Bilabial Sound Acquisition in Children with Down Syndrome

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LIN300 – Introduction to Linguistics
December 5, 2013
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Abstract

Until recently, children with Down syndrome have been looked at by society, including medical professionals, as individuals with few possibilities for growth and development. As such, many of these special children were institutionalized and their progress was stifled. Institutionalization and denying lifesaving procedures were common in the United States until 1984 (Global Down Syndrome Foundation, n.d.).

Beginning in the 1980’s, a great deal of research and medical advancements have improved the living conditions of those with Down syndrome, as well as their life expectancy. Included in this era of growth have been many advances in speech acquisition and development.

The goal of this paper is to explore the age, timing, and usage of the bilabial sounds [p, b, m, w] in children with Down syndrome, and what methods are used to help these children learn to form these sounds. Although efforts were made to isolate the bilabial sound development, as interviews and observations were done, the difficulty in researching only those sounds became apparent. Also, the vast majority of documented research is on overall language acquisition, with little research being done on articulation of specific sounds (Kumin, 2003, pg 141-142). As a result, this paper will address findings specific to bilabial sounds, as well as those for overall speech acquisition. The findings included in this paper will come from personal observations of children with Down syndrome, interviews with parents of children with Down syndrome, interviews with speech therapists, and from documented research.
Research Findings

There has been a great deal of research done on Down syndrome (DS) language acquisition across the globe. The methods of research vary from observations in the child’s normal setting to clinical settings where specific tests are used for evaluation. In studying the effects that Down syndrome has on language development, the following are commonly identified.

1. Cognitive delays
2. Relative macroglossia (enlarged tongue)
3. Reduced muscle tone
4. Frequent otitis media (ear infections)

It should also be noted that over 50% of babies with DS are born with a septal defect (hole in the heart) which often requires surgery within the first year (Facts about Down Syndrome, 2013). The effects of this medical problem will not be addressed in this paper, due to the high frequency of this heart defect among the DS population.

Cognitive delays are, in part, the direct result of slow language development. Speech, both verbal and silent, is used to understand and interpret our world. Without language skills, the child is delayed in other cognitive skills. The size of a child’s vocabulary, and the ability to express himself, play a significant role in that child’s academic success. When a child with DS is struggling to produce sounds, that child also falls behind in speech, reasoning, and memory to name a few areas (Buckley & Le Prevost, 2002).

Children with relative macroglossia, or an enlarged tongue, have difficulty forming sounds properly. This results in both delayed speech and speech that is harder to understand.
Lack of muscle tone and control can affect any and all parts of the body (i.e. lack muscle tone and control in the legs may delay walking; lack of muscle tone and control in the neck may keep a baby of lifting his head). The muscles used to form speech are relatively small. They also require the ability to make small changes in the position of the tongue and lips, to form the proper sounds. In a presentation at the Down Syndrome Research Directions Symposium in 2007 Monica Bray, of Leeds Metropolitan University, spoke on the topic of speech production in people with Down syndrome.

“There is a general consensus that speech difficulties are common in individuals with Down syndrome and that these consist of a complex interweave of phonological and motor-speech delay and deviance. Phonological immaturities such as final consonant deletion, use of stops for fricatives, producing voiced for voiceless sounds and vice versa are common… Children with Down syndrome are inconsistent in speech production, with over half of all words produced being pronounced differently on repeated productions.”

Children with DS may have difficulty producing certain types of sounds because of muscle tone and control issues. For example, if a child has control problems with the lips then the bilabial sounds will be delayed. If the child has control problems that involve “tongue tip elevation” he will be delayed in producing [t, d, n, l] (Kumin, 2003, pg 147).

Finally, otitis media, or middle ear infections, are very common in children with DS. Because of a smaller than normal ear canal, which is also much straighter than normal, these children experience more ear infections. Battling ear infections will slow down the speech acquisition process in part because the fluid in the ear reduces the ability to hear. Also, because of the small
canals and their shape, there tends to be buildup of cerumen (earwax) that can block sound waves even without ear infections, as the earwax becomes trapped and does not drain properly.

In addition to the items listed above, children with DS have additional hurdles to climb. These children take longer to gain the ability to look at and track objects. An important part of speech acquisition is the ability to look at and track the person talking. Practice and stimulation are needed to develop this skill (Kumin, 1994, pg 37).

With the above issues in play, what does research show regarding speech acquisition in children with DS? For maximum development, children with DS require early intervention with speech, occupational, and physical therapy, along with help from other specialists as needed. A development plan should be set up between the therapists and parents in all of these areas during the first year of the child’s life.

During the child’s first year, parents need to ensure that there are no eating disorders and keep a very close eye on possible ear infections. The speech therapist will provide the family with instructions on helping the child learn to make eye contact with others. Therapists and family members will also encourage the young child to start using gestures for communication. These gestures can be in the form of American Sign Language or unique signs developed by the family and child.

Gestures are vitally important. Children with DS will often start the language development process several months later than children without DS. However, most children with DS will have cognitive understanding much earlier than they can communicate verbally. In contrast, children without DS learn to communicate closer to the time that they gain cognitive understanding. This results in a great deal of frustration for both the child and the parents.
Gestures are needed to allow the child to communicate prior to being able to communicate verbally.

At two years old, the intervention turns to more formal language learning. The parents and therapists will select up to three words to work on at a time. These words should be something that the child can visualize while being taught, usually starting with a bilabial sound. Common starting words would include mama, papa, book, ball, doll, baby, more, and toy (Buckley & Le Prevost, 2002). Parents and therapists need to be attentive to those children who struggle with the bilabial sounds. They should identify which sounds the child seems to be able to produce and focus on building vocabulary based on those sounds, so as to start introducing functional language without frustrating the child.

For most children, their first sounds will be bilabials such as [p] and [m], along with the most open vowel sound [a]. With these, the child will be able to say ma and pa. This occurs around the age of six months (Mihalicek, & Wilson, 2011). The children with DS will most often also start with the same sounds. However, these first sounds usually come at two or three years of age, and may not come until the child is four years old. As explained above, this speech delay is the result of poor muscle tone in and around the face, hearing impairments, or other difficulties. Because of these difficulties, the first words spoken may actually be signed as the child begins to communicate with the outside world (Kumin, 1994, pg 55-56).

Often the child will need help starting to form different sounds. For example, the person working with the child will show him a ball. Then put one or two fingers to her lips and release them as she pronounces the [b]. She will then put her fingers to the child’s lips to help the child repeat her sounds. There are many other games and activities used to help the child learn to
produce proper sounds. Even with speech therapy, the child with DS will have difficulty producing sounds correctly. Articulation problems are again the result of the issues explained above and may last the child’s whole life (Kumin, 1994, pg 138).

From many studies, and real life experiences, it has been found time and time again that the main causes of delayed speech in children with DS are poor muscle tone (especially in and around the face and throat), hearing difficulties, and relative macroglossia. To help these children progress, a proactive program directed by a speech therapist and implemented daily in the home is needed.

**Observation Findings**

With permission from the child’s parents, Amy Randall, SLP, a speech therapist for the Robbinsdale (Minnesota) School District allowed me to watch one of her therapy sessions with a two and a half year old child. The session started by singing simple children’s songs that included hand motions. At chosen spots the therapist would stop, waiting for the child to sing and gesture the next word. These stops where often for words starting with a bilabial sound such as “me” or “popping.” Other words used in this exercise started with the [t] sound (i.e. tree or tip) as the [t] sound was one that this particular child was picking up on.

The singing activities were followed with games to help the child make eye contact, a skill in which this child was lacking. To complete this game, Amy held out a toy that the child would want. She would point to her own eyes to get the child to look at her. After making eye contact she helped the child say the toy (i.e. ball, train, or block). After successfully going through the steps, the child would be given the toy.
Throughout the hour long session, Amy would regularly put her fingers to her own lips. Then, as the sound was made, she would push her finger away from her lips as if the sound was blowing her finger. At times she would put her finger on the child’s lips to help make the initial sound of a word. The three words being practiced that session were ball, more, and shoe. Although [ʃ] is not a bilabial sound, Amy would still put her finger close to her lips to draw attention to the sound. But she would not pull the finger away in the same fashion as for the bilabial sounds.

I observed another speech therapy session at Children’s Hospital in Minneapolis. In this session Kristine Maday, SLP worked with a very active two-year old. The therapy session was very similar to the one by Amy Randall. Kristine had the child verbalize and sign “open” to open the cabinet where the toys were kept. Once a toy was selected, the child gestured signs for “give me” and “please.” While the child was signing, Kristine would verbalize the words. Similar steps to help verbalize, vocally or signed, were used throughout the session as other activities were being completed. This child was very engaged, but was scooting around the room and hardly ever made eye contact with the therapist. Attention was paid to the bilabial sounds at the start of words. When Kristine wanted the child to say a word starting with a bilabial she used the same fingers to the lip technique that Amy did and spent additional time helping the child form the sound. These words included “ball,” “box,” “monkey (a favorite toy),” and “mama.”

Located in St. Louis Park, Minnesota, Gigi’s Playhouse is a franchised non-profit community center for children with DS and their families. They have times scheduled each week for children of various ages and backgrounds. During these sessions the children are able to interact with others at a similar developmental stage. I attended a session at the center with a dozen children who were just learning to talk. Observing the actions of small children at Gigi’s,
and talking to their parents, provided a wealth of information. Listed below is basic information provided by parents of children observed at GiGi’s, as well as other DS children.

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Speech Date</th>
<th>Speaking Ability</th>
<th>Therapy</th>
<th>Health Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Janet</td>
<td>2</td>
<td>18 mo.</td>
<td>Verbal skills typical of non-Down syndrome</td>
<td>Speech therapy started at birth</td>
<td>None</td>
</tr>
<tr>
<td>Jacob</td>
<td>2</td>
<td>NA</td>
<td>Said mama recently for the first time</td>
<td>Speech and feeding therapy</td>
<td>Feeding – still cannot chew</td>
</tr>
<tr>
<td>Steve *</td>
<td>2.5</td>
<td>2+ yrs.</td>
<td>Small vocabulary, Good sign language</td>
<td>Speech therapy started at birth</td>
<td>Feeding difficulties</td>
</tr>
<tr>
<td>Sally *</td>
<td>3</td>
<td>1 yr.</td>
<td>Large verbal vocabulary</td>
<td>Speech therapy started at birth</td>
<td>None</td>
</tr>
<tr>
<td>Beth *</td>
<td>3</td>
<td>18 mo.</td>
<td>Large verbal vocabulary</td>
<td>Speech therapy started at birth</td>
<td>None</td>
</tr>
<tr>
<td>Tommy</td>
<td>4</td>
<td>NA</td>
<td>No verbal language, Good sign language</td>
<td>Just started speech therapy</td>
<td>Two heart surgeries</td>
</tr>
<tr>
<td>Robert</td>
<td>4</td>
<td>18 mo.</td>
<td>Small verbal vocabulary, Good sign language</td>
<td>Speech therapy started at birth</td>
<td>None</td>
</tr>
<tr>
<td>Karen</td>
<td>14</td>
<td>3 yrs.</td>
<td>Large verbal vocabulary</td>
<td>Speech and feeding therapy</td>
<td>Feeding – could chew at age 2</td>
</tr>
</tbody>
</table>

On average about three to four children would play in close proximity at any given time. Where children without DS would interact, these children had very little interaction with each other. Periodically they would throw a ball back and forth, or share a toy. However, there was practically no eye contact and there was no verbal or signed communication between them. This is typical for children with DS, but also a symptom of their language acquisition delays.

The children listed above with the “*” are all within the Robbinsdale School District. All school districts in Minnesota are notified as soon as a newborn receives the diagnosis of having Down syndrome, but many districts do not have the resources to provide early intervention.

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1 Names have been changed.
2 Date that the first recognizable word was spoken and retained/repeated by the child.
3 Many children with Down are born with heart problems that require surgery during the first year. This table tracks any health issues outside of the initial heart problems.
However, Robbinsdale has a strong program for children with special needs. As soon as Robbinsdale is notified, the district reaches out to the parents to start therapy.

Steve, Sally, and Beth all live within the Robbinsdale School District boundaries. All three of these children were assigned the same speech therapist from the school district, Amy Randall, and therapy began shortly after the child was brought home from the hospital. The parents of these three children all provided similar accounts of the techniques used to help their child speak, beginning with bilabial sounds.

Because of the early and strong intervention that they have received, their language skills have advanced faster. Even Steve, who is just barely talking, is advancing at a fast pace for a child who has had his feeding problems during the first two years. He is making eye contact sooner and demonstrating cognition sooner than those outside of the Robbinsdale School District. These three children also demonstrate better social skills than the other children, including better eye contact and playing and interacting with children of the same age.

Parents would tell me that their child speaks more at home. Yet in a public setting most would not communicate. Janet was the most advanced child that I observed. Janet has been attending Gigi’s Playhouse since it opened early in 2013 and is quite comfortable there. She knows both the staff and patrons. Her mother said that she talks a great deal at home. But at Gigi’s Playhouse she hardly said a word. Instead, she stayed to herself, playing with a doll house. Janet has been getting speech therapy since birth. She is also involved in beginning level sporting activities through the Special Olympics. She has had few physical difficulties, and her parents have been very active in providing her the needed therapy. With so many factors in her favor, she is progressing at a similar pace as would a child without Down syndrome.
A child on the opposite end of the spectrum is Tommy. The day that I observed Tommy, he was participating at GiGi’s Playhouse for the first time. It was difficult to talk to his father about Tommy’s abilities. It was as if he was still in denial and did not want to discuss the subject of having a child with DS. The parents had never sought out any type of therapy for their son. The lack of therapy was obvious during my observations. Tommy would not produce a single sound, although he did sign with his father. His social skills were less than those of the children half his age. Where other children were moving around the play room, he stayed in one area where he was sheltered and could play alone. I was informed some six weeks after this observation that Tommy has not been seen at GiGi’s Playhouse again. This is a troubling sign for a child with great needs.

**Conclusion**

As part of this research project, I was hoping to find a “smoking gun” as to how and when children with DS begin using bilabial sounds and forming words. I spoke with three therapists (two of them discussed above) and received the same answers from each of them. These answers corresponded with those I found in various research papers and articles. I also identified the same with the children that I observed at Gigi’s Playhouse.

1. Down syndrome children have cognitive understanding much earlier than when they can communicate verbally.
2. There is no set, or usual, timeframe for a child with Down syndrome to meet speech milestones such as bilabial sounds, first word, first two word sentence, or first complete sentence. The milestones will often take twice as long as for children without Down syndrome. However, the timing varies greatly (see appendix).
3. Children with DS usually follow the same pattern of acquisition as other children, starting with bilabial sounds and open vowels.

4. Early intervention is vital for speech development.

5. There are proven techniques used by therapists and parents to improve the child’s speech development.

6. Other health issues can play a major role in the timing and ability to speak.

In my research, I was able to find a great deal on the usual physical and cognitive problems that affect children with DS (i.e. muscle tone, ear infections, feeding problems). But I found nothing linking the severity or number of medical issues with the children’s speed and ability for language acquisition. From my small sample, I saw a strong link between health problems and language acquisition. Those without health problems beyond a septal defect began using bilabial sounds and their first words in a time frame closer to other children. Those who had suffered additional health problems lagged behind the others.

Tommy suffered a heart setback, requiring a second surgery. Steve had difficulties swallowing that required a great deal of feeding attention during his first two years of life. Doctors have suggested to Steve’s parents that the feeding issues were due to low muscle tone and control in the throat. Jacob and Karen had difficulty chewing. All of these children showed slower progress in speech acquisition. I would hope to see additional research in the future to identify possible links between medical problems and the timing of language acquisition.

I am excited for the Down syndrome population in the future. After a very sad history, medical and social advancements are increasing their life style and life expectancy. I would expect to see continual advancements in the future.
Appendix

Sample research findings for when children with Down syndrome produce their first word (Kumin, 2003, pg 66).

<table>
<thead>
<tr>
<th>Age for First Word</th>
<th>Research</th>
</tr>
</thead>
</table>
References


