another than fathers and their children did. Analysis of the children's nonverbal gestures led to a similar trend. Significant differences existed between children's nonverbal behavior with each of their parents (univariate $F(1,144)=3.27$, $p<.05$, partial $\eta^2=.13$). Specifically, children gestured more with their mothers (M=56.9, SD=23.4) than with their fathers (M=53.5, SD=27.5).

These gaps in the children's VCNGs toward mothers and fathers interacted with SES. As indicated by Scheffé's tests (univariate $F(1,144)=5.28$, $p<.02$, partial $\eta^2=.14$), among children from low-SES the gap was most salient (toward

mothers: *M*=44.5, *SD*=11.8 toward fathers: *M*=38.7, *SD*=20.1). Among high-SES children, there was a smaller gap between communication toward mothers (*M*=58.7, *SD*=18.5) and fathers (*M*=57.2, *SD*=17.6).

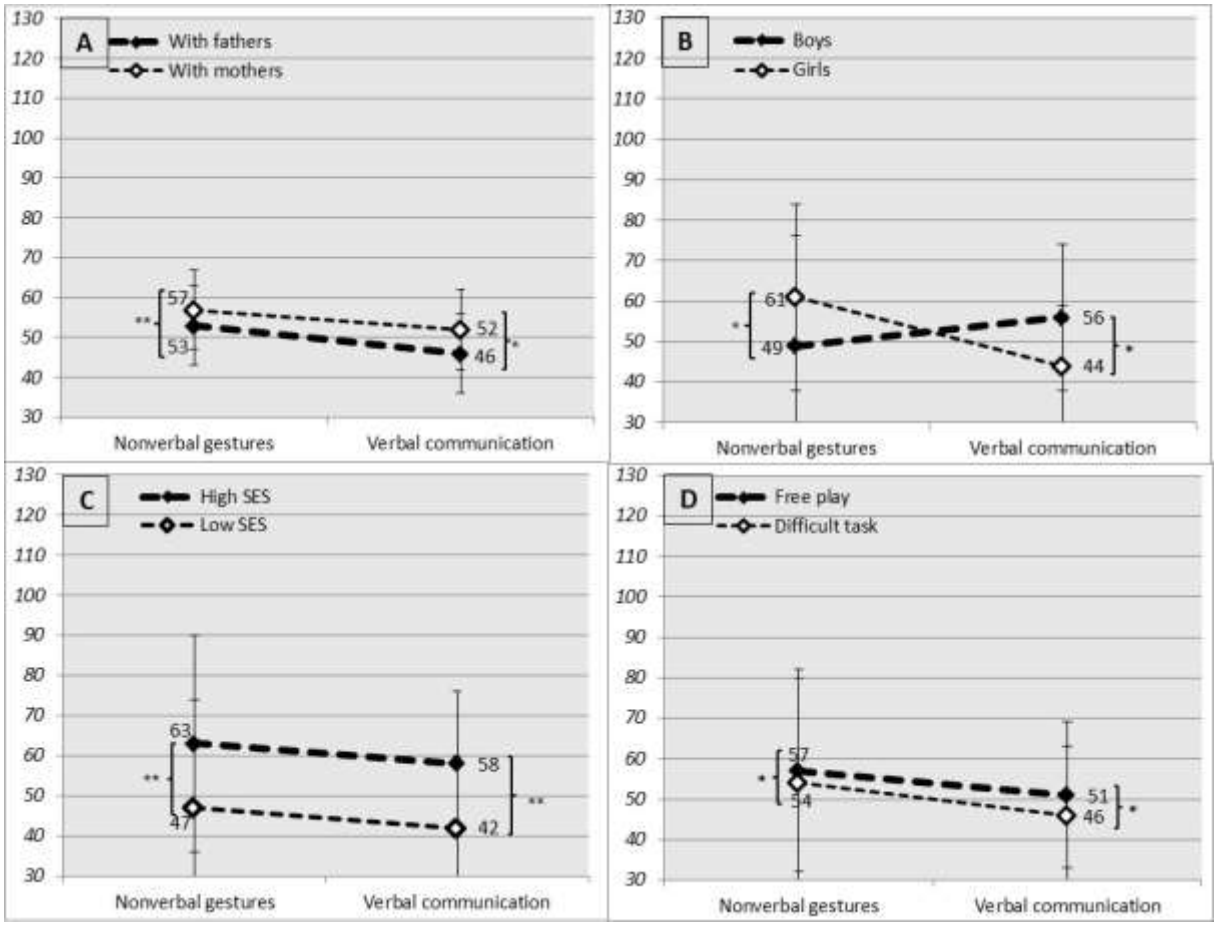

Figure 3. Main Effects for Children's Verbal Communication and Nonverbal Gestures

Note: Figures 3A–3D illustrate children's VCNGs: A. With fathers and mothers. B. Boys and Girls. C. High SES and low SES. D. Free play and difficult task. Shown are mean values +/- SD. Asterisk denotes **p*<.05; ***p*<.001.

6.4 The Effect of Child's Sex on VCNGs

Surprisingly, the findings showed significant effects of VCNGs for child's sex, regarding the verbal communication (univariate $F(1,144)=4.76$, $p<.03$, partial $\eta^2=.24$) and also regarding the nonverbal gestures (univariate $F(1,144)=3.82$, $p<.05$, partial $\eta^2=.16$). In contrast to H2a, boys talked more (*M*=55.7, *SD*=17.6) than girls (*M*=43.9, *SD*=15.1) in interactions with their parents. However, girls used more nonverbal gestures (*M*=61.1, *SD*=23.8) than boys (*M*=49.3, *SD*=26.6), (see Figure 3B). Thus, the present study revealed that the interrelations of VCNGs is based on compensation, but in a diverse manner. The boys used more verbal communication and less nonverbal gestures, whereas the girls were less verbal but used more nonverbal gestures. This led to the conclusion that VCNGs are activated by verbal or nonverbal primacy.

The current study found significant interaction effect for child's sex and SES regarding verbal communication (univariate $F(1,144)=86.16$, $p<.0001$, partial $\eta^2=.79$) and nonverbal gestures ($F(1,144)=49.32$, $p<.0001$, partial $\eta^2=.77$). Scheffé's tests ($p<.01$) showed that the gap between the behavior of boys (*M*=64.6, *SD*=29.3) and girls (*M*=62.1, *SD*=25.4) was smaller in high-SES families than in low-SES families (boys: *M*=57.7, *SD*=14.2; girls: *M*=36.6, *SD*=27.9).

Importantly, these differences were observed in the behavior of the children themselves and not in the behavior of their parents. The parents' behavior toward their children was in line with social stereotypes. As Figure 2B shows, parents behaved differently (univariate $F(1,144)=3.82$, $p<.05$, partial $\eta^2=.14$) according to their children's sex, speaking more to boys (*M*=125.6, *SD*=33.6) than to girls (*M*=110.8, *SD*=25.9). Such behavior creates a circular pattern that preserves sex differences. In contrast to H2b, parents made more nonverbal gestures to their daughters (univariate $F(1,144)=6.16$,

$p<.01$, partial $\eta^2=.47$). This finding reflected reciprocal patterns of VCNGs. However, these reciprocal patterns were in accordance to the children's behavior of more nonverbal gestures among girls than boys. Unexpectedly, the parents expressed a relationship of compensation between VCNGs concerning child's sex.

Interestingly, even the mothers (both high- and low-SES) were active in maintaining the sex differences and behaved to their children in accordance with social stereotypes (univariate $F(1,144)=36.4$, $p<.0001$, partial $\eta^2=.73$ verbally; univariate $F(1,144)=56.19$, $p<.0001$, partial $\eta^2=.76$ nonverbally). High-SES parents might have been expected to behave in a similar manner toward their sons and daughters. However, behaving differently toward children on the basis of their sex seems common to all parents, regardless of SES.

Moreover, it is important to note that fathers' behavior was significantly different toward boys and girls than mothers', especially in their nonverbal communication (univariate $F(1,144)=2.93$, $p<.05$, partial $\eta^2=.11$). Mothers expressed a similar number of nonverbal gestures toward boys ($M=53.2$, $SD=25.2$) and toward girls ($M=50.4$, $SD=16.2$). On the other hand, Scheffé's tests ($p<.01$) revealed that fathers used nonverbal gestures much less frequently with girls ($M=39.2$, $SD=29.8$) than with boys ($M=55.9$, $SD=22.8$). Fathers' communication was more discriminating.

For example, one father–daughter interaction went as follows:

Father: "Go to the right." (Without a nonverbal gesture.)

Girl: "This way?" (Accompanied with a nonverbal gesture indicating the direction.)

Father: "No! The other way. You've ruined the maze. Now it's closed." (Without any nonverbal gestures.) In this example, the father presented verbal content without nonverbal gestures, which created misunderstandings that eventually lead to him scolding his daughter.

As Scheffé tests indicated, the differential behavior vis-à-vis boys and girls was even more salient in different situations (univariate $F(1,144)=3.08$, $p<.05$, partial $\eta^2=.12$). For example, more nonverbal communication toward the boys were expressed during free play (toward boys: $M=45.3$, $SD=12.9$ in free play; $M=63.9$, $SD=28.7$ during difficult task. Toward girls: $M=29.6$, $SD=20.8$ in free play; $M=60.0$, $SD=19.8$ during difficult task).

6.5 The Effect of Parents' SES on VCNGs

As predicted in H3a, high-SES parents talked more to their children than low-SES parents (univariate $F(1,144)=4.08$, $p<.05$, partial $\eta^2=.20$; $M=122.6$, $SD=31.8$; $M=113.8$, $SD=28.6$, respectively). However, in contradiction to H3a and, as Figure 2C shows, high-SES parents used more nonverbal gestures ($M=50.4$, $SD=21.3$) than low-SES parents ($M=46.2$, $SD=22.7$; univariate $F(1,144)=5.58$, $p<.01$, partial $\eta^2=.41$). For example, one high-SES mother said to her son, "Draw a vertical line," when making an upward movement with her hand. This served to teach the child a new concept: if he did not know what a vertical line was before, he did now. This message, which combined verbal elements with gestures, improved the child's perception.

Among high-SES parents, the gap between the fathers' verbal communication ($M=122.3$, $SD=30.5$) and that of the mothers ($M=122.9$, $SD=33.6$) was small. However, among low-SES parents the differences between the fathers' verbal communication ($M=106.7$, $SD=28.5$) were significantly less (univariate $F(1,144)=5.9$, $p<.01$, partial $\eta^2=.38$) than that of the mothers' ($M=120.9$, $SD=28.2$). Low-SES fathers displayed the lowest degree of VCNGs.

Regarding the children's communication, the findings confirmed H3b, which predicted reciprocal pattern of VCNGs, that children of high-SES parents would speak more ($M=58.1$, $SD=17.9$) than children of low-SES parents ($M=41.6$, $SD=16.5$), (univariate $F(1,144)=8.72$, $p<.005$, partial $\eta^2=.63$), (as illustrated in Figure 3C). Unexpectedly, children of high-SES parents used more nonverbal gestures ($M=63.3$, $SD=26.7$) than children of low-SES parents ($M=47.1$, $SD=23.1$), (univariate $F(1,144)=3.91$, $p<.05$, partial $\eta^2=.18$). The findings (see Figure 3C) indicated greater VCNGs for children of high-SES parents, which may stems from higher involvement and communication competence.

6.6 The Effect of Task Difficulty on VCNGs

The study found significant effect of parents' and children's VCNGs according to task difficulty. As expected in H4a (Figure 2D), parents used significantly more verbal communication when faced with a difficult task than with free play (univariate $F(1,144)=9.31$, $p<.0006$, partial $\eta^2=.56$), (free play: $M=110.8$, $SD=30.9$; difficult task: $M=125.6$, $SD=28.9$) and more nonverbal gestures (univariate $F(1,144)=29.21$, $p<.0001$, partial $\eta^2=.68$), (free play: $M=37.4$, $SD=18.0$; difficult task: $M=62.0$, $SD=22.6$). The parent's social role implied a higher degree of participation, primarily of an instructive and guiding nature and particularly in a task-oriented situation with an achievement component. This may lead to the conclusion that a central role in the interaction activated VCNGs.

As the example below shows, a mother in an interaction with her daughter guided the child verbally during the complex task, accompanying her speech with nonverbal gestures:

Mother: "This is a really hard shape. Now, you know how we're going to do it? You make a line toward me, I go up, you make another line toward you a little bit longer so that they don't bump into each other. Then I go down with a line toward me and up with a line toward you, and then down … Like that, right? Let's try. Start with a line. Remember we put it here? You need to start the line toward me."

A significant interaction effect was found for parents' sex and task difficulty (univariate $F(1,144)=6.53$, $p<.01$, partial $\eta^2=.51$ verbally; univariate $F(1,144)=13.97$, $p<.0001$, partial $\eta^2=.62$ nonverbally). Scheffé tests ($p<.01$) indicated that, among mothers, the difference between the free play (verbally: *M*=108.3, *SD*=28.3; nonverbally: *M*=33.9, *SD*=17.7) and the complex task was the greatest (verbally: *M*=135.6, *SD*=33.7; nonverbally: *M*=69.7, *SD*=23.4). Mothers placed more emphasis on the complex task which activated a higher degree of VCNGs (fathers' verbal communication in free play: *M*=113.0, *SD*=30.8; difficult task: *M*=115.9, *SD*=25.7; fathers' nonverbal gestures during free play: *M*=40.9, *SD*=18.3; difficult task: *M*=54.3, *SD*=21.1).

In addition, a significant interaction effect was found for parents' SES and task difficulty (univariate $F(1,144)=4.76$, $p<.03$, partial $\eta^2=.39$). Scheffé tests revealed that high-SES parents spoke less during free play (*M*=111.6, *SD*=31.8) than when attempting the complex task (*M*=133.6, *SD*=30.6) expressing task orientation. These parents were more task-oriented, particularly when they had a concrete task to fulfill. At this stage, the parents took on the role of instructor and guide and used significantly more verbal communication to advance the task. Among low-SES parents, the gap between free play (*M*=109.7, *SD*=30.5) and difficult task (*M*=117.8, *SD*=26.6) was smaller.

In contrast to H4b, the findings concerning children's communication and task difficulty were contrary to those of the parents. As Figure 3D shows, the children's behavior was opposite to that of the parents, characterized by greater VCNGs during free play than during the complex task. In the free play, children expressed significantly more verbal communication (univariate $F(1,144)=5.14$, $p<.02$, partial $\eta^2=.31$), (free play: *M*=50.8, *SD*=18.3; difficult task: *M*=45.7, *SD*=17.8) and more nonverbal gestures (univariate $F(1,144)=4.07$, $p<.02$, partial $\eta^2=.27$), (free play: *M*=56.6, *SD*=24.6; difficult task: *M*=53.8, *SD*=26.4).

For example, a child during free play presented extensive verbal comments combined with nonverbal gestures:

Child: "We drew a boat. It's like a ship. Here's its chimney. This is where the captain goes. What else shall we draw? Now let's draw a truck? With wheels. Its wheels will go here."

A significant interaction effect was found for the child's sex and task difficulty (univariate $F(1,144)=4.09$; $p<.05$, partial $\eta^2=.26$). The largest significant difference, as found by Scheffé's tests, was seen during free play. The boys were more involved in free play, both verbally (*M*=57.6, *SD*=18.6 compared with the difficult task: *M*=53.9, *SD*=19.4) and nonverbally (*M*=64.6, *SD*=23.9 compared with the difficult task: *M*=57.7, *SD*=28.7). During free play as a more open and less structured stage, boys tended to take on a more dominant and meaningful role than girls (verbally: free play: *M*=42.5, *SD*=15.4; difficult task: *M*=45.3, *SD*=16.9; and nonverbally: free play: *M*=48.6, *SD*=24.0; difficult task: *M*=36.6, *SD*=17.6). Therefore, the children's role in the interaction activated VCNGs.

7. Discussion

This study exposed unique findings which based on the proffered theoretical framework delineated the influence that social and situational contexts - the parents' and children's sex, SES, and task difficulty - have on VCNGs. A set of propositions explained factors that activates VCNGs.

7.1 Proposition 1: Involvement Activates VCNGs

Based on the proffered theoretical framework, high involvement increased VCNGs. The present study supported the theoretical argument of social learning theory that socialization patterns in the family continue to be affected by parents' sex (Fox, 2011). However, the findings take that argument further by mapping the different VCNGs among mothers versus fathers, as well as the VCNGs of children toward mothers versus fathers. The study contributes to the theoretical multimodal communication approach (Buck & VanLear, 2002; Jones & LeBaron, 2002) by indicating that mothers' high involvement activated more VCNGs in interactions with their children than fathers. According to AAT (Greene, 2007), the explanation for this is that mothers have more verbal and nonverbal action features that enhance their communication skills and their ability to assemble the verbal and nonverbal procedural records while interacting with their children.

A reciprocal communication pattern of mutual involvement was displayed with the mothers. This reciprocal pattern was established, as the children were more involved in interactions with their mothers than with their fathers, spoke more, and used more nonverbal gestures. Based on social learning theory and shaping theory (Bandura, 1986; Block, 1983), this reciprocal communication pattern could lead to the conclusion that modeling behavior may be occurring. High VCNGs among mothers may encourage their children to express greater use of speech and gestures in their mutual interaction.

The unique finding of this study was that children of high-SES families behaved in more similarly toward their mothers and their fathers than children of low-SES families. This finding expands studies that have argued that fathers have generally become increasingly involved in raising their children and have assumed nontraditional familial roles (Lamb, 1986; Nugent, 1991). High-SES families expressed higher involvement which activated VCNGs.

7.2 Proposition 2: Verbal versus Nonverbal Primacy Activates VCNGs

This study broadened the theoretical perspective of social differences, supporting the recent argument that socialization patterns in a family continue to be affected by the child's sex (Fox, 2011). The distinct attitude of both mothers and fathers toward their sons versus daughters was surprising because it showed that their communication patterns remain in line with social stereotypes. This supports the feminist theories that stated that parental communication was socially derived from sex differences, which influenced the child's perceptions (Chodorow, 2002).

However, this finding contradicts the high value that modern society places on equality in education. This may point to the infiltration of sexual stereotypes in modern society. However, this effect was moderated by the parents SES. High-SES parents were less characterized by a discriminating nature. It was also moderated by the parent's sex. Fathers' behavior was more discriminative to boys than girls. This effect points to the fathers' greater sensitivity to the child's sex and supports similar trends reported by other studies (Lytton & Romney, 1991; Maccoby, 1990).

The theoretical framework explained that verbal versus nonverbal primacy activated VCNG. In interactions with boys, parents expressed verbal primacy. Grounded in AAT (Greene, 2007), parents' verbal communication was increasingly activated with boys because they were oriented to particular procedural records that led to high achievement outcomes. This expands social stereotypes that parents place higher demands on boys than girls, particularly in task-oriented and achievement-oriented situations (Chick, Heilman-Houser & Hunter, 2002; Irby & Brown, 2011; Serbin, Powlishta, & Gulko, 1993). Parents grant boys a greater degree of verbal autonomy, accompanied by high demands.

With regard to parents' communication with girls, the activation level of nonverbal procedural records was dominant. This parental expression of nonverbal gestures toward girls could help explain previous studies that feminine communication is characterized by greater use of nonverbal communication (Hall, 1985). Based on AAT (Greene, 2007), this parental pattern of communication may reinforce the ability of girls to produce nonverbal communication, and may therefore contribute to the perpetuation of sex differences as part of social structuring (Chodorow, 2002).

Contrary to expectations, this also explains the children's VCNGs. Boys displayed verbal primacy, spoke more than girls, whereas girls expressed nonverbal primacy and used more nonverbal gestures. This exceptional expression of compensation association occurred between VCNGs; that is, greater verbal usage implies diminished usage of nonverbal gestures, and vice versa (Bavelas, 1994; Singer & Goldin-Meadow, 2005). Grounded in AAT (Greene, 2007), boys have more verbal procedural records, whereas girls have more nonverbal procedural records. Noteworthy, this effect was moderated by SES. The behavior of high-SES girls was particularly notable because it more closely resembled the boys' behavior. This finding may indicate a social change that, in the future, could reduce sex differences into less clearly defined stereotypical sex roles.

7.3 Proposition 3: Communication Competence Activates VCNGs

Based on the premises of AAT (Greene, 2007), differences in socio-economic status stem from a larger number of action features and a greater ability to organize the appropriate action features into a coherent configuration of verbal and nonverbal cues among high-SES parents. The present study expands family discourse theories, which have shown that high-SES parents were particularly verbal in their communication (Blaney & Quay, 1992; Rogoff, Mistry, Goncu, & Mosier, 1993). These parents were more aware of their verbal communication and used it to provide positive reinforcement, allowing the child to choose and attempting to grant their children maximum autonomy (McCabe & Peterson, 1994; Pine, 1994). Contrary to expectations, high-SES parents made more nonverbal gestures than low-SES parents (Blaney & Quay, 1992).

High-SES parents displayed a strong need for achievement (Herman, 1972; McClelland et al., 1953). This high need for achievement was expressed in high communication competence among high-SES parents which activated more VCNGs and more demands of their children during the joint interaction, particularly by assigning importance to their child's verbal competence and learning abilities (Bornstein & Bradley, 2003; Dickinson & Snow, 1987).

From the expressive perspective, high-SES parents were more involved than their low-SES counterparts. Research stressed the importance of parents' involvement in activities with children, arguing that it hones skills and contributes to understanding, thinking processes, and problem-solving (Lieven, 1994).

Reciprocal patterns of VCNGs were reflected where high-SES children had higher levels of involvement and participation than their low-SES counterparts. This mutual high level of involvement of high-SES parents and children may influence the children's development and may advance their understanding, perceptions, and recall

(Goldin-Meadow, 2009a). From the perspective of reception, this leads to a positive parental impression of the child and an improved overall teaching and learning process (Goldin-Meadow & Singer, 2003; Singer & Goldin-Meadow, 2005). High-SES children's greater VCNGs were established as they spoke more and used more nonverbal gestures. This is explained according to AAT (Greene, 2007), that high-SES children have more verbal and nonverbal procedural records and assembling abilities than low-SES children.

7.4 Proposition 4: A Central Interaction Role Activates VCNGs

This study developed the arguments that situational factors are important because both communication modes are context-sensitive (Ginsburg et al., 2006; Henderson, 1990). The explanation for this effect is that a central interaction role activated VCNGs. Drawing on AAT (Greene, 2007), for the parents as the difficulty of the assignment increased with a specific goal, their interaction role was dominant which enhanced their formulation, production, and assembling of verbal and nonverbal messages. From receptive perspective, according to AAT, the end result of the assembly process – the output representation – is that the entire configuration of action features is an expression that increases understanding, perceptions, and recall.

The unique contribution of this study is that task difficulty effected parents and children in a diverse manner. Specifically, parents were more involved in the complex task, whereas children were highly involved in free play. During free play, the children assumed a more central role in the interaction, which led to higher activation level of verbal communication and nonverbal gestures (Greene, 2007). In contrast, during a difficult task situation, the parents' social role became particularly prominent, and they assumed leading and guiding roles, spoke more, and used more nonverbal gestures. They displayed greater VCNGs, which from receptive perspective, helped the children cope with challenges.

From the expressive perspective, during the difficult task parents expressed a high need for achievement. This need for achievement is cognitively associated with affective situations and is acquired at an early age, primarily nonverbally (McClelland et al., 1953). Parents have a profound effect on how this need develops in their children (Parsons, Adler, & Kaczala, 1982). The explanation for greater VCNGs is that parents were task-oriented and focused on achieving the concrete goal of the complex assignment. Based on the premises of AAT, focusing on a specific goal influences the verbal and nonverbal activation level, thereby enhancing the formulation, production, and assembling of the communication modes. Interestingly, this effect was moderated by parents' sex and SES. Specifically, mothers and high-SES parents were the most achievement oriented, which activated VCNGs during the complex assignment.

8. Conclusions

This study presents a theoretical framework of VCNGs among children and their parents in their interaction. The theoretical framework contributes to the existing research, expanding the multimodal communication approach (Buck & VanLear, 2002; Grebelsky-Lichtman, 2015; Jones & LeBaron, 2002) from receptive and expressive perspectives. When relating to both verbal and nonverbal communication modes and also to their interrelations, the study established that a complex picture emerges of the messages that are conveyed in the interactions.

The theoretical framework enrich the existing research by exposing reciprocal patterns of VCNGs. The unique contribution in exploring VCNGs of both partners is that it exposed novel mutual relationships of reciprocity. The main conclusion to these reciprocal patterns in parent-child interactions is synchronized behavior of VCNGs. Synchronized behavior represents interactional synchrony as a feature of social exchange between family members (Lindsey, Mize & Pettit, 1997; Wahler & Bellamy, 1997). There is absence of studies that analyze reciprocal patterns of VCNGs. Herein lays this study's contribution to the research.

Additionally, this theoretical framework contributes by expanding VCNGs into a communication context approach that delineated several forms of communication that were derived from social and situational contexts.

The study produced some unexpected findings regarding VCNGs. One of the main finding was the strong positive correlation of VCNGs among the parents, but surprisingly, also among the children. The minor compensation of VCNGs occurs when children expressed decreases in verbal communication, thus displaying increases in nonverbal gestures.

8.1 Additional Avenues for Future Research

This study contributes a theoretical framework for the interrelations of VCNGs in parent–child interactions, from both receptive and expressive perspectives. The study has theoretical and practical implementations. The unique methodology was strict and rigid, which was the strength of the study, even though it could limit the findings and their generalization. The novel findings enriched AAT and the multimodal communication approach to the study of parent–child interactions.

The proposed framework may offer additional avenues for future research in a variety of interpersonal communications. This framework could be applied to research in other contexts rather than parent-child interactions.

Future research could explore the implications that the presented framework has for parents and children, especially regarding awareness and planning. The practical implications may suggest that, by increasing their awareness and prior planning of their communication modes, both parents and children can improve their communication skills during mutual interactions. This awareness and planning of VCNGs could have wide-ranging implications for child development and the quality of the parent–child relationship.

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