

## **Enhancing Intentional Expression in Children with Severe Motor and Intellectual Disabilities**

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### **Abstract**

Children with severe motor and intellectual disabilities (SMID) lack overt behavioral responses in their interaction with caregivers. However, in a 6-year-old subject with SMID, we observed different phonations under different situations. As a result of an acoustic analysis, these phonations were classified into five types according to the basic frequency pattern. It was also found that there was a one-to-one correspondence between the phonation type and the care-giving context, which in turn triggered specific primitive behaviors on the part of the subject, such as laughing, turning their eyes on the caregivers and gasping. Given that human emotions and intentions underlie these primitive behaviors, the aforementioned results of our study are suggestive of the idea that children with SMID differentiate phonations for the purpose of expressing specific emotions as well as intentions. Accordingly, it is claimed that the phonation is a key for the development of intentional expression in children with SMID.

### **Introduction**

Children with severe motor and intellectual disabilities (SMID) do not express overt behavioral responses to caregiver interventions. To facilitate the development of children with SMID, it is critical that caregivers provide various expressive cues consistently and continuously in their interactions with SMID acquire intentional expression. In particular, the role of a caregiver in enhancing intentional expression is important. However, there are few concrete findings on a child with SMID and a caregiver interacting, and there are many unidentified points. For infants, there are many studies that mention this (e.g. Trevarthen, 1969; Kaye & Brazelton, 1971; Stern, 1974; Kaye, 1977; Schaffer, Collis, & Persons, 1977; Lock, 1980; Schaffer, 1984; Murray & Trevarthen, 1985; Ginsburg & Kilbourne, 1988; Cohn & Tronick, 1988).

The problem of how an infant learns communication intentionally is very difficult. It is apt to be considered that the development of intention is a joint effort of the infant and parents. Newson (1979) insisted that an infant becomes a person by reason of being treated as a person. A neonate is programmed biologically for behavior in various ways, and they can cope with communication in this sense (Brazelton, 1979). A parent is apt to give early behavior a social meaning. Neonates gives a 'signal' that reflects their state, but such a signal is not directed toward somebody. However, a parent assumes that it pointed to them and treats it accordingly and the neonate is led to a state of intentional communication (Chappell & Sander, 1979). It is assumed that

intentional communication really develops from these facts. Looking at this opinion, it is persuasive but slightly vague. A parent thinks an infant had an intention, but it is not clear how intentional real behavior of an infant will change by such treatment in the future. "What kind of meaning is it to be intentional?" This is important.

Lock (1980) finds "intention" as an act that influences the behavior of other people. In a child with SMID, the behavior expression is poor, and intervention by a caregiver to promote "intention" is necessary. The reason why we pay attention to the phonation behavior of a child with SMID is as follows. The phonation change is poor, but it attracts the attention of the caregiver as a strong stimulation and tends to bring a prompt effect. Phonations of infants are primitive and tend to be undifferentiated, but are reinforced by the immediacy of the effects. The type of phonation may be formed at a comparatively early stage. A caregiver may and must recognize a more social secondary need by reacting well to the phonation originating from a primary need of the infant.

We preliminarily examined the process mentioned above. The items examined were:

- (1) Characteristics of phonations observed in a certain subject with SMID; Are there any differences between them?
- (2) When there is a difference in each phonation, in what kind of situation does it appear? We investigated a phonation and its relationship with a demand.
- (3) Does the subject express a phonation "on purpose"?

### **Methods**

The subject for the observations was a 6-year-old female with SMID. She suffered from viral brain inflammation at age 2 years ten months. Thereafter she had severe motor and intellectual disabilities, and help was necessary for everything in everyday life. Her overt behavior is poor, and there is no useful way to convey intention. It is difficult for a caregiver to understand her intention.

As a result of a development examination, understanding words was equivalent to the ability of a seven-month-old infant. Similarly, phonation and articulation: 6-months, communication skill: 7-months, movement: 8-months. This was based on the Japanese Enzyouji style development standard. About visual and auditory perception, she followed a horizontally moving lamp and when her name was called, she turned toward the sound source.

The following approach was employed in the study. In observation 1, two sets of observational data were collected: Phonations and overt behavior in her interaction with caregivers. We collected phonations that occurred in various care-giving contexts of everyday life. The contexts for various life scenes, such as taking a meal, playing, going out, and training. The caregiver did an intervention while judging the reaction of the subject. The judgment of the caregiver was given on the basis of the behavior each time.

These phonations were recorded to magnetic tape and overt behavior that appeared with each phonation was recorded on videotape. A basic frequency pattern for each phonation was determined by acoustic analysis. These phonations were classified according to a basic frequency pattern. Otherwise, behavior was transcribed by a

check list method and a chronological order method. Furthermore, we later asked the caregiver about the purpose of an intervention while watching the videotape of the intervention.

In observation 2, we collected data on the phonation and overt behavior of the subject when she was put in two situations that we set; (1) She was left alone in a room and (2) the caregiver was inside the room but not intervening. A record and analysis of data was similar to observation 1.

## Results

### *Observation 1.*

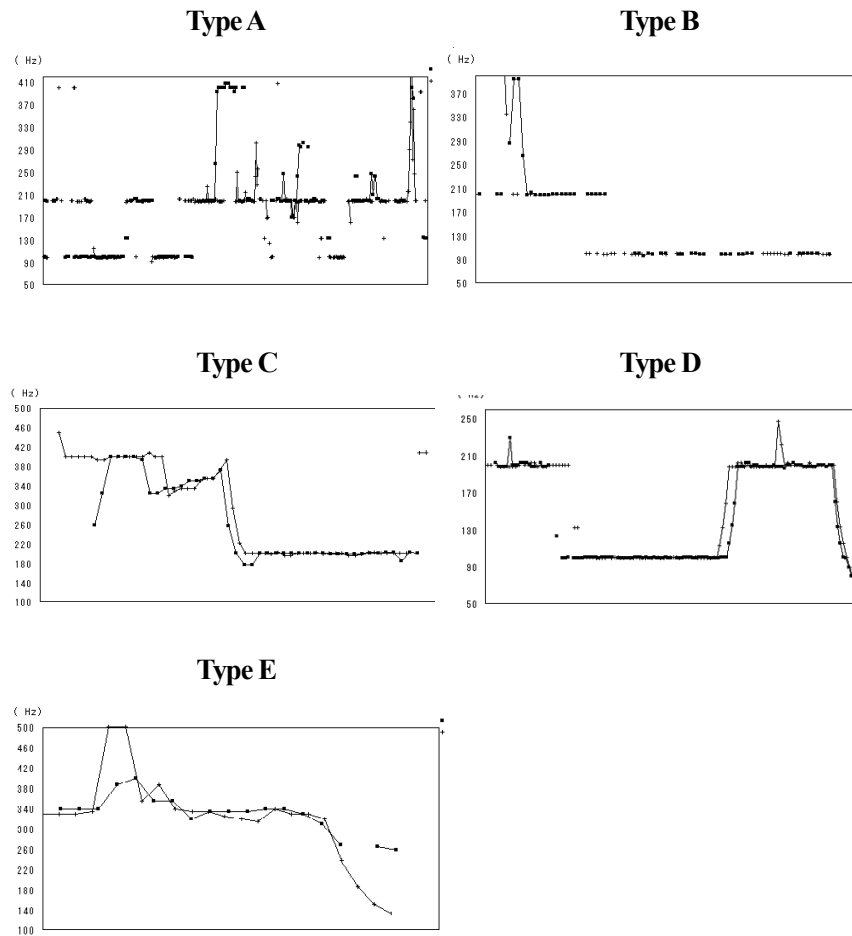
*(1) For plural phonations, was it different or was it the same? In what kind of situation did these phonations appear?*

The caregiver intervened in various situations of everyday life. We observed their interaction and found different phonations under different situations. Eighty-one phonations were recorded, and these were classified by hearing impression. In an acoustic analysis, these phonations were classified into five types according to basic frequency pattern. Figure 1 shows the basic frequency pattern of phonations, and displays two patterns with the same two phonations in a hearing impression. The classification by acoustic analysis agreed with the hearing impression. From these results, it was clear that the subject had five different phonations.

Next, we examined situations where these phonations appeared (Table 1). This table shows the relationship between a phonation and a situation. The number in the table is the appearance frequency of a phonation. The following are situations where the phonation of each type was expressed. Phonation type *A* emerged 20 times in a playing situation. When tickled or moving on a trampoline, this phonation was often emitted. The caregiver approached the subject and talked and, at this time, we were able to hear the phonation type *B*. When the subject was waiting for a meal, phonation type *C* appeared. Phonation type *D* was expressed in a situation where she was kept waiting after eating only a small quantity. When the subject was touched on her face powerfully, phonation type *E* was emitted. The type of phonation and the expressed situation showed a one-on-one correspondence. In particular, phonation type *D* appeared in two situations related to a meal, however, the appearance frequency was different.

*(2) What was the relationship between the phonation and the expression intention?*

Close correspondence was found between the phonation type and the situation as stated above. Therefore we investigated an overt behavior expressed with a phonation (Table 2). It was also found that there was a one-to-one correspondence between the phonation type and the overt behavior, which in turn triggered specific primitive behaviors on the part of the subject, such as laughing, turning her eyes to the caregivers and gasping. The chain of these overt behaviors allowed the caregiver to easily judge the intention of a subject. The expression intention of each phonation was based on the primary need except for type *B*.



**Figure 1.** The Basic frequency pattern of the phonation in the subject.  
These shows stack of two samples every type.

**Table 1.** Relationship of each phonation and the appearance situations.

Situations	The type of phonation				
	A	B	C	D	E
Paying with caregiver.	20				
Playing alone.		13			
Waiting a meal.			16		
Waiting after having eaten a mouthful.			4	17	
Be painted a face with medicine.					11

In observation of a fixed period, we expressed the number of times that each phonation appeared.

**Table 2. Relationship of each phonation and appeared overt behaviors.**

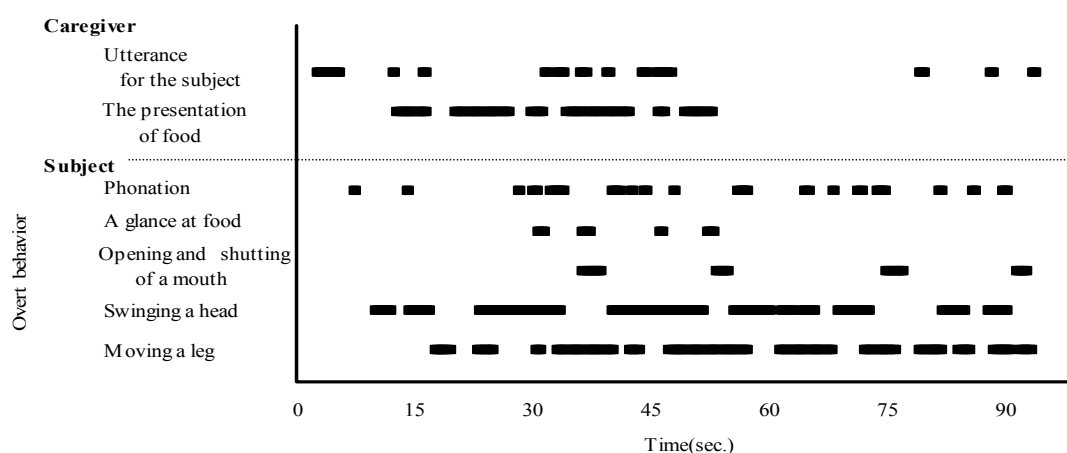
Overt Behaviors	The type of phonation				
	A	B	C	D	E
Laughing. (Laughter)	■				
Smiling.	■		■		
Turning their eyes on the caregivers.		■			
Turning their eyes on the meals.				■	
Opening and shutting of the mouth.			■	■	
Saliva oozes.				■	
Sucking a finger and clothes.		■			
Movement of the hands and the legs.		■	■	■	
Swinging the head from side to side.		■			
Shutting the eyes tightly.					■
Turning the face away.					■
Pushing caregiver's hand away.					■

A black quadrangle in a figure shows an appearance of the behavior concerned.

### Observation 2.

#### (3) Did the subject use a phonation as an 'intentional' means?

We examined whether the subject used a phonation intentionally. First, we examined the timing when a phonation occurred when the subject and the caregiver were interacting (Figure 2). This figure shows the timing of both the phonation and the overt behavior when waiting for a meal. The black square in the figure shows the time when each phonation and each overt behavior was expressed. Overt behavior by the caregiver triggered it, and caused overt behavior by the subject. The caregiver returned with overt behavior based on the overt behavior of the subject. In this way the caregiver interacted with the subject.



**Figure 2. A behavior aspect of the subject in the situation waiting for a meal.**

Figure 3 shows the overt behavior of the subject in two situations. According to this, the subject had few overt behavior repertoires. When we compared the result in the two situations, the kind of the overt behavior was the same. However, in the situation where the subject was left alone in the room, the subject tended to look in the

direction of the source of the voice or sound from a person outside the room. The appearance frequency of a phonation was low in both cases and there was no human factor difference between them. We show the time relation of the appearance of each overt behavior in two situations in Figure 4. The overt behavior of looking in the direction of the source of the voice or sound from a person outside the room was stable in both situations. The longer she was left alone, the more conspicuous the overt behavior. Particularly in the situation where she was left alone in a room, she looked in the direction of a voice or sound from a person outside the room and continuously searched for the sound source after the sound disappeared. However, a phonation did not appear with the combination of the overt and search behaviors mentioned above.

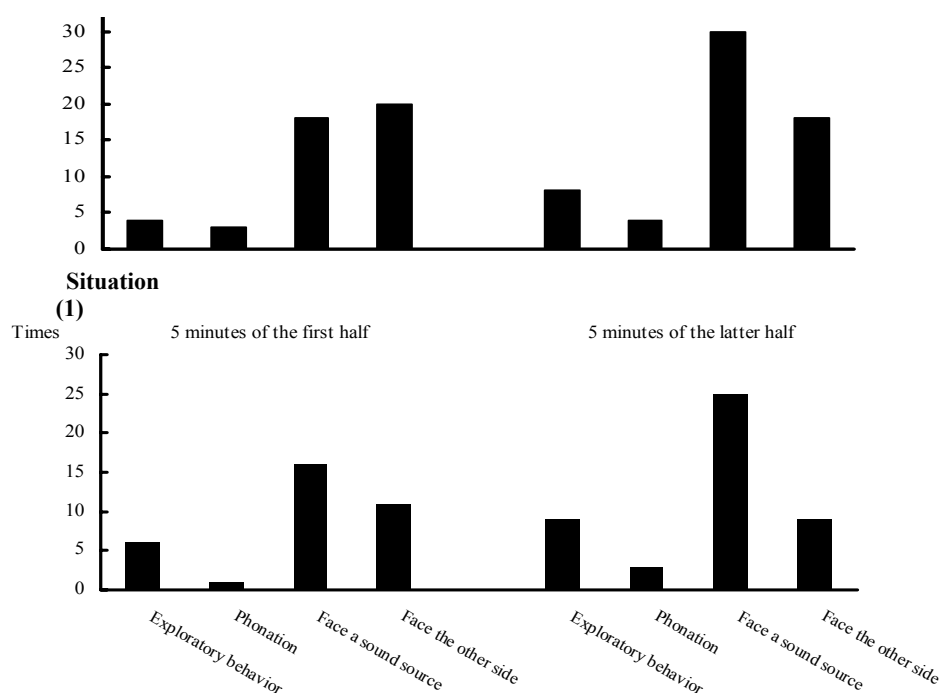
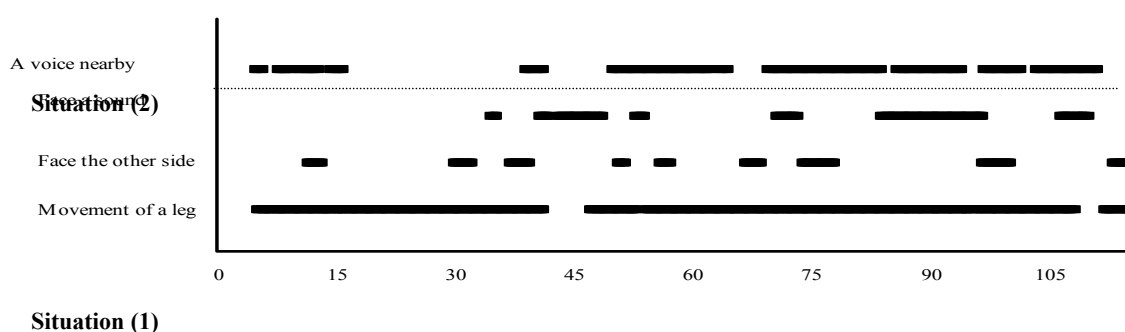
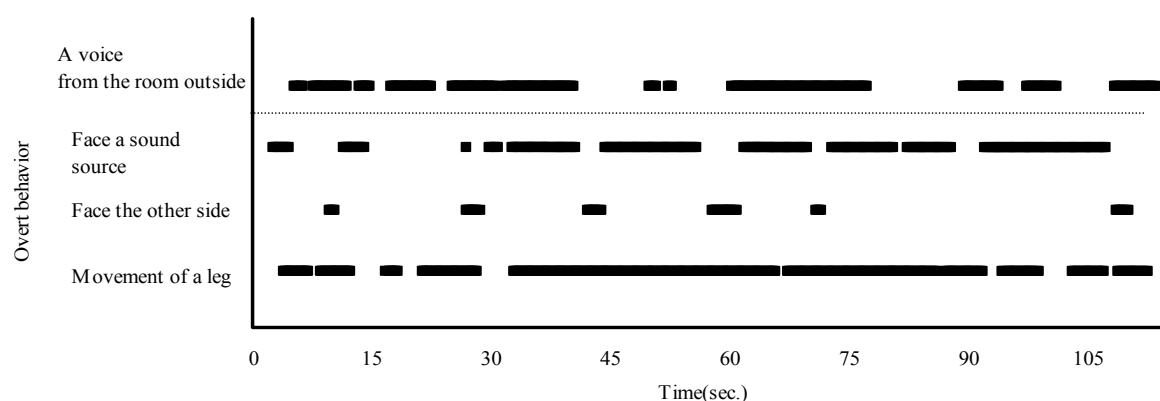


Figure 3. The behavior numerical comparison which appeared in two situation.





**Figure 4. Comparison of a behavior aspect to a sound source in two situations.**

Situation (1): the subject was left alone in a room.

Situation (2): the caregiver was inside the room but not intervening.

## Discussion and conclusions

In this study, we transcribed the sound that a subject expressed into a phonation. The phonation was classified as one of five types. Therefore, the phonation was articulated precisely. We emphasize the significance of the development of an articulated phonation by the following points. An early phonation is tied to a strong primary need and emotion from birth.

(1) When comparing the articulated phonations with other phonations for denotative effects, a phonation which is not articulated, cannot create a differentiation corresponding to a quickly differentiating recognition and need, because of their characteristics. That is, phonation which is not articulated cannot have the variety of sounds which will serve as language sign media. (2) Such phonations are combined with strong primary needs and strong emotions from birth. This combination is rarely cancelled or changed, so that it cannot be combined with a symbolic process. Because the combination between what denotes and what is denoted in the symbolic process should be learned and freely exchanged. An articulated phonation develops and changes into a phonation with a material and a symbolic side. Only this articulated phonation can differentiate and symbolize a phonation which can conform to recognition, emotions and needs of a child that are quickly differentiated and become complicated. However, the articulated phonation is enough linguistic aptitude from the first. The most primitive articulated phonation is considerably restricted by respiratory movement, and the articulated process advances gradually. Some phonations are produced by incidental activities of the phonic organ at the time of phonation. A diversified phonation under respiratory movement means that phonation becomes independent from respiratory movement and emotions, and stabilizes. Phonations of types *B* and *C/D* observed in this study are interesting from this point. It can be considered that a phonation of type *B* was not restricted by a strong primary need, viewed from the situation and activity characteristics at the time a phonation appeared. From the standpoint of symbolization, the subject may express some differential meaning through this phonation. We can suppose that both phonation types *C* and *D* expressed a primary need of hunger. But, there is a difference regarding the strength of a primary need between them. Type *D* was connected with a strong primary need, although type *C* was not. Thus, type *C* was considered to be

phonation produced from the articulated Type D. In this way, it can consider that a child with SMID can differentiate their phonations. Rheingold, Gewritz, and Ross (1959) experimentally showed that a phonation articulated by social reinforcement became active. From this result, it can be supposed that intervention by a caregiver is important.

There are many studies on the initial interaction between an infant and caregiver, and also various points of view to explain the interaction; therefore, we mainly studied control of an order change in an interaction. We examined the time relation where a behavior appeared in an interaction between the subject and caregiver. In the change between the caregiver and the subject, the subject participated in a way to react to the communication activities of the caregiver. The subject's activities cannot necessarily be judged to be intentional regarding influences by the caregiver. In fact, the subject had a strong tendency to look forward to a person's intervention, but the behavior which transmitted this intention did not appear. A subject looked at a caregiver when the caregiver made a sound, but the subject did not attract the attention of the caregiver by her phonation. The subject has plural phonations, but it is thought that these did not serve as an intentional means of communication at the time. What are the key points which change activities that are already acquired into intentional interactions? There is a model regarding the mechanism of how an infant acquires verbal communication ability. Lock (1980) took "a crying infant" as an example. According to his opinion, "a crying infant" means "desire" and there is no doubt that the infant cries to convey their need to another person. Actually, an infant does not know what the need is at first. When an infant bursts into tears, the mother treats it as an act that the infant wants to have the mother satisfy a need. When a need of an infant is satisfied, the infant stops crying, and this is a clue to satisfaction. Until then the mother works on trial and error. A mother lifts a thing that an infant wants, and a crying infant stops crying. It becomes that crying has an influence on the behavior of other people.

It is important to focus on an intervention and a common process about each other's intention. We think it will be a key that a novel disagreement produces a stable common process. A caregiver must distinguish the levels; achievement by the subjects themselves and achievement in cooperation with a caregiver. On the other hand, also it is significant that a caregiver sets a goal slightly higher than the subject's individual level. It is important to clarify the combination of the caregiver's sensibility to the subject's ability with the unconscious tendency to interpret the situations and activities of the child. It is not clear whether a caregiver consciously carries this out. We will consider this point in further studies.

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