Do Maternal Gestures Promote Language Development in Children with FXS?

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Introduction

Fragile X syndrome (FXS) is the leading inherited cause of mental retardation (Crowhurst et al., 2006) and is the result of inactivation in the RM1 gene located on the X chromosome. Children with FXS face many challenges, not only due to the diagnostic profile, but from environmental challenges including lack of early identification, changing behaviors and insufficient social and professional support (Abbeduto et al., 2007). Maternal responsiveness has been shown to be a critical factor in maternal-child interaction and successful child development. This study was designed to further explore potential maternal behaviors that may promote language outcomes. Maternal responsiveness may be one such behavior.

Research Questions

1. What is the frequency and diversity of gesture use by mothers of children with FXS across 2 time points?
2. How often do children speak following these different gesture types?
3. Does maternal gesture use at earlier ages relate to later vocabulary and language test scores?

Subjects

Studied child dyads. All of the children had FXS. There were 34 boys and 50 girls. Demographics: 23% of the mothers qualified as low income, 83% were married and 64% were Caucasian with higher education. There were 17% of children with a high school education or less than 13% with a university degree. 33% of the mothers had full or partial FXS and the other mothers were premutation carriers. Each dyad was participating in a longitudinal study of FXS.

Method

Coding maternal gesture use and child response

Contexts: A 1-minute recorded video of direct communications in each of these contexts: book-reading, snack time, free play and two unstructured activities in natural environment were used for analyses.

Maternal gestures were coded as: 1-sign, 2-affection, 3-prosomal point, 4-feeding/tripping, 5- gidleakas, and 6-distal point.

RDW was obtained by transcribing child utterances from the contexts.

Language Measures: Raw scores from the expressive scale of the Mullen Scale of Early Learning (MSEL, Bayley, 1969) of different scores/VMC was used for analyses. RMSE was obtained from transcribing child utterances from the context lists below and analyzing the transcripts with VMCalc. The number of different words was divided by the time of the sample (approximately 25 minutes) to yield the rate.

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Results

Question 1: What is the frequency and diversity of gesture use by mothers of children with FXS across 2 time points?

The mean number of gestures used by the mothers at each time point is presented in Table 1.

![Figure 1](image1.png)

Figure 1: Diversity of Maternal Gestures at Time 1

![Figure 2](image2.png)

Figure 2: Diversity of Maternal Gestures at Time 2

Table 1: Maternal Gesture use across time two time points.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign</td>
<td>0.48</td>
<td>0.49</td>
</tr>
<tr>
<td>Affection</td>
<td>0.48</td>
<td>0.49</td>
</tr>
<tr>
<td>Finger point</td>
<td>0.34</td>
<td>0.37</td>
</tr>
<tr>
<td>giidleakas</td>
<td>0.34</td>
<td>0.37</td>
</tr>
<tr>
<td>Distal point</td>
<td>0.34</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Question 2: How often do children speak following these different gesture types?

![Figure 3](image3.png)

Figure 3: Percent of Maternal Gestures Followed by Child Speech: Time and Time 2

![Figure 4](image4.png)

Figure 4: Diversity of Maternal Gestures Followed by Child Speech: Time 1 and Time 2

<table>
<thead>
<tr>
<th>Measure</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gesture only</td>
<td>0.48</td>
<td>0.49</td>
</tr>
<tr>
<td>Gesture + speech</td>
<td>0.48</td>
<td>0.49</td>
</tr>
<tr>
<td>Speech only</td>
<td>0.48</td>
<td>0.49</td>
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Question 3: Does maternal gesture use at earlier ages relate to later vocabulary and language test scores?

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Clinical Application

Our results are preliminary and suggest that:

• Children with FXS across two time points spoke more often after mothers produced a proximal point compared to a distal point.
• Proximal points occur in periods of joint engagement such as joint book reading.
• Providing information to parents about how children respond to gestures, particularly proximal points, may be a useful component of parent education.

Future Research

Questions for further research:

• Do specific contexts influence how children with FXS respond to maternal gestures?
• Does maternal gesture use specifically facilitate child speech use over time when other factors such as child developmental differences are taken into account?
• What maternal biological characteristics may influence maternal gesture use?
• What child biological characteristics may influence the response by children with FXS?
• Do children with FXS who also show characteristics of autism respond differently to maternal gestures than those children with FXS who do not have characteristics of autism?

References