Recognizing emotion in illustrations and photographs: Comparing responses of children who are deaf or hard of hearing with those of children with normal hearing

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Recognizing emotions are something children do everyday, whether it is identifying that mom is sad because she lost her job or that a character in a story is mad because no one will listen to him. The purpose of this study is to find out if recognizing emotions is easier to do with realistic photographs or illustrations.
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Introduction

We read emotions everyday. When we go to work we see how our boss feels and base our behaviors on that. When we talk to our friends we read their emotions and use that information to help and support them. We also evaluate emotions in illustrations within books and advertisements. We might read a comic strip and the humor of the strip is based on the facial expression of the main character. The picture might show a character with a red face, steam blowing out of his head, and his eyes popping out of his sockets. These clues tell us that the character is angry. Recognizing emotions is a part of our everyday life. When a facial expression is incorrectly interpreted a person might be described as socially inappropriate, unsupportive, lacking empathy, or might possibly be confused in a reading class.

Very little research has been done on the ability of children who are deaf or hard of hearing (D/HH) to recognize emotions based on nonverbal behaviors. However, this is an important skill. It not only effects interactions with others, it can also effect the student’s ability to use picture clues from books to help the student predict how a character feels or what the character might do next. Children who are D/HH can miss subtle cues in spoken language such as changes in rate of speech, pitch, articulation and volume. These cues can help a child learn to associate an emotion with a tone of voice, a facial expression and other nonverbal cues.

This study will look at the ability of children who are D/HH to recognize emotions in photographs and illustrations. It is hoped that the results of this study will give some indication of the effect this ability might have on reading performance. It is shown that children who are D/HH are delayed in their reading skills. Do photographs or illustrations depict emotions clearly enough to contribute to a child’s comprehension of the story? Is one more helpful than the other?
The hypothesis of this study is that emotions will be easier to identify in illustrations than in photographs. Angry, within an illustration, can be illustrated with a bright red face, steam blowing out of a character’s ears, and eyes popping out of their sockets. The illustrator can include more clues to identify an emotion. Within photographs anger can simply be portrayed with eyebrows facing inward and down. This may be more difficult for a child to identify. If my hypothesis is correct that will help teachers realize that emotions in photographs are more difficult to recognize, therefore they might need to give more explanations.

**Literature Review**

*Possible Developmental, Social and Academic Impacts of the Skill on Children Who are Deaf or Hard of Hearing*

According to Montague and Walker-Andrews (2002) we begin to recognize emotion in early development. Montague and Walker-Andrews’s study of person familiarity showed that infants begin to recognize emotions through parents’ facial and vocal expressions. Other studies have also shown that children learn from parents at a very young age. By the preschool years, most children can discriminate the facial expressions for happiness, sadness, anger, and fear (Izard, 1971; Odom & Lemond, 1971).

What happens if a child can’t hear? Does hearing impairment affect the ability to react to these cues? Does hearing impairment influence the individual’s ability to recognize emotions throughout life?

For children who are D/HH and are raised in a home with spoken language, there is evidence that the lack of auditory information leads to a reduced amount of interactions with caregivers (Lederberg & Mobley, 1990; Wedell-Monning & Lumley, 1980). It is possible that
during the preschool years, children who are D/HH with hearing parents will receive less exposure to emotional language that usually occurs by overhearing other peers. It is also probable that they will receive less complete explanations of their own and other people’s emotional displays (Marschark, 1993). If this is the case, then children who are D/HH will have a delay in recognizing emotions in either illustrations or photographs.

Children with normal hearing were found to understand different situations that would cause people to be happy, scared, sad, and angry feelings at the ages between the ending of preschool and early elementary (Harris, Olthof, Meerum Terwogt, & Hardman, 1987; Mood, Johnson, & Shantz, 1978; Reichenbach & Masters, 1983). If children who are D/HH are already behind in recognizing a single facial emotion, then recognizing emotions within the context of a situation is going to seem almost impossible.

There is little information and data to prove the theory that children who are D/HH do in fact have a delay in their ability to recognize emotions in either illustrations or photographs. However research on the lateralization of face to face processing abilities points to the possibility that the emotional development of children who are deaf may not proceed in an identical fashion like that of hearing children. There is evidence that early auditory experiences influence the cerebral organization of the visual system (Neville, Kutas, Schmidt, 1982; Neville & Lawson, 1987; Neville, Schmidt & Kutas, 1983). Furthermore, the usual patterns of hemispheric asymmetry (i.e. right hemispheric advantage for negative emotions and a left hemispheric advantage for positive emotions) in expression recognition is absent in children who are deaf, (Szelag & Wasilewski, 1992; Szelag, Wasilewski & Fersten, 1982). This information, however, has not been fully investigated.
Research with children who are hearing has shown that the ability to read emotions are related to measures of social competence (Custrini & Feldman, 1989), ratings of peer popularity and likeability (Denham, McKinley, Couchoud, & Holt, 1990; Nowicki & Duke, 1992), and academic achievement scores (Nowicki & Duke, 1992). According to Daniel Goleman, author of *Emotional Intelligences* and *Social Intelligences*, one’s emotional intelligence involves four main areas of skill, including the ability to read emotions such that one is able to take the perspective of others (Scheetz, 2004). If a child can’t recognize how an individual feels, how are they going to have the ability to take that person's perspective?

Making predictions is a reading strategy that is introduced early in reading programs. Pictures can help a reader to predict a character’s future behavior. Pictures may depict emotions that can help cue a reader into what someone is experiencing or feeling. As students find evidence in pictures, they might form hunches, ask questions, recall facts, reread, skim, infer, draw conclusions, and, ultimately, comprehend the text more fully. Predicting is an important part of reading. The ability to read the emotions and subtle clues given within those emotions may contribute to the ability to predict and therefore improve the ability to read.

**Method**

The research protocol and informed consent for this study were reviewed and approved by the Institutional Review Board and the Human Studies Committee at Washington University School of Medicine. 

*Subjects*

Ten children with normal hearing and ten children who are D/HH participated in this research study. Subjects in the current study were included based on the following criteria:
willingness to participate, age between five and ten years, no other known disabilities, and English as their primary language.

All children who were D/HH were recruited from the Central Institute for the Deaf (CID) in St. Louis. The mean age of children who are D/HH was 7 years, with a range of 6 years to 10 years. Every child wore a hearing device on a regular basis in and out of school. All subjects who were D/HH had received their hearing devices after they turned one year old and 1 year to 5 years.

The children with normal hearing were CID students and children in the examiner’s neighborhood. The mean age of the normal hearing (NH) subjects was 6 years with a range of 5 years to 9 years.

Parents of all children within the target ages received a letter briefly explaining the study and what participation would require. A copy of the informed consent was included in the letter. The D/HH students who returned signed informed consent forms were removed from class for a ten-minute testing session with the author. The children with normal hearing were tested by the author in their own homes. At the beginning of each session, the examiner explained the study to the child in language the child would understand and allowed him or her to ask questions before they began.

*Procedures*

Pictures of 4 emotions were used for this study. These included 16 illustrations and 16 photographs of a single face. There were also 16 illustrations and 16 photographs of emotional situations (such as arguing, falling off bike, etc.). Each emotion was represented in 4 single face photographs, 4 single face illustrations, 4 situational illustrations and 4 situational photographs. Single face photographs were taken from *Super Duper Publications* and *Weber photo* emotion...
cards. The single face illustrations were taken from Google images (see appendix references). The situational photographs were also taken from Google images. Situational illustrations were obtained from children’s books (see appendix references).

The testing began with an explanation of the different feelings. The examiner explained each feeling (happy, sad, mad, or scared) with a verbal definition and produced a facial expression representing the emotion. After each emotion was fully understood the examiner then told the subjects that they would look at different emotions and should say whether the person is was happy, sad, mad, or scared. Responses were tallied and would be compared to the responses of children with normal hearing.

**Results**

*Children who are Deaf or Hard of Hearing vs. Children with Normal Hearing for all Conditions*

The percent correct for all conditions for children who are D/HH and children with normal hearing are shown in Figure 1. Children with normal hearing performed better than children who are D/HH on three of the four tasks. Children who are D/HH were more accurate in the recognition of emotions in photographed face.
Figure 1: The percent correct for all conditions from children who are D/HH and children with normal hearing.

Photographed Faces vs. Illustrated Faces for All Subjects

The percent correct for identification of emotion using photographed and illustrated faces for all subjects combined are shown in Figure 2. Illustrations were identified correctly with an average of 92% accuracy including both children with normal hearing and children who are D/HH. Photographs were identified correctly with an average of 77% accuracy including both children with normal hearing and children who are D/HH. These results confirm that the subjects were more accurately able to recognize emotions in illustrations than in photographs.
Figure 2: The percent correct for photographed and illustrated faces for all subjects.

Situations in Photographs vs. Situations in Illustrations for all Subjects

The percent correct for photographed situations and illustrated scenes for all students are shown in Figure 3. Happy was identified with 100% accuracy in both illustrations and photographs and was therefore not included in the graph for comparison. Illustrations were identified correctly with an average of 88% accuracy for all subjects. Photographs were identified correctly with an average of 75% accuracy for all subjects. These results again confirm that the subjects were more accurately able to recognize emotions in illustrations than in photographs.
Photograph Scenes vs. Illustration Scenes

**Figure 3**: The percent correct for photograph and illustration scenes of both deaf and normal hearing.

*Photographed Faces vs. Photographed Scenes for All Subjects*

The percent correct for photographed faces and photographed scenes for all subjects are shown in Figure 4. Photographed scenes were identified correctly by all subjects with an average of 81% accuracy. Photographed faces were identified correctly by all subjects with an average of 77% accuracy. These results show that photographed scenes were identified with more accuracy by all subjects than were illustrated scenes. This is in contrast to the results for emotions depicted with a single face.
Figure 4: The percent correct for photograph faces and scenes of both deaf and normal hearing.

Illustrated Faces vs. Illustrated Scenes for all Subjects

The percent correct for illustration faces and scenes for all subjects are shown in Figure 5.

Illustrated scenes were identified correctly by all subjects with an average of 93% accuracy.

Illustrated faces were identified correctly by all subjects with an average of 92% accuracy.

Emotions in both illustrated faces and illustrated scenes were identified with approximately the same accuracy.
An additional unexpected and unrequested behavior was also noted. Seven of the ten of the children with normal hearing explained each of their answers. None of the children who are D/HH offered an explanation for their responses.

**Discussion**

The hypothesis of this study is that emotions will be easier to identify in illustrations than in photographs.

The results indicate that the hypothesis was correct in that children who are D/HH more accurately identify emotions when depicted in illustrations than those depicted in photographs.
However, children who are D/HH are not significantly different than their peers with normal hearing in their ability to recognize emotions.

Figure 1 shows that children who are D/HH are not too far behind children with normal hearing on their ability to recognize emotions in all conditions examined by this study. The examiners were especially interested to note that when the children with normal hearing made their choices it demonstrated that they were confident in their answers and were not merely guessing. The researchers then considered whether the children who were D/HH were as confident of their responses. Although subjects were not expected to give a verbal explanation, it may be significant that children who were D/HH did not spontaneously include a reason while children with normal hearing did. It might be expected that children with the language ability would occasionally respond that a picture represented an emotion similar to but different from the expected response (e.g. excitement instead of happy, worried instead of scared). This did not occur with either group.

One photographed situation created the greatest difficulty for the children who are D/HH. Figure 6 is the situational photograph shows a thief who is trying to steal an elderly woman’s purse. The photograph is intended to show that the woman feels scared. The children who are D/HH gave a variety of responses: one angry, four scared, and five happy. Two children who are D/HH pointed to the thief and said “OH, NO” “He is bad” yet continued to say that the older women was happy.
Figure 6: This photographed situation depicting a robbery prompted many children who are D/HH to respond that the woman was angry, scared, or happy.

Scared and sad emotional labels were often confused. Happy seemed to be the most accurate? Anger was occasionally confused with happiness. One might guess that the children who are D/HH are primarily looking at the mouth to see if it has raised corners. At a basic level, raised corners at the mouth might be thought to indicate that the individual feels happy. The direction of the eye brows is apparently not considered. This may be explained by the students’ experiences in an oral school for the deaf, where speech reading supplements listening in the learning of speech and language. It may be that the subjects carried over this task into recognizing emotions.

Emotions depicted in illustrations were easier to identify those shown in photographs. This may be due to the illustrator’s efforts to depict emotion using all means possible. For example, an illustrator can draw puddles of tears in front of the person who is sad or hair-raising and eye-popping expressions when some one is scared. The emotions in illustrations are sometimes drawn with exaggerated or stereotypic features to dramatize the intended emotion. The photographer cannot easily use such overdramatic cues therefore making the facial expression more subtle and harder to read.
Conclusion

In conclusion, this study suggests that children who are D/HH are not significantly delayed in the ability to recognize emotions. Subjects were able to recognize emotions in illustrations rather than photographs regardless of hearing status. It is recommended that more research be done on this topic. Future studies might examine if children who are D/HH from oral school-tend to look primarily at the mouth for emotional cues. In addition, research might determine whether children who are D/HH can not only label the emotions, but explain their answer to thoroughly, indicating a greater understanding of the emotions presented.
References


Figure 6 was taken from [www.SuperStock.com](http://www.SuperStock.com) Man Stealing Woman’s Purse.
Appendix A

Illustration Faces
Appendix B

Photograph Faces
Appendix C

Illustration Situations
Appendix D

Photograph Situations
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