THE ABILITY OF FOUR-YEAR-OLD CHILDREN TO RECOGNIZE BASIC EMOTIONS REPRESENTED BY GRAPHIC SYMBOLS

by

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Summary

Emotions are an essential part of development. There is evidence that young children understand and express emotions through facial expressions. Correct identification and recognition of facial expressions is important to facilitate communication and social interaction.

Emotions are represented in a wide variety of symbol sets and systems in Alternative and Augmentative Communication (AAC) to enable a person with little or no functional speech to express emotion. These symbols consist of a facial expression with facial features to distinguish between emotions.

In spite of the importance of expressing and understanding emotions to facilitate communication, there is limited research on young children's ability to recognize emotions represented by graphic symbols. The purpose of this study was to investigate the ability of typically developing four-year-old children to recognize basic emotions as represented by graphic symbols.

In order to determine their ability to recognize emotions on graphic symbols, their ability to understand emotions had to be determined. Participants were then required to recognize four basic emotions (happy, sad, afraid, angry) represented by various graphic symbols, taken from PCS (Johnson, 1981), PICSYMS (Carlson, 1985) and Makaton (Grove & Walker, 1990). The purpose was to determine which graphic symbol the children recognized as representation of an emotion.

Results showed that the emotion of happy was easier to recognize, which might be because it was the only emotion in the pleasure dimension of emotions. Sad, afraid and angry were more difficult to recognize which might be because they fall in the displeasure dimension. It is also evident from the findings that the facial features in the graphic symbol play an important part in conveying a

specific emotion. The results that were obtained are discussed in relation to previous findings. Finally, recommendations for future use are made.

Key words

Emotions, emotion recognition, graphic symbols, Alternative and Augmentative Communication (AAC), facial expressions, facial features, happy, sad, afraid, angry.

Opsomming

Emosies is ‘n wesenlike deel van menslike ontwikkeling. Daar is bewyse dat jong kinders emosies verstaan en uitdruk deur middel van gesigsuitdrukkings. Korrekte identifikasie en herkenning van gesigsuitdrukkings is belangrik vir die fasilitering van kommunikasie en interaksie.

Emosies word deur ‘n wye verskeidenheid van simbool stelsels en sisteme in Alternatiewe en Aanvullende Kommunikasie (AAK) voorgestel, om ‘n individu met ‘n kommunikasie afwyking in staat te stel om emosies uit te druk en in interaksie te tree. Hierdie simbole bestaan uit gesigsuitdrukkings met gelaatstrekke wat tussen verskillende emosies onderskei.

Ten spyte van die belang van emosionele uitdrukking en begrip om kommunikasie te fasiliteer, is daar nog min navorsing oor jong kinders se vemoëns om emosies wat deur grafiese simbole voorgestel word, uit te ken. Die doel van hierdie studie was om die vermoë van tipies ontwikkelende vier-jarige kinders te bepaal, om emosies op grafiese simbole van gesigsuitdrukkings te herken.

Hul begrip van die vier emosies (gelukkig, harsteer, bang en kwaad) moes eers bepaal word, voordat herkenning bepaal kon word. Die deelnemers moes dan die vier emosies wat deur grafiese simbole voorgestel word, herken. Hierdie simbole is uit PCS (Johnson, 1981), PICSYMS (Carlson, 1985) en Makaton (Grove & Walker, 1990) geneem. Die doel was om vas te stel watter simbool die kinders as verteenwoordigend van ‘n emosie, gekies het.

Resultate het getoon dat gelukkig die maklikste emosie was om te herken, moontlik omdat dit die enigste emosie is wat in die “pleasure” dimensie val. Hartseer, bang en kwaad was moeiliker om te herken, moontlik omdat dit binne die “displeasure” dimensie val. Die gelaatstrekke in die grafiese simbool speel ook ‘n belangrike rol in die oordrag van emosies. Resultate stem ooreen met

wat vroeër in die literatuur bevind is. Voorstelle vir toekomstige navorsing is gemaak.

Sleutelwoorde

Emosies, emosie herkenning, grafiese simbole, alternatiewe en aanvullende kommunikasie (AAK), gesigsuitdrukkings, gelaatstrekke, gelukkig, hartseer, bang, kwaad.

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1 INTRODUCTION

1.1 Problem Statement

Emotions play an important role in human development. It is part of our everyday lives and it is the motivational force behind an individual's life course (Izard, 1971; Magai & Hunziker, 1993). They are not separate entities, but rather an important part of the substance of social interaction (Gnepp & Hess, 1986; Oatley, 1993). Both adults and children use emotion, while interacting and communicating with other people. Emotion is also the medium by which such experiences are organized, interpreted and communicated (Gnepp & Hess, 1986; Stein & Trabasso, 1992).

Correct identification, recognition and labelling of expressed emotions are important skills for any individual's social development (Ekman & Friesen, 1975; Ekman & Oster, 1982). The abstract concept of emotions is expressed through a variety of modalities, namely bodily behaviours, facial expressions and vocalizations (Lewis, 1993). These modalities make identification, recognition and labelling of emotions possible. Children are exposed to these modalities from a young age and are required to identify, recognize and label different emotions from early on (Harris, 1993). The ability to recognize facial expressions of emotion in the young pre-verbal child is therefore of great importance (Nelson, Parker & Guthrie, 2006). The understanding of emotions is, however, an important pre-requisite, which must be in place if individuals are to recognize emotions. This emotional understanding, recognition and labelling reflect the perception of emotions, which begins to develop from a very young age. The ability to understand and express emotion thus forms an integral part of a child's development. For this reason, it is important to develop ways to facilitate the understanding and expression of emotions in children where development may be atypical.

Emotions can also be represented by graphic symbols. A variety of symbol sets and systems are currently used in Augmentative and Alternative Communication (AAC) (Alant, Life & Harty, 2005; Fuller, Lloyd & Stratton, 1997). The majority of these symbol sets and systems include certain facial features to convey emotions. It is important, however, to note that emotions expressed through graphic facial features have a varying degree of iconicity (Fuller & Lloyd, 1997). Graphic representations of emotions used in AAC interventions aim to improve expressive and receptive communication as well as language development (Sevcik, Romski & Wilkinson, 1991). Graphic symbols representing emotions on communication displays are being used with increasing frequency with atypical children with severe communication impairments in order to provide the child with the opportunity to express emotions should he/she not be able to speak or make the relevant facial expressions. It also provides a child with the opportunity to participate in life at home, at school and in the community (Fallon, Light & Kramer Paige, 2001). It is important for AAC users to convey emotional concepts, as emotions are part of any individual's life and essential for healthy social interaction and competency. Although the inclusion of graphic representations of emotions are commonly used on communication displays, little research documentation exists which explores young children's ability to recognize emotions by selecting specific graphic representations.

Apart from children who use AAC as a primary means of expressive communication, young children are often required to rate opinions or attitudes by means of a scale consisting of graphic line drawings representing facial expressions. This is known as a semantic differential scale. Certain measuring instruments are frequently used to obtain an objective profile of an individual's primary reactions towards various concepts. These measurements depend on a single face to convey a specific emotion, for example happy or sad. Numerous questions can be asked and answered in this way, in order to obtain a holistic picture of perception regarding specific concepts. This type of scale is

advantageous, as it can be completed speedily and simple graphic facial expressions are used to enable young children to easily depict their opinions (McMillan & Schumacher, 2001), as very young children are often unable to convey a message verbally (Camras & Allison, 1985). Graphic facial expressions can also be used effectively to obtain assent from young children to participate in a study (MacDonald, Kirkpatrick & Sullivan, 1996). They are then required to choose between a happy or sad face in order to give assent.

The ability of young children to recognize emotions through facial expressions on photographs has been well documented, but children's ability to recognize emotions on graphic representations of facial expressions remains uncertain. The response of a young child, who is expected to recognize emotion conveyed by a photograph of a facial expression, will not always be as accurate, as the child will identify with the model in the photograph in terms of age, gender, and race, rather than to attend only to the emotion displayed (Widen & Russell, 2003). Gender displayed on a photograph will influence recognition of the emotion as male and female faces are processed in opposite hemispheres in the brain (Brune, Bahramali, Hennessy, Snyder, 2006). Therefore the use of a photograph may result in the interpretation of the identities of the face and not the components of the face (Sullivan & Kirkpatrick, 1996). However, if a child is expected to recognize an emotion when exposed to a schematic drawing, these confounding factors may be eliminated or at least substantially reduced. Schematic drawings of facial expressions that are used in semantic differential scales have a simplicity that enables pre-schoolers to interpret a facial expression without any irrelevant information (Cunningham & Odom, 1986). It has been demonstrated that schematic drawings are an effective method to use when investigating the different facial components that convey an emotion through a facial expression (Kirkpartrick & Bell, 1996). Infants have the ability to abstract feature configurations that give affective meaning to facial expressions (Serrano, Iglesias & Loeches, 1992; Maurer & Barrera, 1981b). That knowledge is generalized to graphic schematic faces (Maurer & Barrera,

1981b). It is therefore postulated that it is very important to understand the ability of young children to recognize emotions on schematic drawings of facial expressions (MacDonald, Kirkpatrick & Sullivan, 1996). This study therefore aims to determine whether four-year-old children are able to identify and recognize basic emotions as depicted by graphic facial expressions.

1.2 Chapter Outline

Chapter One gives a brief overview and introduction to the study. An outline of each chapter is provided and an explanation of important terms and abbreviations are explained.

Chapter Two provides a detailed discussion of the theoretical background for this study. A definition of emotions, the development and innateness thereof and the impact of cultural differences on emotion recognition and labelling are discussed. Facial expressions as conveyers of emotions are emphasized and the importance of graphic representations of facial expressions is also highlighted.

Chapter Three outlines the methodology and procedures of this research study. The aims, design, participants, material and data collection procedures are discussed. The pilot study and results are also presented in table format.

Chapter Four presents the results of the study. Results are presented visually and are discussed in accordance with the aims proposed in the methodology. The percentage and variety of symbols that were chosen for each emotion are presented.

Chapter Five provides a critical overview of the study, where the strengths and limitations are highlighted. Recommendations for future research are made.

1.3 Definition of Terms

Augmentative and Alternative Communication (AAC)

"The supplementation or replacement of natural speech and/or writing using aided and/or unaided symbols; the field or area of clinical/educational practice to improve the communication skills of individuals with little or no functional speech." (Lloyd, Fuller & Arvidson, 1997, p. 524).

Graphic symbols

"A visual symbol that represents a referent to convey meaning…" (Lloyd, Fuller & Arvidson, 1997, p. 531).

Facial expressions

Facial expressions reflect emotions and are the main organ of expression (Pioggia, Ahluwalia, Carpi, Marchetti, Ferro, Rocchia, De Rossi, 2004). Facial expressions are a form of information that is perceived and used by human beings to guide social behaviour (Bornstein & Arterberry, 2003).

Basic emotions

Basic emotions are the more observable emotions (Baron-Cohen, Riviere, Fukushima, French, Hadwin, Cross, Bryant & Sotillo, 1996). The basic emotions are happiness, surprise, fear, anger, sadness, disgust and interest.

The experience and understanding of emotions

Emotional experience involves an evaluation and interpretation of internal states, contexts, behaviours of others and meaning through culture (Lewis, 1993). Emotional expressions are used to communicate emotional experience (Gnepp & Hess, 1986). Emotional experience aids in the understanding of emotions. To understand an emotion through a facial expression, relevant and invariant

characteristics of the emotional expression should be perceived and extracted and invariant and varying characteristics of the same or different poser of the facial expression should be ignored (Bornstein & Arterberry, 2003).

The identification and recognition of emotions

For recognition of something an individual is exposed to a list of items and the retrieval of information from the memory is established through forced choice (Light & Lindsay, 1991).

The labelling of emotions

The ability to recognize and then produce a verbal label for an emotion on a facial expression requires an adequate lexicon of emotion terms, where these terms have to be understood and have to be associated with a specific facial expression (Vicari, Reilly, Pasqualetti, Vizzotto, Caltagirone, 2000).

PCS

“A large set of aided symbols composed primarily of simple line drawings with words printed above them.” (Lloyd, Fuller & Arvidson, 1997, p. 537).

PICSYMS

“A graphic symbol system of pictographs and ideographics developed by Faith Carlson.” (Lloyd, Fuller & Arvidson, 1997, p. 537).

Makaton

“An instructional program arranged in nine stages for teaching a pre-selected vocabulary of approximately 350 manual signs from British Sign Language.” (Lloyd, Fuller & Arvidson, 1997, p. 594).

1.4 Abbreviations

AAC	Augmentative and Alternative Communication
PCS	Picture Communication Symbols
PICSYMS	PICture SYMbols

1.5 Summary

This chapter proposes to provide the rationale and motivation for the study. Each chapter in the thesis is briefly outlined and the definitions and abbreviations frequently used in the study are presented.

2 THEORETICAL BACKGROUND

2.1 Introduction

This chapter will firstly describe the concept of basic emotions and the development of emotions in the young child, by emphasizing the ability to understand and recognize basic emotions. There is a distinct difference between understanding and recognizing emotion in someone else, recognizing emotion portrayed by a photo or line drawing and finally, labelling an emotion. The impact of culture on emotion recognition will be highlighted, as culture plays an important role in the recognition and perception of emotions (Oatley & Jenkins, 1996). Age and gender also play an integral part in the recognition and perception of emotions. Emotions have been studied using photographs of facial expressions, but although the field of AAC uses graphic symbols consisting of line drawings to depict emotions, there has been limited research on children's ability to recognize and use line drawings to express and communicate emotions. There are a wide variety of different symbol sets and systems, which use different graphic symbols to represent emotions. The last section of this chapter will focus on a description of the different graphic symbols representing the four emotions of happy, sad, afraid and angry.

2.2 The concept of emotion

The concept of emotion is difficult to define as emotions are complex, multi-component systems (Izard, 1982; Kang & Shaver, 2004). A number of basic emotions exist and when these basic emotions are blended, secondary emotions are formed (Plutchik, 1993). Basic and secondary emotions constitute the total emotional repertoire. Basic emotions are more likely to be observed through facial expressions and may be interpreted universally, whereas secondary emotions are not as clearly visible on the face (Baron-Cohen, Riviere, Fukushima, French, Hadwin, Cross, Bryant & Sotillo, 1996).

Emotions can be classified in terms of dimensions and categories. Three different dimensions in emotions exist and include pleasantness-unpleasantness, relaxation-tension and calm-excitement (Izard, 1971). Russell and Bullock (1986) described emotions in terms of the dimensions of pleasure-displeasure and arousal-sleepiness. Evidence suggests that for four-year-old children happiness lies in the pleasure and arousal dimension and can therefore be classified as a positive emotion with intensity (Russell & Bullock, 1986). Sadness falls in the displeasure and sleepiness dimension suggesting that sadness is a negative emotion with a lower intensity (Russell & Bullock, 1986). Fear and anger falls in the displeasure and arousal dimension (Russell & Bullock, 1986). This suggests that fear and anger are both negative emotions with a higher intensity. More recently, Widen and Russell (2003) stated that emotions identified through facial expressions are firstly interpreted in terms of the dimensions of comfort-discomfort and intensity and only later progress to more articulated and specific conceptual emotion categories.

These categories of basic emotions have been identified from extensive research. Generally, the literature states that happiness, surprise, fear, anger, sadness, disgust and surprise belong to the category of basic emotions (Ekman, Friesen & Ellsworth, 1972; Ekman, Friesen, & Ellsworth, 1982; Smith, Cottrell, Gosselin, Schyns, 2005). Happiness, sadness, fear and anger will be discussed in more detail in this chapter, as these emotions will be investigated in the study. Happy, sad, afraid and angry have different facial features, which makes it possible to distinguish between them with relative ease. The recognition of happiness in real facial expressions was found to be greater than recognition of negative emotions (Denham & Couchoud, 1990). Expressions of happiness are the earliest to be discriminated, followed by sadness and anger in sequence (Walden & Field, 1982; Widen & Russell, 2003). Scared, surprise and disgust then follow (Widen &

Russell, 2003). Surprise and disgust are more difficult to recognize and surprise is sometimes even confused with fear (Balconi & Carrera, 2006). Ribordy, Camras, Stefani and Spaccarelli (1988), found that surprise is therefore a more difficult emotion for young children to recognize. After acquiring cognitive capacity during the second half of the second year, a new class of self-conscious emotions that can be experienced begin to develop, i.e. embarrassment, envy, empathy, pride, shame, and guilt (Lewis, 1993). These are the secondary emotions, which are not readily observed in facial expressions, but rather in body language (Lewis, 1993).

2.3 Development of emotions

The ability to identify, recognize, decode and interpret emotion represented by facial expressions improves with age (Boyatzis, Chazan & Ting, 1993; Camras & Allison, 1985; Gosselin, 2005; Gnepp & Hess, 1986; Lewis, 1993). The basic emotions develop and differentiate as the infant grows older (Izard, 1982). Emotional development forms the foundation for learning in any child's life (Greenspan, 2004). The four basic emotions of happy, sad, afraid and angry manifest themselves at different stages in a young child's development. These emotions begin to develop early in life and are present by the first birthday (Cohen, Stern & Balaban, 1997; Izard, 1971; Lewis, 1993; Liggett, 1974; Mussen, Conger, Kagan & Huston, 1984; Young, 1975).

It is evident that emotional development already starts in the newborn infant when he/she cries if in pain or distress or displays happiness and contentment when fed. Specific configurations of facial muscles are present even at birth and serve as proof that displaying emotion through facial expressions is an inborn ability (Field, Woodson, Greenberg & Cohen, 1982; Lewis, 1993). By the age of five to six months, a child can distinguish between emotions depicted by drawings and live human faces (Izard, 1971). Two-year-old children already understand the concept of emotions and how to recognize them (Bullock & Russell, 1984). Around this age

spoken word labels for the emotions start to develop (Ridgeway, Waters, Kuczaj, 1985; Stein & Trabasso, 1989). Several authors have found accurate identification of the emotions of happiness, sadness and anger with children as young as three years, regardless of the mode of presentation (Lewis, 1993; Stifter & Fox, 1986). However, other authors have found that the recognition of faces start developing and improving at the age of five years (Chung & Thomson, 1995; Gosselin, 2005). Regardless of the exact age, by the time children start pre-school they know what a specific facial expression looks like and understand what it means (Ekman & Oster, 1982). The comprehension of the concept of emotions is an important prerequisite for the recognition of emotions. In other words, recognition of emotions is dependent upon a child's comprehension of emotion.

2.4 The impact of culture on the recognition of emotions

Emotions are innate and universal (Darwin, 1979; Harris, 1989; Liggett, 1974; Vicari, et al. 2000; Young, 1975). Izard (1971) emphasizes the innateness and universality in the fundamental emotions and Brune, Bahramali, Hennessy and Snyder, (2006) also argue that there is universality regarding face recognition among cultures. Pre-school children from the United States and Israel responded to marital conflict in much the same manner. They watched a pre-recorded video recording of actors pretending to be married and having marital conflict. The children were asked how they felt while watching the video recording. According to their responses they experienced emotion in the same way regardless of culture (Shamir, Cummings, Davies, Goeke-Morey, 2005). Japanese, Western and Hindustani listeners rated music filled with emotions and all were sensitive to the emotions in music regardless of culture (Balkwill, Thompson & Matsunaga, 2004). This universality of emotional facial expressions is the result of innate neural programmes.

These facial expressions are, however, subject to consequences of socialization during childhood and adolescence (Izard, 1971) and differ in style (Parker, Saklofske, Shaughnessy, Huang, Wood, Estabrook, 2005). There are distinct differences in emotion expression and emotion recognition between cultures, ages, gender and previous experience with faces (Boyatzis, Chazan & Ting, 1993; Brody & Hall, 1993; Brown & Dunn, 1996; Ekman & Friesen, 1975; Ekman, Friesen, & Ellsworth, 1982; Gosselin, 2005; Oatly, 1993; Oatley & Jenkins, 1996; Malatesta, Culver, Tesman & Shepard, 1989; Maurer & Barrera, 1981a; Nelson, Parker & Guthrie, 2006; Pollak & Kistler, 2002; Shweder, 1993; Young, 1975). Cultural contact and exposure are also factors that influence emotional expression (Elfenbein & Ambady, 2003). It is consequently viable to state that cultural and experiential factors influence perception, identification, recognition and labelling of emotions. These individual differences should be taken into account when looking at an individual's ability to recognize and label an emotion through facial expressions. An individual's ability to identify, recognize and label an emotion that is conveyed by a facial expression is therefore shaped by various influences. Various examples in the literature prove that culture does indeed impact on the perception and development of emotions through facial expressions: American children recognize and label the emotion of anger more readily than French children (Izard, 1971). The mother-child conversations of a Chinese mother and child dyad consist of more negative emotion words than those mother-child conversations of a Euro-American dyad. The Euro-American dyad is more engaged in the negotiations of emotions (Fivush & Qi Wang, 2005). Japanese carers have lower expression of positive and negative emotional reactions towards family members than English carers (Nomura, Inoue, Kamimura, Shimodera, Mino, Gregg, & Tarries, 2005). The emotional intelligence of Canandian rural aboriginal youth differs from the emotional intelligence of the rural non-aboriginal youth (Parker, Saklofske, Shaughnessy, Huang, Wood, Estabrook, 2005). It can

therefore be concluded that, to a certain degree, culture does impact on emotion recognition and expression.

The issue of whether emotion recognition is universal or culture-specific is, as yet, unresolved and is still much debated (Baron-Cohen, Riviere, Fukushima, French, Hadwin, Cross, Bryant & Sotillo, 1996; Izard, 1971). However, all individuals, irrespective of culture, age or gender perceive emotions and this perception includes the identification, recognition and labelling of emotions as part of everyday life.

Culture also plays an important role in the labelling of emotions (Widen & Russell, 2003). As indicated by Izard, (1971), the recognition of emotions across cultures is partially accurate, whereas the labelling of emotions appears to be more culture-specific. She argues that emotional labelling is a more complex response than emotion recognition and that it is more dependent on the cognitive system and more subject to experiential factors. The experience of emotion is therefore universal and innate, but the expression and labelling thereof differ in terms of culture.

2.5 The representation of emotion through facial expressions

The human face reflects emotions and distinguishing between these expressed emotions is crucial to the personal, social and communicative well being of any individual (Bornmann- Kischkel, 1986; Du & Lin, 2003; Ekman & Friesan, 1975; Ekman, Friesen & Ellsworth, 1972; Gosselin & Larocque, 2000; Pelc, Kornreich, Foisy & Dan 2006; Pioggia, Ahluwalia, Carpi, Marchetti, Ferro, Rocchia, De Rossi, 2004). Facial expressions provide important information regarding the people around us and therefore human beings rely heavily on facial expressions when communicating with other people (Liggett, 1974; Pollak & Sinha, 2002; Warren, 1977). The face is also the medium of communication between parent and child

before language and speech start acting as the primary means of communication (Ekman, Friesen & Ellsworth, 1972). Facial expressions can assist a child in interpreting emotion and conveying meaning that contributes to communication (Darwin, 1979).

Discrimination between facial expressions of emotions aids an infant in identifying another individual's emotional state and provides cues on how to behave in social situations (Nelson, Parker & Guthrie, 2006). One of the first steps in the process of interpreting and recognizing emotion through facial expressions therefore remains the ability to distinguish between one emotion and another (Bullock & Russell, 1984; Walden & Field, 1982). The representation of emotion is based on the fine-grained details of variations in facial input and emotional labelling is the result (Pollock & Sinha, 2002). Vocalizations are one of the most important conveyers of emotional states (Lewis, 1993).

Facial expressions are the expressive component of emotions and provide sensory data to the cortical-integrative activity in the brain that produces the experience of emotion (Izard, 1982). The human face transmits expression signals, which the brain then decodes (Smith, Cottrell, Gosselin, Schyns, 2005). An emotional state may change neurophysiological and hormonal responses, as well as facial, body and vocal behaviours (Lewis, 1993). These facial changes in behaviours then result in facial expressions, and are produced by a contraction of the facial muscles (Ekman & Friesan, 1975). There are 44 different muscles under the skin of the face that are connected and manipulated in order to display different emotions (Frost, 2003). The major emotions, displayed through facial expression are surprise, fear, anger, disgust, sadness and happiness and these emotions are registered on the face by changes in the eyebrows, forehead, eyelids, cheeks, lips, chin and nose (Ekman & Friesan, 1975).

Facial expressions are processed based on the individual features of the facial expression, for example, relation of the eyebrows to the mouth shape (Bornstein & Arterberry, 2003). The specific features of a facial expression therefore play an important role in the interpretation of an emotion on a facial expression. When recognizing an emotion an individual relates features of that face to already stored representations of facial features in an emotion lexicon (Pollak & Sinha, 2002). The partial information provided by features of a facial expression allows an individual to correctly recognize a specific emotion (Pollak & Sinha, 2002). The emotion of happiness is, for example, the only emotion in which the mouth is turned upwards. Sadness (and disgust) has a mouth with downward corners. Fear (and surprise) has round open mouths and the eyebrows for fear and sadness look much the same, whereas the eyebrows for anger are unique (Sullivan & Kirkpatrick, 1996). The eyes on a human face are an essential part of distinguishing emotions in the face (Hess & Pick, 1974).

As mentioned previously, there is not only one area on the face that reveals emotion (Boucher & Ekman, 1975). There are, however, three important components of the face that are important for the communication of facial expressions of emotions (Ekman & Friesen, 1975), namely:

a) the upper component – eyebrows and forehead
b) the middle component – eyes and cheekbones
c) the lower component – nose, mouth and chin

These three components are combined in unique ways to convey each of the six basic emotions (anger, disgust, fear, happiness, sadness and surprise). Table 1 gives an overview of the facial features of the four emotions in terms of the upper, middle and lower component of the face as described in the literature (Ekman & Friesen, 1975; Frost, 2003; Izard, 1971; Kohler, Turner, Stolar, Bilker, Brensinger, Gur & Gur, 2004).

Table 1. The three components on the face responsible for emotional expression

	Upper component	Middle component	Lower component
Happy	Raised eyebrows More pronounced lines under the lower eyelids	Tightened lower eyelids Raised cheeks Deepened naso-labial folds	Raised upper lip Upward lip corners A broad grin Exposed teeth
Sad	Drawn-up inner corners of the eyebrows	Not discussed in the literature.	Lip corners turned down Chin pulled up
Afraid	Raised eyebrows	Eyes wide open Raised upper eyelids Tensed lower eyelids	Stretched mouth Open mouth
Angry	Lowered inner corners of the eyebrows	Eyes wide open Tightened lower lids Staring eyes	Lips exposing teeth Lips tightly pressed together

2.6 Graphic representations of facial expressions of emotion

Despite many studies of emotion and facial expressions, many unanswered questions exist that need to be researched and documented (Ekman & Friesan, 1975; Ekman, Friesen & Ellsworth, 1972). One such an example is how do children identify and use representations of emotions through graphic symbols.

Static facial expressions can be conveyed via photographs or line drawings. Photographs and line drawings of facial expressions are both static, two dimensional representations of an abstract concept. Both are primarily picture-based symbols without linguistic characteristics (Fuller, Lloyd & Stratton, 1997). The most widely used method of researching the ability to correctly identify, recognize and label emotion through facial expression is photographs (Boyatzis, Chazan & Ting, 1993; Ekman & Friesen, 1978). Photographs are generally regarded as easier to recognize than line drawings, as a photograph is more iconic than a line drawing according to the aided symbol hierarchy (Mirenda & Locke, 1989). The Facial Action Coding System, developed by Ekman and Friesen (1978), uses photographs of facial expressions to objectively quantify the ability to identify

emotions. Models display different emotions and intensities thereof and the observer is requested to look at the photographs and make a judgement as to which emotion is conveyed (Ekman & Friesan, 1975). This method provides an important behavioural measure for the study of emotion, cognitive processes, and social interaction (Bartlett, Stewart, Hager, Ekman & Sejnowski, 1999). The reliability of the use of photographs has been widely documented, but research on emotion identification, recognition and labelling of graphic representations is still limited.

It is important to study the iconicity and learnability of graphic symbols representing facial expressions of emotions to offer a better understanding of emotion recognition. A relationship between the symbol and referent will enhance the iconicity of the symbol and will increase the ease of learning the specific symbol (Millikin, 1997). Iconicity is in the eye of the beholder and the degree of iconicity can only be judged by the observer and is not intrinsic to the symbol (Fuller & Lloyd, 1997; Stephenson & Linfoot, 1996). Iconicity is therefore an important issue when using AAC symbols for the purpose of expressive communication.

Sixteen graphic symbols were identified for inclusion in this study and Table 2 provides the label as well as the description of the facial features as identified in the literature. Different facial features of each of the symbols used in this study are compared. The information was obtained from studies produced by Sullivan and Kirkpatrick, (1996) and Kohler, Turner, Stolar, Bilker, Brensinger, Gur and Gur, (2004) and was used as a basis for describing the facial features used in this study.

Table 2. Graphic symbols used in the present study

Symbol	Expected choice	Upper component	Middle component	Lower component
Symbol 1  **PCS**	Happy	Raised eyebrows	Tightened lower eyelids Raised cheeks	Raised upper lip Upward lip corners
Symbol 2  **PCS**	Happy	No eyebrows	Undefined eyelids	Upward lip corners
Symbol 3  **PCS**	Happy	Undefined eyebrows	Defined eyelids	Upward lip corners Nose
Symbol 4  **PCS**	Happy	No eyebrows	Big blank eyes	Upward lip corners Nose
Symbol 5  **PCS**	Sad	Inner corners of the eyebrows are raised	Undefined eyelids Tear on the cheek	Opened mouth Lip corners turned down
Symbol 6  **PCS**	Sad	No eyebrows	Lowered upper eyelids Tear on the cheek	Lip corners turned down Nose
Symbol 7  **PCS**	Sad	Inner corners of the eyebrows are raised	Defined tensed upper eyelids	Lip corners turned downwards Small mouth
Symbol 8  **PCS**	Sad	Inner corners of the eyebrows are raised Big forehead	Lowered upper eyelids	Lip corners slightly turned downwards Small mouth
Symbol 9	Afraid	Raised eyebrows	Eyes wide open	Open mouth

 PCS				Hand in front of mouth
Symbol 10  PCS	Afraid	Inner corners of the eyebrows are raised	Eyes wide open	Stretched and open mouth exposing teeth Raised chin
Symbol 11  PCS	Afraid	Raised eyebrows	Eyes wide open	Open mouth
Symbol 12  PCS	Afraid	No eyebrows Frown on forehead	Eyes wide open Tensed upper eyelids	Lip corners turned slightly downwards like that of a sad face Open mouth
Symbol 13  PICSYMS	Angry	Inner corners of the eyebrows are lowered	Undefined eyelids	Stretched lip corners
Symbol 14  Makaton	Angry	Inner corners of the eyebrows are lowered	Undefined eyelids	Furrowed mouth
Symbol 15  PCS	Angry	Inner corners of the eyebrows are lowered	Undefined eyelids	Furrowed mouth
Symbol 16  PCS	Angry	Inner corners of the eyebrows are lowered	Undefined eyelids Steam from the ears	Lips exposing teeth Stretched lip corners

From Table 2 it is clear that there are four graphic symbols per emotion. The four variations of each emotion were included to provide the participants with the

opportunity of choosing from a variety of graphic symbols representing one emotion.

The various graphic symbols in Table 2 have certain commonalities and differences. All four symbols for happy (Symbol 1-4) have a mouth with upward lip corners, but only Symbol 1 has an open mouth. Symbol 1 is also the only symbol with distinct eyes and eyebrows. All four symbols for sad (Symbol 5-8) have downward lip corners and eyebrows or eyelids that are turned down. Symbol 5 and 6 are the only symbols with a tear on the cheek and the mouth of Symbol 5 is open. Symbol 7 and 8 has small mouths and Symbol 8 has a big forehead. The four symbols for afraid (Symbol 9-12) all have wide-open eyes, but Symbols 9 and 11 are the only symbols with raised eyebrows and an open mouth. Symbol 9 is the only symbol with a hand in front of the mouth and Symbol 11 is the only symbol with hair. The mouths of Symbols 10 and 12 are only slightly open. The lip corners of Symbol 12 are turned slightly downward like that of a sad face (Symbols 5-8) and the frown of this symbol is also a unique feature not found in the other three afraid symbols. The four symbols for angry (Symbol 13-16) all have turned down inner corners of the eyebrows. Symbol 16 is the only angry symbol with an open mouth and steam coming from the ears. It is therefore clear that the graphic symbols used in this study have different facial features, which might impact on the recognition of the four emotions.

The ability of the individual using AAC, should be matched with the specific characteristics of the graphic symbol set/system (Fuller & Lloyd, 1997), however studies that focus on the ability of typically developing children to identify emotional symbols are of great importance. Improved understanding of the ability of children to identify graphic symbols, as well as an understanding of the characteristics of graphic symbols will be beneficial to the field of AAC.

2.7 Summary

This literature study provided available research and literature regarding the basic emotions, the development and innate nature of emotions. Cultural impact on emotion recognition and labelling is discussed. Facial expressions as the primary conveyer of emotions are emphasized and the importance of graphic representations of facial expressions is also discussed.

3 RESEARCH METHODOLOGY

3.1 Introduction

The methodology of the research study is presented in this chapter. Firstly, the aim and sub-aims are stated and the research design and phases are discussed. This is followed by an overview of the development of the material, participant selection, as well as the procedures and results of the pilot study, which are presented in table format. Lastly, the procedures for data collection and data analysis are included.

3.2 Aims

3.2.1 Main aim

To describe the ability of four-year-old children to recognize basic emotions as represented by graphic symbols.

3.2.2 Sub-aims

- To identify the percentage of anticipated choices across emotions, as well as the variety of symbols chosen for each emotion.
- To identify which of the graphic symbols participants most frequently identify as representing the specific emotions of happy, sad, afraid and angry.
- To identify how consistently participants chose a particular graphic symbol to identify a specific emotion in relation to the different questions asked.

3.3 Research design

A descriptive research design was used in this study where twenty-six typically developing English-speaking children were exposed to an overlay with graphic representations of emotions (McMillan & Schumacher, 2001). In response to questions eliciting the target emotions, the participants had to select the graphic symbol representing the specific emotion elicited. The focus of the study was on

children's ability to recognize specific graphic symbols, so it was important to ensure that all the participants understood the four emotions, before being allowed to participate in the final testing procedure. The participants therefore first completed a pre-test and proceeded to complete the remainder of the testing, if an understanding of the emotions were shown. The participant was then immediately exposed to a layout of 16 graphic symbols on an A4 page, which consisted of four graphic symbols of facial expressions for each emotion. Three questions about each of the four emotions were asked; therefore each participant was exposed to 12 questions. The participant had to point to a specific graphic symbol in response to each question.

3.4 Phases of the study

The research study consisted of two phases, namely Phase One (development of material and pilot study) and Phase Two (main study).

3.4.1 Phase One (development of material and pilot study)

Phase One was conducted in close collaboration with pre-school teachers as consultants in order to develop the testing material. Four-year-old children were also consulted to informally determine the relevance of the material before the formal pilot testing was carried out. Thus, the steps in this phase included the preparation and development of the testing material for the pilot study (See Section 3.5) as well as the pilot testing (See Section 3.6), and were as follows:

a) Selection of the four emotions to be included in this study.
b) Selection of spoken labels for the emotions.
c) Selection of the graphic symbols to be used to represent the four emotions.
d) Development of the overlay and questions
e) Development of the testing procedure for determining the comprehension of the four emotions that were selected.
f) Development of the scoring sheet

g) Development of the procedures for obtaining consent from the principals and parents/legal guardians, as well as from the relevant teachers, in order to determine the adherence to the selection criteria.
h) Pilot testing of the whole procedure, as well as the material, to ensure the appropriateness for four-year-old children.

3.4.2 Phase Two (main study)

a) Distribution of short surveys to teachers to determine the eligibility of each child to participate in the study based on the selection criteria.
b) Distribution of the consent forms
c) Fieldwork
d) Data capturing

3.5 Development of material (Phase One)

A new measuring instrument was developed to collect the data, address the sub-aims and to answer the research question. To ensure face validity, this measuring instrument was developed with input from various professionals (five pre-school teachers, four speech therapists, two occupational therapists and one experienced researcher) who work with young children. This material was developed based on focus groups held with pre-school teachers, professional people and three- and four-year-old children. The development of the material will be discussed in terms of the following aspects: selection of the emotions, lables and graphic symbols, development of the questions and overlay, procedures to determine comprehension of the emotions, procedures for obtaining consent and information to determine adherence to selection criteria, and pilot testing.

3.5.1 Selection of emotions

The literature was first reviewed to identify the basic emotions that young children are able to understand, recognize and express. Happy, sad, afraid, angry and surprised were five of the six basic emotions identified through this process.

These emotions were then presented to a panel of professional people, who work with young children. The panel confirmed that happy, sad, afraid and angry would be sufficiently understood by four-year-old children in South Africa, but contrary to the literature, the panel predicted that surprised would be too difficult for young children to understand and recognize. Surprised was therefore excluded from the current set of target emotions. Happy, sad, afraid and angry were chosen as the four target emotions, as these basic emotions were also successfully used in research with young children (Balconi & Carrera, 2006; Bullock & Russell, 1984; MacDonald & Kirkpatrick, 1996; Russell & Widen, 2002).

3.5.2 Selection of labels for emotions

All the possible labels for one emotion were identified and presented to a panel of judges, again consisting of professionals working with pre-school children. The panel was asked to select all the labels per emotion that four-year-old children would be most likely to identify with. The labels were also presented to a four-year-old child who had to choose the most appropriate label for each emotion. One label per emotion was identified and the following four labels were used in the study: *happy, sad, scared* and *cross.* It was, however, decided that *afraid, mad* and *angry* would be used as synonyms should a participant not understand the four main labels.

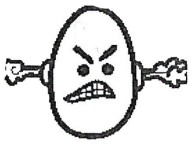
3.5.3 Selection of the graphic symbols

All the possible graphic symbols for happy, sad, afraid and angry in PCS were identified, as this set is fairly readily available for use in South Africa. The variety of symbols for these emotions within PCS was limited and PICSYMS and Makaton were therefore used to select additional symbols. These symbols were shown to a panel of judges consisting of professionals working with pre-school children, who had to choose what they saw as the most appropriate symbols for each emotion for a four-year-old child. The aim was to select four graphic symbols for each emotion.

Four graphic symbols for each emotion were selected through this process, and the resulting 16 graphic symbols to be included in the overlay, can be seen in Table 3.

Table 3 presents the four graphic symbols for each emotion and from which symbol set or system it originates. The 16 graphic symbols were taken from PCS, PICSYMS and Makaton. Please see Table 2 in Chapter 2 for a complete description of each of these symbols.

Table 3. Four symbols for each emotion

Happy	Sad	Afraid	Angry
			
Symbol 1 (PCS)	Symbol 5 (PCS)	Symbol 9 (PCS)	Symbol 13 (PICSYMS)
			
Symbol 2 (PCS)	Symbol 6 (PCS)	Symbol 10 (PCS)	Symbol 14 (Makaton)
			
Symbol 3 (PCS)	Symbol 7 (PCS)	Symbol 11 (PCS)	Symbol 15 (PCS)
			
Symbol 4 (PCS)	Symbol 8 (PCS)	Symbol 12 (PCS)	Symbol 16 (PCS)

3.5.4 Development of the overlay and questions (See Appendix A for overlays and Appendix B for questions)

Three questions per emotion were developed to provide each participant with three opportunities to choose a graphic symbol for each emotion. (See Table 4). The three questions within one emotion were designed with variability within the questions. The reason for testing a participant three times on one emotion was to eliminate the possibility of a participant accidentally pointing to the expected graphic symbol based on one exposure, as well as to determine whether there was some consistency with which the participants chose the graphic symbols across the three questions. The resultant 12 questions were developed in close consultation with the panel of professional people experienced in working with young children. The questions were clearly defined and no vague terms were used (McMillan & Schumacher, 2001). After successfully completing the pre-test each participant was also exposed to three trial questions, before formal testing began. Two of the three questions had to be answered correctly in order to proceed with the 12 questions. The reason for including the trial questions was to ensure that the participant was familiar with the layout of the response booklet, and could correctly scan through the options and indicate a choice of graphic symbol in response to the questions.

Table 4. Three questions per emotion

Emotions	Question 1	Question 2	Question 3
Happy	It is Peter's birthday. He got a big present. He is very happy. Show me the happy face?	Peter is playing with his new toy truck. He is happy about his toy truck. Show me the happy face?	Peter is going to play at his friend's house. He is happy. Show me the happy face?
Sad	Peter cannot find his mommy/daddy. He is very sad. Show me the sad face?	Peter has lost his new ball. He is very sad. Show me the sad face?	Peter cannot play with his new friend. He is very sad. Show me the sad face?
Afraid	Peter is alone in the house and it is dark around him. He is very scared/afraid. Show me	There is a thief in the house and Peter is afraid/scared. Show me the scared face?	There is a spider on the wall. Peter is very afraid/scared. Show me the scared face?

	the scared face?		
Angry	Peter's friend hit him on his shoulder. He is very angry/cross/mad at his friend. Show me the angry face?	Peter was very naughty and his dad is angry/cross/mad at him. Show me the angry face?	Another boy took Peter's toy car. He is very angry/cross/mad. Show me the angry face?

Subsequently an overlay for the purpose of exposing the participants to the entire range of graphic symbols per emotion was designed. As four graphic symbols per emotion were chosen, 16 symbols in total were presented on the overlay. It was felt that this number of symbols would be manageable for four-year-olds, as 12 to 20 symbols per exposure had been successfully used in previous studies (Light, Drager, McCarthy, Mellot, Millar, Parrish, Parsons, Rhoads, Ward & Welliver, 2004). This number of symbols proposed by Light et al (2004) was also tested on two four-year-old children with an overlay of 16 symbols. The researcher therefore felt confident that this number of symbols would be manageable for four-year-old children.

A booklet of 12 A4 pages was thus used during the testing of each participant. The participants had to choose a graphic symbol in response to a context-based question regarding a specific emotion. Each participant was exposed to 12 pages with 16 graphic symbols on one page for each of the 12 different questions. Graphic symbols from PCS, PICSYMS and Makaton were used. The 16 graphic symbols were randomly sequenced on each of the 12 pages by means of the Excell randomization function as suggested by the statistician.
provides the random order of the first three questions, as an example. There was no similarity between the order of graphic symbols on any of the randomized pages.

Table 5. The first three overlays

Question	**Order of graphic symbols**															
Question 1	15	13	4	5	16	10	11	12	6	14	3	9	1	7	8	2

Question 2	14	10	9	8	6	5	11	16	12	15	2	13	3	4	7	1
Question 3	2	13	16	5	11	7	1	4	9	12	15	14	3	8	10	6

The researcher marked the graphic symbols chosen by the participant with a cross and transferred the number of the chosen graphic symbol for each question to the scoring sheet directly after the testing. The reason for this procedure was to ensure that the participant did not lose interest or concentration during testing was done. Each page was numbered on the reverse side to correspond with the scoring sheet's numbers.

3.5.5 Determining the comprehension of the four target emotions (See Pre-test. Appendix C)

A pre-test was designed to test the participant's understanding of emotions, as an understanding of the knowledge of children's emotional experience is important for any study investigating the accuracy of judging emotion (Ekman & Friesan, 1975). Understanding emotions was thus an important prerequisite for recognizing emotions on graphic symbols and the pre-test thus aimed at determining emotional understanding of the four target emotions. Professionals who work with pre-school children were consulted to identify different scenarios and contexts that would provoke the four emotions. A story was written with four scenarios that elicited the four different emotions (See Appendix C). The character was given a present for his/her birthday and was *happy*. Then he/she lost the present and was *sad*. He/she went to search for the present and walked around alone in the dark house at night and was *afraid*. He/she found the present in his/her little sister/brother's room and was *angry*. The character who experiences the four emotions was adapted according to the participant's gender and was either Peter or Mary. Gnepp and Hess (1986) also tested children's understanding of verbal and facial display rules of emotion with eight stories in which the character was of the same gender as the child being tested. The story had a logical structure with which young children were able to identify. The pre-test had pre-determined scripted

verbal reinforcements, to ensure that the researcher provided consistent verbal reinforcement. This pre-test was informally tested on two three- and four-year-old children before piloting and proved to be effective in testing the participant's understanding of happy, sad, afraid and angry.

3.5.6 Scoring sheet

The information and responses of the participant were recorded on the scoring sheet. The scoring sheet consisted of three sections.

Section A for the following information that the researcher had to complete: the teacher provided this information.

a) The participant's number. No names were written on the scoring sheet for purposes of anonymity and confidentiality.
b) Gender
c) Home language
d) School
e) Date of birth
f) Age

Section B for the pre-test. The pre-test determined whether the participant understood the four basic emotions. A story was told and a question for each emotion appeared in this section, with a space for the purpose of notation next to each question. The pass criterion for this section was an understanding of three of the four emotions. (See section 3.5.5 for more details).

Section C for the symbols. Three questions regarding each of the four emotions equals 12 questions in total that had to be recorded in this section. A square for the

purpose of response notation appeared next to each question. The number of the graphic symbol that the participant pointed to was noted in the block.

3.5.7 Obtaining consent and relevant information in order to determine adherence to selection criteria (See Appendix D, E and F)

Informed consent is an integral part of research ethics (McMillan & Schumacher, 2001). This informed consent was obtained by providing the principals and parents/legal guardians with consent letters that had to be completed, signed and returned (See Appendices D and E). The purpose, procedures and implications of this study were stated in the consent letters and the researcher and supervisor signed them. This correspondence required that the principals of the pre-schools and the parents/legal guardians of each participant grant written permission for the children to participate in this research study. The parents/legal guardians also had to give permission for testing sessions to be recorded for the purpose of reliability of the researcher's instructions to each participant. All the participants assented to participation in this study by means of verbal agreement.

An existing teacher questionnaire (Visser, 2004), which was successfully used in a previous study focusing on three-year-old children was used to gather other demographic information pertaining to the children to determine adherence to the selection criteria. (See Appendix F).

3.6 Pilot testing

A pilot study was conducted to identify any potential factors that could negatively impact on the main study (Brink, 2003).

3.6.1 Participants

A comparable pre-school was identified and two participants (one boy and one girl) were selected strictly according to the selection criteria for the main study.

Informed consent from the principal and parents/legal guardians, as well as assent from the participants, was obtained.

3.6.2 Pilot study results

The aims and motivation, procedures, results and recommendations of the pilot study are discussed in table format (Table 6). The recommendations were used to refine the methodology and measuring instrument to ensure reliable data collection, during the main study.

Table 6. Pilot study

Aims	Procedures	Results	Recommendations
1. To determine the participants' comprehension of the four emotions: happy, sad, afraid and angry	Understanding of emotions was determined by exposing the participant to a story with the character experiencing the four target emotions. This was developed in consultation with professionals with experience with young children.	The participants demonstrated an understanding of the four emotions. They identified with the story, as the character's gender was adapted accordingly. This confirmed the teachers' and professionals' predictions that the typical four-year-old should demonstrate an understanding of these four emotions.	It is recommended that the pre-test be administered before starting the testing and that a participant should understand three out of the four target emotions.
2. To determine whether the labels used for the four emotions, are age appropriate.	Professionals working with pre-school children had to examine the graphic symbols and provide age appropriate labels for the graphic symbols. The resultant labels for the emotions were used in the pilot study. The following labels were decided upon: happy, sad, scared and cross.	The children were able to correctly identify these labels.	It is recommended that these labels are used, but to supplement them if a participant demonstrates confusion with a specific emotion label. Afraid, mad and angry would be the possible synonyms, as was the procedure in a study by MacDonald and Kirkpatrick (1996).
3. To determine whether the graphic symbols used, are appropriate for four-year-old children.	Twelve professionals working with pre-school children were consulted in the selection of the graphic symbols. They were required to choose between various graphic symbols for one emotion. The resultant graphic symbols were displayed on an overlay and used in the pilot study.	The children recognized the expected graphic symbols.	Four graphic symbols were selected for each emotion. The resultant 16 graphic symbols would be used in the material for the main study. It is recommended that the participant be made aware of each of the graphic symbols on a page to ensure that each of them is considered in the subsequent formal testing.

4. To determine whether the participants understand the instructions (See Appendix B for the instructions)	Complete instructions were given and the participants were asked whether they understood, before commencing with the test.	They understood all the instructions and responded appropriately.	It is recommended that the participants be exposed to three trial questions with the chosen graphic symbols to ensure that the instructions are understood before the first question is asked in the formal testing.
5. To determine the effectiveness of the distribution and completion of the informed consent letters to the parents/legal guardians.	The teachers handed the informed consent letters to the parents/legal guardians personally. The teachers returned the informed consent letters to the researcher.	The two teachers cooperated well and gave the informed consent letters to the researcher. Both pairs of parents gave written permission. The teachers reported that this was a useful method of distributing the letters.	It is recommended that the informed consent letters be given to the teachers to distribute to the parents/legal guardians.
6. To determine whether participants understand the instructions in order to give assent to participate in the study.	The participants were asked whether they were willing to participate in the study. If they wanted to participate they had to put a red sticker on the consent letter and, if not they had to put a blue sticker on the letter.	The participants did not understand the assent instructions and were confused by the instruction regarding the stickers. The researcher asked whether they wanted to participate and they readily gave verbal assent, but they seemed confused regarding the stickers.	The use of stickers is not recommended; participants should rather give verbal assent to participate.
7. To determine the consistency with which the researcher gives instructions and reinforcement to the participants by recording the sessions.	A qualified speech therapist listened to the recording of the sessions.	The researcher's instructions and positive reinforcements were inconsistent throughout all the sessions.	It is recommended that the researcher give consistent instructions. The verbal reinforcement should be scripted on the researcher's question-form to ensure that verbal reinforcement is the same with every participant. (See Appendix B for scripted questions and verbal reinforcement).

From Table 6 it is clear that the testing material and equipment can be used for the main study as in the pilot study.

3.7 Main study (Phase Two)

3.7.1 Participants

3.7.1.1 Selection criteria

Typically developing four-year-old English-speaking children participated in this study. All of them attended pre-schools in the eastern part of Pretoria. Purposeful sampling was used, as the researcher had to decide which participants would best provide the necessary information to answer the research question and represent the target population (McMillan & Schumacher, 2001).

The following selection criteria were used:

- Participants had to be between the ages of 48 and 59 months.
- Participants should be mother tongue English-speakers.
- Participants should be typically developing children with normal hearing, vision and age appropriate language abilities. This would be pre-determined by the Teacher Questionnaire (See Appendix F).
- Participants should be able to understand three out of the four emotions. This was determined by a pre-test (See Appendix C).
- Participants should be able to scan the symbols presented on the page and point to the target symbol when presented with the overlay. Participant's ability to scan through the symbols was tested on three trial questions where they were asked to scan the symbols and point to a specific symbol.

A random and equal gender distribution (thirteen girls and thirteen boys) was employed in order to ensure that the population represented the target population.

3.7.2 Description of pre-schools and participants

The population was a group of 26 four-year-old, typically developing English-speaking children from five different pre-schools in Pretoria East, Republic of South Africa. Thirty consent forms were distributed and twenty-eight returned. Two consent forms were not returned. Two participants did not pass the pre-test and were therefore not included in the study. Twenty-six children, who met the selection criteria, therefore participated in the study. Five pre-schools in Pretoria East were used and English was the primary language medium used in the classroom. Figure 1 presents the number of children per age group. The 48-50 months age group consisted of 8 participants and the rest of the age groups had between five and seven participants. Figure 2 presents the distribution of participants among the five comparable schools.

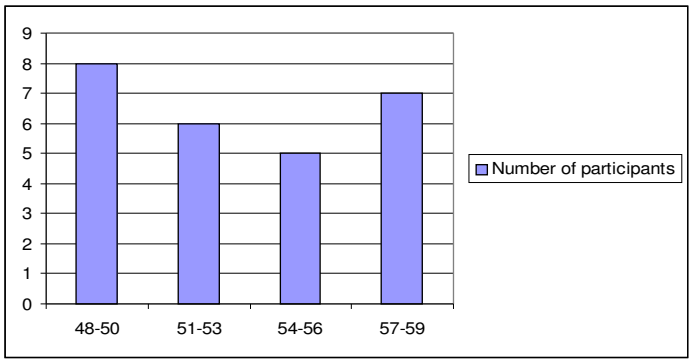


Figure 1. Age distribution of participants

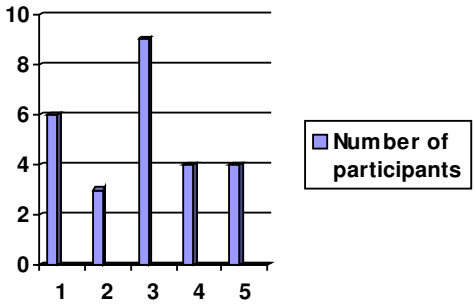


Figure 2. Distribution among schools

3.8 Material and Equipment used during the main study

3.8.1 Testing booklet

The testing booklet consisted of 12 A4 pages with 16 graphic symbols on each page. See 3.5.1 for the selection of emotions, 3.5.2 for the labels for each emotion and 3.5.3 for the graphic symbols that were chosen.

3.8.2 Overlay and questions

See 3.5.4 for more details on the procedures by which the 12 overlays and questions were developed. (See Appendix B for the 12 questions and Appendix A for the 12 overlays).

3.8.3 Determining the comprehension of the four target emotions (See Pre-test. Appendix C)

See 3.5.5 for more details on the procedures by which the pre-test was developed. See Appendix C for the pre-test.

3.8.4 Scoring sheet (See Appendix G)

See 3.5.6 for more details on the procedures whereby the scoring sheet was developed. See Appendix G for the scoring sheet.

3.8.5 Obtaining consent and relevant information to determine adherence to selection criteria (See Appendix D, E and F)

See 3.5.7 for more details on the procedures by which the consent letters and teacher questionnaire were developed. See Appendix D and E for consent letters and Appendix F for teacher questionnaire.

3.9 Procedures

The detailed procedures that were followed for the execution of the main study will be discussed below.

3.9.1 General procedures

Permission was obtained from the principals of the pre-schools and the purpose and procedures of the study were explained in the informed consent letter (See Appendix D). The principals were then required to grant written permission to the researcher to test children in their pre-schools. Responsible and reliable research considers ethical aspects at all stages of the research process. The best professional judgements are possible only if ethical considerations are taken into account (McMillan & Schumacher, 2001).

A potential group of thirty four-year-old, English-speaking, typically developing children was identified as possible participants in the study. Each participant's

teacher had to complete the Teacher Questionnaire (See Appendix F) for the purpose of a reliable developmental profile.

The parents/legal guardians of each participant were informed of the purpose and the procedures of the research study and were required to give written informed consent for their children to participate in the study (See Appendix E). The testing was conducted by a qualified speech language pathologist. The researcher also kept the principals and teachers up-to-date as the study progressed. The participants were protected from any form of physical or mental discomfort at all stages and was allowed to withdraw at any time during the research process. Participants understood that there were no negative consequences to the participants should they choose to withdraw from the study. All the participants completed the testing and there were no withdrawals. Parents, principals and teachers understood that anonymity was assured and that comprehensive written and verbal feedback would be provided after completion of the study. Appropriate dates and an appropriate room for testing were discussed with the principals and teachers.

The measuring instrument was administered and scored (See Material and Equipment (3.8) for discussion of material development).

3.9.2 Procedures for data collection

3.9.2.1 Pre-test for testing comprehension

A pre-test determined the participant's understanding of the basic concept of the four emotions. (See Appendix C). A story was told in which the character experienced the four target emotions. The character in the story was of the same gender as the participant being tested. (See Appendix C for pre-test story). The participant was asked to label the emotions experienced by the character. This method determined the participant's understanding of the emotional concepts in the story; it was also used in a study by Gnepp and Hess (1986). The researcher supplemented the story and emotions by using different

voice intonations and expressing the desired emotions on her own face. If the participant understood three of the four emotions, the researcher proceeded to the main testing section in which the graphic symbols were presented. Positive verbal reinforcement (*Good girl/boy)* was given after the first and last questions in the pre-test. (See Appendix C).

3.9.2.2 Main test

Participants were only tested in the morning to ensure that fatigue or low concentration did not influence the results negatively. Approximately 15 minutes were spent with each participant. The researcher visited each pre-school twice for the purpose of the main study. The researcher personally fetched each selected participant from the classroom on the day of testing. The participants were then tested individually in a private room. The researcher and participant were seated at a child-sized table and chair. The researcher then explained what was expected and how the testing would be done. Clear instructions had to be given as to what was expected of the participant during the testing procedure. These instructions were important, as it orientated the participant to what had to be done. These types of instructions were also used in the study of Gnepp and Hess (1986). The participant had to provide verbal assent to participate in the study before testing commenced.

The portable cassette recorder was activated to record the session. These recordings were checked by a second rater to confirm that the researcher was consistent across participants.

The booklet with stimulus material was placed in front of the participant. The blank scoring sheet, the specific participant's completed teacher questionnaire, the informed consent form and a pen were placed in front of the researcher. The participant was exposed to three trial questions to ensure that the procedure and instructions were clearly understood. Positive verbal

reinforcement (*Good girl/boy)* was given after the first and last trial questions. (See Appendix B).

Three questions for each of the four emotions were asked resulting in 12 questions in total. (See Appendix B for the 12 questions). Positive verbal reinforcement (*Good girl/boy)* was given after the first and last questions. (See Appendix B). The participant was rewarded with a sticker at the end of the session. The researcher accompanied the participant back to the classroom.

3.10 Analysis of data

The symbol to which the participants pointed was marked with a cross and transferred to the scoring sheet after the session. Accurate notation of the responses is of great importance as research results should be a reliable reflection of the reality and should ensure the validity and reliability of conclusions (Brink, 2003). Responses would be regarded as expected and anticipated if it correlated with the labels given to the symbols in Table 2. The response would be considered as unexpected if it did not correlate with the labels in Table 2.

Data was recorded on the scoring sheet and submitted for analysis. A short discussion will follow of the procedures used during the analyses.

Table 7. Data Analysis

Type of statistics	Statistical procedure	Motivation for selection
Descriptive statistics: Central tendency (McMillan & Schumacher, 2001).	Mean and median	To determine the mean number of responses which reflects expected versus unexpected choices of graphic symbols
	Frequency distributions	To determine the frequency of participants that chose each symbol within an emotion.
		To determine the frequencies of symbols that was chosen for each question in the main study.
		To determine the variety of unexpected symbols chosen within one question.
		To determine the consistency of symbols chosen within an emotion (i.e. across emotions).

Descriptive statistics were used to describe the data. Expected responses were calculated and converted into frequencies and percentages. Frequency distribution counts were calculated, percentages would be presented in tables and mean scores were be presented graphically.

3.11 Summary

The methodology of the research study was discussed in this chapter. The aim and sub-aims, research design, data collection and data analysis were discussed, as well as the study phases and the pilot study. The development of the material and recommendations for the main study, which were obtained from the pilot testing, were also presented in this chapter.

4 RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the study and provides a discussion in terms of the aims that were stated in the methodology. The frequency of expected choices within an emotion are discussed, as well as the variety of symbols that were chosen for each emotion. The most frequently chosen symbol for each emotion is identified and discussed in terms of different facial features presented in Table 2 in Chapter 2.

4.2 Frequency of expected and unexpected symbols within an emotion

Each participant was exposed to three questions per emotion, resulting in 12 questions (See Appendix B). There were four expected options of graphic symbols to choose from within each emotion. The majority of participants chose one of the four expected choices of symbols at each question, but a few choices were made outside of the expected four options per emotion (i.e. unexpected choices). The frequency of these unexpected choices gives a clear indication of the degree of variation of recognition of the symbols.

Table 8 provides a detailed analysis of the variety of expected and unexpected choices as perceived by the participants that was made in favour of each of the 12 symbols. As a participant could choose any of the 16 symbols on the overlay, it is to be expected that some participants could have selected symbols not within the four expected symbols for a specific emotion.

Table 8. Response choices per question (n=26)

Questions	Expected symbols	Unexpected symbols	Questions	Expected symbols	Unexpected symbols
Happy			**Afraid**		
1. It is Peter's birthday. He got a big present. He is very happy.	**Symbol 1** n=9 **Symbol 2** n=7 **Symbol 3** n=5 **Symbol 4** n=5		**7. Peter is alone in the house and it is dark around him. He is scared/afraid.**	**Symbol 9** n=2 **Symbol 10** n=8 **Symbol 11** n=4 **Symbol 12** n=5	**Symbol 4** n=1 **Symbol 5** n=1 **Symbol 6** n=1 **Symbol 13** n=1 **Symbol 14** n=1 **Symbol 15** n=1 **Symbol 16** n=1
2. Peter is playing with his new toy truck. He is very happy about his toy truck.	**Symbol 1** n=9 **Symbol 2** n=4 **Symbol 3** n=6 **Symbol 4** n=6	**Symbol 11** n=1	**8. There is a thief in the house and Peter is afraid/scared.**	**Symbol 9** n=3 **Symbol 10** n=5 **Symbol 11** n=3 **Symbol 12** n=8	**Symbol 4** n=1 **Symbol 5** n=3 **Symbol 8** n=2 **Symbol 16** n=1
3. Peter is going to play at his friend's house. He is very happy	**Symbol 1** n=12 **Symbol 2** n=7 **Symbol 3** n=4 **Symbol 4** n=3		**9. There is a spider on the wall. Peter is very afraid/scared.**	**Symbol 9** n=4 **Symbol 10** n=8 **Symbol 11** n=1 **Symbol 12** n=7	**Symbol 5** n=3 **Symbol 6** n=1 **Symbol 14** n=1 **Symbol 16** n=1
Sad			**Angry**		
4. Peter cannot find his mommy/daddy. He is very sad.	**Symbol 5** n=7 **Symbol 6** n=6 **Symbol 7** n=3 **Symbol 8** n=4	**Symbol 12** n=6	**10. Peter's friend hit him on his shoulder. He is very angry/cross/mad with his friend.**	**Symbol 13** n=5 **Symbol 14** n=10 **Symbol 15** n=5 **Symbol 16** n=2	**Symbol 6** n=1 **Symbol 7** n=1 **Symbol 8** n=2
5. Peter has lost his new ball. He is very sad.	**Symbol 5** n=11 **Symbol 6** n=2 **Symbol 7** n=3 **Symbol 8** n=2	**Symbol 9** n=1 **Symbol 12** n=7	**11. Peter was very naughty and his dad is angry/cross/mad with him.**	**Symbol 13** n=3 **Symbol 14** n=9 **Symbol 15** n=4 **Symbol 16** n=6	**Symbol 6** n=1 **Symbol 8** n=2 **Symbol 9** n=1
6. Peter cannot play with his new friend. He is very sad.	**Symbol 5** n=2 **Symbol 6** n=13 **Symbol 7** n=1 **Symbol 8** n=3	**Symbol 9** n=1 **Symbol 10** n=1 **Symbol 12** n=4 **Symbol 16** n=1	**12. Another boy took Peter's toy car. He is very angry/cross/mad.**	**Symbol 13** n=4 **Symbol 14** n=12 **Symbol 15** n=1 **Symbol 16** n=5	**Symbol 5** n=1 **Symbol 8** n=1 **Symbol 11** n=1 **Symbol 12** n=1

Table 9. Percentage expected choices across emotions (n=26)

Emotion	Question 1, 2 & 3 per question / 3	Average of expected choices per emotion
Happy	100% + 96% + 100% = 296 296 / 3 = 97 %	97 %
Sad	77% + 69% + 73% = 219 219 / 3 = 73 %	73 %
Afraid	72% + 74% + 74% = 220 220 / 3 = 73 %	73 %
Angry	84% + 84% + 84% = 252	84 %

	252 / 3 = 84 %	

4.2.1 Happy symbols

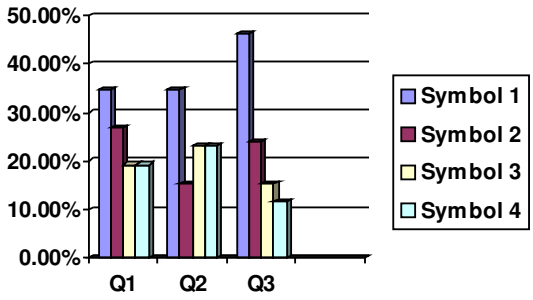


Figure 3. Frequency of expected choices for each happy question

In *Question 1* and *Question 3* all the participants (100%) chose one of the four expected symbols, namely Symbols 1, 2, 3 or 4. In *Question 2* twenty-five participants (96%) chose one of the four expected symbols, whereas only one participant (4%) chose an unexpected symbol, namely Symbol 11 (See Figure 3). The variety and frequency of choice of the unexpected symbols across the three questions of happy is not large (only one unexpected symbol). The majority of participants therefore chose one of the four anticipated or expected symbols. The average percentage of expected choices made within the emotion of happy for all three questions was 97% (See Table 9). This clearly indicates that the emotion of happy was easy to recognize and that the four symbols appear to be fairly iconic representations of the emotion of happiness. Happiness is one of the earliest emotions to be recognised, followed by sadness and anger in sequence (Walden & Field, 1982). Happiness is also a positive emotion and develops much earlier than the other negative emotions (Denham & Couchoud, 1990).

4.2.2 Sad symbols

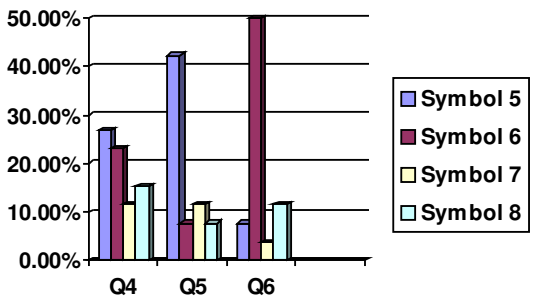


Figure 4. Frequency of expected choices for each sad question

In *Question 4*, twenty participants (77%) chose from symbols among the expected options (Symbols 5, 6, 7 or 8), but six participants (23%) chose Symbol 12. The fact that such a large portion of the sample chose Symbol 12 (originally a symbol designed to convey the emotion of afraid) for this question, although Symbol 12 does not fall within the expected four options for *Question* 4, clearly indicates that Symbol 12 has one or more features that reflect the emotion of sadness. In *Question 5*, eighteen participants (70%) chose the expected options, but eight participants (30%) chose an unexpected two symbols - Symbol 9 and Symbol 12. One participant chose Symbol 9 and seven participants again chose Symbol 12. The variety of unexpected symbols chosen for this question is not that great as only two unexpected symbols were chosen, but the frequency of unexpected choices for Symbol 12 indicates that this symbol is linked very strongly to the question in particular and recognition of the emotion of sadness in general. In *Question 6*, nineteen participants (73%) chose the expected options, but seven participants (27%) chose an unexpected four symbols – Symbol 9, Symbol 10, Symbol 12 and Symbol 16. Again Symbols 9, 10 and 16 respectively were each chosen by only one participant, but Symbol 12 was again chosen by four participants (15%). (See Figure 4).

It can therefore be concluded that when choosing symbols to represent the emotion of sadness, across all the three questions, the majority of participants chose symbols from the expected options (Symbols 5, 6, 7 or 8). The average percentage of expected choices within the emotion of sad for all three questions was 73 %. (See Table 9).

It is interesting to note, however, that while four alternative symbols were chosen for this emotion, across the three questions, a large portion of the sample in each question chose Symbol 12. The variety of unexpected symbols within this emotion is therefore not as much (four alternative symbols), indicating that this emotion was not difficult for the participants to recognize. The fact that Symbol 12 was chosen several times raises questions regarding the facial features of Symbol 12 that relate to the emotion of sad. See Table 2 for a discussion of the facial features of Symbol 12 that links it very strongly to the emotion of sadness, due to the downward mouth corners.

4.2.3 Afraid symbols

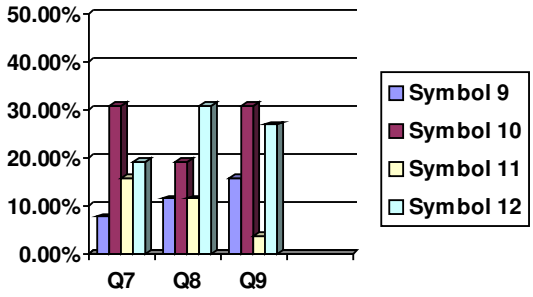


Figure 5. Frequency of expected choices for each afraid question

In *Question 7*, nineteen participants (72%) chose the expected options (Symbols 9, 10, 11 or 12), but seven participants (28%) chose seven unexpected symbols (Symbols 4, 5, 6, 13, 14, 15 and 16). These unexpected symbols were only chosen once. Although the variety of the unexpected symbols that were chosen is relatively large, there is no pattern in the

responses. However, the fact that seven participants chose outside the four expected symbols could indicate that the emotion of afraid was more difficult to recognize. In *Question 8*, nineteen participants (73%) chose one of the expected options, but seven participants (27%) chose four unexpected symbols (Symbols 4, 5, 8 and 16). Symbols 4 and 16 were chosen each time by only one participant. Symbol 5 and Symbol 8 were chosen by three participants (11%) and two participants (8%) respectively. Seven participants (27%) again (like *Question* 7) chose outside the four expected options indicating that afraid, as an emotion was more difficult to understand, than either happy or sad. In *Question 9*, twenty participants (77%) chose one of the expected options, but six participants (23%) chose four unexpected symbols (Symbols 5, 6, 14 and 16) outside the four expected symbols which again confirms that the emotion of sadness (as depicted by the four graphic symbols) is more difficult to recognize (See Figure 5).

Symbols 6, 14 and 16 were chosen each time by only one participant. This indicates that these specific symbols have no pattern in responses, because of the low frequency of participants that chose the symbols. Symbol 5, which was designed to convey the emotion of sadness, was chosen by three participants (11%). This specific symbol with a higher frequency is associated with the emotion of afraid. See 4.3.3 for a discussion on the specific features of Symbol 5 that were associated with the emotion of afraid.

It can thus be concluded that within the emotion of afraid, across all three questions, the majority (72%, 73% and 77%) of participants chose the expected symbols (Symbols 5, 6, 7 or 8). The average percentage of expected choices within the emotion of afraid for all three questions is 73 %. (See Table 9). Eight alternative symbols were chosen for this emotion, across the three questions. The variety of alternative symbols for the emotion of afraid is greater than for sad (four unexpected symbols) and happy (one unexpected symbol). The fact

that there is such a great variety of unexpected choices indicates that this emotion was more difficult to interpret.

4.2.4 Angry symbols

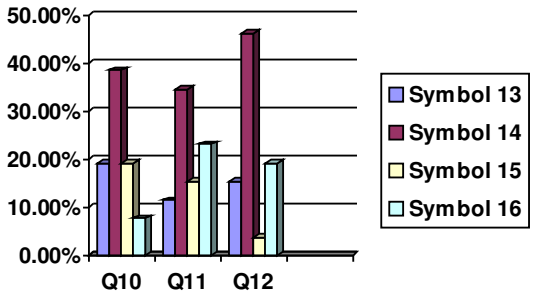


Figure 6. Frequency of expected choices for each angry question

In *Question 10*, twenty-two participants (85%) chose one of the expected options (Symbols 13, 14, 15 and 16), but four participants (15%) chose three unexpected symbols (Symbols 6, 7 and 8). Symbols 6 and 7 were chosen once, and Symbol 8 by two participants (7%). These low frequencies do not indicate a pattern in responses with regard to the specific symbols. The variety of the unexpected symbols, which were chosen outside the four expected symbols, is therefore not large (only three unexpected symbols). In *Question* 11, twenty-two participants (85%) chose one of the expected options, but four participants (15%) chose three unexpected symbols (Symbols 6, 8 and 9). Symbols 6 and 9 were chosen once and Symbol 8 was chosen by two participants (7%). Again this indicates no pattern in responses with regard to the specific symbols. In *Question* 12, twenty-two participants (84%) chose the expected options (Symbols 9, 10, 11 or 12), but four participants (16%) chose four unexpected symbols (Symbols 5, 8, 11 and 12). The four unexpected symbols were only chosen once each time, indicating that there is no pattern in responses of the specific four unexpected symbols because of the low frequencies per symbol. The variety of the unexpected symbols that were

chosen outside the four expected symbols is therefore not great (only four unexpected symbols). (See Figure 6).

Hence it can be concluded that within the emotion of angry, across all three questions, the majority (85%, 85% and 84%) of participants chose the expected symbols (Symbols 9, 10, 11 and 12). The average percentage of expected choices within the emotion of afraid for all three questions is 84 %. (SeeTable 9). According to these percentages afraid (72 % expected) is more difficult to understand than angry (84 %). Balconi and Carrerra (2006) noted that the emotions with high arousal and negative value (e.g. anger) are better understood. Seven alternative symbols were chosen for this emotion, across the three questions. The variety of alternative symbols for the emotion of angry is greater than for sad and happy but smaller than for afraid indicating, that it is perhaps an easier emotion to recognize than afraid. The fact that there is such a great variety of symbols possibly indicates that the four expected symbols do not adequately capture the emotion.

It can thus be concluded that there is a difference between the four emotions in terms of unexpected symbols chosen per emotion. For *happy* there was only one unexpected symbol, across the three questions. This may indicate that happy was an easy emotion to recognize and that the four symbols for happy (Symbols 1-4) successfully captured the emotion of happy. For the emotion of *sad*, there were four unexpected symbols. This may indicate that sad is a more difficult emotion to recognize than happy or that the four sad symbols (Symbols 5-8) did not fully represent the emotion of sad. For *afraid* the variety of unexpected symbols was greatest. Eight unexpected symbols were chosen for this emotion, indicating that this was the most difficult emotion to recognize or that the four symbols (Symbols 9-12) did not successfully capture the emotion of afraid. *Angry* had an unexpected seven symbols, also indicating that this was a difficult emotion to recognize. These results correlate well with what was found in the literature that states that the recognition of happy can be expected

to occur in earlier stages than negative emotions (Denham & Couchoud, 1990). Happy is also the only one of the four target emotions that falls in the pleasure dimension and this may explain why happy was the emotion that was understood and recognized the best in this study. Sad, afraid and angry all fall within the displeasure dimension and are therefore more difficult to understand and recognize. (See section 2.2). It is interesting to note that happy, sad and angry were easier to recognize than afraid. This finding is also supported by the literature where Widen and Russell (2003) state that typically developing children first recognize happy, angry and sad in this order, and then scared, surprised and disgusted follow.

4.3 Preferred symbol choices for happy, sad, afraid and angry

There is a distinct preferred choice of symbol for each emotion. This indicates something about the specific symbol and may be related to iconicity that is the degree to which each selected symbol represents the target emotion. In order to attempt to qualify this, these preferred choices within each emotion will be discussed. See Table 2 for a graphic representation of each symbol and a discussion of the facial features differentiating emotions on facial expressions from one another.

Table 10 discusses the data of all the responses for the different emotions. The frequency of choices in favour of each symbol is discussed in terms of the four emotions, where [n=] equals the frequency of choices for a specific graphic symbol. Each graphic symbol was an expected choice for the emotion in bold and an unexpected choice for the remaining three emotions not in bold. For example, it is evident that Symbol 5 was an expected choice for the emotion of sad, as Symbol 5 was chosen 20 times within the sad questions. Symbol 5 was a unexptected choice of symbol for afraid and was chosen seven times as an unexpected choice. Symbol 5 was also an unexpected choice within the emotion of angry, although it was only chosen once.

Table 10. Most frequently chosen symbol across the emotions invesigated

Symbol	Frequency of choices across three questions	Upper component	Middle component	Lower component
Symbol 1 (happy)  **PCS**	**Happy n= 30** Sad n=0 Afraid n=0 Angry n=0	Raised eyebrows	Tightened lower eyelids Raised cheeks	Raised upper lip Upward lip corners
Symbol 2 (happy)  **PCS**	**Happy n= 18** Sad n=0 Afraid n=0 Angry n=0	No eyebrows	Undefined eyelids	No differentiation between upper and lower lip Upward lip corners
Symbol 3 (happy)  **PCS**	**Happy n= 15** Sad n=0 Afraid n=0 Angry n=0	Undefined eyebrows	Defined eyelids	No differentiation between upper and lower lip Upward lip corners Nose
Symbol 4 (happy)  **PCS**	**Happy n= 14** Sad n=0 Afraid n=0 Angry n=0	No eyebrows	Big blank eyes	No differentiation between upper and lower lip Upward lip corners Nose
Symbol 5 (sad)  **PCS**	Happy n= 0 **Sad n=20** Afraid n=7 Angry n=1	Inner corners of the eyebrows are raised	Undefined eyelids Tear on the cheek	Opened mouth Lip corners turned down
Symbol 6 (sad)  **PCS**	Happy n= 0 **Sad n=21** Afraid n=2 Angry n=2	No eyebrows	Lowered upper eyelids Tear on the cheek	Lip corners turned down Nose
Symbol 7 (sad)  **PCS**	Happy n= 0 **Sad n=7** Afraid n=0 Angry n=1	Inner corners of the eyebrows are raised	Defined tensed upper eyelids	Lip corners turned downwards Small mouth
Symbol 8 (sad)  **PCS**	Happy n= 0 **Sad n=9** Afraid n=2 Angry n=5	Inner corners of the eyebrows are raised Big forehead	Lowered upper eyelids	Lip corners turned slightly downwards Small mouth

Symbol 9 (afraid)  **PCS**	Happy n= 0 Sad n=2 **Afraid n=9** Angry n=1	Raised eyebrows	Eyes wide open	Open mouth Hand in front of mouth
Symbol 10 (afraid)  **PCS**	Happy n= 0 Sad n=1 **Afraid n=21** Angry n=0	Inner corners of the eyebrows are raised	Eyes wide open	Stretched and open mouth exposing teeth Raised chin
Symbol 11 (afraid)  **PCS**	Happy n=1 Sad n=0 **Afraid n=8** Angry n=1	Raised eyebrows	Eyes wide open	Open mouth
Symbol 12 (afraid)  **PCS**	Happy n= 0 Sad n=17 **Afraid n=20** Angry n=1	No eyebrows Frown on forehead	Eyes wide open Tensed upper eyelids	Lip corners turned slightly downwards like that of a sad face Open mouth
Symbol 13 (angry)  **PICSYMS**	Happy n= 0 Sad n=0 Afraid n=1 **Angry n=12**	Inner corners of the eyebrows are lowered	Undefined eyelids	Stretched lip corners
Symbol 14 (angry)  **Makaton**	Happy n= 0 Sad n=0 Afraid n=2 **Angry n=31**	Inner corners of the eyebrows are lowered	Undefined eyelids	Furrowed mouth
Symbol 15 (angry)  **PCS**	Happy n= 0 Sad n=0 Afraid n=1 **Angry n=10**	Inner corners of the eyebrows are lowered	Undefined eyelids	Furrowed mouth
Symbol 16 (angry)  **PCS**	Happy n= 0 Sad n=1 Afraid n=3 **Angry n=13**	Inner corners of the eyebrows are lowered	Undefined eyelids Steam from the ears	Lips exposing teeth Stretched lip corners

4.3.1 Happy

Symbol 1 was the most preferred choice across the three questions for happy. See Table 10 for frequencies of expected and unexpected choices and description of Symbol 1 in terms of facial features. The features of Symbol 1 are an open mouth, with raised outer lip corners and raised eyebrows. The open mouth of Symbol 1 is a focus point and it has been found that children focus on the lower component (mouth) of a face when interpreting happy facial expressions (Sullivan & Kirkpatrick, 1996). Raised eyebrows and an open mouth have also been found to be definite facial features evident in the facial expression of happy (Kohler, Turner, Stolar, Bilker, Brensinger, Gur & Gur, 2004). None of the other happy symbols (Symbols 2, 3 or 4) have raised eyebrows or an open mouth. Symbol 1 is thus distinct from the other three symbols due to the presence of these features. It may therefore be assumed that the latter two features distinguished Symbol 1 from the rest in such a way that Symbol 1 was the most preferred happy symbol, and therefore the most iconic, as it displays the typical features, which convey the emotion of happiness on this symbol, i.e. the eyebrows and the open mouth for these children. Symbols 1-4 were also only an option for *Questions* 1-3 and were not chosen as unexpected options for other emotions.

4.3.2 Sad

Symbols 5 and 6 were the most preferred choices for the emotion of sad. See Table 10 for frequencies of expected and unexpected choices and description of Symbols 5 and 6 in terms of facial features. Symbols 9 and 12 were also popular choices although these symbols were not of the expected choices. (See Table 10).

Both Symbol 5 and Symbol 6 have a tear and it is possible that this feature is important for the representation of sad, but this feature has not been identified in the literature. The characteristics of the emotion of sad are furrowed (wrinkled) eyebrows, an open mouth with a raised upper lip, turned down lip

corners and a pulled-up chin (Kohler, Turner, Stolar, Bilker, Brensinger, Gur & Gur, 2004). The lower component of the face plays an important role in the interpretation of a sad face (Sullivan & Kirkpatrick, 1996). The mouths of Symbol 5 and Symbol 6 are more defined drawing attention to the mouths, whereas for Symbols 7 and 8 more attention seems to be focused on the eyes and eyebrows.

Symbol 9 and Symbol 12 (afraid symbols) were two unexpected choices for the sad questions. The eyebrows of Symbol 12 look much the same as the sad-eyebrows of Symbols 5, 7 and 8 (sad symbols). Other features that might have characterized Symbol 12 as a sad face is the frown on the forehead and the mouth with lowered outer lip-corners that also looks much like Symbol 5 (sad face). This finding was also confirmed by Sullivan and Kirkpatrick, (1996).

4.3.3 Afraid

The most preferred overall choice of symbol within the emotion of afraid was Symbol 10 and 12 and then Symbols 9 and 11.

Symbol 10 and Symbol 12 (the two most preferred choices) differ visually from the other two afraid symbols (Symbol 9 and Symbol 11) in terms of the eyebrows. Symbol 10 and Symbol 12's eyebrows have raised inner-corners, whereas Symbol 9 and Symbol 10 have symmetrical raised eyebrows. It can therefore be assumed that among this group of participants the eyebrows (upper component) play an important role in the recognition of the emotion of afraid. This is in agreement with the findings of Sullivan and Kirkpatrick, (1996).

Symbol 5 (sad face) was also a popular choice for all three afraid questions. (See Table 10). It can therefore be assumed, that a certain feature in Symbol 5 is also indicative of the emotion of afraid for this group of four-year-old participants. The upper component of Symbol 5 may have led participants to

choose this sad face as a fearful face. The wide opened eyes and the opened mouth of Symbol 5 are distinct features of a fearful face (Kohler, Turner, Stolar, Bilker, Brensinger, Gur & Gur, 2004). Another feature of afraid is visually represented by raised inner corners of the eyebrows (Kohler, Turner, Stolar, Bilker, Brensinger, Gur & Gur, 2004); Symbol 5 also possesses this feature.

It is clear that there were many more unexpected choices for *Questions* 7, 8 and 9. It may be concluded that this emotion (afraid) is more difficult to recognize than happy and sad.

4.3.4 Angry

The most preferred overall choice of symbol within the emotion of angry was Symbol 14, followed by Symbol 16 and then Symbols 13 and 15. Symbols 5, 6, 7, 8, 9, 11 and 12 were unexpected choices within this emotion. (See Table 10). However, the percentage of choices for these symbols does not reveal any pattern. There were many unexpected choices and the conclusion is that the emotion of angry is more difficult to recognize than happy and sad.

Children focus on the eyebrows (upper component) when interpreting angry facial expressions (Sullivan & Kirkpatrick, 1996). The eyebrows of Symbol 14 were therefore of value to the participants and differentiated it from Symbols 13, 15 and 16. The eyebrows and upper component of Symbol 14 are higher up in the face than Symbols 13, 15 and 16. This supports the fact that the upper component plays an important role in the recognition of angry, as Symbol 14's upper component is much more prominent than in the other three symbols. Symbol 14 is also the only angry symbol with a nose that differentiates it from the rest. Other characteristics of anger include lowered eyebrows, wide opened eyes, with tightened lower lids and exposed teeth (Kohler, Turner, Stolar, Bilker, Brensinger, Gur & Gur, 2004).

4.4 Variations of graphic symbol choices across questions

There were three questions asked in relation to each of the four emotions. At times the participants selected different graphic symbols for the same emotion in relation to different questions.

4.4.1 Happy

Symbol 1 was the most preferred for Q*uestions* 1, 2 and 3. The contexts of the three questions did therefore not impact on the choices within this emotion.

4.4.2 Sad

Symbol 5 was the most preferred for Q*uestions* 4 and 5; Symbol 6 was the most preferred for *Question* 6. Only 2 subjects chose Symbol 5 (most preferred Symbol for *Question* 4 and *Question* 5) for Q*uestion* 6. It may therefore be assumed that the intensity of emotion elicited in Q*uestion* 6 differs from the intensity of emotion elicited from *Questions* 4 and 5. *Question* 6 also had four unexpected alternative answers and therefore a greater variety. This also supports the assumption that the context of *Question* 6 was different from that of *Questions* 4 and 5. In Q*uestions* 4 and 5 the character has lost something (mommy/daddy and ball), but in Q*uestion* 6 the character cannot play with a friend and that loss-element is absent. The difference in the context could therefore have influenced the most preferred symbols within the questions.

4.4.3 Afraid

Symbol 10 was the most preferred for *Questions* 7 and 9, Symbol 12 was the most preferred for *Question* 8. Again it can be concluded that the context of *Question*s 7 and 9 are the same in some way and yet different from the context in *Question* 8. *Question* 8 uses the word *thief.* Perhaps the participants experienced an intense feeling of fear, due to the high rate of violent crime prevalent in South Africa. The intensity of afraid that was experienced while exposed to this question, may have influenced the choice of symbol. The focal point for the emotion of fear is the upper component (eyebrows) of the face

(Sullivan &Kirkpatrick, 1996). Symbol 12 has a very strong focal point on the upper component, because of the eyebrows and the frown on the forehead. This may be one reason why children chose this option when they experienced intense fear. Symbol 8 was also only an option at *Question* 8. This also indicates that the context of *Question* 8 differs from the context of *Questions* 7 and 9.

4.4.4 Angry

Symbol 14 was the most preferred for Q*uestions* 10, 11 and 12. The contexts of the three questions did therefore not impact on the choices within this emotion.

4.5 Gender differences and consistency of choices for three questions within one emotion

There were no significant gender differences between the emotions in recognizing the symbols. There is also no significant consistency with which the participants chose specific symbols for the three questions within one emotion.

4.6 Summary

In this chapter the results of the study were analysed. The frequencies of expected choices within an emotion were discussed, as well as the variety of symbols that were chosen within each emotion. The most preferred choice of symbol for each emotion was identified and discussed in terms of different facial features.

5 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE USE

5.1 Introduction

In this chapter the results of the study are summarized and conclusions are drawn. The limitations and strengths of the study are identified and discussed and recommendations for future research are presented.

5.2 Summary and conclusion

The purpose of this study was to determine whether typically developing four-year-old children are able to recognize four basic emotions as represented through graphic symbols of facial expressions.

A descriptive research design was used in this study. The four emotions used were happy, sad, afraid and angry. Symbols from PCS, PICSYMS and Makaton were used to convey these four emotions. There were four alternative symbols per emotion resulting in a total of 16 symbols that participants were exposed to at once. Each participant was asked 12 questions that consisted of three questions per emotion. The aim of the questions was to provide a participant with the opportunity to choose from a variety of 16 symbols, the symbol that truly represents that specific emotion.

The results showed that the participants of this study were able to recognize the emotions conveyed by the graphic symbols. It should be noted that all the participants understood the four emotions, before they were required to recognize the emotions. The participants chose mostly from the four expected symbols within each emotion indicating that they have the ability to recognize the emotions of happy, sad, afraid and angry.

However, there were variations of choices within each emotion. These unexpected choices of graphic symbols within an emotion indicate that certain

emotions are more difficult to recognize than other, for example sad, afraid and angry. Happy did not have as much variation across questions than sad, afraid and angry indicating that happy is an easier emotion to recognize.

The results of this study also indicate that graphic symbols conveying emotions have certain facial features that discriminate emotions from each other. The lower component of the face (mouth) plays an important role in the recognition of happy and sad, whereas the upper component (eyes and eyebrows) plays an important role in the recognition of afraid and angry. These findings correlate with previous research in the literature.

5.3 Critical evaluation of the study

5.3.1 Limitations

This study was critically evaluated and certain limitations were identified:

- The sample size of this study was small. A larger sample would have allowed for more detailed statistical analyses.
- The influence of the context of the questions on the resulting choice of symbols for an emotion is acknowledged. The type of question used in eliciting a specific emotion can impact on the recognition of the emotion.
- Finally, only one of the symbols indicated an emotion situated in the pleasure dimension (happy) and the remaining 12 symbols indicated emotions in the displeasure dimension (sad, afraid and angry). As a result the variety of choices for symbols displaying displeasure may have contributed to the fact that a greater number of unexpected choices fell within the displeasure dimension, than in the pleasure dimension that only had four choices of graphic symbols (Symbol 1-4).
- Even though there was a choice of four symbols for each emotion it is acknowledged that the choices were still limited.

5.3.2 Strengths

There were also certain strengths in this study:

- One of the strengths is that the sample is a homogenous group of four-year old English speaking children.
- The development of all the material was done over an extended period. Various professionals were consulted throughout the process. Four-year-old children were also consulted during the development of the material. The material used in the test proved to be appropriate for use with this children
- A pilot study was done to pre-test all procedures and material. There were only a few recommendations for the main testing due to the fact that an informal pre-pilot was also done to prepare for the pilot testing.
- Comprehension of emotions is an important prerequisite for recognition of emotions using graphic symbols. Participants had to pass a pre-test before qualifying as potential participants.
- More than one choice of symbol was available per emotion. This gave the participants the opportunity to identify a symbol that more closely reflects the emotion they wanted to express.
- The symbols on each of the twelve pages in the testing booklet were presented randomly to the participants to avoid sequencing effects.

5.4 Recommendations for future research

The following recommendations are highlighted:

- A larger sample for the same research study would allow for making conclusions in terms of the variety of different symbols that were chosen for each emotion.
- The sample can be varied, using children from different ages and cultural backgrounds and addressing the issue of age and cultural differences in the recognition of graphic representations of emotions through facial expressions.
- Emotions, other than the four emotions that this study investigated, could be used for future research. It is recommended that surprise and disgust

be used in a future study, as these two emotions have also been classified as basic emotions (Ekman, Friesen & Ellsworth, 1972).

- It is recommended that this study be replicated with children with special needs, for example, mental retardation, autism, etc. It would be insightful to determine how children who are developing atypically recognize emotions that are graphically represented through facial expressions.
- The relationship between the stimuli material (the context of each emotion) and the graphic representation of the emotion chosen can be studied. It is possible that the same questions in different semantic contexts might lead to different symbol choices in representing an emotion.

5.5 Summary

This chapter briefly presents the conclusions of the research, critically evaluates the strengths and limitations of the current study and makes recommendations for future research.

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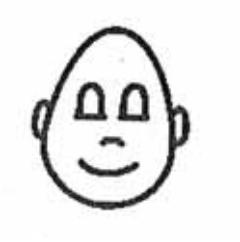
Appendix A

Overlays





















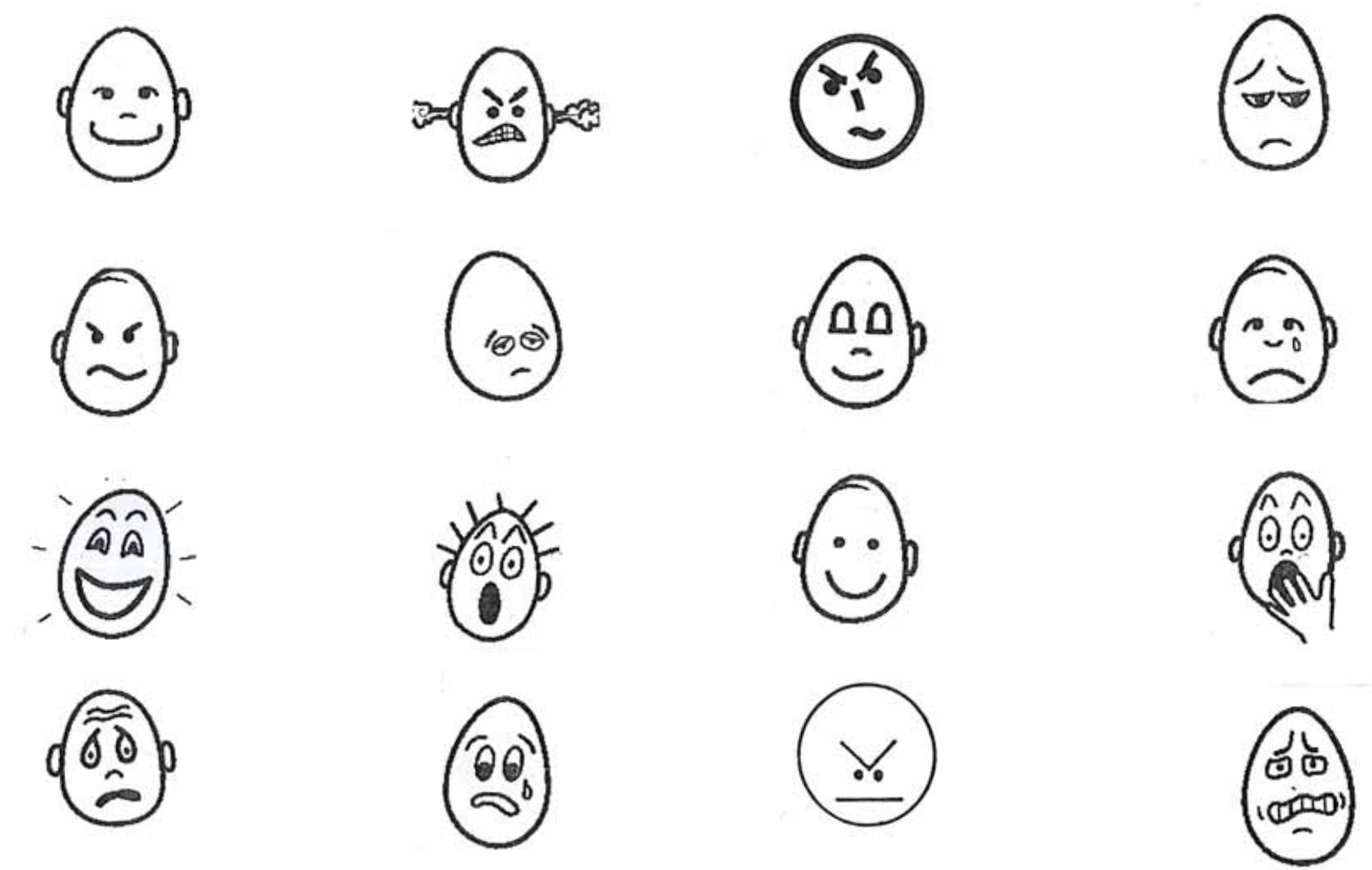


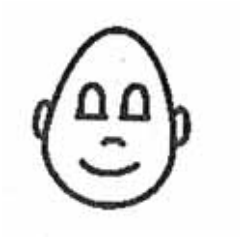














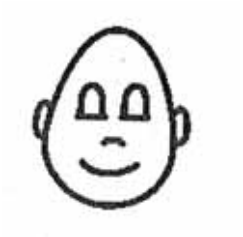




















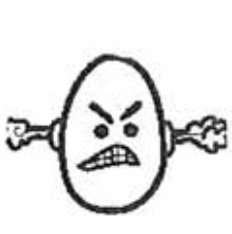








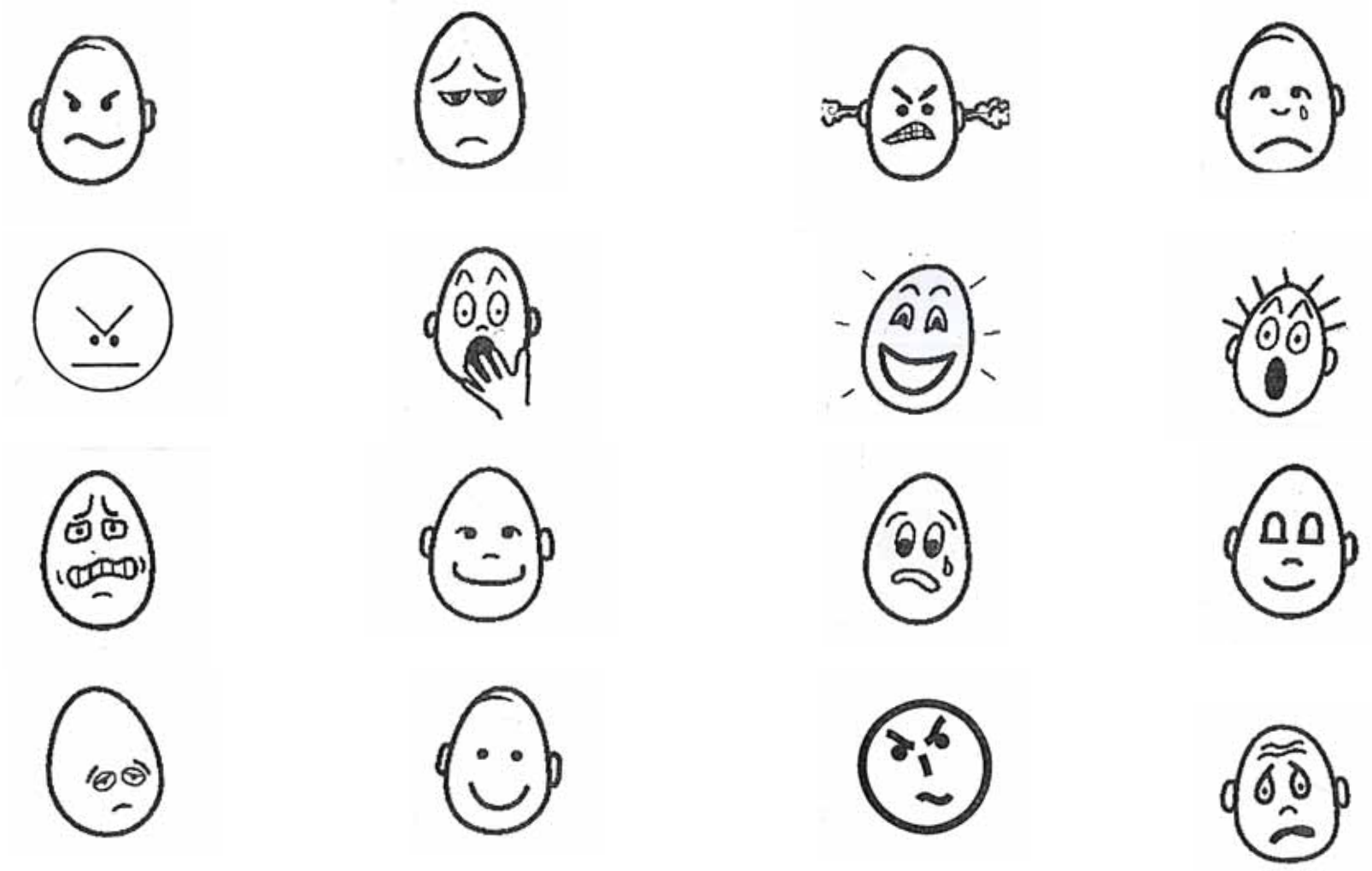




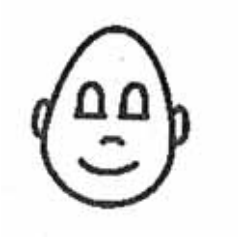








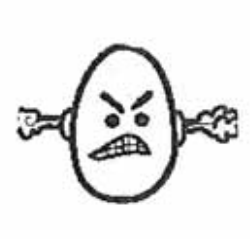




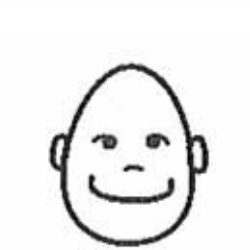


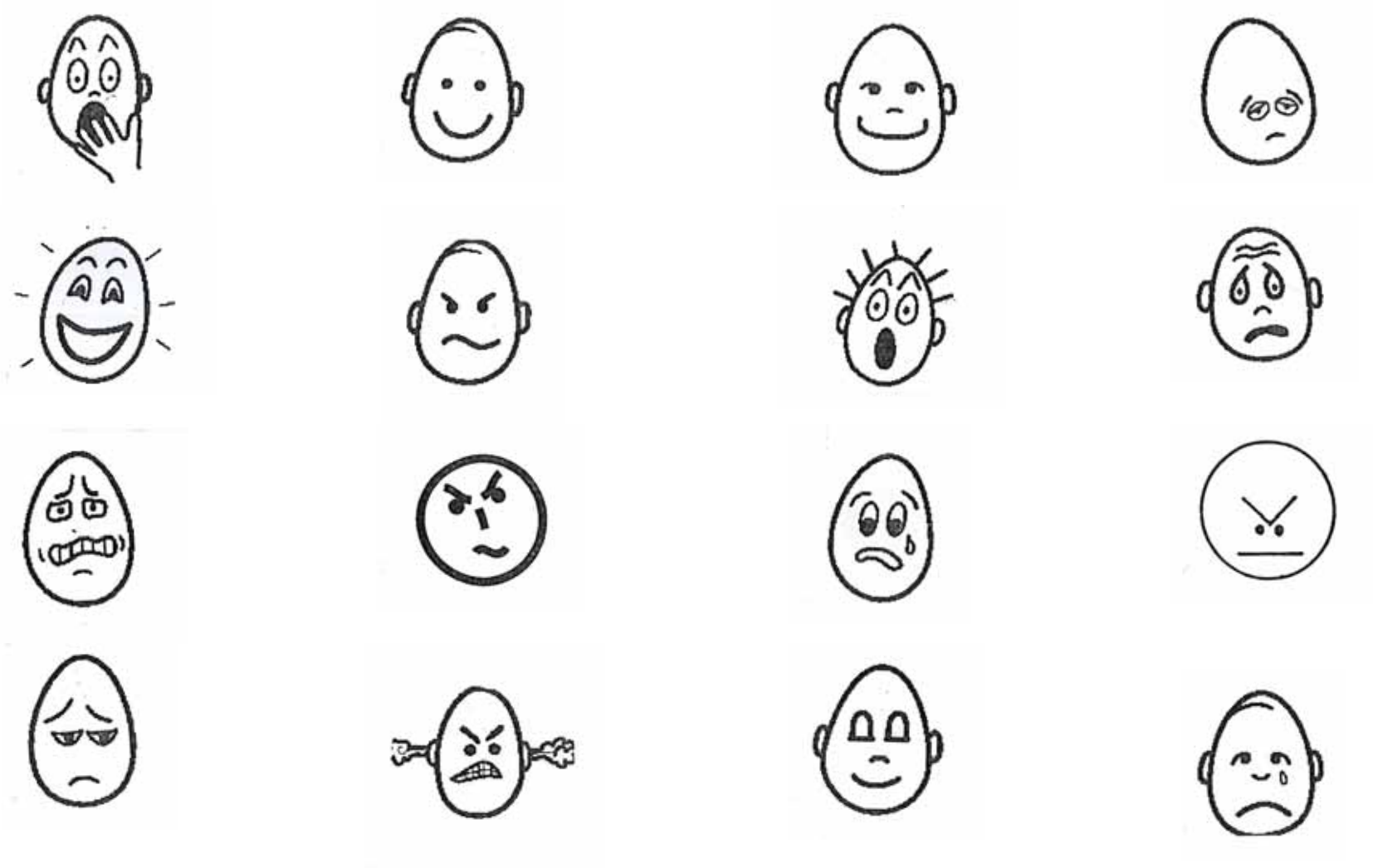


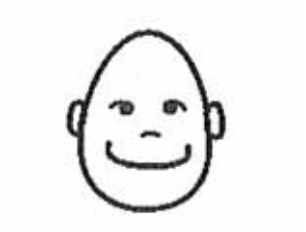














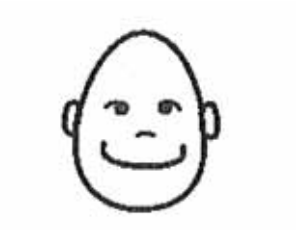






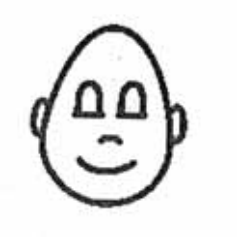






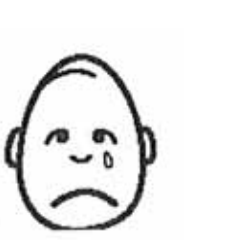






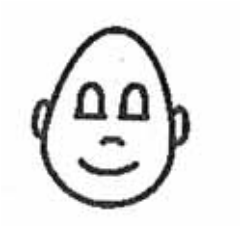














Appendix B

Questions

Material/Questions

Happy

1. It Peter's birthday. He got a big present. He is very happy. Show me where is the **happy** face?
2. Peter is playing with his new toy truck. He is very happy about his toy truck. Show me where is the **happy** face?
3. Peter is going to play at his friend's house. He is very happy. Show me the **happy** face?

Sad

4. Peter cannot find his mommy/daddy. He is very sad. Show me the **sad** face?
5. Peter has lost his new ball. He is very sad. Show me the **sad** face?
6. Peter cannot play with his new friend. He is very sad. Show me the **sad** face?

Scared

7. Peter is alone in the house and it is dark around him. He is very scared/afraid. Show me **scared**?
8. There is a thief in the house and Peter is afraid/scared. Show me **scared**?
9. There is a spider on the wall. Peter is very afraid/scared. Show me **scared**?

Angry

10. Peter's friend hit him on his shoulder. He is very angry/cross/mad at his friend. Show me **angry**?
11. Peter was very naughty and his dad is angry/cross/mad at him. Show me **angry**?
12. Another boy took Peter's toy car. He is very angry/cross/mad. Show me **angry**?

For all male participants: Peter
For all female participants: Mary (Question 2 will be a doll instead of a toy truck and question 12 will be doll instead of toy car)

Instructions/verbatim

Hello _____. How are you? Today we are going to talk about a boy, Peter (a girl, Mary). I am going to tell you what happened with Peter – and then I want you to show me what he felt like when it happened. I will show you some pictures…. Shall we start?

BOYS

Trials

A Show me the picture of the boy with his hand in front of his mouth?
Reinforcement: Good boy

B Show me the picture of the boy that's hair is standing up in the air?
Reinforcement: Yes

C Show me the picture of the boy that has a tear on his cheek?
Reinforcement: Good boy

Questions

1. It Peter's birthday. He got a big present. He is very happy. Show me where is the **happy** face? *Reinforcement: Good boy*
4. Peter cannot find his mommy/daddy. He is very sad. Show me the **sad** face? *Reinforcement: Yes*
7. Peter is alone in the house and it is dark around him. He is very scared/afraid. Show me **scared**? *Reinforcement: Yes*
10. Peter's friend hit him on his shoulder. He is very angry/cross/mad at his friend. Show me **angry**? *Reinforcement: Yes*
8. There is a thief in the house and Peter is afraid/scared. Show me **scared**? *Reinforcement: Yes*
2. Peter is playing with his new toy truck. He is very happy about his toy truck. Show me where is the **happy** face? *Reinforcement: Yes*
5. Peter has lost his new ball. He is very sad. Show me the **sad** face? *Reinforcement: Yes*
11. Peter was very naughty and his dad is angry/cross/mad at him. Show me **angry**? *Reinforcement: Yes*
12. Another boy took Peter's toy car. He is very angry/cross/mad. Show me **angry**? *Reinforcement: Yes*
9. There is a spider on the wall. Peter is very afraid/scared. Show me **scared**? *Reinforcement: Yes*
6. Peter cannot play with his new friend. He is very sad. Show me the **sad** face? *Reinforcement: Yes*
3. Peter is going to play at his friend's house. He is very happy. Show me the **happy** face? *Reinforcement: Good boy*

GIRLS

Trials

A Show me the picture of the boy with his hand in front of his mouth?
Reinforcement: Good girl

B Show me the picture of the boy that's hair is standing up in the air?
Reinforcement: Yes

C Show me the picture of the boy that has a tear on his cheek?
Reinforcement: Good girl

Questions

1. It Mary's birthday. She got a big present. She is very happy. Show me where is the **happy** face? *Reinforcement: Good girl*
4. Mary cannot find her mommy/daddy. She is very sad. Show me the **sad** face? *Reinforcement: Yes*
7. Mary is alone in the house and it is dark around her. She is very scared/afraid. Show me **scared**? *Reinforcement: Yes*
10. Mary's friend hit her on her shoulder. She is very angry/cross/mad at her friend. Show me **angry**? *Reinforcement: Yes*
8. There is a thief in the house and Mary is afraid/scared. Show me **scared**? *Reinforcement: Yes*
2. Mary is playing with her new doll. She is very happy about her new doll. Show me where is the **happy** face? *Reinforcement: Yes*
5. Mary has lost her new ball. She is very sad. Show me the **sad** face? *Reinforcement: Yes*
11. Mary was very naughty and her dad is angry/cross/mad at her. Show me **angry**? *Reinforcement: Yes*
12. Another girl took Mary's new doll. She is very angry/cross/mad. Show me **angry**? *Reinforcement: Yes*
9. There is a spider on the wall. Mary is very afraid/scared. Show me **scared**? *Reinforcement: Yes*
6. Mary cannot play with her new friend. She is very sad. Show me the **sad** face? *Reinforcement: Yes*
3. Mary is going to play at her friend's house. She is very happy. Show me the **happy** face? *Reinforcement: Good girl*

Appendix C

Pre-test

Pre-test (for understanding)

The pre-test will consist of an informal conversation about certain situations that will elicit certain emotions. The researcher will use exaggerated voice intonations and facial expressions while conversing with the child.
Scoring: 1= understand, 2= not sure 3=doesn't understand

FOR A GIRL

Happy
One day, there was a little girl. It was her birthday and she got a beautiful doll from her daddy and mommy. This was a very pretty doll. How do you think the little girl feels about her pretty new doll? (If the child does not respond, a forced choice between two emotions will be given).
Reinforcement: Good girl

Sad
That evening she went to sleep with her new doll. When she woke up, her doll was gone. She could not find her doll anywhere. How do you think the girl feels about her lost doll? (If the child does not respond, a forced choice between two emotions will be given).
Reinforcement: Yes

Afraid
She decided to go and look for her doll. She opened her bedroom door. It was dark and she was alone. She walked to her little sister's room. It was dark and she was alone. How do you think she felt when she was alone? (If the child does not respond, a forced choice between two emotions will be given).
Reinforcement: Yes

Angry
When she opened her little sister's door, she saw her doll. Her little sister stole her doll. She took her doll. "My sister took my doll!!". How do you think the girl feels? (If the child does not respond, a forced choice between two emotions will be given).
Reinforcement: Good girl

Pre-test (for understanding)

The pre-test will consist of an informal conversation about certain situations that will elicit certain emotions. The researcher will use exaggerated voice intonations and facial expressions while conversing with the child.
Scoring: 1= understand, 2= not sure 3=doesn't understand

FOR A BOY

Happy
One day, there was a little boy. It was his birthday and he got a beautiful play car from his daddy and mommy. This was a very pretty car. How do you think the little boy feels about his pretty new car? (If the child does not respond, a forced choice between two emotions will be given).
Reinforcement: Good boy

Sad
That evening he went to sleep with his new car next to him on the ground. When he awoke in the middle of the night, his car was gone. He could not find his car anywhere. How do you think the boy feels about his lost car? (If the child does not respond, a forced choice between two emotions will be given).
Reinforcement: Yes

Afraid
The boy decided to search for his car. He opened his bedroom door and everything was dark. He walked through the dark house, alone searching for his car. How do you think he felt when he walked alone in the dark? (If the child does not respond, a forced choice between two emotions will be given).
Reinforcement: Yes

Angry
When he opened his little brother's door, he saw the car lying next to his brother. "My brother stole/took my toy car!!". How do you think the boy feels? (If the child does not respond, a forced choice between two emotions will be given).
Reinforcement: Good boy

Appendix D

Permission from Principal

Centre for Augmentative and Alternative Communication
Sentrum vir Aanvullende en Alternatiewe Kommunikasie
&
INTERFACE

University of Pretoria

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Tel: (012) 420 – 2001
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Faculty of Education / Fakulteit Opvoedkunde
Centre for Augmentative and Alternative Communication
Sentrum vir Aanvullende en Alternatiewe Kommunikasie
University of Pretoria, Lynnwood Road
PRETORIA, 0002
SOUTH AFRICA

2004 T-Systems Age of Innovation & Sustainability Awards: Excellence in Innovation and Sustainability: Social
2003 National Science & Technology Awards: Corporate Organization over the last ten years.
2002: Shirley McNaughton Award for Exemplary Communication received from the International Society for Augmentative and Alternative Communication
1998: Rolex Award for Enterprise: Associate Laureate
1995: Education Africa Presidential Award for Special Needs

Letter to Principal

2006

Re: Permission to do Research Project

Dear Principal

I am a speech therapist that qualified at the University of Pretoria in 2004. To further my knowledge and skills I am studying part-time at the University of Pretoria to obtain a Masters Degree in Augmentative and Alternative Communication (AAC). AAC is a branch of the Speech Therapy Department that focuses on people who cannot speak and need alternative means to communicate. One mode of communication for these persons with severe disabilities is the use of communication symbols – pictures or line drawings that are used to represent ideas. The person can point to a picture to indicate what he/she wants to communicate.

In partial fulfillment of the Masters in Augmentative and Alternative Communication I am required to conduct research. My supervisor is Prof E. Alant. The title of my research project is: ***Four-year-old children's ability to recognize four basic emotions from graphic symbols.***

Young children are often required to rate opinions or attitudes with graphic representation of emotions. Little research has been done to determine young children's ability to identify emotions on line drawings of facial expressions. The aim of this study is to determine if four-year-old typically developing children that speak English are able to identify and recognize basic emotions that are represented on graphic symbol sets. The children will be presented with the graphic symbols and will be required to point to a specific basic emotion. This data will be cassette recorded and retained for academic writing purposes at the University of Pretoria, Department of Statistics for three years.

Typically developing four-year-old children will constitute the sample of the study. Typical development will be determined with a questionnaire that each child's teacher should complete. English should be the children's mother tongue.

Informed consent from each child's parent/legal guardian is also a requirement.

No harm will be done and they have the right to withdraw from the research project at any point in time.

Your cooperation will be appreciated.

Please see the attached research proposal with more details of the research project.

For any further information or queries, please contact me at 082 7264583.

Thank you.

Yours Sincerely

_____	_____
Naomi Visser **Student in MA. AAK**	**Prof. E. Alant** **Director: Centre for Augmentative and Alternative Communication** **Study Supervisor**

<u>Permission from Principal</u>

I _____ (principal) grant permission to Naomi Visser, student in the Masters Degree at the University of Pretoria to use selected children in _____ (school) as participants in the research study.

I understand that the data and results will be used for research purposes and that it will be handled confidentially.

_____	_____
Signature of the Principal	Date

Appendix E

Permission from Parents/Legal guardians

Centre for Augmentative and Alternative Communication
Sentrum vir Aanvullende en Alternatiewe Kommunikasie
&
INTERFACE

University of Pretoria

2004 *T-Systems Age of Innovation & Sustainability Awards: Excellence in Innovation and Sustainability: Social*
2003 *National Science & Technology Awards: Corporate Organization over the last ten years.*
2002: *Shirley McNaughton Award for Exemplary Communication received from the International Society for Augmentative and Alternative Communication*
1998: *Rolex Award for Enterprise: Associate Laureate*
1995: *Education Africa Presidential Award for Special Needs*

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Faculty of Education / Fakulteit Opvoedkunde
Centre for Augmentative and Alternative Communication
Sentrum vir Aanvullende en Alternatiewe Kommunikasie
University of Pretoria, Lynnwood Road
PRETORIA, 0002
SOUTH AFRICA

Letter to Parent/Legal guardian

2006

Re: Permission to do Research Project

Dear Parent/Legal guardian

I am a speech therapist that qualified at the University of Pretoria in 2004. To further my knowledge and skills I am studying part-time at the University of Pretoria to obtain a Masters Degree in Augmentative and Alternative Communication (AAC). AAC is a branch of the Speech Therapy Department that focuses on people who cannot speak and need alternative means to communicate. One mode of communication for these persons with severe disabilities is the use of communication symbols – pictures or line drawings that are used to represent ideas. The person can point to a picture to indicate what he/she wants to communicate.

In partial fulfillment of the Masters in Augmentative and Alternative Communication I am required to conduct research. My supervisor is Prof E. Alant. The title of my research project is: ***Four-year-old children's ability to recognize four basic emotions from graphic symbols.***

Young children are often required to rate opinions or attitudes with graphic representation of emotions. Little research has been done to determine young children's ability to identify emotions on line drawings of facial expressions. The aim of this study is to determine if four-year-old typically developing children that speaks English are able to identify and recognize basic emotions that are represented in graphic symbol sets. Your child will be presented with the graphic symbols and will be required to point to a specific basic emotion. This data will be cassette recorded and retained for academic writing purposes at the University of Pretoria, Department of Statistics for three years.

Informed consent from the principal has been obtained.

No harm will be done and they have the right to withdraw from the research project at any point in time.

Your cooperation will be appreciated.

For any further information or queries, please contact me at 082 7264583.

Thank you.

Yours Sincerely

_____ _____

Principal

Prof. E. Alant
Director: Centre for Augmentative and Alternative Communication
Study Supervisor

_____

Naomi Visser
Student in MA. AAK

<u>Permission from Parent/Legal guardian</u>

I _____ (parent/legal guardian) grant permission to Naomi Visser, student in the Masters Degree at the University of Pretoria to use _____(child's name) as a participant in the research study.

I understand that the data and results will be used for research purposes and that it will be handled confidentially.

_____ _____

Signature of the Parent/Legal guardian Date

Appendix F

Teacher Questionnaire

Teacher Questionnaire

Please supply the child's biographical and developmental information

A: Biographical information

Name:_____
Class: _____
School: _____
Date of Birth: _____
Gender: ☐ Male ☐ Female
Home language:_____

B: Development

1. Is **hearing** within normal limits?

☐Yes ☐ No ☐ Unsure

2. Is **vision** within normal limits?

☐Yes ☐ No ☐Unsure

3. Is there a **receptive language delay?**

☐Yes ☐ No ☐ Unsure

4. Is there an **expressive language delay?**

☐Yes ☐ No ☐ Unsure

5. Are there any **emotional problems?**

☐Yes ☐ No ☐ Unsure

6. Any **other problems**?

_____
_____
_____

Participant number:_____

Appendix G

Scoring Sheet

Scoring sheet

Section A: Biographical Information

A1 **Participant number**:_____

A2 **Gender**:

	1		2
Male:	☐	Female:	☐

A3 **Home language**:

	1		2
Afrikaans:	☐	English:	☐

A4 **School:**_____

Date of birth:_____

Age:_____

Section B: Pretest

B1 Happy ☐

B2 Sad ☐

B3 Angry ☐

B4 Afraid ☐

Section C: Testing

C1	
C4	
C7	
C10	
C8	
C2	
C5	
C11	
C12	
C9	
C6	
C3	