Prelinguistic Communication and the Acquisition of Verbal Communication in Young Children with Fragile X Syndrome (FXS)

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Introduction

- There is little information available about the early communication of children with FXS, especially young females with FXS
- Past research has suggested that there is a relationship between prelinguistic communication and later linguistic development

Methods

- Participants were young, nonverbal children (24 males and 7 females) with FXS
- Observed at two time points: CA approximately 25 and 57 months
- Standardized measures included: The Mullen Scales of Early (MSEL); The Childhood Autism Rating Scale (CARS) and The Vineland Adaptive Behavior Scale (VABS)
- Additional communication measures were obtained from 25 minute video samples across four different home contexts:
  - Communication forms (i.e., gestures, vocalizations, signs, speech, and combinations)
  - Communication functions (i.e., behavior regulation, joint attention, and social interaction)
  - Gesture types observed at the first observation period (See table below for gesture types coded)
<table>
<thead>
<tr>
<th>Type of Gesture</th>
<th>Gesture Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distal Point</td>
<td>The index finger is extended towards the object/person of interest, and is 6” or more from the object. Other fingers are curled under.</td>
</tr>
<tr>
<td>Touching the Adult</td>
<td>Touching an adult with clear communicative intent.</td>
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<tr>
<td>Showing an Object</td>
<td>Child extends the object toward the adult with the sole intention of showing the object.</td>
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<tr>
<td>Giving an Object</td>
<td>Child gives an object to adult. Child must release the object, and the adult must accept the object.</td>
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<tr>
<td>Tapping</td>
<td>Child taps the object while sharing attention with the adult. Tapping may be with whole hand or with a finger.</td>
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<tr>
<td>Contact Point</td>
<td>Child touches an object with the index finger. At least two of the adjacent fingers should be curled under or arched up.</td>
</tr>
<tr>
<td>Abbreviated Reach</td>
<td>Child reaches for an object but does not directly grab it. There should be a momentary, expectant pause by the child.</td>
</tr>
<tr>
<td>Moving Object Away</td>
<td>The child distinctly and purposefully moves the object away from the adult.</td>
</tr>
<tr>
<td>Pantomime</td>
<td>Pantomime is the use of a part of the body or face to imitate an object or the use of an object.</td>
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<tr>
<td>Raising Arms Up</td>
<td>Child raises his or her arms up to indicate that he or she would like to be picked up.</td>
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<tr>
<td>Moving Object Toward</td>
<td>The child discreetly and purposefully moves an object toward the adult.</td>
</tr>
<tr>
<td>Throwing/Dropping</td>
<td>This act must have meaning in order to be coded as a gesture. Back and forth ball games should not be coded as gestures.</td>
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<tr>
<td>Waving</td>
<td>Child waves the hand or arm, can be directed towards an object or a person (for the purpose of greeting or saying goodbye).</td>
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<tr>
<td>Shrugging Shoulders</td>
<td>A shrug includes lifting of the shoulders to the ears or upturning of palms to indicate &quot;what&quot; or &quot;I don't know.&quot;</td>
</tr>
<tr>
<td>Upturned Palm</td>
<td>The palm should be upturned as if to say &quot;give that to me.&quot;</td>
</tr>
</tbody>
</table>
### Both Palms Upturned
Both hands are held palms up and to the side as if to say/ask “Where is ___?”

### Come Here
Upturned palm with one or more fingers or the whole hand wiggling to convey the message to come.

### Shh
The gesture must be distinctive with the finger held in close approximation to the mouth.

### Head Nod/Shake
A head nod or shake must be intended to convey the message "yes" or "no."

### Crossed Arms
Child crosses arms over chest to show dissatisfaction—not just a resting stance.

### Clapping
Child brings hands together quickly in midline, palms usually touch.

### Hands Over Mouth
Child places one or both hands over mouth as if to express surprise.

### Patting Chair
Child pats chair, as in “sit by me”.

### Pushing Object Away
The purpose of this gesture is always rejection or a signal that the child is finished with the object.

### Not Otherwise Specified
Gesture that are not on the list but appear to be clearly communicative.

- Expressive language outcome measures examined at the second observation included:
  - Mean length of utterance during videotaped samples
  - Rate of different words used during videotaped samples
  - Mullen expressive language raw score

#### Results

- **Descriptive Data**
  - Observation one
    - Participants communicated primarily using gestures at observation one
    - The primary function of participant communication at observation one was behavior regulation
    - There did not appear to be a strong relationship between the use of any one specific type of gesture at observation one and positive verbal language outcomes at observation two
Observation two

- The majority of participants were primarily verbal communicators by observation two with 52% of participants communicating verbally 50% or more of the time
- The primary function of participant communication at observation two was joint attention

![Mean Proportions of Modality Usage](image)

Correlation Data

- No significant relationships were found between observation one communication variables and observation two expressive language measures for the whole sample of participants
- Moderate negative relationships were found between age and observation two expressive language measures with a significant negative relationship ($r=-.41$) between age and total child communication at observation two
- A significant relationship ($r=.81$) was found between rate of communication for joint attention at observation one and rate of different words used at observation two among female participants (See scatter plot below for graphical representation)
Also among the female subgroup, a moderately strong but not significant relationship ($r = .40$) was found between variety of gestures used at observation one and rate of different words used at observation two.
When participants were divided into high and low autism symptomatology subgroups, no significant relationships were found between observation one communication measures and observation two expressive language outcomes.

- A weak to moderate negative relationship was found between participants’ observation one CARS scores and observation two MLU ($r = -0.31$).
Discussion

- Limitations
  - Small sample size
  - Broad age range (11 to 48 months at observation one; 40 to 76 months at observation two)
  - Video sample context (natural observation) differs widely from that of past research

- Implications
  - Early intervention should focus on increasing children with FXS’s amount of communication for joint attention, especially among young females with FXS
  - Intervention should begin at very young ages so as to improve children with FXS’s chances of positive language outcomes later in life