Preterm Language Outcomes and Maternal Responsiveness

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Introduction

- Infants born preterm display a range of developmental delays depending on when they are born, their weight, and other neurological complications as a result of their early birth.
- According to the social-interactionist model, caregiver responsiveness and child engagement are crucial to the development of language (Tannock & Girolametto, 1992).
- Caregiver responsiveness benefits the development of language in typically developing toddlers and preschoolers, as well as preschoolers with disabilities (Tamis-LeMonda, Bornstein, & Baumwell, 2001; Yoder, Warren, McCathern, & Leew, 1998; Warren, Brady, Sterling, Fleming, & Marquis, 2011).

Purpose

- To describe the maternal responsiveness behaviors displayed by mothers and their 9-15 month old children who were born preterm during play.
- To evaluate whether there was a relation between the maternal responsiveness variables and child language abilities.

Specific Research Questions

1. What are the responsiveness characteristics of the mother's interactions with their children who were born preterm?
2. Are there associations between maternal responsiveness characteristics and the children's language abilities?

Methods

- Ten mothers and their children who were born preterm were invited to participate once their children were between 9 to 15 months of age.
- The families were enrolled in a larger study of the NTrainer which provides synthetic patterned orocutaneous stimulation to increase sucking for babies while in the NICU.
- Mothers were interviewed about their child's language development using the *Receptive-Expressive Emergent Language Test-3* (Bzoch, League, & Brown, 2003).
- Mothers also completed a short questionnaire about their child's developmental history and their own background. See Tables 1 & 2.

Table 1. Mom Characteristics & Income

Education	2 High School Diplomas/GED; 3 some college; 1 AA; 4 BS		
Occupation	Paraeducator, District Manager, Stay at home mom, Daycare Provider, Deputy City Clerk, Free Lance Media Manager		
Annual Income	4= $21,000-40,000	3= $41,000-80,000	3= above $100,000

Table 2. Child Characteristics

	Mean	SD	Range
Months premature	2.22	.47	2-3
Corrected age in months	13.1	2.02	9-15
Birthweight	1513.09	433.01	770-1841
REEL-3 Receptive subtest	99	10.95	83-115
REEL-3 Expressive subtest	102.6	13.35	80-123
REEL-3 Language Ability	109.9	13.4	81-123
Gender	5 males	5 females	
Status at birth	4 Healthy Infants 3 Infants of Diabetic Mother 3 with CLD		
Other diagnoses	1 with hypertonia 2 with motor delays 1 with speech-language delay		

Maternal Responsiveness Measurements

Maternal Responsiveness was evaluated in two ways.

1. The *Characteristics of Adult REsponsiveness (CARE) Scale* was developed to measure an observer's judgment of an adult's responsiveness during an interaction with a young child (See Figure 1). The *Teacher Interaction and Rating Scale* (Girolemetto, Weitzman, & Greenberg, 2000) served as a guide for developing the *CARE Scale*. Ratings on the *CARE Scale* were determined based on video-tape data of the session.

FIGURE 1

Characteristics of Adult REsponsiveness (CARE) Scale

Child Code _____ Scorer _____ Time _____

Never	Rarely	Occasionally	Frequently	Always	
1	2	3	4	5	NA

Characteristics of Talk

1. Watches child with no or little talking. 1 2 3 4 5 NA
2. Interprets vowel sounds, jargon, babbling or child's words. 1 2 3 4 5 NA
3. Imitates child's vocalization or word(s). 1 2 3 4 5 NA
4. Describes what adult is doing (self-talk). 1 2 3 4 5 NA
5. Talks about child's focus. 1 2 3 4 5 NA
6. Uses short sentences (1-3 words in length) 1 2 3 4 5 NA
7. Rejects child verbalization ("No, that's not….) 1 2 3 4 5 NA
8. Tells child to do things ("Do ___"/"Put this here."). 1 2 3 4 5 NA
9. Asks child to say things ("Say ___")(not imitation). 1 2 3 4 5 NA
10. Ignores what child says. 1 2 3 4 5 NA
11. Asks child "test" questions (Where's your nose?, what's this? What sound does this make?) 1 2 3 4 5 NA
12. Describes toys (e.g., usually adjective or adverb) 1 2 3 4 5 NA
13. Labels/names toys or items in environment 1 2 3 4 5 NA
14. Describes what you can do with toys 1 2 3 4 5 NA
15. Interrupts child 1 2 3 4 5 NA
16. Invites child verbally to take turn, (e.g.,"Your turn") 1 2 3 4 5 NA

Characteristics of Observing& Listening

1. Watches child and describes what child is doing 1 2 3 4 5 NA
2. Waits expectantly for child to take a turn. 1 2 3 4 5 NA

Characteristics of Prosody

1. Uses sing-song, animated, or enthusiastic voice 1 2 3 4 5 NA
2. Rate of talking is too fast or too slow. 1 2 3 4 5 NA

Characteristics of Nonverbal Communication

1. Gestures, touches child, or uses an object to encourage child to take a turn 1 2 3 4 5 NA
2. Encourages child to use sign or gesture 1 2 3 4 5 NA
3. Imitates gesture 1 2 3 4 5 NA
4. Introduces different toys nonverbally 1 2 3 4 5 NA

Characteristics of Touch and Proximity

1. Holds child or puts child in lap/by her/him 1 2 3 4 5 NA
2. Pushes child away from self 1 2 3 4 5 NA
3. Physically prompts child's hand(s) in task 1 2 3 4 5 NA
4. Attempts to or succeeds in taking something the child has (unless it is a safety risk). 1 2 3 4 5 NA

Typical of play based on adult report? _____
If no, explain _____

Other Comments: _____

Loeb & Barlow (San Diego, November 2011, ASHA Convention)

2. Coding the language sample transcribed from the audio-tape of the mother-child interaction using the *Systematic Analysis of Language Transcripts* (SALT) (Research Version 9, 2010).

The sample was coded for:

- use of imperatives, praise, and negating a child's utterance.
- maternal MLU, number of different words, and proportion of questions as well as proportion of one-word utterances.

General Language Sampling Procedure

- The mother and child were given a standard set of toys and the mother was asked to play with the child as she might normally do.
- The average interaction time was 14.8 minutes (SD= 2.49 minutes, range of 11-17 minutes). The interaction was audio- and video-taped.

Transcription and Coding- Research assistants in speech-language pathology were trained to 90% agreement levels in transcription and then transcribed the samples after the sessions. The same students were trained in coding procedures for both the *SALT* system and the *CARE Scale* system.

Reliability- Consensus reliability was utilized with both transcription and coding for each sample for the *CARE Scale* and *SALT* analyses.

Results

Research Question 1: What are the responsiveness characteristics of the mothers' interactions with their children who were born preterm?

Structural Characteristics

	# of Utterances	MLU	NDW	1-word utterances
Mean	224.80	3.53	159.10	0.32
Standard Deviation	105.29	0.53	46.98	0.05
Range	68-388	2.54-4.18	80-215	0.16-.43

Question Use

	# of Utterances	Questions	WH Q	Y/N Q	Request for Clarification
Mean	224.80	0.32	0.10	0.28	0.01
Standard Deviation	105.29	0.05	0.04	0.19	0.01
Range	68-388	.22-.40	.05-.18	.13-.8	0-.01

Regard for Child's Communication

	Imperatives	Negative	Praise
Mean	0.19	0.01	0.03
Standard Deviation	0.12	0.12	0.02
Range	.08-.46	0-.003	0-.08

	Talk	Observe/ Listen	Prosody	Nonverbal	Touch/ Proximity
Mean	2.97	3.95	3.60	1.58	3.57
Standard Deviation	0.41	0.90	0.81	0.39	0.39
Range	2.47-3.53	2.5-5.0	3.0-5.0	1.0-2.25	2.75-4.25

CARE Scale (1-5 with 5 being the highest level of responsiveness; 1= never, 2= rarely, 3= occasionally, 4= frequently, 5= always)

Summary

SALT Analysis

- Moderate-High responsiveness for maternal sentence length.
- Moderate-High responsiveness for maternal question use.
- Moderate-Low responsiveness for maternal imperative use.
- High responsiveness for negative regard use
- Low responsiveness for praise use.

CARE Scale

- The most responsive characteristic was in the area of Observing/Listening, followed by Prosody and Touch/ Proximity.
- Responsiveness for the area of Talking occurred occasionally during play on average.
- The lowest responsive mean was for the Nonverbal communication area.
- These data suggest that the mothers were frequently watching their children as they played and waiting for their children to make attempts to communicate with occasional responsive input to them.
- The input provided was consistently verbal rather than nonverbal and when verbal input was provided, the rate of talking was judged to be not too fast or too slow.

Research Question 2: Are there associations between maternal responsiveness characteristics and the children's language abilities?

Figure 2. Correlation Matrix between REEL-3 and Maternal Responsive Coding Variables

	REEL-Ex	REEL-R	REEL-LA	Talk	Obs/List	Prosody	Nonverbal
REEL-Ex							
REEL-R	0.70						
REEL-LA	0.94	0.90					
Talk	0.30	0.41	0.38				
Obs/List	0.55	0.52	0.58	0.74			
Prosody	0.25	-0.08	-0.55	-0.28	0.28		
Nonverbal	*-0.64	-0.57	*-0.66	-0.53	-0.38	0.65	
Touch/Proximity	-0.27	-0.27	-0.29	0.49	0.23	-0.41	-0.01

The lower the overall child language score, and the lower the expressive language score, the more likely the mother is to use nonverbal maternal responsive characteristics * $p < .05$.

Figure 3. Correlation Matrix between REEL-3 and Maternal Language Sample Variables

	MLU	NDW	Questions	1-word	Imperative	REEL LA	REEL-Ex
MLU							
NDW	0.42						
Questions	0.75	0.20					
1-word	-0.95	-0.37	0.13				
Imperative	-0.33	-0.47	0.10	0.13			
REEL LA	0.03	0.38	0.12	0.00	0.00		
REEL-Ex	0.27	0.54	0.23	-0.16	-0.56	0.70	
REEL-R	0.15	0.49	0.18	-0.08	-0.27	0.94	0.90

None of the maternal language sample measures were significantly correlated with REEL-3 scores.

Conclusion

- Together the analyses indicated several responsive interactive behaviors on the part of the mothers characterized by watchful, observant behavior of their children during play. Mothers tended to use short sentences and often asked questions or directed their child's play with imperatives ("Try this").
- Regarding associations between maternal responsivity and child language outcomes, the lower the child's language ability, the more likely the mother would use gestures during interaction. This can be viewed as a positive communication strategy on the part of mothers who are trying to find additional ways to help their children communicate.

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