A Micro-Ethnographic Study of the Communication/Language Development in a Japanese Child with Profound Hearing Loss Before and After Cochlear Implantation

Richard R. Kretschmer
University of Cincinnati, USA
kretscr@ucmail.uc.edu

Laura Kretschmer
University of Cincinnati, USA
laura.kretschmer@uc.edu

Katsura Kuwahara
Japan Oral School for the Deaf and Reischnauer-Kramer Nursery
Machida City, JAPAN
kuwahaka@yahoo.co.jp

Roberta Truax
University of Cincinnati, USA
truaxrr@yahoo.com

Abstract

This study described the communication and spoken language development of a Japanese girl with profound hearing loss who used a cochlear implant from 19 months of age. The girl, Akiko, was born in Belgium where her family was living at that time. After she was identified as deaf at birth, she and her parents were provided with support services. The family relocated to Japan when Akiko was 1 year 5 months of age. When she was 1 year 6 months of age Akiko underwent cochlear implantation. The cochlear implant device was activated when Akiko was 1 year 7 months of age. The parents routinely made video recordings of Akiko interacting with family members and teachers at home and at school. The video recordings taken by the parents used as the data for this study contained scenes of Akiko from the time she was 3 months of age until she was 4 years 11 months of age. Micro-ethnographic methods were used to analyze the dynamics and development of selected communicative interactions over this age span of fifty-six months. The original pool of video recordings contained 213 scenes.
As a result of video viewing and editing, Akiko's communication development was found to follow expected patterns of development as described by other child language researchers of children with normal hearing. There were seven demarcations that represent Akiko's communication and spoken language development: 1) perlocutionary, 2) transition of perlocutionary to illocutionary, 3) illocutionary, 4) transition of illocutionary to locutionary, 5) locutionary, 6) dialogue, and 7) narrative.

Keywords: Cochlear implant; child development; communication/language development

Introduction

It is well understood that the acquisition of intelligible spoken language in young deaf children is a challenge, even with early intervention (Kretschmer & Kretschmer, in press; Nittrouer, 2010). Problems are evident in all area of language, including literacy, discourse, semantics, syntax, and

phonology. If the choice of the family is to develop spoken language, hearing aids as well as intervention have assisted some, but not all children. Cochlear implants are being increasingly used with young children with congenital or early onset of deafness and are thought to be of substantial benefit in the development of more typical phonological, grammatical, semantic and discourse abilities as well as literacy (Dowell, 2005; Ertmer, Strong, & Sadagopan, 2003; Papsin & Gordon, 2007; Tomblin, Barker, Spencer, Zhang, Gantz , 2005; Waltzman & Roland, 2005). Early implantation, before the age of three, is described as having the most beneficial effects on communication development. Increasingly, implantation before 2 years or even by 1 year of age is advocated (Dowell, 2005; Ertmer & Mellon, 2001; Houston, Ying, Pisoni, & Kirk, 2003; Lesinksi et al., 2006; Nicholas & Geers, 2000) as well as bilateral implantation as well (Gordon, Valero, & Pepsin, 2007; Ruggirello & Mayer, 2010). Taken as a whole, the reports on the benefits of early implantation share two important characteristics: a) they tend to be cross sectional studies rather than single subject longitudinal studies, and b) they tend to focus on test results rather than on descriptions of patterns of language/communication growth over time. There are virtually no studies that focus on patterns of language growth in young deaf children with cochlear implants. This study attempts to address that issue.

To track and analyze longitudinal language acquisition, we decided to utilize a model of typical language acquisition from the literature to frame the qualitative analysis, namely identification of the following stages observed in typical infants, toddlers and young children. These included: a) the perlocutionary stage, b) illocutionary stage, c) the locutionary stage, d) the dialogue stage, and e) the extended dialogue stage (Bates, 1976; Bates, Camaioni, & Volterra, 1975; Clark, 2009; Halliday, 1975; Tomasello, 1995). The perlocutionary stage involves the primary caregiver contextualizing the infant's s vocal/non-vocal behaviors into a conversational exchange. In other words, the infant produces a vocal or non-vocal behavior and the mother responds to it as if it were communicative in nature. In the illocutionary stage, the infant or toddler begins to become a more equal partner with the mother in that he or she begins to signal their communicative intentions to the parents. During this stage, the child's vocalizations come closer and closer in their syllabic structure (canonical syllables) and intonation patterns to the language to which they are being exposed. In this stage, the parent recognizes the intention and then responds in an appropriate fashion either verbally or non-verbally. In the locutionary stage, the child signals his intentions using words or syllables from his or her mother tongue. The mother responds to these productions with speech and gestures as a way of extending the conversational exchange. In the dialogue stage, the child generates multiple spoken turns and the mother extends these efforts to maintain multiple exchanges on the same topic. As the child matures linguistically, these exchanges become more and more extended, so that the child can begin to engage in longer discourse such as personal or literary narration. This model was developed on English speaking children but has been applied with success to the study of other languages such as Finnish (Paavola, Kunnari, & Molanen, 2005), French (Blake, 2000; Marcos, Ryckenbusch, & Robain-Jamien, 2003; Ryckebusch & Marcos, 2004); Hebrew (Zaidman-Zait & Dromi, 2007), Italian (Bates et al., 1975), Japanese (Blake, Osborne, Cabral, & Gluck, 2003). Because of this ability to generalize to other languages including Japanese, this model was used as a framework to study the language growth of a single child with early onset deafness who was acquiring Japanese and due to the parents decision to video tape her from the moment of diagnosis through cochlear implantation and to entry in to a formal educational program.

Description of the Deaf Child and her Family

Akiko is a Japanese child of Japanese speaking parents. She was born in Belgium and lived there until she was 1 year 5 months of age. The family then relocated to Japan to live in the home of the paternal grandparents. Both parents are college graduates and the father is employed as manager of

a textile manufacturing subsidiary with a large Japanese car company. At her paternal grandparents' home she interacted not only with her parents but with the grandparents as well. When Akiko was 3 years 10 months of age, her sister, Mari, was born and became a member of her community.

Akiko was diagnosed with a probable hearing loss at 3 days old due to Wardenburg Syndrome. At 30 days, she demonstrated responses to ABR at 90dB in the left ear and 45dB in the right. At seven months of age she was fitted binaurally with Phonak behind the ear hearing-aids. At this time she was enrolled in an early childhood program for the hearing impaired where an educator of the deaf came to the home to work with the child and family two or three times a week. All of these sessions were conducted in French. Both of Akiko's parents could speak French while the mother was also fluent in English. The language of the home was Japanese. At 11 months, she had an unaided speech awareness threshold of 98dB in the right ear and no responses in the left ear In addition to the home visitor, while in Belgium, they visited a nearby clinic so that she and her parents could participate in group activities related to having a child with profound hearing loss.

When Akiko was 1 year 3 months of age, the family relocated to Japan. One month later she received a cochlear implant in the left ear. Audiological testing indicated that she had responses at 25 dB from 250 Hz to 8000 Hz with her cochlear implant. She continued to use a hearing aid in the right ear, although not on a consistent basis. In Japan, she was enrolled in an early intervention program at a local public school and continued to attend this program until she was four years of age when she was enrolled in a regular kindergarten. At six years, she transitioned to a regular local elementary school first grade.

Method

Data Collection

Akiko's parents decided early on to videotape her communicative and linguistic progress. They began their home movies when she was 3 months old and made their last recording when she was 4 years 11 months. They made a composite VHS cassette which included 30 scenes over this age span and donated this cassette to the early intervention program in which Akiko had been enrolled. The director of this program contacted the primary author who was a doctoral student in an US university and asked her opinion on the child's language growth. After watching this tape, the first author asked the director if she could contact the parents to see if this tape could be released to her for research purposes. A meeting was arranged with the parents at which time it was determined that the videotape was a composite of 9 DVD's compiled by the parents. The parents agreed to release the videotape and the 9 DVD's to the researcher. Table 1 provides a summary of the number of scenes represented by these recordings. This data set yielded 213 scenes which ranged in length from 3 seconds to approximately 30 minutes in length of video taken of Akiko and various communication partners as noted beginning when she was 3 months of age and continuing to 4 years 11 months. Clearly the task was going to be to reduce these tapes to some representative samples of her communication interactions.

Table 1. The Total 213 Scenes from the Source Video Recordings

Recording media	**Nr. of scenes**	**The length of video recordings**
VHS	30 scenes	9 months through 4 years 5 months
DVD 1	38 scenes	3 months through 6 months
DVD 2	23 scenes	7 months through 10 months
DVD 3	36 scenes	10 months through 1 year 7 months
DVD 4	43 scenes	2 years through 2 years 6 months
DVD 5	40 scenes	2 years 6 months through 3 years 11 months
DVD 6	3 scenes	4 years 5 through 4 years 11 months
Total	213 scenes	

Data Analysis

Data analysis began with the first author viewing each of these scenes and making initial field notes to describe the basic parameters, namely, indicating the communication partners and the "topic" around which the interaction occurred. Once this was accomplished, the scenes were broken into those that occurred prior to implantation and those that occurred after. The next step was to refocus this analysis on those interactions where the other communication partner was the mother. This resulted in 115 scenes that meet that criterion.

Next, the 115 segments were reviewed for common elements which resulted in separating the segments into three categories, namely, game activities (14 scenes), activities centering on books (18 scenes) and early communication and language development interactions (83 scenes). After careful review of the latter scenes, forty-five were selected as the best examples of the early communication and language development interactions. Those that were eliminated included ones where the sound was not clear, or those where it was not possible to code the complete interaction because one or the other communication partner could not be seen on the video and their reactions could not be determined. It was decided to separate these 45 interactions on the basis of developmental stages. Thus, they were separated into scenes that occurred in infancy (19 scenes), those that occurred as a toddler (16 scenes), and those representing preschool (10 scenes). In talking with the parents, it became clear that they prized literacy development in their child, so it was decided to include the 18 book interactions scenes in the final analysis. The 14 scenes revolving around games were not considered further in this analysis.

The 63 interactions were then shared with the parents on a visit by the primary researcher back to Japan. Based on parental feedback, it became apparent that even this data base was too extensive for adequate analysis. The data were reduced even further by selecting those interactions that the parents felt were best representative of Akiko's communication at various ages. This resulted in a reduction of 45 scenes to 10, four for infancy, 3 for toddler, and 3 for preschool. These 10 interactions plus the 18 interactions under literacy development were analyzed further. There was one scene that occurred at age 2 years when the mother and child were interacting and had a bag of plastic toys and then the interaction segued into a book conversation. This segment was therefore divided into two scenes which increased the interactions around books from 18 to 19, while the interactions demonstrating early communication stayed at 10. These interactions were deemed by the mother as typical of her interactions with Akiko.

The next step was to transcribe each of these 29 interactions. These transcriptions attempted to capture all verbal and nonverbal behaviors of both the child and the mother as they interacted. In addition, each interaction was labeled with a time code so that it was possible to determine the length of each turn. All utterances were recorded first in Japanese and then translated into English. In order to establish the validity of these translations, both the first author, and a Japanese graduate student in the Literacy Program at the university independently translated two randomly selected scenes to determine the accuracy of the initial transcription. There was 76 percent agreement on the first scene and 100 percent agreement on the second. The disagreements centered on dialectical differences between the mother's Japanese and the raters' Japanese. The differences in translation did not seem to affect the basic content of the scene, as determined by both the researcher and the graduate student. Based on these results, it was decided to proceed with the original transcripts made by the researcher.

For the next step of the analysis, a model of typical language development was accepted as fitting the interactions in the data set, namely, a) the perlocutionary stage; b) a transitional stage between perlocution and illocution, c) the illocutionary stage, d) a transition stage between illocution and locutionary, e) the locutionary stage, f) a dialogue stage, and g) a discourse example of a literary narrative. Examples of each of these stages were then examined to provide the results for this project.

Results

The results consist of a series of Tables, each of which presents an example of an interaction that illustrates a particular stage in Akiko's communication/language development, Each of these examples are drawn from larger segments which explains why some Tables begin with numbers other than 1,

Perlocutionary Stage

Table 2 presents an example from the first stage, the perlocutionary stage as observed when Akiko was 3 months of age. As can be seen, Akiko is producing verbal and nonverbal actions which her mother appears to be contextualizing into a communicative exchange. Mother builds on what Akiko has produced, but Akiko only generates what seems relevant to her. It is clear that mother attended to both vocal and non-verbal behaviors and treated each of them as if they were actual conversational turns. Interestingly, she waited until Akiko completed her turn before initiating any vocalization.

Table 2. 3 Months of Age

Time	Turn	Akiko	Turn	Mother
00:00;00	1	Laying down on her back on the mat and tilting her face toward her right side to gaze at M.	1	Videotaping the right side of A from the above. She is running camera and interacting with A. She can view what is being taped on a small screen on camera.
00:00; 17	2	Moving her right arm rhythmically to her vocalization as if clear her	2	

Time	Turn	Akiko	Turn	Mother
		throat. ワ、オ、オオン。 **Whaa,wo,won.**		
00:03;14	3	Open her mouth. 3	3	ふうん。**Phmmmmmmm.**
00:04;27	4	4 ウワ、オ。**Wo, wha, wo.**	4	
00:06;02	5		5	うん。**Hmm.**
		LAPSE (2 minutes)		**LAPSE**
00:08;02	6	Louder voice. ウワ、ア、オオン、 **Wua, Whaa, won.** As if she was hiccupping. Her both feet rise along with the hiccup sounds.	6	
00:10;06	7	Then bent both feet and kick in the air right foot first	7	ん、なんだいそりゃ。 **Mm, what is that?**
00:12;00	8	Then left foot along with voice ア、オオン、**Aghh, ughhhn.**	8	
00:13;01	9		9	ううん。**Hmmm.**
00:14;01	10	Smacking her lips. チョ、チョ、 チョ、ウク、ウウン。**Tuk, tuk, tuk, mk, mhmmmm.** her right hand touched her chin.	10	
00:17;10	11		11	Zooming in on the A's face. ふ うん。 **Hmmmmmm.**
00:17;27	12	ウウ、ワアア. **Woo, whaah.**	12	
00:18;19	13		13	ウウ、ワア、**Woo, whaahh.** mimicking A's tone
00:19;14	14	Pursing her lips in making sucking sounds. チョッ、チョッ。 **Tuk, Tuk.**	14	

Time	Turn	Akiko	Turn	Mother
00:22;22	15	Then turning her eyes away from camera		
00:24;21	16		16	Turning off the camera.

And further, she waited until Akiko produced a behavior before taking her turn, as witnessed by the time lapse between turns 5 and 6. The limited vocalizations observed were consistent with Oller' Gooing stage of typical vocalizations for 3 month olds with normal hearing. At this time Akiko likely had only a moderate hearing loss in her better hearing ear so she would have been aware of her own voice as well as her mother's voice produced at close range.

Transition from the Perlocutionary to the Illocutionary Stage

Table 3 shows a sample of interaction when Akiko was 9 months, summarizes an interaction that is beginning to approach the illocutionary stage of communication/language development. In this interaction, Akiko produces a variety of both verbal and non-verbal actions which the mother consistently interprets as communicative in nature. Akiko's actions and vocalizations are more under her control and appear to be less reflexive in nature. She is wearing hearing aids by this time which could have altered her vocalizations, but in this segment no canonical syllables were observed, as predicted by Oller's Grand Synthetic model of typical vocal development (Kretschmer & Kretschmer, in press). It is difficult to know exactly what Akiko's hearing levels were at this age, or what effects the hearing aids were having if any. By 11 months, her hearing loss had progressed to a profound level in both ears. What is still missing from this sample interaction is any attempt by Akiko to direct her communications toward the mother in order to control the interaction for her own purposes.

Table 3. 9 Months of Age

Time	Turn	Akiko	Turn	Mother
00:48;14	43	Grabs a paper cup and picks it up.	43	
00:50;07	44	Holds the cup with both hands.	44	Puts her right hand in the shoebox and smiles at A.
00:50;25	45	Turns her head toward the camera and throws the cup towards the lid of a nearby box.	45	
00:51;26	46	オオオオ。**Wohhh.** Puts both her hands on the floor and crawls forward.	46	
00:52;08	47		47	んんん、かあ。"**Hmmmmm." huh?** Said while picking a paper tube from the lid of the box, shaking it a little bit and then putting it down on the lid.
00:54;08	48		48	Glances at the camera.

Time	Turn	Akiko	Turn	Mother
00:55;00	49	Gazes at a block on the floor. Crawls toward the block.	49	
00:56;09	50	Grabs the block with her right hand.	50	Says: パパ、**Papa,** 見つけちゃったねえ。 **(She already) found (you = her father).**
00:57;23	51	Stops crawling. Holds the block with both hands and pulls her head up, and gazes at the camera.	51	Says: はあやいわあ。**(She is) soooo quick.**
00:59;00	52	Turns with her back facing the camera.	52	
01:00;18	53		53	ここよ。**Me, Here**.
01:01;12	54	Gazes at the block and puts the block into her left hand.	54	Crawls behind her.
01:02;00	55	Turns back to M.	55	
01:02;19	56	Gazes at M.	56	Waves to A.ここよ。and says **Me, Here.** Continues to wave to A.
01:04;23	57		57	Crouches down and crawls toward A.
01:05;18	58	Averts M's gaze while holding the block in her left hand.	58	一緒に行く？**Go together?** while bringing her face near to A's face.
01:05;23	59		59	Crawls toward A's right side.
01:05;27	60	Pushes the block to the right side of the floor with her left hand.	60	Arrives at A's right side. And says, 緒に行く。Go Together. はいこ。 **Hurry.**
01:07;18	61	Starts crawling.	61	Says はいこ、**Hurry,** はい、**Hey.** while touching the block with her right hand.
01:08;07	62	Still crawling beside the mother	62	Crawls forward, then grabs the block and throws it behind them while saying はい、**Hey.**
01:08;28	63	Still crawling beside the mother	63	Still crawling and says はいはいはいはいはい。 **Heyheyheyheyhey.**

Time	Turn	Akiko	Turn	Mother
01:10;21	64	Says: ウググウウ。**Ughughuuu.** While crawling.	64	Still crawling
01:11;13	65	Still crawling	65	Still crawling and then says: あああやああ, **ahhh, yeahh,** ママの が早いやっ。**Mama won (the race).**
01:12;28	66	Stops crawling	66	While looking at A, pretends to pant はあはあはあは あ。 **Hah, hah, hah, hah.**
01:14;00	67	Grabs her feet.	67	

Illocutionary Stage

Table 4 shows an event from age 14 months, that presents an example of an illocutionary act. In Turn 21, she clearly is signaling to the mother that she is planning to do something with an object in front of her, namely, a box. The entire interaction revolves around various actions on the box and the mother makes comments about each of these actions. This clearly is an attempt by Akiko to direct the interaction and it appears to be successful in that the mother attends to her actions on the box. It should be recognized, however, that this attempt is solely nonverbal in nature as are her actions on the box itself. This interaction occurred while Akiko was still wearing hearing aids, three months before receiving her cochlear implant.

Table 4. 14 Months of Age

Time	Turn	Akiko	Turn	Mother
00:32;12	16	Grabs the edge of the table with her right hand and reaches with both hands inside of the table to find a position in order to standup.	16	
00:37;13	17	Stands up	17	
00:38;24	18	Puts the left foot down on the floor, raises the right foot and puts her knee on the table.	18	Says よいしょ。**Oof!**
00:39;26	19	Raises her left foot and puts it on the table turning around her entire body.	19	
00:42;29	20	Puts her bottom on the table	20	Saysしぃぃぃぃぃぃ。**Shhhhhh.**
00:44;01	21	Gazes at mother, glances at the floor, then raises her right arm and points to the front where there is a box.	21	Says へえ、へえい、やったああ。**Hey, hehhhhey! Yahoo!**

Time	Turn	Akiko	Turn	Mother
00:47;08	22	Puts her right hand on the edge of the table again.	22	Says ううん？**Hmm?**
00:47;24	23	Puts her left hand on her lap, then turns her eyes away while touching the edge of a paper box sitting at the left side of the table while simultaneously putting her right hand on the edge of the table.	23	
00:49;02	24	Grabs the edge of the box, gazes at the edge, and pulls it with her left hand.	24	Says: いつもやるね。それ。**(You) always do that.**
00:50;24	25	Pushes away the box while releasing the right hand from the edge of the table and tilting her entire body toward the box, and then puts her right hand in the box.	25	Says 気持ちいい。**Feeling good.**

Transition from the Illocutionary to the Locutionary Stage

Table 5 is a sample taken when Akiko was 2 years of age with an auditory age of 7 months post implant. Akiko appears to be transitioning from the illocutionary to the locutionary stage. The turn of interest is 29. Here Akiko is signaling an interest in looking at the book by holding it up but unlike the previous example, here she makes a vocalization along with the gesture. The vocalization is not a "real" word but a nonsense syllable, but the mother clearly recognizes the intent as she begins to read the book. Her behavior at turn 33 signals that she is not attending to the book, so the mother talks about opening the mouth. In Turn 36, Akiko indicates an interest in the book again, but this time she only uses a nonverbal gesture with no vocalizations. Again, this is successful as the mother begins to read the book for a second time.

Akiko produces a bilabial sound in turn 29 and her actions in turns 31, 33 and 35 although not involving her own vocalizations suggest that she is well aware of the crocodile's mouth as well as her own.

Table 5: 2 years of age (7 months of use of a cochlear implant)

Time	Turn	Akiko	Turn	Mother
00:55;21	27	Raises her left arm upward and tilts her upper body toward her right side.	27	
00:56;27	28	Opens her mouth and sits up.	28	Says があああああ。**Gaaaahhhh.**
00:58;21	29	Looks down, holds up the	29	

Time	Turn	Akiko	Turn	Mother
		book up to her face, and says んんん。**Mmm.**		
01:02;14	30		30	Says ふううん、**Phmm.**
01:02;29	31	Puts the book down, then, opens her mouth while grabbing her lips with her right hand.	31	
01:04;18	32		32	Looks at the book, and says わにさんが、**Mr. Crocodile is .**
01:05;25	33	Opens her mouth little bit more and grabs the lips again.	33	
01:08;14	34		34	Says があああだね。**Opening his mouth, Gaaahhh.**
01:09;29	35	Takes her right hand from her mouth, while leaning toward the book on the floor.	35	
01:11;02	36	Moving her left arm back and forth over the book.	36	Says なんか食べてるね。**Eating something.**

Locutionary Stage

At 2 years 8 months we observe progress made with 15 months of cochlear implant use by review of Table 6. Akiko has moved from the use of vocalizations as indicators of communication to the use of actual words in locutionary acts. With a full year of listening, and consistent input from her caregivers, it is reasonable to expect that she would be in the single or even 2 word stage as seen in typically developing toddlers. In this example, Akiko is trying to negotiate the return of a pen that was taken by her mother. In turn 5, she makes a request using the nonsense syllable euu. In turns 8, 10, and 11, she makes various requests for the pen using real words, namely, don't, mama is, and please. In turn 13, mother recognizes this attempt by repeating back to Akiko the word please. As the exchange progresses (not included in the table), mother relinquishes the pen back to Akiko, so we can see that her efforts were successful.

Table 6. 2 Years 8 months of Age (15 Months of Use of a Cochlear Implant)

Time	Turn	Akiko	Turn	Mother
00:00;00	1	Picks up a pen with her left hand, then strokes the pen with her right hand's fingers in order to pass he pen to her right hand.	1	
00:01;06	2	Holds the pen in her right	2	Puts the different pen on

Time	Turn	Akiko	Turn	Mother
		hand, while gazing the pen that M just put on the workbook.		the workbook. Says じゃ、これで塗っ て、これで。**Use this one. This one.**
00:02;07	3	Reaches toward the pen placed on the workbook by the mother with her left hand.	3	Reaches toward the pen that A is holding in her right hand.
00:02;22	4	Picks up the pen on the workbook in her left hand, then gazes at M's right hand which now has A's pen.	4	Takes A's pen with her right hand and says ママこっちもっとる。**Mama have this one. (The pen that A picked up.)**
00:03;20	5	Shifts the pen from left hand to right hand while gazing at M's right hand. Says ウウ。**Euu.**	5	Approaches workbook with her both hands as if to pick it up.
00:04;12	6	Holds the pen in her right hand, and reaches with her left hand toward the pen M took from her.	6	Puts her left hand on the workbook while holding the pen she took from A in her right hand in the position of writing. Says いくよ。**Let's draw.**
00:04;26	7	Grabs her former pen with her left hand pulling it from M's right hand.	7	Opens her fingers and lets go of the pen.
00:05;26 8	8	Says だあめ。**Don't!** releasing the pen from her right hand into M's right hand.	8	
00:06;13	9		9	Grabs and takes the pen from the A's hand and holds it.
00:07;01	10	Gazes at M's face and then says マアマアは、 **Mama is.**	10	Gazes down on A.
00:07;29	11	Averts M's gaze by shutting her Eyes. Opens eyes and then gazing on the pen in M's right hand. Says どうぞ。 **Please.**	11	
00:09;01	12	Puts her left hand on her chest, then moves her left hand from her chest with the palm up and then puts her left index	12	

Time	Turn	Akiko	Turn	Mother
		finger on the point of the pen M is holding in her right hand.		
00:09;24	13		13	Says どうぞ？ **Please?**

Extended Dialogue Stage

Table 7 presents an example of extended dialogue between the mother and child when Akiko is 3 years 11 months with an auditory age of 2 years 6 months. Akiko has discovered a nail file in a case. She shows the file case to her mother and requests her mother to show her how to use it. The remainder of the exchange is an attempt to show Akiko how to use the file. It should be noted that Akiko has begun to learn certain Japanese linguistic conventions. Her younger sister has been born, so she now is the big sister and she refers to herself in this manner (Liu, 2007).

Table 7. 3 Years 11 Months (2 Years 6 Months Use of a Cochlear Implant)

Time	Turn	Akiko	Turn	Mother
00:31;16	16	Says ツメキリノカバ？ **Nail clipper's cover?** while showing it to M.	16	
00:33;11	17		17	Says うん。**Yes**
00:34;00	18	Says ママ、やってみて。**Mama, do it (show me how you use it).**	18	
00:35;26	19		19	Moves the camera.
00:36;04	20	Says お姉ちゃん、お姉ちゃん、やらないから、**ONEICHAN, ONEICHAN, Big sister, big sister, because (she) doesn't do it.** Glances at the camera.	20	Still adjusts the camera so it is facing toward A.
00:39;25	21	Says お姉ちゃん、**Big sister.** while handing the nail clipper cover to M.	21	Makes the camera stable.
00:41;18	22	Says 見てて。**MITETE. Look at (me).** お姉ちゃん、**Big sister,** 見てて。**MITETE. Look at (me).** while looking at M's hand.	22	Takes the cover from A. (The cover has a file on it.)

Time	Turn	Akiko	Turn	Mother
00:44;05	23		23	Putting the file on her finger nail. 見せて、**MISETE, Show me,** こう、 **This is how.** Striking the cover back-and-forth. こうやって使うん。**This is the way (you) use.**
00:46;04	24	Gazes at M's hands. And says こうにゃって、使うの？ **Is this the way (you) use?**	24	
00:47;15	25		25	Says うん。**Yeah.**

Discourse Function of Literary Narration

From this point onward, Akiko's language growth expanded dramatically. For instance, at 4 years 5 (auditory age of 3 years) she began to retell stories based on books that she had been exposed to. She would either pretend to read the book herself, or enact the story using puppets to represent the various characters. In one enactment using puppets with her mother as the audience, she used sentences such as イッチョニサガソウヨ。**Let's find it!;** あ、見つけたよおお。**Oh, I found it.;** これね、かき の種ダンダア。**This. It's persimmon seed.;** どこか、ツチヲウメルところを、探そうよ。**Let's find a place to bury it in the ground.;** 早く、芽を出せ、カキノタネ、出さぬとはさみで **Hurry sprout persimmon seed. If you don't sprout now, with my scissors,** and ちょん切るぞお。**Chop you off.** Examination of these sentences clearly demonstrates that she has moved from single propositional sentences to more complex ones using relativization (persimmon seed), complementation (find a place to bury it in the ground), and conjunction (if you don't sprout now …). In addition, her effort was a narrative effort that mirrored the folk tale on which this enactment was based. It is now clear that she can now not only engage in extended dialogue, but also has the ability to take the floor and engage in discourse such as a literary narration.

Summary and Conclusions

Examination of Akiko's growth of language demonstrated that she had progressed in the same developmental pattern as children with normal hearing. She went from the Perlocutionary to the illocutionary stage, from the illocutionary stage to the locutionary stage, and eventually demonstrated the ability carry on extended dialogue and discourse. The initial stages of development, namely, the perlocutionary and illocutionary stages, tended to be fairly non-verbal in nature. These stages occurred prior to the cochlear implantation. With her cochlear implant, she began to add vocal behaviors which moved into single words and eventually connected language. The addition of this component allowed for the development of the locutionary and extended dialogue stages. During the extended dialogue stage, she became aware of linguistic conventions peculiar to her native language

of Japanese, such as identifying herself as the older sister and in another sample she was observed engaging in a welcoming home routine with her father which is common in some Japanese households. After 15 months of listening to others and to herself, Akiko was able to use spoken language as a communication tool. After she engaged in extended dialogue, her linguistic capacities increased to include more complex linguistic structures which allowed her to engage not only in dialogue, but also to produce a discourse task of literary narration.

Table 8 summarizes these stages for Akiko. As can be seen, there is a difference in the appearance of the illocutionary stage and the locutionary stages for Akiko and the research reported on normally hearing children. The most obvious reason for the difference is Akiko's lack of reliable auditory input for the first 17 months of her life. Further, since the data used in this study was dependent upon home movies taken by the parents, who did not video tape on a regular schedule. It is possible that some behaviors exhibited by Akiko actually occurred earlier than was observed in this study. There are two arguments, however, that support the reality of these data. First, unlike most hearing children, Akiko demonstrated a transition stage between the perlocutionary and the illocutionary stage. Previous research has repeatedly found that hearing mother-deaf child interactions are often replete with many missed communication opportunities (Kretschmer & Kretschmer, in press). This transition phase for Akiko may have been a reflection of this struggle in communication. For instance, in Table 3, although the interaction revolves around a central topic, a block, there really is no dialogic interaction between Akiko and her mother, even though the mother struggles to establish and maintain such an interaction. This might explain the delay in acquisition of a clear illocutionary stage. Second, prior to the cochlear implant, the child was using amplification in the form of personal hearing aids but due to the profound nature of her hearing loss they may have been providing little benefit. The literature has reported that much of the early interactions between mothers and typical children are highly non-verbal in nature as seen in Table 4 (Kretschmer & Kretschmer, in press.) Once cochlear implantation occurred, there was a constant and steady stream of auditory experiences available to Akiko which resulted in the transition between the illocutionary and locutionary stages reported for This could explain the delay in the locutionary stage, but once she began developing oral communication, the remaining stages of dialogue and narrative discourse are parallel to those of normally hearing children.

Table 8. Developmental Stages and Ages of Language/Communication Growth in Hearing Children and in Akiko

	Research on hearing children	**Akiko's development**
Infant 3 to 18 months	Perlocutionary (3-5 months) Illocutionary (6-11 months) Transition from Illocutionary to Locutionary (12-18 months)	Perlocutionary (3-5 months) Transition from Perlocutionary to Illocutionary (6-11 months) Illocutionary (12-17 months)
Toddler 19 to 35 months	Locutionary (19-30 months) Dialogue (31-35 months)	Transition from Illocutionary to Locutionary (19-26 months) Locutionary (30-31 months) Dialogue (32-36 months)
Preschool 37 to 60 months	Narrative (37-60 months)	Narrative 37-59 months)

This is a study of a single subject where the cochlear implant was obtained fairly early in her life (17 months). The effects of the implant along with an interactive and communicative mother can clearly be seen in the more normalized language development that was observed as she approached 3 years

of age. One question that remains is whether these findings can be replicated in children acquiring a variety of languages. In addition, the question also remains about what constitutes "early" implantation. Is 17 months too late to have positive spoken language outcomes? The answer for this child and family is definitely not. The findings of Ruggierello and Mayer (2010) would seem to suggest that even earlier is "better" but to fully understand the issues, detailed longitudinal studies of the processes of language acquisition in children with early cochlear implantation seems warranted as a companion to studies that report formal language test results. We need a variety of qualitative as well as quantitative data to explore this important question.

References

Bates, E. (1974). *Language and context: The acquisition of pragmatics.* New York: Academic Press.

Bates, E., Camaione, L., & Volterra, V. (1975). The acquisition of performatives prior to speech. *Merrill Palmer Quarterly*, *21*, 205-226.

Blake, J. (2000). *Routes to child language: Evolutionary and developmental precursors.* New York: Cambridge University Press.

Blake, J., Osborne, P., Cabral, M., & Gluck, P. (2003). The development of communicative gestures in Japanese infants. *First Language*, *23*, 3-20.

Clark, E. (200). *First language acquisition* (2nd ed.). Cambridge: Cambridge University Press.

Dowell, R. C. (2005). Evaluating cochlear implant candidacy: Recent developments. *The Hearing Journal*, *58*, 9-22.

Ertmer, D. J., & Mellon, J. A. (2001). Beginning to talk at 20 months: Early vocal development in a young cochlear implant recipient. *Journal of Speech, Language, and Hearing Research*, *44*, 192-206.

Ertmer, D.J., Strong, L.M., & Sadagopan, N. (2003). Beginning to communicate after cochlear implantation: Oral language development in a young child. *Journal of Speech, Language, and Hearing Research*, 46, 328-340.

Gordon, K.A., Valero, J., & Pepsin, B.C. (2007). Binaural processing in children using bilateral cochlear implants. *Neuroreport*, *18*, 613-617.

Halliday, M. A. K. (1975). *Learning how to mean: Explorations in the development of language*. New York: Elsevier.

Houston, D. M., Ying, E., Pisoni, D. B., & Kirk, K. I. (2003). Development of pre-word learning skills in infants with cochlear implants. *The Volta Review*, *103*, 303-326.

Kretschmer, R. R., & Kretschmer, L. W. (in press). Intervention of with auditory and visual sensory impairments. In M. Ball, & J. Damico (Eds.), *Blackwell's Handbook of Language and Speech Disorders*. New York: Blackwell Press.

Lesinski, S., Illg, A., Warnecke, A., Hermann, R., Bertram, B., & Lenarz, T. (2006). Paediatric cochlear implantation in the first year of life: Preliminary results. *HRO*, *54*, 556-572.

Liu, X. (2007). Cultural aspects of Japanese family address terms as part of language learning. *Virginia Review of Asian Studies*, *2007*, 1-11.

Marcos, H., Ryckenbusch, C., & Robain-Jamien, J. (2003). Adult responses to young children's communication gestures: Joint acknowledgement of speech acts. *First Language*, *23*, 213-237.

Nicholas, J.G., & Geers, A.E. (2006). The process and early outcomes of cochlear implantation by three years of age. In P. Spencer, & M. Marshack (Eds.), *Advances in the spoken language development of deaf and hard-of-hearing children* (pp. 271-297). New York: Oxford Press.

Nittrouer, S. (2010). *Early development of children with hearing loss*. San Diego: Plural Press.

Paavola, L., Kunnari, S., & Moilanen, I. (2005). Maternal responsiveness and infant intentional communication: Implications for early communicative and linguistic development. *Child: Care, Health, & Development*, *31*, 727-735.

Papsin, B. C., & Gordon, K. A. (2007). Cochlear implants for children with severe-to-profound hearing loss. *The New England Journal of Medicine*, *357*, 2-9.

Ruggirello, C., & Mayer, C. (2010). Language development in a hearing and a deaf twin with simultaneous cochlear implants. *Journal of Deaf Studies and Deaf Education*, *15*, 274-286.

Ryckenbusch, C., & Marcos, H. (2004). Speech acts, social context and parent-toddler play between the ages of 1;5 and 2;3. *Journal of Pragmatics*, *36*, 883-897.

Tomasello, M. (1995). Thinking in niches: Sociocultural influences on cognitive development. *Human Development*, *38*, 46-52.

Tomblin, J. B., Barker, B. A., Spencer, L. J., Zhang, X., & Gantz, B. (2005). The effect of age at cochlear implant initial stimulation on expressive language growth in infants and toddlers. *Journal of Speech, Language, and Hearing Research*, *48*, 853-867.

Waltzman, S., & Roland, J. R. (2005). Cochlear implantation in children younger than 12 months. *Pediatrics*, *116*, 487-493.

Zaidman-Zait, A., & Dromi, W. (2007). Analogous and distinctive patterns of prelinguistic communication with and without hearing loss. *Journal of Speech, Language, and Hearing Research*, *50*, 1166-1180.