Children's identification of graphic symbols representing four basic emotions: Comparison of Afrikaans-speaking and Sepedi-speaking children

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Abstract

Purpose: Speech language pathologists recommend graphic symbols for AAC users to facilitate communication, including labelling and expressing emotions. The purpose of the current study was to describe and compare how 5- to 6-year-old Afrikaans- and Sepedi-speaking children identify and choose graphic symbols to depict four basic emotions, specifically *happy*, *sad*, *afraid,* and *angry*.

Method: Ninety participants were asked to select the graphic symbol from a 16-matrix communication overlay that would represent the emotion in response to 24 vignettes.

Results: The results of the t-tests indicated that the differences between the two groups' selection of target symbols to represent the four emotions are statistically significant.

Conclusions: The results of the study indicate that children from different language groups may not perceive graphic symbols in the same way. The Afrikaans-speaking participants more often chose target symbols to represent target basic emotions than did the Sepedi-speaking participants. The most preferred symbols per emotion were identified and these different symbols were analysed in terms of facial features that distinguish them.

Keywords: basic emotions, graphic symbols, non-target symbols, Picture Communication Symbols (PCS)™, preferred symbols, target symbols.

INTRODUCTION

Experiencing and expressing emotions lies at the core of being human and it is important for the psychological well-being of individuals that they are able to express and communicate about these emotions (Johnson, 1997). Although emotion is an abstract concept, typically developing children as young as three years old are – with exposure and practice – able to infer basic emotions from facial expressions. At age three, typically developing children start to develop the ability to conceptualise and name different emotions (Greenspan, 2004). They are able to express emotions symbolically by using spoken language.

Facial expression of emotions is crucial to the development and regulation of interpersonal relationships (Ekman, 1999). Some authors regard recognising basic emotions from facial expressions as a universal phenomenon (Elfenbein & Ambady, 2003; Ekman, 1994; Izard, 1994), while others (Boyatizis, Chazan, & Ting, 1993) caution that cultural differences and differences between individuals also play a role and should be taken into account when discussing emotions and the facial expressions linked to such emotions.

A number of cross-cultural studies on the universality of emotions (Beaupré & Hess, 2005; Shioiri, Someya, Helmeste, & Tang, 1999; Yik & Russell, 1999) showed evidence of cross-cultural agreement in the judgement of facial expression (Ekman, Friesen, O'Sullivan, Chan, Diacoyanni-Tarlatzis, Heider et al., 1987).Consensus exists on the universal recognition of the emotions of *happiness*, *sadness*, *surprise*, *disgust*, *anger* and *fear*, although culturally dependent variations in the normal population are possible (Ekman et al., 1987; Shioiri et al., 1999). Four emotions (*happy*; *sad*; *afraid; angry*) are viewed as basic emotions (Brown & Dunn, 1996; Denham & Couchoud, 1990; Ekman et al., 1987; Ortony & Turner, 1990; Widen & Russell, 2004) and are regarded as universal; that is, they are experienced across cultural boundaries (Ortony & Turner, 1990).

The recognition of emotion across cultures is similar, while the way in which emotions might be represented or labelled appears to be more culture specific. The symbolic representation and interpretation of emotions may be influenced by cultural differences in the experience of emotions, which might be reflected in how individuals from different cultures identify graphic symbols that represent emotions.

Children with little or no functional speech (LNFS) will probably have difficulty expressing their emotions due to a variety of reasons. A possible augmentative and alternative communication (AAC) strategy in assisting these children in communication and specifically in expressing/labelling emotions involves the use of graphic symbols. These two-dimensional line drawings can be pictorial or more abstract. Picture Communication Symbols (PCS)™, for example, constitutes a set of pictorial symbols where the symbols are line drawings with a strong visual link between the objects being represented and the line drawings. Researchers are continually debating the nature of pictorial graphic symbols selected to represent concepts –especially non-picture producing concepts like emotions – and whether these pictorial graphic symbols can successfully depict language. Research studies over the years have revealed that children (even typically developing children) relate to graphic symbols differently from the way in which developers of graphic symbol sets and systems anticipated the children would. As children with LNFS form a heterogeneous group, initial research in different areas in the field of AAC use typically developing children as participants. Once researchers have a better understanding of the researched area, their results can be used as the foundation for further research, including research among children with LNFS.

Several studies have explored graphic symbols in the South African context since 1997. Some used different symbol sets and/or systems and investigated different parameters, namely learnability (Alant, Life,& Harty, 2005; Basson & Alant, 2005), retention (Alant et al., 2005), iconicity (Basson & Alant, 2005; Haupt & Alant, 2002, Dada, Huguet,& Bornman,

2013) and representation of emotions (Visser, Alant,& Harty, 2008). These investigations were conducted in five of South Africa's eleven official languages: Afrikaans, English, Northern Sotho (Sepedi), Setswana and isiZulu (Alant et al., 2005; Basson & Alant, 2005; Bornman et al., 2009; Haupt & Alant, 2002; Visser et al., 2008). They focused specifically on theme-based communication overlays and indicated possible cultural differences in the way typically developing children from different language groups selected symbols in response to a spoken label (Basson & Alant,2005; Haupt & Alant,2002).The study findings proved to have clinical implications for selecting graphic symbols for AAC intervention and for communication overlays, particularly if the professional came from a cultural background different from that of the AAC user.

Of the above studies, only the study by Visser et al. (2008) focussed specifically on the abstract construct of emotions depicted by means of line drawings, and constituted the first attempt to explicitly investigate the ability of 4-year-old English-speaking typically developing children to identify graphic symbols representing the basic emotions of *happy*, *sad*, *angry* and *afraid*. The study revealed that the highest consensus (99%) between children's actual responses and those anticipated by researchers occurred in respect of *happy*. At the lower end of this scale was *sad* (37%), with *afraid* at 74% and *angry* at 85%.

The present study endeavoured to determine and compare how typically developing South African children, aged 5;00 to 5;11 (years;months), from two different indigenous language groups (Afrikaans and Sepedi), related to 16 PCS symbols that depict four basic emotions: *happy, sad, angry,* and *afraid*. The children were from Limpopo, the fourth largest province of the Republic of South Africa (Census 2001, 2003), where Sepedi is the home language spoken by most (52.1%) residents, as well as the fourth biggest home language in the entire country. Although Afrikaans is spoken only by a small portion (2.3%) of the Limpopo population, it constitutes the third biggest home language group in the Republic of

South Africa (Census 2001, 2003). The aim of this study was to compare the identification of emotions, and the target and non-target choices of graphic symbols to represent the basic emotions, across language groups, gender groups and vignettes. *Target symbols* in this study refer to any of the four symbols that were systematically identified to represent a specific basic emotion. Table 1 outlines the four target symbols for the emotion *happy* which include symbols 1, 5, 9, 13. The *Non-target symbols* refer to all the remaining symbols that have not been identified as a target symbol. The non-target symbols for the emotion *happy* refer to the remaining 12 symbols in Table 1 (i.e the target symbols for basic emotions *sad*, *angry and afraid*). Due to the nature of the task, the selection of a target symbol is no more correct than the selection of a non-target symbol. In addition, the symbols most preferred by the participants to represent the basic emotions would also be described.

METHOD

Design

Two groups of typically developing children, one from an Afrikaans and one from a Sepedi language background were compared regarding their identification of emotions using PCS symbols. Participants were individually exposed to a pre-assessment task, and after passing the pre-assessment task to a task, involving16 PCS symbols (four possible symbols for each emotion) presented on 24 random overlays and by 24 vignettes (6 vignettes for each of the four emotions) representing four basic emotions (*happy*, *sad*, *angry* and *afraid*). A vignette was read to the participants, after which they were asked to select on an overlay a graphic symbol that they thought represented the specific emotion.

Participants

Ninety children (44 Afrikaans-speaking and 46 Sepedi-speaking) participated in the data collection. They were all typically developing 5;00 to 5;11year-old children living in the Limpopo Province of the Republic of South Africa. Participant selection criteria included the

Table 1 : ***Symbols used to represent four basic emotions***

Four target symbols for happy	Four target symbols for sad	Four target symbols for afraid	Four target symbols for angry
			
1	2	3	4
			
5	6	7	8
			
9	10	11	12
			
13	14	15	16

following: no history of developmental delay; no apparent learning problem; and no hearing loss or uncorrected eyesight problems. Participants spoke either Afrikaans or Sepedi as a home language and received school education in either of the two languages. All participants were in pre-school classes, had no previous experience with PCS symbols and verbally assented to take part in the study.

Altogether 45 boys (22 Afrikaans-speaking and 23 Sepedi-speaking) and 45girls (22 Afrikaans-speaking and 23 Sepedi-speaking) took part in the study. The mean age of the Afrikaans-speaking participants was 5;07 years, while the mean age of the Sepedi-speaking participants were 5;04years. Although a difference was observed between the mean ages of the two language groups, they were still considered comparable because all participants had passed the same pre-assessment task. The age distribution of the Afrikaans-speaking and Sepedi-speaking participants respectively was 60-62 months (6 and 16 participants respectively); 63-65 months (10 participants each); 66-68 months (12 and 16 participants respectively) and finally 69-71 months (16 and 4 participants respectively).

Materials

Overlay: choice of symbols

Synonyms for each of the emotions (*happy, sad, afraid,* and *angry*) were identified in the Oxford Thesaurus (Urdang, 1991) and entered into the Boardmaker version 6 Demo (© 1981-2007 Mayer-Johnson) symbol finder. Each identified symbol was further searched for other labels as identified by the developers of Boardmaker version 6Demo (© 1981-2007 Mayer-Johnson). Any labels present in Boardmaker but not listed in the Oxford Thesaurus (Urdang, 1991) were also entered through the symbol finder.

Through this process, a total number of 21 symbols were identified. From these, the researcher (first author) selected the final 16 symbols, by eliminating 5. Preference for inclusion was given to symbols representing the formal labels (*happy, sad, angry* and

afraid).Second symbols representing the thesaurus synonyms (Oxford Thesaurus, Urdang, 1991) were selected, and for the remaining symbols the Boardmaker version 6 Demo synonyms (© 1981-2007 Mayer-Johnson) were used. A panel of eight pre-school teachers (four native Afrikaans speakers and four native Sepedi speakers) were asked to confirm that children in the mentioned age group would be able to recognise the selected symbols.

The 16 symbols compromised of four target symbols and 12 non-target symbols for each emotion. *Target symbols* can be defined as the four PCS symbols that were systematically identified to represent a specific basic emotion, while *non-target symbols* refer to any of the remaining PCS symbol on the presented overlay. *Non-target symbols* therefore refer to any PCS symbols on the presented overlay that are not part of the target symbols of the target basic emotion. The difference between a target and a non-target symbol depends on which target basic emotion it has been identified to represent.

The 16 PCS (see Table 1) symbols were randomly arranged in 24 different ways, using the randomising function in Microsoft Excel resulting in 24 different overlays of the 16 PCS. These 24 overlays were then placed in a file.

Pre-assessment task

A pre-assessment task was developed to ensure all participants understood the four emotions. The understanding of emotions was checked and evaluated by using four stories, each representing one of the four emotions. Each of the stories was told to the participants as scripted (de Klerk, 2011), after which the participants had to verbally identify the emotion in response to four questions.

Vignettes for eliciting emotions and their translation

Twenty-four questions (six vignettes x four emotions) were prepared for use in this study. Vignettes were compiled by selecting vignettes from previous studies (Boyatzis,Chazan, & Ting, 1993; MacDonald & Kirkpatrick, 1996; Visser et al., 2008; Widen

&Russell, 2004; Wang, 2003). The vignettes were presented to seven professionals working with children. The professionals evaluated each vignette in terms of its relevance for eliciting the specific emotion targeted, after which they proposed a further 20 vignettes. These 20 vignettes were added to the existing list, bringing it to a total of 44 vignettes.

Six speech-language pathologists (four Afrikaans native speakers and two Sepedi native speakers) evaluated each of the 44 vignettes in relation to its relevance for eliciting the specific emotion targeted. The researcher translated the vignettes from English into Afrikaans. A native Afrikaans-speaking and an Afrikaans speech-language pathologist provided feedback regarding the appropriateness of the translation.

The 44 Afrikaans vignettes were piloted on eight typically developing Afrikaans-speaking children and results indicated that they understood the vignettes. As the study required only 24 vignettes, the 44 vignettes were reduced by asking eight teachers (four native Afrikaans speakers and four native Sepedi speakers) to rate the vignettes from the most familiar to the least familiar situation. The final 24 vignettes were therefore selected by choosing the six most familiar vignettes for each emotion.

The vignettes were translated from Afrikaans to Sepedi. Combinations of three protocols were followed, namely back translation, the committee approach, and pre-test procedures (Brislin, 1980; Retief, 1988). A native Sepedi speaker (Translator 1) working as the Sepedi teacher at an Afrikaans school translated the Afrikaans protocol into Sepedi. The Sepedi translation was given to a native Sepedi-speaking person (Translator 2) working in the Department of African Languages at the University of Pretoria, who translated it back into Afrikaans. The Afrikaans back translation was edited for language mistakes and sent back to Translator 2 to make sure that any editorial changes did not change the intended meaning. The two Afrikaans transcripts were presented to an independent rater (a native Afrikaans speaker and an Afrikaans first language teacher) who noted some differences in meaning.

These differences were discussed with Translator 1 and the necessary changes were made. The Sepedi vignettes were presented to native Sepedi-speaking pre-school teachers who indicated that the Sepedi vignettes were relevant and familiar. They did however indicate that three of the emotion labels used in the original Sepedi translation was not used in current conversational speech and that Sepedi-speaking children of the age of those who participated would rather know the more commonly used synonyms. The words for happy, angry and sad were changed accordingly.

The vignettes and protocol were piloted on Afrikaans-speaking and Sepedi-speaking children with a similar background to that of the participants in the main study. Each overlay in the presentation file represented a particular vignette. Each participant was exposed to the pre-assessment task (consisting of four vignettes), 24 vignettes and 24 different symbol overlays. The order of the vignettes and overlays was the same for each participant.

Examples of the vignettes in English, Afrikaans and Sepedi are presented in Table 2.

Procedures

Before the study commenced, ethical clearance was obtained from the Ethics Committee of the Faculty of Humanities, University of Pretoria, while permission was also obtained from the Limpopo Department of Health and Social Development. Ten principals (from four Afrikaans and six Sepedi schools) were approached to request permission for the study to be conducted in their respective schools. All principals gave their permission. When the principals had granted their permission, parents or legal guardians were given letters of consent and a short questionnaire to obtain information that was relevant for participant selection.

The pre-assessment task was conducted to ensure that all participants understood the four emotions. To pass the pre-assessment task, participants had to correctly identify the emotion that the protagonist in the story felt. They answered verbally and had to answer all

Table 2 : ***Vignettes used to elicit four basic emotions***

Symbol Nr	English vignettes	Afrikaans vignettes	Sepedi vignettes
Vignettes representing *happy*			
3	Johan/Lebo is playing with his new toy.	Johan speel met sy nuwe speelding.	Lebo o raloka ka sebapadišane sa gagwe.
9	Johan/Lebo is going to play at his friend's house.	Johan gaan by sy maatjie se huis speel.	Lebo o ya go raloka go mogwera wa gagwe.
10	Johan's/Lebo's mom took him to the park.	Johan se ma het hom parkie toe gevat.	Mmago Lebo o išitše Lebo phakeng.
15	Daddy brought Johan/Lebo a new toy for Christmas.	Pappa het vir Johan 'n nuwe speelding vir Kersfees gebring.	Tate o tletše Lebo sebapadišane sa kresimose.
19	Johan/Lebo sang a song in church. Everyone applauded.	Almal het vir Johan hande geklap nadat hy in die kerk gesing het.	Batho ka moka ba phaphathetše Lebo matsogo, ka ge a opetše ka kerekeng.
24	Johan/Lebo is going to the movies.	Johan gaan fliek.	Lebo o ya go boga filimi.
Vignettes representing *sad*			
1	Johan's/Lebo's brother broke Johan's/Lebo's bicycle.	Johan se boetie het Johan se fiets gebreek.	Buti wa Lebo o robile paesekele ya Lebo.
2	Johan/Lebo lost his new ball.	Johan het sy nuwe bal verloor.	Lebo o timeditše kgwele ya gagwe.
5	Johan's/Lebo's grandmother died.	Johan se ouma is dood.	Koko Lebo o hlokofetše.
13	Johan's/Lebo's friend is playing with other friends and does not want to play with him anymore.	Johan se maatjie speel met ander maatjies en wil nie meer met hom speel nie.	Mogwera wa Lebo o raloka le bangwera ba bangwe ebile ga a nyake go raloka le yena gape.
14	Johan's/Lebo's friends all have bicycles. Johan/Lebo does not have one.	Johan se maatjies het almal fietse. Johan het nie een nie.	Bagwera ba Lebo ba na le dipaesekele ka moka. Lebo ga a na yona. Lebo o kwa bohoko.
16	Johan/Lebo lost his R5.	Johan het sy R 5 verloor.	Lebo o timeditše R5 (diranta tše hlano).
Vignettes representing *angry*			

8	Another boy took Johan's/Lebo's food.	'n Ander seun het Johan se kos gevat.	Mosemane yo mo ngwe o tšeere dijo tša Lebo.
11	Johan's/Lebo's brother blamed him for something he did not do.	Johan se boetie het Johan die skuld gegee vir iets wat Johan nie gedoen het nie.	Buti wa Lebo o pharile Lebo ka molato, go seo Lebo a sego a se dira.
18	Johan's/Lebo lost his crayons.	Johan het sy kryte verloor.	Lebo o timeditše motaga wa gagwe.
21	Someone stole Johan's/Lebo's lunch.	Iemand het Johan se middagete gesteel.	Motho yo mongwe o utswitše dijo tša Lebo tša mosegare.
2	A boy hit Johan/Lebo on the shoulder.	'n Seun het Johan teen die skouer geslaan.	Mosemane o bethile Lebo magetleng.
23	Someone broke Johan's/Lebo's toy.	Iemand het Johan se speelding gebreek.	Motho yo mongwe o thubile sebapadišane sa Lebo.
Vignettes representing *afraid*			
4	Johan/Lebo is alone in the house and it is dark.	Johan is alleen in die huis en dit is donker.	Lebo o tee ka ntlong gape ke leswiswi gore a ka aba tee.
6	There is a storm with lightning and thunder.	Daar is 'n donderstorm met weerlig.	Go na le ledimo le le ntsho kua lefaufaung.
7	There is a thief in the house.	Daar is 'n dief in die huis.	Ga na le lehodu ka ntlong.
12	Johan/Lebo cannot find his mommy.	Johan kry nie sy mamma nie.	Lebo ga a humane mma goba papa wa gagwe.
17	Johan/Lebo broke the window while playing ball.	Johan het die venster gebreek terwyl hy bal gespeel het.	Lebo o thubile lefasetere gae a raloka.

four questions correct to pass this task. A total of 199 participants did the pre-assessment task and altogether 109 participants did not pass indicating that the pre assessment task included only those children who were able to identify the emotions. They were thanked and returned to their classroom, which meant that they were excluded from the study. Ninety participants passed the task and proceeded to the data collection phase. They all complied with the selection criteria and subsequently also assented to participate in the study.

The researcher administered the procedure with the Afrikaans-speaking participants, whereas a research assistant was employed for the Sepedi data collection. The research assistant was a native Sepedi-speaking female who had completed high school and used to work with children as an HIV/AIDS counsellor at school. Data collection took place in the mornings and each school was visited as many times as necessary to complete testing of the participants. The children were collected from their classrooms and taken to the designated room where each participant was seen individually. The researcher was present at all interviews (Sepedi and Afrikaans) to ensure adherence to the testing protocol.

Data collection commenced individually. The file containing the 24different overlays was placed in front of the participant. The researcher and participant faced each other. The participant listened to the vignette in which the emotion was indicated and was then asked which of the 16pictures on the overlay described the emotion implied in the vignette. The researcher facilitated scanning by pointing to each of the symbols. The participant had to point to his/her chosen symbol on the overlay in the file to indicate an answer. The researcher indicated the participant's choice on the score sheet and the same procedure was followed with the next vignette and a new overlay until all 24 vignettes and accompanying overlays were completed. Intermittent verbal feedback was provided by the researcher using non-task-specific comments like 'Good job!', 'Good listening!'. After the completion of the above task, the participant received a sticker as a token of appreciation for having participated in the

study. The participant was escorted back to class and the next participant was brought in for data collection.

Reliability of data collection

The researcher recorded the data for both Afrikaans-speaking and Sepedi-speaking participants on individual score sheets. Responses were subsequently transferred from each individual's score sheet to a collective score sheet. These rewritten scores were double-checked by the researcher and an independent rater (who had completed tertiary education).Training for this process was not necessary as the independent rater read the scores from the collective score sheet, while the researcher checked the individual score sheets to ensure no transfer errors were made. The researcher transferred the data from the collective score sheet on to a Microsoft Excel 2000 workbook. The researcher and independent rater checked the captured data by comparing it to the collective score sheet. Any transfer errors were corrected and the process was repeated until no more transfer errors were found.

Procedural integrity

Forty percent of the audio recordings were rated for reliability by an Afrikaans rater and a Sepedi rater. The raters each received a rating form and had to indicate whether the researcher/research assistant had followed the protocol. The rating forms were scored and procedural integrity scores calculated. The procedural integrity scores were 99% for both the Sepedi and the Afrikaans, which indicates that both the researcher and research assistant had followed the protocol, thus making it possible for the two groups to be compared.

RESULTS

Target symbols in this study refer to any of the four PCS symbols systematically identified to represent a specific basic emotion presented on the 24 overlays. *Non-target*

symbols refer to any PCS symbols on the presented overlay that are not part of the target symbols of the target emotion. Due to the nature of the task, the selection of a target symbol is no more correct than the selection of a non-target symbol. *Preferred symbols* can be defined as the particular symbols most of the participants selected in order to represent the emotions. Preferred symbols can be either target or non-target symbols.

Comparison between Afrikaans-speaking and Sepedi-speaking participants with regard to target and non-target symbols selected to represent basic emotions

The results from the two language groups were analysed and the means statistically compared using independent group T-tests (see Table 3). The t-test indicated statistically significant differences ($p < 0.0001$) between the two groups' selection of target symbols to represent each of the emotions' mean scores of the two groups for all four emotions. The Afrikaans- speaking participants identified the target symbol for a target emotion significantly higher for the target basic emotion *happy* ($p < 0.0001$, $t = 7.22$), *angry* ($p < 0.0001$, $t = 10.59$), *afraid* ($p < 0.0001$, $t = 4.63$), and *sad (*$p < 0.0001$, $t = 4.88$) when compared to the the Sepedi-speaking participants. As it can be observed, effect sizes are large.

The results of the t-tests indicated that the mean scores for the Afrikaans-speaking and Sepedi-speaking participants for representing the four emotions differ statistically significantly. Afrikaans-speaking participants more often chose target symbols to represent the target basic emotions than did Sepedi-speaking participants.

Description and comparison of target choices of graphic symbols across the two language groups

Results are presented in terms of participants' selection of target and non-target symbols. Participants most frequently selected target symbols to represent *happy,* followed

Table 3 : ***Differences between Afrikaans-speaking and Sepedi-speaking participants with regard to the target symbols selected to represent four basic emotions***

Emotions	Afrikaans participants Mean (*SD*)	Sepedi participants Mean (*SD)*	**p-value**	**T-statistic**	**Effect size**
Happy	5.591 (0.844)	3.435 (1.834)	< 0.0001*	7.22	1.18 **
Angry	5.068 (1.301)	2.000 (1.445)	< 0.0001*	10.59	2.12**
Afraid	3.273 (1.703)	1.739 (1.421)	< 0.0001*	4.63	0.90**
Sad	3.159 (1.855)	1.565 (1.148)	< 0.0001*	4.88	0.86**

SD = standard deviation
T Statistic = Independent group T-test
* significant if p<0.01
** Large effect size

by those for *angry* and *afraid*, while target symbols for *sad* were selected least frequently. Table 4 presents the four target symbols as well as the non-target symbols selected most frequently by Afrikaans- and Sepedi-speaking participants separately to represent the four basic emotions. The results are presented in the order stated above. For the purposes of the current article, the focus will be on the target symbols as well as on the preferred symbols.

Symbols selected to represent happy

Table 4 shows that Afrikaans-speaking and Sepedi-speaking participants selected the four target symbols to represent *happy* with a frequency of 93.18% and 57.25%, respectively. The order in which the four target symbols were selected was the same for participants in both language groups, namely first symbol 1, then symbol 13, followed by symbols 5 and 9.

Symbols selected to represent angry

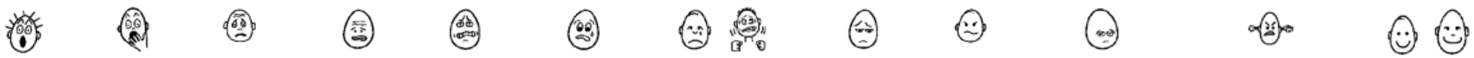
According to Table 4, Afrikaans-speaking participants selected target symbols with a frequency of 84.79% to represent *angry*, and Sepedi-speaking participants with a frequency of 33.32% to represent this emotion. The target symbol that was selected most by Afrikaans-speaking participants to represent *angry* was symbol 8, followed by symbols4,12 and16 – in this order. In comparison, the Sepedi-speaking participants most frequently selected symbol 12 to represent *angry*, followed by symbols 8, 4 and symbol 16.

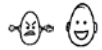
Symbols selected to represent afraid

Afrikaans-speaking participants selected target symbols to represent *afraid* with a frequency of 54.55%. Symbol 11 was selected most frequently, followed by symbols 7, 3 and 15. Sepedi-speaking participants selected target symbols to represent *afraid* with a frequency29.09%; in their case, symbol 7 was selected most frequently, followed by symbols 11, 3 and 15.

Table 4 : ***Target and non-target symbols selected by Afrikaans- and Sepedi-speaking participants to represent basic emotions***

Emotion	Participants	Target symbols	Non-target symbols
Happy	Afrikaans-speaking participants	Total selection percentage of target symbols 93.18% Selection percentages of the respective target symbols  45.83% 21.21% 16.67% 9.47%	Total selection percentage of non-target symbols 6.82% Selection percentages of the respective non-target symbols  1.14%, 1.14%, 1.14% 0.76%, 0.76%, 0.76% 0.38%, 0.38%, 0.38%
	Sepedi-speaking participants	Total selection percentage of target symbols 57.45% Selection percentages of the respective target symbols  22.18% 14.91% 13.45% 6.91%	Total selection percentage of non-target symbols 42.54% Selection percentages of the respective non-target symbols  4.73%, 4.73% 4.36% 4.00% 3.64% 3.27%, 3.27%, 3.27% 2.91%, 2.91%, 2.91% 2.18%
Angry	Afrikaans-speaking participants	Total selection percentage of target symbols 84.79% Selection percentages of the respective target symbols	Total selection percentage of non-target symbols 15.20% Selection percentages of the respective non-target symbols

			
		51.33% 20.91% 8.37% 4.18%	3.04% 2.28% x 2= 4.56 1.90% x 2= 3.8% 1.52% 1.14% x 2= 2.28%
	Sepedi-speaking participants	Total selection percentage of target symbols	Total selection percentage of non-target symbols
		33.32%	66.68%
		Selection percentages of the respective target symbols	Selection percentages of the respective non-target symbols
			
		10.87% 10.14% 6.88% 5.43%	8.70% 7.97% 7.25% 6.16% x 2 12.32% 5.80% 5.07% x 2 11.4% 4.35% 3.99% 3.26% 2.90%
Afraid	Afrikaans-speaking participants	Total selection percentage of target symbols	Total selection percentage of non-target symbols
		54.55%	45.47%
		Selection percentages of the respective target symbols	Selection percentages of the respective non-target symbols
			
		17.05% 15.53% 14.39% 7.58%	14.02% 7.58% 6.06%, 6.06% 3.03% 2.65 2.27 1.52 1.14%, 1.14%
	Sepedi-speaking participants	Total selection percentage of target symbols	Total selection percentage of non-target symbols
		29.09%	71.91%
		Selection percentage of the respective	Selection percentage of the respective non-target symbols

		target symbols																
																		
		10.55%	8.36%	7.27%	2.91%	10.18%	9.82%	7.27%, 7.27%	6.81%	6.18%	5.45%	4.73%, 4.73%	3.64%	2.91%	1.82%			
Sad	Afrikaans-speaking participants	Total selection percentage of target symbols				Total selection percentage of non-target symbols												
		52.65%				47.35%												
		Selection percentage of the respective target symbols				Selection percentage of the respective non-target symbols												
																		
		20.08%	17.42%	9.85%	5.30%	10.23%, 10.23%, 10.23%			6.82%	3.03%, 3.03%		1.89%	0.76% , 0.76%			0.38%		
	Sepedi-speaking participants	Total selection percentage of target symbols				Total selection percentage of non-target symbols												
		26.08%				73.92%												
		Selection percentage of the respective target symbols				Selection percentage of the respective non-target symbols												
																		
		7.97%	6.88%	6.52%	4.71%	9.78%	8.70%	7.97%	7.16%	6.52% , 6.52%		6.16%	5.80%	5.07%	3.99%	2.90% , 2.90%		

Symbols selected to represent sad

From Table 4 it is evident that Afrikaans-speaking and Sepedi-speaking participants selected target symbols with a frequency of 52.65% and 26.08% respectively, to represent *sad.*. Afrikaans-speaking participants selected symbol 10 most frequently, followed by symbol 14, symbol 6 and symbol 2. Sepedi-speaking participants selected symbol 2 most frequently, followed by symbols 10, 14 and 6.

Statistical comparison between gender groups with regard to target and non-target symbols selected to represent basic emotions

Table 5 contains a comparison of the means across gender groups with regard to the symbols selected to represent the four basic emotions. It indicates no significant difference between the two gender groups' choices of target symbols to represent basic emotions for *happy* ($p=0.293$), *angry* ($p< 0.9999$), *afraid* ($p= 0.510$), and *sad* ($p= 0.301$).

Symbols that were preferred most for representing *happy*, *angry*, *afraid* and *sad*

Table 6 indicates each emotion with the most preferred symbols as selected by the Afrikaans- and Sepedi-speaking participants to depict the particular emotion.

Both Afrikaans-speaking and Sepedi-speaking participants selected the four target symbols 1, 13, 5 and 9 as the most preferred choices to represent *happy*. Afrikaans-speaking participants selected the four target symbols 8, 4, 12 and 16 as the most preferred choices to represent *angry*. Sepedi-speaking participants on the other hand selected two target symbols (12 and 8) as the two most preferred symbols and two non-target symbols (3 and 10) as their third and fourth most preferred symbols to represent *angry*.

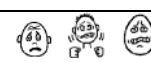
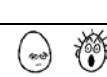
Afrikaans-speaking participants selected target symbols 11, 7 and 3 as the first, second and third most preferred symbols and non-target symbol 16 as the fourth most preferred symbol to represent *afraid*. Sepedi-speaking participants selected target symbols 7 and 11 as the most and the fourth most preferred symbols, respectively, and non-target

Table 5 : ***Target symbols that were selected: Comparison of means across gender groups***

Emotion	Male participants Mean (SD)	Female participants Mean (SD)	p-value Separate T
Happy	4.689 (1.550)	4.289 (2.007)	0.293
Angry	2.489 (1.604)	2.489 (1.878)	>0.9999
Afraid	3.644 (1.944)	3.356 (2.186)	0.510
Sad	2.156 (1.623)	2.533 (1.817)	0.301

Note: *SD* = standard deviation
* significant if $p<0.01$

Table 6 : ***Most preferred symbols to represent basic emotions***

Emotion	Participants	Most preferred symbols			
Happy	Afrikaans-speaking				
		Target symbol 1	Target symbol 13	Target symbol 5	Target symbol 9
		45.83%	21.21%	16.67%	9.47%
	Sepedi-speaking				
		Target symbol 1	Target symbol 13	Target symbol 5	Target symbol 9
		22.18%	14.91%	13.45%	6.91%
Angry	Afrikaans-speaking				
		Target symbol 8	Target symbol 4	Target symbol 12	Target symbol 16
		51.33%	20.91%	8.37%	4.18%
	Sepedi-speaking				
		Target symbol 12	Target symbol 8	Non-target symbol 3	Non-target symbol
		10.87%	10.14%	8.70%	10
					7.97%
Afraid	Afrikaans-speaking				
		Target symbol 11	Target symbol 7	Non-target symbol 3	Non-target symbol
		17.05%	15.53%	14.39%	16
					14.02%
	Sepedi-speaking				
		Target-symbol 7	Non-target symbol	Non-target symbol	Target symbol 11
		10.55%	2	6	8.36%
			10.18%	9.82%	
Sad	Afrikaans-speaking				
		Target symbol 10	Target symbol 14	Non-target symbols 3, 12 and 16	
		20.08%	17.42%	10.23% each	
	Sepedi-speaking				
		Non-target	Non-target symbol	Target symbol 2 and non-target symbol 11	
		symbol 7	8	7.97% each	
		9.78%	8.70%		

symbols 2 and 6 as the second and third most preferred symbol to represent *afraid*. Finally, Afrikaans-speaking participants selected two target symbols (10 and 14) as most and second most preferred symbols respectively, and three non-target symbols (3, 12 and 16) jointly as third most preferred symbols to represent *sad*. The Sepedi-speaking participants selected two non-target symbols (7 and 8) as the most and second most preferred symbols, respectively, and one target symbol (2) and one non-target symbol (11) jointly as the third most preferred symbols to represent *sad*.

DISCUSSION

Choice of target and non-target symbols

Although the different symbols were classified as target and non-target symbols, it is important to note that there were no 'correct' or 'incorrect' answers, since the aim of the study was to describe and compare the two language groups' selection of graphic symbols when depicting four basic emotions.

The results of the t-tests indicated that the mean scores for the Afrikaans-speaking and Sepedi-speaking participants for representing the four emotions differ statistically significantly. These results support the differences observed in studies that investigated different symbol characteristics within different language groups in the South African context (Basson & Alant, 2005; Haupt & Alant, 2002). The findings also accentuate the dynamic relationship between language groups and the interpretation of symbols (Bornman et al., 2009), particularly those depicting abstract concepts like emotions.

Overall, Afrikaans-speaking participants selected more target symbols than did Sepedi participants. Both language groups were more often in agreement regarding target symbols representing *happy*, followed by *angry*, *afraid* and, lastly, *sad*. English-speaking participants in an earlier South African study by Visser et al. (2008) also chose target symbols in this order. This order differs from the order of accuracy mostly mentioned in

emotion recognition literature, which is *happy* followed by *sad*, *anger* and *afraid* (Denham & Couchoud, 1990; MacDonald & Kirkpatrick, 1996). Some other researchers found variations regarding the order of *sad*, *anger* and *afraid*, but *sad* was never the least accurate (Boyatzis et al., 1993; Holder & Kirkpatrick, 2001; Walden & Field, 1982).

According to the differentiation model (Widen & Russell, 2003, 2008), the acquisition of the label is associated with the acquisition of the concept. This model could account for the phenomenon that symbols for *angry* were chosen more accurately than those for *sadness*. It could be that the participants in this particular study had developed the concept of anger before they developed the concept for sadness, which according to this model is possible. The model does not give an explanation as to why symbols for *afraid* were also chosen more accurately than were symbols for *sadness*. It maybe that the participants did not perceive the specific symbols that had been chosen to represent *sad* as being good representations of *sad*.

Results from the current study indicated no statistically significant difference between male and female perceptions of the symbols. Such results seem to support studies by Bennett, Bendersky and Lewis (2005) as well as by MacDonald and Kirkpatrick (1996),in which no gender differences were indicated. The study by Bennett et al. (2005) investigated individual differences in emotion knowledge, while MacDonald and Kirkpatrick (1996) investigated how accurately children recognised facial expressions for emotions using schematic drawings and photographs as stimuli. Kirkpatrick and Bell (1996) mentioned that the gender differences found in some studies investigating emotions were likely to be indicative of method rather than actual differences.

Most preferred symbols

In an attempt to understand why certain symbols were preferred over other symbols to represent *happy*, *angry*, *afraid* and *sad*, the features of the more often selected symbols were analysed.

Symbol 1 was the most preferred choice to represent *happy* for both Afrikaans-speaking and Sepedi-speaking participants. The facial features of this symbol are an open-mouthed smile with raised lip corners, raised eyebrows and large open eyes. This symbol displays extra features in the form of 'light rays' around the face. According to Sullivan and Kirkpatrick (1996), children focus on the lower component of the face (the mouth) when interpreting happy facial expressions. Kohler,Turner, Stolar, Bilker, Brensinger, Gur, & Gur (2004) found that apart from an open mouth, raised eyebrows are facial features that are also evident in the expression of *happy*. Higher expression intensity is associated with more accurate matching, particularly for the expression of fear, disgust and happiness (Herba, Landua, Russell, Ecker, &Phillips, 2006). The 'light rays' around the face could be seen as intensity markers indicating 'more happy' than the other symbols.

Symbol 1 is distinct from the other target *happy* symbols, which do not show raised eyebrows, wide open eyes or 'light rays'. Symbols 5 and 9 furthermore do not display an open mouth whereas symbol 13 does. The latter distinct feature of symbols 1 and 13 is probably the reason why they were the most preferred choices for representing *happy*.

The facial features indicating the emotion *anger* are furrowed or lowered eyebrows drawn together, wide open eyes with a tightened lower lid, a nose wrinkle, raised upper and turned lower lips exposing teeth, as well as stretched lip corners and a dropped jaw or pressed lips (Ekman &Friesen, 1975; Kohler et al., 2004; Sullivan &Kirkpatrick, 1996). Sullivan and Kirkpatrick (1996) found that children focused on the upper component when interpreting angry facial expressions. They also found that heavy (thick) eyebrows were chosen more

frequently for *anger*, *disgust*, *fear*, *sadness* and *surpris*e than thin or neutral eyebrows. Afrikaans-speaking participants chose target symbol 8 the most to represent *angry*. The facial features of this symbol were inner corners of eyebrows lowered, dot eyes, open mouth exposing teeth and stretched lip corners. An extra feature was present, namely steam/smoke coming out of the ears. The facial features also seemed to be drawn together.

The features that differentiated symbol 8 most from the other target symbols were the eyebrows that appeared to be thick, the steam/smoke coming out of the ears and the drawn-together facial features. Symbol 4, selected second most by Afrikaans-speaking participants, had small eyes with the inner corners of the eyelids lowered and a furrowed mouth. Symbols 12 and 16 –in contrast –had open lips, with stretched lip corners exposing teeth, and eyes that were wide open. Results seem to indicate that, for the Afrikaans-speaking participants, the thick eyebrows and steam/smoke coming out of the ears carried more weight than the wide open eyes when choosing a preferred symbol to represent *angry*.

Sepedi-speaking participants preferred target symbol 12 to represent *angry*. Symbol 12's features can be described as raised eyebrows, wide open eyes and an open mouth with stretched lip corners (corners turned down) exposing teeth. Extra features were raised hair, fists, action indicators and accentuation lines around the eyes and mouth. The features that distinguished symbol 12 most from the other target symbols were these extra features. Their second choice was symbol 8.Symbol 3, anon-target symbol, was chosen third most by the Sepedi-speaking participants. Symbol 3's features were a frowned forehead, wide open eyes, a down-turned mouth and a nose. When interpreting symbol 3, the Sepedi participants might have focused on the upper component as suggested by Sullivan and Kirkpatrick (1996). The frown, together with the wide open eyes might have appeared as furrowed eyebrows and therefore been the reason why the Sepedi-speaking participants chose this symbol.

Facial features that were indicative of *afraid* expressions were furrowed and raised eyebrows, eyebrows drawn together, wide open eyes, raised upper eyelids, tense lower eyelids, stretched lips/mouth and a dropped jaw (Ekman &Friesen, 1975; Kohler et al., 2004; Sullivan &Kirkpatrick, 1996). Target symbol 11 was the Afrikaans-speaking participants' first and the Sepedi-speaking participants' fourth most preferred choice to represent *afraid*. Symbol features were raised eyebrows, big open eyes and an open mouth (coloured dark) with an extra feature of hair standing on end. The target symbol chosen most often by Sepedi-speaking participants and second most by Afrikaans-speaking participants was symbol 7,which showed raised eyebrows, big open eyes, an open mouth (coloured dark), a nose and the extra feature of a hand in front of the mouth. The only differences between these two symbols were the nose and hand (symbol 7) and the hair standing on end (symbol 11). These two symbols differ from the other target symbols with regard to the raised eyebrows, very wide open eyes and a dark open mouth.

The target symbols 3 and 15 both had stretched lips, with symbol 3 also having wide open eyes. According to Kirkpatrick and Bell (1996), children focus on eyebrows when identifying fear. It seems that the participants in this study focused on the raised eyebrows when selecting symbols 11 and 7 as their top representations of *afraid*. Although known research does not mention the importance of the mouth when identifying *afraid*, the fact that the mouths of these two symbols were coloured dark could have drawn the participants' attention to them.

Two non-target symbols, 2 and 6, were chosen by Sepedi-speaking participants to represent *afraid,* rather than the target symbols 3 and 15. The two non-target symbols both had eyebrows, a feature that was absent in symbols 3 and 15. Symbols 2 and 6 also had eyes wider open than symbol 15. Once again Sepedi-speaking participants seemed to focus on the upper component and consequently symbol 11 was their first choice to represent *afraid*; the

open eyes with eyebrows of the non-target symbols for *sad* might have led them to choose symbols 3 and 15 as their second and third choices.

According to the literature, the features for *sad* are inner eyebrows raised and drawn together, furrowed eyebrows, tight eyelids, an open mouth with the upper lip being raised, lip corners stretched and turned down and a pulled-up chin. Afrikaans-speaking participants chose target symbol 10 as the most representative symbol for *sad*. The features of this symbol are no eyebrows, eyelids turned down, a large mouth curved downwards and an extra feature of a tear on the cheek. The features of symbol 14, which was chosen second most, were eyebrows curved down (inner corners raised), big open eyes, an open mouth with lip corners turned down and also the extra feature of a tear on the cheek. Sullivan and Kirkpatrick (1996) found that in identifying *sad*, children focused on the mouth. The three non-target choices (symbols 13.12 and 16)all had a down-turned mouth. The tear on the cheek differentiated these symbols from the symbols mostly chosen (by the Sepedi-speaking participants). It seemed that Afrikaans-speaking participants based their choice of the symbols to represent sad firstly on the tear on the cheek (symbols 10 and 14), although all the other symbols also had the corners of the mouth turned down.

Sepedi-speaking participants most often chose the non-target symbol 7 to represent *sad*, despite the fact that this symbol had none of the commonly accepted sad features. The non-target symbol 8 that was chosen second most shows a mouth with stretched lip corners which could look like lips turned down. Target symbol 2 was chosen third most, as was non-target symbol 11; its features were hanging/drooping eyebrows and a small mouth turned downwards. All three non-target choices (7, 8 and 11) had extra features. It seems as if Sepedi-speaking participants were unsure of which symbols could represent *sad* and therefore chose the symbols that contained extra features.

Six of the nine most preferred symbols for representing the emotion *sad* (7, 8, 10, 11, 12 and 14) had extra features (see Table 1).This may indicate that the participants in the current study did not look only at the facial features, but at all the features present. It could further be that the extra features drew more attention to the particular symbols. In real-life situations, when interpreting others' emotions and actions, the perceiver is almost never exposed to the face only. In developing or choosing symbols to represent emotions, clinicians might want to use symbols that also include some of the context.

CONCLUSION AND RECOMMENDATIONS FOR FURTHER RESEARCH

The results of this study illustrate that Afrikaans-speaking participants more often chose target symbols to represent the different basic emotions than did their Sepedi-speaking peers. It is important to remind the reader that the selection of a target symbol is not more correct than the selection of anon-target symbol. All participants understood the four emotion concepts; this was established with the use of a pre-assessment task. However, the results obtained in this study point to a statistically significant difference at the 1% level between the Afrikaans-speaking and Sepedi-speaking participants with regard to their choice of target symbols to represent *happy*, *angry*, *afraid* and *sad*.

Both language groups chose more target symbols for *happy* than they did for *angry*, *afraid* or *sad*. No significant differences were observed in the symbols chosen by boys and girls.

In analysing the features of the most preferred symbols, it became clear that different facial components played a role in participants' decisions of which symbol should represent a certain emotion. The participants found it more difficult to differentiate between negative emotions (*angry*, *afraid* and *sad*) and this could be due to the overlapping facial features between these emotions. Great care should therefore be taken when choosing symbols to represent emotions. Speech language pathologists should not assume that symbol selection

and use will be the same for different AAC users, specifically in cases when clients do not share a common culture. Symbol selection requires the sharing of the specific label/meaning of the symbol, as well as an understanding of why a certain symbol is used.

When assessing AAC users' speech, language pathologists should keep in mind that their client may well not perceive a particular symbol/drawing the same as they do. This seems particularly true for clients who receive therapy from professionals who do not share their native language.

There are definite limitations to the study. The relatively small sample size means that care must be taken when interpreting the results. The possibility of the experimenter effect having an influence on the results should not be overlooked either. Future research should further explore the influence of age on the symbols chosen so as to determine whether the recognition of the graphic symbols representing emotions improves with age. Researchers should also compare visual perception of facial expressions and different graphic symbols to investigate how participants perceive emotions from other graphic symbols sets and systems. In other words, research should be conducted to see if these findings are related to specific graphic symbols, or if an emerging pattern could be observed in comparing different graphic symbol sets or systems. Besides using typically developing children, it is important to also do similar studies involving children with disabilities and or those who, for various reasons, need to communicate in a language that is not their mother-tongue, including those who use English as an additional language.

Because this study was the first to statistically compare two different language groups in the South African context, it should be seen as a preliminary study. Since the findings revealed significant statistical differences between the two language groups, additional comparative studies between different South African language groups are warranted to better

understand the nature of the differences that may emerge in different cultural contexts - not only in respect of symbols representing emotions, but also other symbols.

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