



Research on the Characteristics Evaluation of Communication Skills of Persons with Developmental Disability

**-Development and Trial of Test of Emotion Recognition
by Facial Expressions and/or Tone Expanded version-**

(Research Reports No. 119) Summary

[Keywords]

Developmental Disability communication test

[Usage of this report]

At workplaces, we need to infer not only clearly expressed emotion, but also more complicated and ambiguous emotion from tones and faces. In this research, we developed expanded version of test of emotion recognition by Facial Expressions and/or Tone to evaluate the characteristics of persons with developmental disability when they judge other persons' pleasantness from ambiguous prosodic or facial expressions. We can use this report as a material to clarify the criteria for the evaluation of communication by persons with developmental disability and issues of support to them.

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2 Study Period

FY2012 to FY2013

3 Composition of the research report

Preface: Problems of support to communication by persons with Developmental Disability

Part 1: Development of test of emotion recognition by Facial Expressions and/or Tone
-expanded version-

Chapter 1: Development of test of emotion recognition by Facial Expressions and/or Tone -Expanded version-

Chapter 2: Study on the test characteristics of test of emotion recognition by Facial Expressions and/or Tone -Expanded version-

Part 2: Characteristics of emotion recognition in persons with Developmental Disability

---Study based on test of emotion recognition by Facial Expressions and/or Tone

Chapter 1: Summary of understanding of emotion words, frequency of emotional experience and facial emotion recognition by persons with Developmental Disability

Chapter 2: Characteristics of persons with Developmental Disability based on the results of test of emotion recognition by Facial Expressions and/or Tone -Basic version-

Chapter 3: Characteristics of persons with Developmental Disability based on the results of test of emotion recognition by Facial Expressions and/or Tone -Expanded version-

Part 3: Problems and support to communication skills of persons with Developmental Disability

Chapter 1 Study of stress of human relationship

Chapter 2: Problem of support to persons with Developmental Disability ---based on the results of hearing survey

Summary

Materials

4 Background and Purpose of Research

Communication characteristics evaluation (for example, evaluating whether emotions are judged more accurately from facial expressions or tone of voice) provides useful information for support and guidance because difficulties in emotion recognition from the tone of voice and facial expressions by persons with Developmental Disability have been indicated. National Institute of Vocational Rehabilitation developed test of emotion recognition by Facial Expressions and/or Tone -basic version-(F&T -Basic-) as one of the methods to evaluate communication skills. This test is to evaluate the characteristics of persons with Developmental Disability when they infer the basic emotions (joy, sadness, anger, dislike) from clearly expressed tones and faces. It is, however, necessary to have a test to evaluate their characteristics when they infer the emotions of others from ambiguous expressions because emotions are often expressed ambiguously at workplaces.

In this research, we developed " test of emotion recognition by Facial Expressions and/or

Tone -Expanded version- (F&T –Expanded-)" to evaluate the characteristics of persons with Developmental Disability when they judge the emotions of others from ambiguous tones and faces. We evaluated the characteristics of communication skills of persons with Developmental Disability using the tests.

5 Method

- (1) Survey for the development of the test (F&T -Expanded-)
- (2) Survey for the establishment of reference value of the test (F&T -Expanded-)
- (3) Trial of characteristics evaluation of communication skills of persons with Developmental Disability using the test (F&T)
- (4) Examination of issue of support to communication of persons with Developmental Disability based on hearing survey

6 Summarized Results of the Study

(1) Survey Method and Details

a. Survey for the development of Expanded version of the test (F&T -Expanded-)

Subjects: 10 Neurotypical adults aged between 23 and 61 years (4 men / 6 women)
 Survey period: June 2012
 Methods: We presented 224 stimuli (8 types of words x 7 types of emotions: joy, sadness, anger, dislike, surprise, fear, contempt x 4 types of performers: 2 males and 2 females in their 20s and 40s) of the F&T –Basic- which we developed according to test conditions ("presenting tone only," "presenting face only," "presenting both tone and face") and requested subjects to answer the emotion expressed by the stimuli (multiple answers allowed) and their confidence in their replies in three levels.



Figure 1 Stimulus Conditions

b. Development of F&T –Expanded–

Based on the results of study in above-mentioned "a," we selected stimuli of tones and faces (ambiguous stimuli) which is difficult to infer specific feelings and composed an expanded version. As ambiguous stimuli have a tendency to be inferred unpleasant feeling, we added pleasant stimuli which express "Joy" to test stimuli to relieve stresses caused by seeing unpleasant stimuli repeatedly. As the influence of stress relief was expected just after pleasant stimuli were presented, we prepared ambiguous stimuli which were not the subject of analysis. The composition of test stimuli in the Expanded version is as the following:

[Composition of stimuli]

9 (ambiguous stimuli) x 2 (repeated presentations) + 3 (pleasant stimuli)
 + 2 (ambiguous stimuli which were not the subject of analysis) = 23 stimuli

[Stimulus Conditions]

Tests are divided into the following 3 conditions (Stimulus Conditions) according to the method of presenting stimuli.

Each condition is implemented according to the procedures from 1) to 3). Required time is about 7 minutes for each condition and about 21 minutes for the entire test.

- 1) "Tones only" condition: Words which cannot be inferred the emotion from its literal meaning ("Good afternoon" etc.) are presented with the voices added emotions.
- 2) "Faces only" condition: Though the faces of persons who talk with emotions are presented, their tones are not presented.
- 3) "Tones and faces" condition: Both faces and tones of persons who talk with emotions are presented.

[Task]

Persons answer the level of pleasantness-unpleasantness of presented stimulus between the following 9 levels: "-4: very unpleasant" - "0: not pleasant nor unpleasant" - "+4: very pleasant." The selection will be the grade of each stimulus.

c. Establishment of reference value of the test (F&T -Expanded-)

- Subjects: 155 undergraduates or graduates aged between 18 and 29 years (83 men / 72 women)
- Survey period: From October 2012 to February 2013
- Methods: We presented stimuli of the test (F&T -Expanded-) and ask them to evaluate the grade of pleasant-unpleasant, which can be inferred from stimuli by 9 levels.
- In addition to it, we collected the following data by the survey using questionnaires.
- The level of pleasantness-unpleasantness corresponding to emotion-words (joy, sadness, anger, dislike, surprise, fear, contempt) / Frequencies of experiencing emotions in the past 3 months as of the time of survey / The correspondence between the situation in which emotions are stimulated and emotion-words / Correspondence between face pictures and emotion-words, and remarkable point for the judgment / Stresses in human relationships

d. Trial of characteristics evaluation of communication skills of persons with Developmental Disability using F&T

- Subjects: 103 persons who were diagnosed or judged as Developmental Disability between 18 and 54 years old (81 men / 22 women)
- Survey period: From April to December 2013
- Methods: In addition to the same study details in the above-mentioned "c," we implemented F&T -Basic-. In the the test, persons select the emotion expressed by tones and faces from among "joy," "sadness," "anger," "dislike." Then we can grasp the percentage of correct answers, the trend of confusion among emotions, and types of communications.

e. Study of problem of support to communication of persons with Developmental Disability using hearing survey

- Subjects: Among persons in "d," those who cooperated with hearing survey. 7 persons who were diagnosed or judged as Developmental Disability in their 20s and 30s (4 men / 3 women)
- Survey period: From May to December 2013
- Study details: Work experiences, life histories, etc.

(2) Results of study

a. Establishment of reference value (temporary version) of the test (F&T -Expanded-)

Based on the results of the test (F&T –Expanded-) for 149 persons aged between 18 and 29 years (78 men / 71 women), we established the reference values according to gender and stimulus conditions. Though subjects for Neurotypical are undergraduates and graduates, subjects with Developmental Disability are between in their 20s and 50s. As a result of analysis, the tendencies are different according to ages. Then we established the temporary version of reference value for the test.

The reference value will be the criteria for to judge "What are the deviations of their inferences from ambiguous emotional expressions concerning pleasant and unpleasant?" We can evaluate the characteristics of attitudes towards others such as "Whether they infer too much negative feelings from others?" based on the results of the test.

b. Characteristics of persons with Developmental Disability that can be evaluated based on the results of F&T.

Comparing the results of surveys on the persons who were diagnosed or judged as Developmental Disability to the results of surveys on the Neurotypical persons or Persons with Intellectual Disability, we could find the following characteristics. ¹

(a) Study in F&T -Basic-

- 1) **The percentage of correct answers was lower among persons with Developmental Disability than among Neurotypical persons.** It suggests that the former have difficulties in inference of feelings. Among persons with Developmental Disability, the percentage of correct answers was the lowest among the person with the condition of "faces only."

Percentages of correct answers in F&T -Basic- (standard deviation)

Neurotypical persons:	"Faces only" = "Tones only" < "Tones+Faces"		
	84.5% (6.69)	85.9% (6.90)	94.7% (5.55)
Persons with Developmental Disability:	"Faces only" < "Tones only" < "Tones+Faces"		
	71.0% (10.18)	76.8% (9.57)	86.9% (10.04)

- 2) As listed in table 1, **persons with Developmental Disability have a higher tendency to confuse "joy" with "anger" or "dislike" compared to Neurotypical persons with the condition of "tones only."** Then we should note that whether they have a tendency to infer unpleasant emotions from pleasant expressions or pleasant emotions from unpleasant expressions which causes troubles in their human relationships.

Table 1. The percentage of confusing "joy," "anger" and "dislike" in F&T -Basic-

Stimulus Conditions Subjects		Error in inferring unpleasant emotions from pleasant expressions			Error in inferring pleasant emotions from unpleasant expressions		
		Joy -> Anger	Joy -> Dislike	Total	Anger -> Joy	Dislike -> Joy	Total
Tones only	Neurotypical	0.3 %	0.6 %	0.9 %	0.8 %	0.6 %	1.4 %
	With Dev. Dis.	1.0 %	6.9 %	7.9 %	2.2 %	3.5 %	5.7 %
Faces only	Neurotypical	—	—	—	0.1 %	—	0.1 %
	With Dev. Dis.	0.2 %	1.1 %	1.3 %	0.2 %	0.1 %	0.3 %
Tones+Faces	Neurotypical	0.3 %	0.4 %	0.7 %	0.2 %	0.2 %	0.4 %
	With Dev. Dis.	0.1 %	1.7 %	1.8 %	0.2 %	0.2 %	0.4 %

¹ 80% of persons with Developmental Disability in this study were diagnosed as "Autistic Spectrum Disorder" and only about 10% were not diagnosed as "Autistic Spectrum Disorder" in both single and multiple diagnoses.

- 3) **Persons with Developmental Disability have higher tendency to infer "sadness" as "anger" or "dislike."** Then we should note whether they "infer unpleasant emotions of others more than the actual levels" which causes trouble and stress in their human relationships. This tendency was the characteristic of persons with Developmental Disability including Persons with Intellectual Disability
- 4) Comparing the type of communication which was evaluated based on the tendencies in answers to the results of Persons with Intellectual Disability, it was suggested that (i) **there were more high-receiving type and complementary type, and less low-receiving type.**²(ii)Persons with Developmental Disability who preferentially use the information of higher discrimination have higher tendency to depend on "tones."

(b) Study in F&T –Expanded-

- 1) As showed in Figure 2, persons with Developmental Disability inferred more unpleasant emotions than Neurotypical person. Then we should note that **they have a tendency to infer unpleasant emotions more than actual levels from ambiguous expressions of others.**

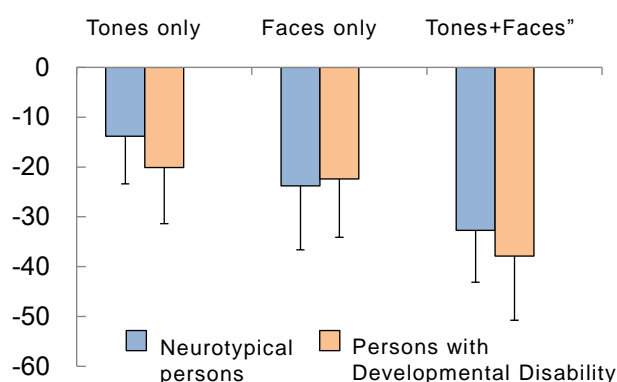


Figure 2. Average of the total evaluation score among targets regarding ambiguous stimuli in the Expanded version (error bar shows a standard deviation)

- 2) The study showed that the more "anger," "dislike" or "fear" persons with Developmental Disability experienced in the past 3 months, the higher was the tendency to infer unpleasant emotions from ambiguous expressions, but Neurotypical persons did not have such relativity. According to the results, we should note their daily emotional experiences during feedback from test results.

(c) Knowledge of emotional words, frequencies of experiencing feelings, focused parts of faces, study of stress in human relationships

- 1) As indicated in Table 2, there were no significant differences between responses of neurotypical persons and persons with Developmental Disability regarding the judgment of the level of pleasantness to unpleasantness (-4 points to +4 points) in emotional words (joy, sadness, anger, dislike, surprise, fear, contempt). **Particularly, "joy" was most pleasant and "anger" and "dislike" were most unpleasant for both target groups.** On the other hand, the order of the level of unpleasant emotions differed.

² High-receiving type: The percentage of correct answers was more than 90% of general standard in all stimulus conditions.

Complementary type: Though the percentage of correct answers was low in "tones only" and "faces only," high in "tones + faces."

Low-receiving type: The percentage of correct answers was less than 70% of general standard in all stimulus conditions.

**Table 2. Average of evaluation of pleasant to unpleasant levels among targets
(standard deviation)**

<Neurotypical persons (undergraduates and graduates)>

Pleasant ←				→ Unpleasant		
Joy	Surprise	Sadness	Fear / Contempt	Anger / Dislike		
3.8	0.0	-2.1	-2.6	-2.8	-3.3	-3.4
(0.47)	(0.71)	(1.13)	(1.21)	(1.15)	(0.94)	(0.76)

<Persons with Developmental Disability>

Pleasant ←				→ Unpleasant		
Joy	Surprise	Sadness / Fear	Contempt	Anger / Dislike		
3.6	-0.1	-2.3	-2.5	-2.7	-3.1	-3.2
(0.74)	(1.29)	(1.32)	(1.34)	(1.44)	(0.96)	(1.21)

2) As showed in Figure 3 on the frequencies to experience emotions, the frequencies to experience "fear" was higher in persons with Developmental Disability than Neurotypical persons. As for feelings other than "fear" (joy, sadness, anger, dislike, surprise, contempt), however, neurotypical persons had higher frequencies than persons with Developmental Disability. It requires discretion to conclude that "persons with Developmental Disability have less opportunities to experience both pleasant and unpleasant situations in their daily lives" according to the results because those experiences were only from their experiences in the past 3 months and they do not include the experiences from their school periods, job-hunting periods, employment periods and other periods.

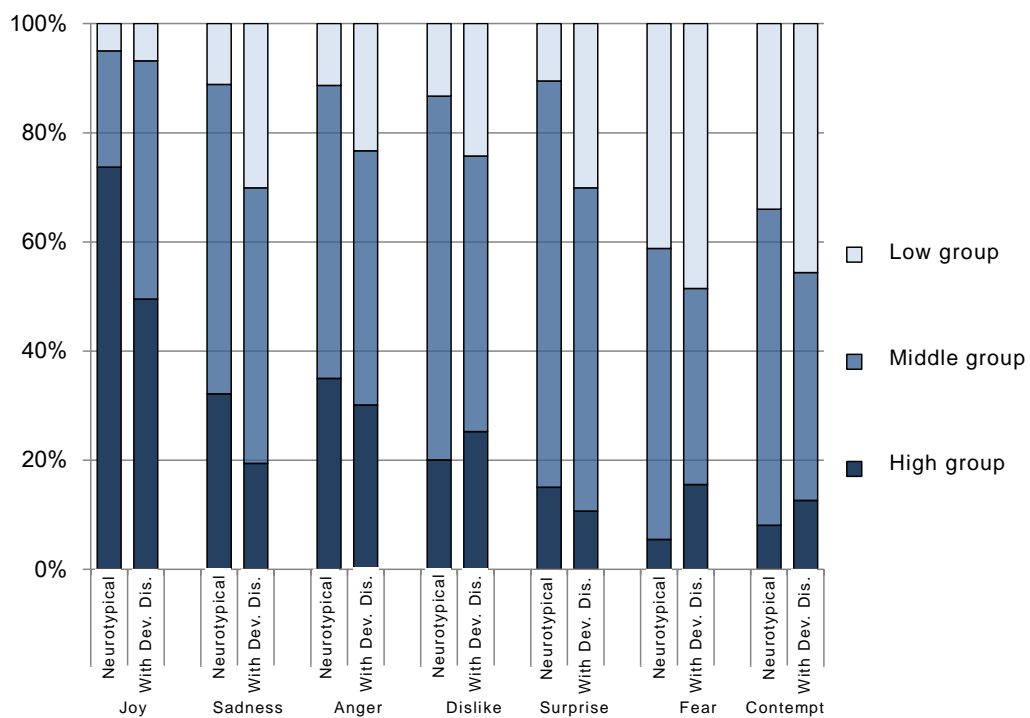


Figure 3 Rates of persons in each group according to the frequencies to experience emotions

3) We could verify the characteristic that "persons with Developmental Disability have a tendency to focus on mouth of speaker when they discriminate faces." They also regard, parts of face other than "mouth" such as "eyebrows" or "eyes" as important, and they have higher tendency to mention "eyebrows" and "eyes" as focused parts.

- 4) The response to the psychological measurement for "stress in human relationships" showed that persons with Developmental Disability experience higher stress than neurotypical persons "in not being able to facilitate smooth communication" and " in providing unpleasant feelings to others by their own words and actions". There is a possibility, however, that the way they experience stress is influenced by how they find their difficulties or characteristics in communications.

c. Study of problem of support to communication of persons with Developmental Disability using hearing survey

(a) Indications by the study of cases

The results of F&T provides important findings for the identifying of problems of support, not only in the cases when persons and their supporters are conscious of the characteristics of their communications, but also in cases they are not conscious of them. It is also required for the interpretation of these results to study the status of adaptations to workplaces or characteristics of stress in human relationships.

- 1) Persons with Developmental Disability have less accuracy compared to general standards in discriminating of emotions from faces. The possibility in training for facial discrimination was suggested to improve the situation. The training, however, may not be the best suggestion if persons have strong resistance to see faces of others.
- 2) There were not many cases in which they were conscious of their characteristics of inferring emotions or interested in this matter even though they had experienced maladjustment in workplaces. Nevertheless, experiences of maladjustment in workplaces etc. are related to the consciousness of disability characteristics, and the situation of possible work and troubles in human relationships have been examined.
- 3) Necessity to improve the support system and to share the information between supporting organizations have been suggested in view of the consultation support not being used. Elaborating cooperation with career counseling support, specific support in vocational rehabilitation as necessary, the development of consultation support by understanding the characteristics of Developmental Disability, confirming coping strategies, and mental health support are also issues to be considered.
- 4) Analysis of the background of cases in which persons did not select employment relationships clarified the requirements which should be considered when persons enter an employment relationship. Specifically, in addition to clarifying characteristics of knowledge and techniques for performing the operation, consideration not only for characteristics of verbal communication but also for non-verbal communication should be taken such as determining individual paces for time designations, generating possible work by avoiding immediate customer facing situations, and roll-sharing or fixed work for difficult jobs. Such considerations are issues in support to improve the adaptability of persons at their employment.

(b) Considerations in interpretation of results of F&T

The F&T results are expected to be utilized effectively to clarify issues in supporting persons with Developmental Disability regarding their communication skills. For this purpose, it is required to consider the following matters: (1) Situation and response to confusion of "anger" and "dislike"; (2) Looking back at past experiences based on the test results; (3) Proposal of complementary actions and environmental adjustment and support; (4) Possibility of implementation and issues for training to discriminate faces; (5) Confirmation of understanding emotional words and experiences (including the evaluation of stress in human relationships); and (6) consideration to characteristics.