

# ON THE PROPERTIES OF INFANT VOCALIZATION IN THE JAPANESE PRE-VERBAL STAGE\*

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## 1. Introduction

Infant vocal behaviors are complicated than it appears. Oller (2000) proposes that there are five pre-verbal stages in the very young infants' speech: the Phonation Stage, the Primitive Articulation stage (or the GOO stage in Oller (1980)), the Expansion Stage, the Canonical Stage, and the Integrative stage (or the Variegated Babbling Stage in Oller (1980)). (See Table 1 and 2 for the details.) Discussing the language properties of the very young infants, Oller (2000) contrasts squealing with growling in terms of pitch. Squealing is usually at 2 to 4 times the pitch of growling even in the expansion stage (Oller 1980). In addition, "in yelling, infants explore the ability to produce sounds of maximum amplitude, and in whispering, they delve into sounds of minimum amplitude." (Oller 2000: 171).

It has been also found that infants are sensitive toward prosody at a very early stage of language acquisition. For instance, English-speaking infants at the age of 7.5 months are sensitive to their native word stress patterns (Jusczyk, Cutler and Redanz 1993). Hayashi (2003) also reports that Japanese-speaking infants at the age of 7-8 months also show sensitivity to their native rhythmic patterns. Masataka (1992) examined whether or not the change in maternal pitch could differentially affect acoustic features of pitch in immediately subsequent infant utterance. He found that when the infants were responding to maternal speech with exaggerated pitch patterns, they tended to mimic those patterns, although they tended not to do so in response to maternal speech with non-exaggerated patterns.

Yuta, our subject in the project we report here, at 2 months and 26 days old, produced a

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In this paper, we use the same terminology as Oller (1980, 2000) used for the description. We owe to the website of <http://www.abdn.ac.uk/~clt011/psychology/babbling.html>, made by Phil Marston, who is an eLearning advisor of Aberdeen University. This website, Marston (2003), let the user hear the actual sounds of babbling and others observed in the early infant speech, which encouraged us to challenge the cross-linguistic study of infant vocalization.

prosodic word [o a yo] with the same intonation contour immediately after his father uttered [o ha yo]. It is notable that this “mimic” was observed in the natural context in our longitudinal study. Our infant was responding to the paternal speech though it did not have exaggerated pitch patterns even. Then, at a later stage, he also made request and expressed feeling not only by vocalization, but also with gestures, despite the fact that he never “learnt” such coding system based on the input available.

In this paper, we present a longitudinal observational study of a Japanese-speaking boy, Yuta. We videotaped the subject about 30 minutes a week from 1 month 3 days after his birth in natural context. He is at the age of 8.5 months as of December, 2007. When we started the observational study, he was at the beginning of the Primitive Articulation stage, and now he is in the Canonical stage after about the four-month Expansion stage. Based on the study, we first show that a Japanese-speaking infant goes through the same stage as Oller’s (1980, 2000) observation summarized in (1) and (2). Then, we report that our subject conveys his request by rising intonation at the final edge of the utterance, and indicate the reference he refers to by gestures (such as the shape of the mouth and reaching of his arms) as early as in the Primitive Articulation stage. By investigating infant vocal and non-vocal behavior carefully, we discuss in this paper that the emergence of some language properties is very early, thereby arguing for the universality of infant vocalization and the innateness of such properties as intonation and gestures.

(1) Table 1 Stages of Development in Phonetic Control (Oller 1980)

Infant’s age	Characteristic vocalization types	Metaphonological characteristic of mature languages
0-1 month phonation stage	QRN (quasi-resonant nucleus)	Normal phonation in non-reflexive vocalizations
2-3 months GOO stage	GOO (QRN plus velar or uvular consonant-like element)	Vocalizations with closure of the vocal tract
4-6 months expansion stage	FRN (fully resonant nuclei) RSP (raspberry) SQ (squeal) GRL (growl) YEL (yell) IES (ingressive-egressive sequence) MB (marginal babble)	Use of resonance capacity providing possibility for contrasts of resonance types ?Front as opposed to back (GOO) closures? Further manipulation of vocalizations during closure? Pitch contrasts Amplitude contrasts ?Further control of vocal breath stream? Alternation of <i>full</i> opening and closure of the vocal tract
7-10 months canonical stage	BB (canonical babbling)	syllabic timing constraints on relationship of openings and closures (vocalic transitions)
11-12 months variegated babbling stage	VAR (variegated babbling) GIB (gibberish)	Contrasts of consonantal and vocalic type Contrasts of stress

(2) Table 2 (Oller 2000)

	New Vocal Types Occurring: Protophones	New Vocal Types Occurring: Other Sounds	Infraphonological Achievement: Principles of Well-Formed Syllabification in the Human System	Infraphonological Achievement: Properties of Potential Phonological Systems	Infrasemiotic Achievement: Properties of Potential Semiotic Systems
Phonation Stage	Quasivowels, sometimes with glottal adjustments	Vegetative sounds; crying	Normal Phonation	Very Primitive Syllabification And Rhythmic Hierarchy	Contextual Freedom (production of quasivowels under no external stimulus control), primitive Free Expressivity
Primitive Articulation Stage	Gooing		Articulatedness (movements of the vocal tract during normal phonation, creating primitive consonant-like margins)	Primitive Signal Analysis as seen in extremely variable production of sounds in gooing	Directivity (vocalization with eye contact), Interactivity (use of gooing in turn-taking interactions)
Expansion Stage	Full vowels, squealing, growling, yelling, whispering, raspberries, marginal babbling	Laughter	Full resonance of nuclei, creating well-formed vowel-like centers for syllables	Signal Analysis (exploration of pitch, intensity, resonance types), Categorical Adaptation, primitive Recombinability in marginal babbling	Elaborate Free Expressivity (use of cry, vegetative sounds and protophones in playful self-expression), early Imitability
Canonical Stage	Canonical babbling, reduplicated babbling, variegated babbling		Well-formed transitions between margins and nuclei	Fully well-formed Syllabification, early Recombinability of syllables, early Rhythmical Hierarchy, Hot/Cool Synthesis	More elaborate Imitability, Designation
Integrative Stage	Gibberish, mixing of early speech and babbling		Elaboration of babbling and speech	Further Recombinability, and early Segmentatioin	Conventionality, Arbitrariness, Early Semanticity, Displaceability, Propositionality

## 2. The Sounds of Speech in Infancy

Based on the one-year observation of his verbal and non-verbal behavior, in this section, we report the phonological development of our subject, Yuta. We discuss the clear parallelism between Oller's (1980, 2000) analysis (summarized in Table 1 and Table 2) and our observation.

## 2.1. The Phonation Stage

According to Oller (1980, 2000), in the first stage, which is termed the Phonation stage, infants produce “comfort sounds” with normal speech-like phonation. Oller calls the syllabic nasals or nasalized vowels as quasi-resonant nucleus or quasivowels. When infants produce quasivowels, they will often have the mouth closed, or nearly closed. Though our subject didn't produce much sound in this stage besides crying, he also sometimes made quasivowel sound when he was hungry or discomfited.

## 2.2. The Primitive Articulation stage (GOO stage)

The second stage is the Primitive Articulation stage, which was termed GOO stage by Oller (1980). According to Oller (2000), babies use gooing to do something important, and through the interactions that include gooing, they establish and build a relationship with their caretakers. According to Oller (1980), GOOs are back consonant-like sounds, often velars, and often voiced fricatives. They comprise the sound [x, k, g], and they may combine with quasi-resonant nucleus to produce syllable-like sounds, but the timing of the opening and closing of these syllables is irregular and not particularly adult-like. The typical sounds in this stage are [gu] and [ku].

Our subject got into this stage at around two months. It is notable that he started to produce conversation-like utterances with an addressee in front of him, and started to talk to himself in this period. Although the sound types were limited, the volume of his voice became louder. We observed, as Oller (2000) states, that our subject also used gooing to do something important, and he built a relationship with his caretakers through the interactions that include gooing: He vocalized for request, discomfort, comfort, and “a talk” with his caregivers.

Murasugi and Nakatani-Murai (2007) presented an analysis of his vocalization at this Primitive Articulation stage as the onset of the linguistic expression of request. We observed that he controls pitch and makes some gestures in order to make a request. Whenever he made a request, he tried to move his hands, and/or pressing out his tongue. An example is shown in (3). In (3), Yuta was lying on his bed, and he requested his mother's milk with the hands moving and the tongue pressing out.

(3) (Yuta (=Y) wants to drink mother's milk.) (1 mth 5 d.)

Y: [a↑a↑a↑a↑a: a↑a↑a↑a: a: ] + (reaching gesture, pressing tongue out)

On the other hand, when he talked to someone or himself, his utterances were at low-pitch and he did not make gestures. We will come back to the issue on intonation and gestures in the next section.

In addition, in this stage, the child's sensitivity to the intonation was also observed. Hayashi (2003) argues that 7-8 month-old Japanese-speaking infant has sensitivity to their native rhythmic pattern. However, we found that infants are sensitive to it at a much earlier

stage. We observed that our subject imitated his father's intonation contour at the age of 2 months 26 days as shown in (4). This corresponds to the discovery of Kessen et al. (1979) and Masataka (1992). According to them, infants as young as 3 months can imitate variations in vocal pitch. In (4), Yuta and his father were having a talk, and right after his father said [o ha yo:], meaning "good morning", Yuta produced [o a yo] in exactly the same pitch accent, while a consonant [ha] became [a].

(4) (Yuta is talking with his father (=F).) (2 mth 26 d.)

F: [o ha yo:]

Y: [o a yo:]

'Good morning.'

This observation implies that infants are sensitive to intonation at a very early stage of language acquisition, even at as early as the Primitive Articulation stage.

### 2.3. The Expansion Stage

According to Oller (2000), the third stage, or the Expansion Stage, is a period during which babies perform important functions with vocalization like the Primitive Articulation stage. Oller (2000) states that in the Expansion Stage, on the one hand the babies use social usage of sounds as in the Primitive Articulation stage, but they also use protophones for practice in vocal control. In this stage, infants produce various sounds. According to Oller (2000), in the Expansion stage, a variety of new types of sound develop such as full vowels, squealing, growling, yelling, whispering raspberries, and marginal babbling. Natheni and Oller (2001) also mentions the difficulties of identifying these pre-canonical sounds, because they do not fit the canonical categories of speech syllables and segments.

Yuta got into this Expansion stage when he was 3 months old. At this stage, he started to "talk" more frequently than before. Then, at the age of around 4-5 months, his voice became diversified even more. In this stage, He produced full vowels, raspberries, squealing, whispering, yelling, and marginal babbling exactly as Oller (1980, 2000) finds. Those sounds were often produced as sound play, but by analyzing his vocalization carefully, we noticed that he made some particular kinds of sound for the particular situation. For example, Yuta produced full vowels when he talked to himself or made a conversation with someone. In (5), Yuta "talked" to his father with full vowels, and in (6), he produced full vowels when his mother talked to him.

(5) (Yuta talks with Father.) (3 mth 26 d.)

Y: [a:→a:→au a:→a:→uku:→a:→]

(6) (Yuta is in his baby chair. Mother talks to Yuta.) (3 mth 27 d.)

Y: [a:→u:→a:→a:→↑a:→a:→↓a:→]

(7) is an example of growling. Yuta produced the vowel sequence, when he felt good or he found something interesting. At the age of 4 months 13 days, we observed him producing growling as shown in (7). In (7), Yuta tried to touch the dishes on the table.

- (7) (Yuta tries to touch the dishes on the table.) (4 mth 13 d.)  
 Y: [ua:→ua:→]

On the other hand, when he was frustrated or angry, he produced yelling as shown in (8). In (8), he is lying by his grandmother, and started yelling because he wanted to be held up.

- (8) (Yuta wants to be held up.) (4 mth 12 d.)  
 Y: [ua:→na:→↓a:→↓a: →↓→na:→]

Whispering was vocalized when he felt good. His father talked to Yuta, who was in a very good mood. Then, Yuta produced whispers as in (9).

- (9) (Father talks to Yuta.) (4 mth 5 d.)  
 Y: [a:→a:→]

Oller (1980) mentions that the vocalization types of this stage changes radically from day to day. As Oller (1980) finds, in the case of Yuta also, the day-by-day-change was observed. At the middle expansion stage, around 4-5 months, he produced various sounds such as growling, yelling and whispering, but as time went by, some sounds such as growling and whispering disappeared. However, at around 6 months, whispering was observed frequently again, and he started to produce raspberries and marginal babbling.

At the end of his Expansion stage at around 6 months of age, he vocalized marginal babbling such as [ma n ma: / mya n ma: / ma: ]. Marginal babbling refers to a string of vowels such as [a: a:]. These sequences are not reduplicated and do not have regular timing to the syllables, unlike the babbling at the later stage or canonical babbling. Analyzing his productions, we noticed that he produced it when he needed his mother's assistance desperately. For instance, he produced it when he really wanted to drink his mother's milk.

It should be noted here that [ma n ma: / mya n ma: / ma: ] resembles the sound of [ma n ma], which means 'food' and/or [ma ma] meaning 'mother' in Japanese. Among Japanese-speaking infants, it is widely known that [ma n ma] or [ma ma] is a common first word that the Japanese-speaking infants produce. Therefore, it is plausible to conjecture that it is a one-word utterance referring to the food or the mother. However, we consider the one we observe in this stage is still one of the marginal babbings, which contains nasal sound as he has not started any other one-word words.

## 2.4. The Canonical Stage

The fourth stage, or the Canonical stage, is usually identified with the onset of babbling. This stage is characterized by the production of reduplicated sequences. Typically, a string of consonants and vowels such as [ba ba ba] or [da da da] are produced.

Yuta got into this stage at the age of around 7 months, and he is still at this stage right now (8 mths 20 d.). Observing his vocalization carefully, we noticed an interesting fact: The mastering of canonical babbling goes step by step. We could videotape the process of acquiring canonical babbling as shown in (10) and (11). In (10), first, Yuta vocalized labial, [b: b:], which is termed the sound of raspberries in Oller (1980, 2000), and he repeatedly opened and shut his mouth. Then, the next day, he mastered the canonical babbling, [ba ba ba] as shown in (11). In the context of both (10) and (11), he was in a very good mood.

(10) (Yuta sits in his baby chair.) (6 mth 5 d.)

Y: [b:b:b:]

(open and shut the mouth)

(11) (Yuta stands in his bed.) (6 mth 6 d.)

Y: [bua:bababa babababa:ba:]

As mentioned in 2.3, the sound of infant speech also fluctuates everyday in this stage. Sometimes [ba ba ba], sometimes [da da da], and sometimes it equips intonation contour.

## 3. Intonation and Gestures

### 3.1. Intonation

Intonation is one of the properties of “language” that children show before the onset of adult languages. Menn (1975) reports that babbling equips intonation contours, and many children make requests and rejections with intonation contours carried by babble-sequences. de Boysson-Bardies and Vihman (1991) reports that babbling equips intonation contours which are compatible with the language around them by 10 to 12 months of age. As mentioned in 2.2, our subject Yuta started employing intonation and gestures in Primitive Articulation stage. In this section, we are going to discuss the function of those properties, specifically intonation and gestures.

#### 3.1.1. Intonation in Babbling and One-Word Utterances

Nakatani (2005), based on her longitudinal observation, reports that her subject Niko made proper use of the intonation of babbling and one-word utterances depending on the intended sentence types. Niko’s verbal behavior was characterized of her long Variegated Babbling stage. From 1:3 through 1:8, despite the fact that she understood the parental speech very well, her utterances were very much limited to the variegated babbling such as [a, a, a],

and her one-word was very few in number until 1:8. It was only after 1:8 that she started producing one-word utterances. Nakatani (2005) discusses that the babbling and one-word utterances of Niko were associated with the rising intonation contour for request and demand; while lowering intonation contour was associated with the declaratives. For example, in (12a), Niko asked a question using babbling with rising contour, and in (12b), she replied with the falling contour because at that time she was satisfied with the answer that the mother gave. Arrows indicate the intonation contours.

(12) (Niko (=N) is reading a picture book with mother (=M). She sees a page with a lot of washing hanged out on the line.) (1 yr 7 mth)

a. N: [a↑a↑a↑a↑] + (points to a pair of socks in the book)

M: Kutsushita da yo. Kore ga Nena-tyan no. Kore ga Niko-tyan no.  
 socks -Cop this-Nom Nena's this-Nom Niko's

‘This is a pair of socks. This is Nena’s, and this is Niko’s.’

b. N: [a:↓a:↓a:↓a:↓]

c. N: [a↑a↑] + (points to a doll in the book)

M: Kore wa Niko-tyan no oningyoo.  
 this-Nom Niko's doll

‘This is Niko’s doll.’

d. N: [a↑a↑] + (points to an apron)

M: Kore wa Aa-tyan no epuron.  
 this-Nom Aa-tyan's apron

‘This is Aa-tyan’s apron.’

e. N: [a↑a↑] + (points to a pair of trousers)

M: Kore wa Aa-tyan no zubon.  
 this-Nom Aa-tyan's trousers

‘This is Aa-tyan’s trousers.’

f. N: [a↑a↑] + (points to a swimsuit)

M: Kore wa Aa-tyan no mizugi.  
 this-Nom Aa-tyan's swimsuit

‘This is Aa-tyan’s swimsuit.’



- g. N: [a:↓a:↓a:↓a:↓]  
[a:↓a:↓a:↓] + (points to a pair of socks)

The pattern of intonation in single-word utterances is almost parallel with that of babbling. Again, Niko was reading a picture book with her mother in (13). In (13a), Niko wanted to ask whether or not those socks belong to Nena, her sister, and Aatan, her mother. In this case, her intonation contour was upwards. However, in (13b), since her mother replied Niko's question, Niko was satisfied with her production. Then, her intonation contour was downwards in (13b). The line shows the intonation contour.

(13) (Niko is reading a book.) (1 yr 10 mth)

- a. N: [nena] (=sister's name) [a: tan] (=mother)  
[nn:↑nn:↑] + (points to a pair of pants in a book)

M: Aa-tyant to onaji.  
Aa-tyan and same

'It is the same as Aa-tyan's pants.'

- b. N: [ne \na] [a: \tan]

- c. N: [nn↑nn↑] + (points to a swimsuit in a book)

M: Mizugi da yo.  
swimsuit -Cop

'It is a swimsuit.'

Puuru de kita desho.  
swimming pool at wore -Cop

'You wore it in the swimming pool.'

- d. N: [pu/ u] [pu/ u] (= swimming pool)

- e. N: [ji: /ji] (=grandpa) + (points to an underwear in a book)

M: Jiji no pantsu.  
grandpa's underwear

'Yes, it's Jiji's (=grandpa's) underwear.'

In questions, the subject raised her intonation contours. In contrast, in the production of statement with satisfaction, the intonation contour fell. At the stage where the sentences are not verbally syntactically structured, in the utterances in babbling and one-word stages, infants represent their request or satisfaction controlling the intonation. Murasugi and Nakatani (2005) present a further analysis for the questions and requests in the babbling and

one-word stages, and find that they are associated with the specific (rising) intonation. They propose that the intonation carries the function that functional categories eventually take care of in the adult grammar.

### 3.1.2. The Vocalization in Precanonical Stage

Although Nakatani (2005) and Murasugi and Nakatani (2005) report the use of intonation in babbling and single-word stages, we find that intonation as a linguistic marker actually appear much earlier. As we have mentioned in 2.2, we found that utterances in the Primitive Articulation stage and the Expansion stage are already associated with intonation and gestures. Depending on the intended meaning, we found that there is a specific pattern in the usage of intonation and gestures. Vocalizations for request are at high-pitch accompanied by some reaching gestures and tongue pressing out. (3) is one of the examples of vocalization for request, which is repeated below.

(3) (Yuta wants to drink mother's milk.) (1 mth 5 d.)

Y: [a↑ a↑ a↑ a↑ a: a↑ a↑ a↑ a: a:] + (reaching gesture, pressing tongue out)

(14) and (15) are also the examples of which intended meaning are request. In (14), he was asking for mother's milk, and in (15), he wanted to be held up from his bed, or drink mother's milk. Both vocalizations contain the same properties as shown in (3), i.e., high-pitch, reaching gesture and tongue pressing out.

(14) (Yuta wants to drink mother's milk.) (1 mth 2 d.)

Y: [a↑a↑a↑a↑a: a↑a↑a↑a↑a: a↑] + (reaching gesture, pressing tongue out)

(15) (Yuta wants to be held up or drink mother's milk.) (1 mth 12 d.)

Y: [a:↑a↑a↑a:↑a↑a↑a↑a: a↑] + (reaching gesture, pressing tongue out)

On the other hand, when Yuta produced declarative utterances in the situation such as talking with his father, the strings were associated with low-pitch, and he hardly moved his arms. (16), (17) and (18) are some of the observed data indicating such situation. The example in (16) was recorded when Yuta was at the age of 2 months and 16 days. Yuta was staying with his mother at first, but when she left, he started to produce full vowels at high pitch and started moving his arms, since he did not want to be left alone. The example is shown in (16a). Then, when his father came along and talked to him, he started to vocalize at low pitch and stopped moving his arms as in (16b).

(16) (Yuta is lying on a cushion.) (2 mth 16 d.)

a. M: Yuta, okaasan hanare chauyo.

Yuta mother leave -Cop

'Yuta, mother is leaving.'

Y: [a:→a:→a:→ua:→a↑a↑a↑a↑] + (hand-moving)

b. F: Yuta. (Father coming)

Y: [ua:→a:→a:→a:→]

Compare (16a) with (16b), (17) and (18). In (17) and (18), he is talking with his mother. His vocalizations were low-pitched, and he did not use any gestures.

(17) (Yuta is talking with mother.) (2 mth 29 d.)

Y: [u:→u:→aue:↑u:→u:→u:→]

(18) (Yuta is talking with mother. Mother asked him what they did that day.) (3 mth 23 d.)

Y: [a:→a: u:→au:→a:→a:u:↓]

To the observer, it seemed that Yuta uses different pitch patterns depending on his intension. Interestingly, the variety of intonation disappeared as he grows and acquires new ways to express himself after about 4 months. Now, at 8.5 months old, he makes a request with gestures (mainly by reaching his hands) and crying, stamping the floor. These findings are not necessarily compatible with Nakatani's (2005) observation that the vocalization at the early acquisition stage has intonation patterns depending on the intended sentence types. However, if intonation is truly innate language properties, Yuta's intonation patterns should remain in his vocalizations as Nakatani's (2005) findings. We will continue observing our subject and see how he uses intonation.

### 3.2. Gestures

It has been found that children use gestures instead of lexicons at the pre-verbal stage. Caselli (1990), for example, investigates the child's communication with gestures and the relation between the child's gestures and languages. He states that the deictic gestures are context-bound, while the referential gestures contain semantic content which does not change the meaning depending on the context. Acredolo and Goodwyn (1988) also propose that symbolic gestures are equivalent to the vocalization in the early language development.

Pettito and Marentette (1991) state that deaf infants produce the manual babbling. The similarities between manual and vocal babbling suggest that there is a unitary language capacity that underlies the signed and spoken language acquisition. Therefore, it is plausible that hearing infants at pre-verbal stage use gestures as "language" which corresponds to adult vocal lexicons.

#### 3.2.1. Referential Gestures

Nakatani (2005) reports that her subject also used gestures very early to convey linguistic meanings. For example, her subject expressed her pleasant feeling by hugging-gesture at the age of one year and seven months as shown in (19). In (19), Niko was eating jelly, and when a researcher asked whether or not the jelly tasted good to Niko, she

replied to the question by giving hugging-gesture to the mother and the researcher.

(19) (Niko is eating jelly.) (1yr 7 mth)

Researcher: Niko-tyan oishii no?  
                   Niko-tyan delicious -Cop

‘Niko, is it good?’

(Niko hugged the shoulder of her mother first, and then hugged the shoulder of the researcher.)

Since caregivers tend to use gestures when they talk to children, it is natural for children to perceive gestures linguistically meaningful. However, the forms of gestures Niko used were not the imitation of her caregivers. Rather they were unique to Niko. Therefore, the gestures are not considered to be the imitation. Niko created them herself.

In our study, a referential gesture was observed at 7-month-old. He clapped his hands when he was pleased. (20) and (21) are the examples of referential gestures that Yuta made. In (20), Yuta was playing with a chestnut with his mother. When Yuta took the chestnut from his mother’s hand, he clapped his hands, smiling. Then, in (20), Yuta was playing with his mother again using a ball, clapping his hands.

(20) (Yuta is playing with a chestnut with mother.) (7 mth 3 d.)

Y: (taking a chestnut from mother and clapping his hands)

(21) (Yuta is playing with a ball with mother.) (7 mth 4 d.)

Y: (clapping his hands)

In Yuta’s case, his caregivers clapped their hands, whenever he achieved some new things, for instance, rolling over, or when he did some good things. Hence, it is plausible to consider that Yuta just imitated the gesture that his caregivers made. Indeed, the form of his gesture probably based on the input that his caregivers gave.

However, the way he used it was different from the caregivers’. The caregivers clapped their hands only when they praised him for his achievement. In contrast, he clapped his hands spontaneously whenever he was pleased. In addition, he patted the person or the object around him when he was pleased at around 8 months. He patted the table when he ate, or he patted his parents on the shoulders or the legs when he nestled them. By those gestures, he seemed to express his pleasant feeling or his affection. Note here that his caregivers patted him on the back or the shoulders when they tried to sooth him, but they never patted the table when they showed their pleasant feeling. The form of his gesture in those contexts was unique to him. Therefore, we consider that the gestures above were not imitations, but his original ones. Although the form of his gestures might have been partly perceived in the input by Yuta, he created his own gestures as meaningful signs by himself as Nakatani’s (2005) subject Niko showed.

#### 4. Conclusion

In this paper, based on a longitudinal observational study of a Japanese-speaking child from 1 month 3 days till 8 months 20 days of age, first, we proposed the parallel order of sound acquisition and the types of speech sound with Oller's (1980, 2000) observation. We also found that two-month-old infant could imitate several variation of vocal pitch as Kessen, et al (1979) and Masataka (1992) report. We also presented a longitudinal report that intonation and gestures are employed at a very early stage of language acquisition. In particular, we proposed that the control of pitch and the use of gestures for request are observed even in the Primitive Articulation stage.

As the child develops, the way of representing request seems to change. It seems that Yuta, who once used intonation in 2 to 4 months frequently, stopped using intonation for making request at around 4 months. At present (8.5 months, the Canonical Stage), he does not use intonation to make a request either. After the intonation contour "disappeared" in his speech, in 2 months through 8.5 months, he actually stretched his hands toward the objects that he wanted to get. Because of the "exploration" of gestures and various kinds of sound available to the babies, the use of intonation may disappear temporarily to convey the meaning of request, which used to be marked by the intonation at the Primitive Articulation stage.

Recall here that Nakatani (2005) and Murasugi and Nakatani (2005) discuss that the vocalization of her subject, Niko, employs intonation depending on intended sentence types in canonical and one-word stage. Given their observation and analysis, we expect that our present subject, Yuta, might also start to use intonation again for making a request, as Niko did. We will leave this possibility for our future research. To attain the full understanding of the strong continuity of language acquisition and the variation in the nonverbal/verbal realization, we will keep observing our subject Yuta carefully from now on too.

The research of Infants' speech is difficult, partly because it is hard to establish the basic common linguistic unit among the researchers. Oller (2000) discusses that there are cultural differences found in the treatment of the categorization of sounds and the interpretation of the infants' intended communicative functions. He also indicates the potential lexical ambiguities of those terms and imperfection in translating them.

(22) Table 3 Terms for a Few infant Sounds in Six Languages (Oller 2000)

English	Spanish	French	German	Chinese (Mandarin)	Czech
Cry	Lloro	Cri	Schrei	Ku(1)*	Křik
Laugh	Risa	Rire	Lachen	Siaw(4)	Smich
Goo	Gorgojeo	Roucoulement	Gurren	Tsitsigugu(1)	Vrkat
Squeal	Chillido	Cri aigu	Quietschen	?	Pistěni
Growl	Gruñido	Grognement	Brummen	How(3)	Mrčěni
Raspberry	Trompetilla	Faire pfft	Prusten	?	Prskani
Babble	Balbuceo	Babillage	Plappern	Yaya(1) Such(2), Yi(3)	Žvatlani

\*tones according to the Mandarin standard: 1=high/flat, 2=rising, 3=dipping, 4=falling, 5=light

Observe Table 3 in (22), for example, Raspberries and Squeals are very short terms in English. However, in Mandarin Chinese, Raspberries and Squeals are described in long phrases. They are not represented by common simple terms, unlike English. “Growl” is termed “Gruñido” in Spanish, but “Gruñido” is often used to mean to grunt as well as to growl. The lexical meaning of “Growl” in English does not exactly correspond to “Gruñido” in Spanish. Thus, it is inevitable that the categorization or the interpretation of the infant vocalization tend to be influenced by the background of each researcher.

The paper presented here is an attempt to make a comparative speech study of the very young English- and Japanese-speaking infants. Despite the potential problem discussed above, however, if our study correctly describes the infants’ speech, then, the fact that Japanese- and English-speaking children take the same route in the “exploration” of sounds is mysterious and interesting. Despite the differences of the social background and the order of input the infants receive, each infant “explores” the same sounds in the same order. If our findings provide a piece of evidence for the cross-linguistic parallelism in the very young infants’ vocalization and gestures, then, it would indicate that the pre-verbal mechanism is also programmed in human beings, thereby supporting the innateness and universality of linguistic knowledge.

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