

# A PRACTICAL INSTRUMENT FOR THE PERCEPTION OF EMOTION IN PRE-SCHOLARS

An experiment on 4-year-olds with and without communication disorders

*Ilse Meezen<sup>1</sup> and Jeannette van der Stelt*

## Abstract

This paper gives a short overview of an experiment that took place in 2001 and 2002 as part of an MA thesis (Meezen, 2002). The goal of this experiment was to design a practical instrument to collect information about a pre-school child's understanding of emotional expression in spoken communication. 100 four-year-old children on primary schools were tested, as well as 84 children at schools for special education. Five conditions of emotion (happiness, sadness, anger, fear, indignation) were selected. From the 20 items that were used to test these emotions, 16 items appeared to work satisfactory. The mean result for special education was significantly lower than the mean result for normal education. Items with an extreme emotional contrast are easier for both groups.

## 1 Introduction

Our interest in the emotional expression carried by speech started during the work of the first author in the field of language disabilities in young children. Children with learning disabilities and language disorders often have difficulties with social and emotional development (Van Balkom, 1991; Berk, 2000). Observations in daily life illustrate that the content of spoken language is also based on the knowledge of how emotions are expressed by human beings.

Surprisingly, when a pre-scholar starts elementary school there are no practical tests available which measure the understanding of emotions in speech. Does the lack of a practical instrument in educational settings implicate that there is no need for it?

The answer is no, there is a need. There are several reasons why it is important that we know more about the understanding of emotion by pre-scholars. One reason is that at the beginning of elementary school a young child has to develop communication abilities to socialize in groups of children of the same age. To develop these abilities it is important that a child is aware of the emotional expressions transmitted in speech. This information must be combined with knowledge about the inner emotional state of others, the child's own emotions and external events (Berk, 2000). If a person is unable to recognize emotions it will influence his or her understanding of relations between people and social experiences. We know that social experiences are

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<sup>1</sup> e-mail address of the first author [i.meezen@cedgroep.nl](mailto:i.meezen@cedgroep.nl) or [ijmeezen@yahoo.it](mailto:ijmeezen@yahoo.it)

profoundly important for the development of cognitive abilities like language (Cole, 1990).

An instrument to measure emotion perception in pre-scholars should provide a teacher or therapist with important goals for education and/or therapy, aiming at better communicative skills in the child. Communicative skills are a vital necessity in order to become a socially competent person.

Nowadays a lot of attention from politics and educational institutes is given towards socially competent behaviour and moral issues. It is suggested that schools need special programs to stimulate practical moral development, social skills and communication.

Assuming that the perception of emotions is important for the improvement of communication and social competence (Sterneman, Meesters & Muris, 2000), we need to establish a baseline of the current level of emotion perception. Since no practical instruments are available in the schools to test the emotion perception in speech by pre-scholars, it was necessary to design a test from scratch.

## **2 Perception of prosody and communication disorders**

A new test for emotion perception should be practical and based on knowledge of the role of emotion perception in human behaviour. Spoken language is typical human behaviour of a higher order (Hagoort, 2002). Modern linguistics has broadened its focus to paralinguistic factors as an aspect of spoken language. These include hand gestures and facial expression but the main paralinguistic issue in linguistics is the prosody of speech. Prosody itself is divided into three distinct aspects: the tempo of speech, the variations in loudness of the voice and the changes in pitch (Rietveld & Van Heuven, 1997). Emotions in speech are communicated by prosodic variations (Mozziconacci, 1998). We know that at least a part of the meaning in normal human communication is transmitted by the prosody of speech. For example, brain damage can lead to deficits in language that affect communication skills, and specifically in the understanding of emotion in spoken communication (Vingerhoets & Lanno, 1998).

So, when designing a test to measure emotion perception in children, it is interesting to investigate whether children with communication disorders have lower scores than children with a normal communicative developmental level. It then is predictable that children with communication disorders might have problems with processing information concerning emotions in speech.

## **3 The design of the instrument**

Testing pre-scholars is difficult since we need an active reaction from them. A young child is not always interested in showing knowledge. The question was: "How to design an instrument that will motivate very young children and give them the possibility to react?". This will be even more difficult for children that have communication disorders. The test should consist of understandable situations in which the child can give an adequate emotional reaction. At the same time the test should detect problems in the perception of emotional expressions in speech.

The conclusion is that the test should consist of an attractive and understandable visual situation in which an emotional reaction is implied. This picture is accompanied by verbal emotional stimuli. The child is expected to match the sound with the picture.

This concept resulted in a computer-controlled test consisting of twenty items, all composed of a picture and a choice between two verbal emotion expressions, one of them adequate in that situation. The pictures are originally based on children's drawings of emotions.

The content of the drawings represent four universal emotions (Ekman, 1984): happiness (blijdschap), sadness (verdriet), anger (boosheid), fear (angst) and one more complex emotion: indignation (verontwaardiging). Every emotion is represented in the test by four items, which gives us a total of twenty items. The test is limited to twenty items because of the short attention span that is normal for pre-scholars, even though twenty items are not enough for complete statistical reliability.

The crucial structure of the situation in which the emotion must be recognized is short: the utterance of the word 'Yes'. By keeping the verbal stimulus limited to one word we eliminate the possible effects of auditory memory deficits in the child. The verbal emotional stimuli were collected by recording the utterances of one single child. The reason for this procedure is that the information processing will not be affected by problems with voice recognition. Basically the test must be designed in such a way that children with or without language disabilities can be successfully instructed to do the test.

#### 4 The task

The task includes a visual instruction book for the experimenter. Since the task has to be performed by pre-scholars, it is important that the experimenter has adequate material to prepare the children (APA, 1985). The test procedure must be the same for every child that is tested. In the test, the child sees on the monitor of the computer a picture of a situation in which emotion is expressed.

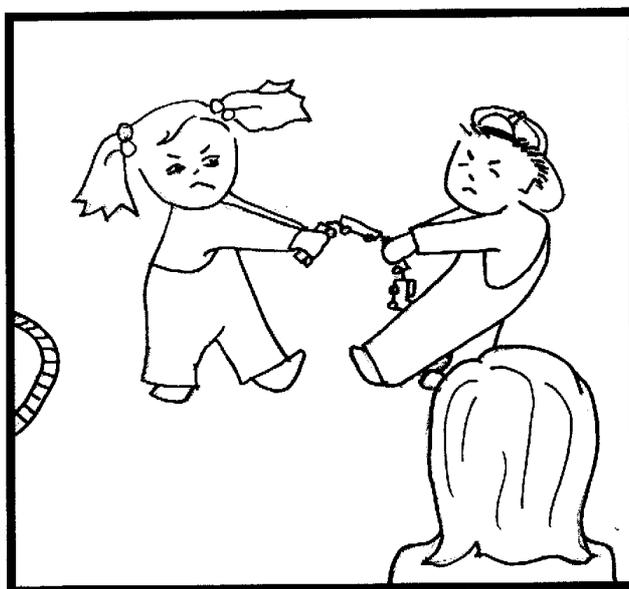


Fig. 1: Item 08. Anger.

Task: Discrimination between auditory stimuli happiness and anger.  
Are you angry? Choice between two stimuli: Yes + happiness or Yes + anger.

Simultaneously the child hears a very simple verbal dialogue, which further explains the picture. The user interface provides two buttons linked to the two possible choices. Both choices represent the word “Yes” but spoken with different emotional prosodic characteristics.

The child has to decide which answer is correct in the given situation. This decision should represent the child’s ability to match the situation with the adequate emotional response. For a successful reaction the adequate prosodic content should be matched to the situation displayed on the monitor of the computer.

For example: If the picture shows a crying child, the correct choice is the sad sounding utterance. In order to hear sadness the listener must be aware of acoustic features, which refer to sadness in speech (Jackendoff, 1996). This is expressed by prosodic variation in pitch, duration and loudness. If for some reason there is a deficit in the detection of emotions in pictures or in sounds, the listener will not be able to match the picture with the correct emotional vocalization.

## **5 The experiment**

Before testing the children, the test was done with twenty adults. The adults recognized correctly the adequate emotional expression in relation to the situation given in the picture. This result was satisfying enough to proceed with the experiment in children.

By means of a laptop 100 four-year-old children attending nine primary schools and 84 children of seven schools for special education were tested. The pupils in schools for special education were selected to have communication disabilities. Those children have a ‘cluster 2 indication’ for special education. This means that a multidisciplinary team of specialists diagnoses a language disorder and that the parents are advised to send their child to a school for special education.

Both groups of children were interested in the test. Only nine children (three from normal education and six from special education) where, for various reasons, not able to complete the test.

## **6 Results and conclusions**

The maximum score is 20, when the child chooses from two possibilities the correct emotional expression of ‘yes’ that matches with the situation. The cumulative results are summarized in table 1. A positive conclusion of this experiment is that these young children showed a good concentration and interest in the test. The test only takes ten to twenty minutes per child, which is practical since time is usually limited in schools. Furthermore, we had to account for the short attention span of pre-scholars and children with development disorders.

Of course there are still questions about the validity and reliability of the test. But in this first trial it is evident that the results of the children in schools for special education are significantly lower than the results of children in normal primary schools. If the differences between emotions in an item are extreme (happiness-sadness or anger- happiness) then the item was easier for both groups.

According to statistical analysis (Drenth & Sijtsma, 1990) twenty more items would be needed for a validity of Alpha 0.8. Because of the short attention span of the pre-scholars a 40-item test would have to be administered in two occasions.

Table 1. Scores on a twenty items test for the perception of emotion in speech. Mean and standard deviation are given of four-year-olds in normal and in special education. Maximum score correct is 20.

	Normal education	Special education
Mean	15.02	10.71
Std.Dev.	2.85	2.38
N	97	78

For four items the item-test correlation was too low (below 0.20, internal test consistency: Cronbach, 1951). So these items probably measured something else than just emotion perception. The correct choices in these items were fear, indignation, fear, and sadness. These items need to be further investigated because the overall results of the test are possibly influenced by the construction of these four items.

The overall conclusion is that this experiment provides a basic set of sixteen items to test the perception of emotional expression in speech by pre-scholars at the age of four.

Since there is a need for an instrument to test a child's understanding of emotional expressions in communication, it would be beneficial to continue research into this test. A reliable and practical instrument would provide teachers and therapists with a quick scanning of the understanding by the child of emotion in spoken communication. This will be a welcome innovation in normal education as well as in the field of language pathology and psychiatry.

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