ROCZNIKI HUMANISTYCZNE
Tom LXIV, zeszyt 10 – 2016
DOI: http://dx.doi.org/10.18290/rh.2016.64.10-7

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DIFFERENCES IN RECOGNITION AND JUDGEMENT OF NEGATIVE EMOTIONS BETWEEN BLIND AND SIGHTED PEOPLE

INTRODUCTION

Prosodic information accompanied by facial expressions, gestures and body postures serve as reliable indicators of a person's emotions. Extensive literature on emotion recognition from vocal expressions and from nonverbal cues (see e.g. Rao & Koolagudi 2013; Scherer & Scherer 2011; Ekman & Rosenberg 2005; Scherer, Johnstone & Klasmeyer 2003) clearly shows that both vision and hearing is crucial to distinguish between a speaker's positive and negative attitudes, label the speaker's emotions and judge their intensity. All these abilities constitute a person's emotion recognition competence which is indispensable in everyday social interactions and which plays an important role in the inference of other people's mental states (also known as Theory of Mind). Here arises a question whether both speech-related (prosodic) and speech-unrelated (visual) information is necessary in the recognition of attitudes, feelings and emotions of speakers during communication and whether both types of cues are equally important in leading a listener to the intended interpretation of a message.

As often indicated in literature, facial expressions carry the most accurate information concerning a person's emotional state. In accordance, it is implicitly assumed that these non-verbal cues play a pivotal role in recovering and judging emotions of others, marginalising the effect of other speech-related (auditory) and speech-unrelated (visual) non-verbal information. As a result, the role of these cues in communication has not been appropriately examined and it is not known what happens if the access to any non-verbal cues is limited, and visual or auditory information becomes unavailable. If, however, this is true that the important information concerning a speaker's mental state is conveyed by facial expressions, blind people

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might be less successful in detecting and assessing the speaker's emotions during communication. While certain psychological and neurological disorders have been found to impair emotion recognition abilities (Spell & Frank 2000, Doody & Bull 2011, Wickline et al. 2012), little attention has been paid to sensory disabilities and their effect on the recognition of emotions as displayed by others in communication. For this reason, the aim of this article is to explore whether the lack of access to visual cues may affect the recognition and judgement of emotional states.

The ability of blind people to distinguish between positive and negative feelings displayed by others has not been investigated in literature. However, anecdotal comments made by blind individuals indicate that at least some of them find it difficult to recognise the attitudes of other people during communication. The inspiration for performing this research and writing this article was a comment made by a congenitally blind teenage boy to the author of this article. The boy said that he would like to be able to tell who liked him and who did not. On this basis we speculate that the reason for the person's inability to recognise person's attitude was the lack of access to the information provided by speakers' gestures, facial expressions and other non-verbal cues. This may also indicate that the cues provided by others' tone of voice and other prosodic information such as stress and intonation, turn out to be insufficient. Although it may be relatively easy for the person to recognise that a speaker is angry, because his or her tone of voice is raised, it may be much more difficult with other more concealed emotions such as antipathy. This is confirmed by Banziger, Grandjean and Scherer (2009) who observed that more intense emotions are generally better recognised. It also appears that recovering emotions from prosodic information only is much more difficult than from a person's non-verbal behaviour and speech, not only in situations when people purposefully conceal their emotions or try to mislead others from recognising their true intentions.

On the other hand, many blind individuals claim they are perfectly able to determine emotional content of utterances from accessible auditory information. A number of experimental studies provide evidence for this claim and report superior auditory perception in congenitally and early-blind individuals, as compared to the sighted (Muchnik et al. 1991; Röder et al. 2002). Indeed, in perceptual auditory tasks blind people are said to demonstrate better speech discrimination (Gougoux et al. 2004; Muchnik et al. 1991; Niemeyer and Starlinger 1981), and enhanced verbal memory. Also, they have been found to make compensatory use of prosodic features of speech and process speech faster and more accurately than sighted people (Klinge et al. 2010; Föcker et al. 2012). There are, however, very few studies examining the emotion recognition in visually impaired people. One of such studies reveals a specific emotion recognition deficit in blind children and adolescents (Dyck et al. 2004). This, as suggested by the authors, might be related to delays in acquiring mind-reading abilities, and have been confirmed in a number of other

studies (e.g. McAlpine and Moore 1995; Minter et al. 1998; Peterson et al. 2000). The findings of the studies indicate that "restricted access to non-verbal cues […] may limit the blind child's access to what is in other's mind, even in the context of perfect linguistic comprehension" (Peterson et al. 2000, p. 445). Although an experiment by Bedny et al. (2009) shows that the initial difficulties of blind children are successfully overcome by adults, it is still unknown if visual impairment might be a barrier to detecting hostility, anger or indifference of others and if auditory information might effectively compensate for the visual cues in the process.

The aim of this article is to examine whether blind people are less successful in recognising the attitude, emotions and feelings of other people during communication from the available (speech-related) information. The article is also intended to investigate differences in the way blind and sighted people judge the emotional states. In other words, the experiment should reveal whether people who are blind, due to their lack of access to a speaker's gestures, facial expressions and body language, find the person more negative or positive than people who are sighted. If indeed people who are blind have problems with recognising and judging negative emotions during communication, it is important to determine whether this is because they have not learnt to interpret social cues or because they have limited perception of such cues.

METHOD

Participants

20 normally sighted, 20 sighted blindfolded and 19 congenitally blind adults between the ages of 19 and 67 participated in the study. As indicated in Table 1. below, there were relatively equal numbers of men and women in all three groups. No participant was assigned to more than one group and could participate in the experiment more than once.

Table 1. The number of (blind and sighted) male and female participants.

	Men	*Women*	*N*
Blind participants	11	8	19
Blindfolded participants	10	10	20
Sighted participants	10	10	20

All participants were Polish native speakers. Sighted participants were recruited from the John Paul II Catholic University of Lublin. They were students, administrative or technical workers. Visually impaired people were members of the Polish Association of the Blind, Blind Co-operative Society or Occupational Therapy

Workshops in Lublin. The selection of congenitally blind adults with no functional vision was aimed at forming a homogenous group of people who had no access to visual information and whose recognition and judgement of emotions may have been affected by this impairment. Participants with diagnosed mental disabilities did not take part in the study. The permission for conducting this study was obtained from the president, director and psychologist of the organisations mentioned. The study was approved by the institutional review board. The participation in the study was voluntary and all participants gave informed consent.

Material

The primary concern of the study was to test blind and sighted participants on their recognition and judgement of negative emotions by speakers in natural communication. In order to achieve the desired effect comparable to a real life situation, it was necessary to prepare materials based on such situations. Since inevitably any scenarios invented for the purpose of this study would be unnatural to some extent, scenarios from natural conversations overheard at bus stops, in shops and supermarkets, on TV, in offices etc. were used in the study and presented as short dialogues. In all the dialogues speakers demonstrated different emotions which varied in intensity and valance (positive, negative and neutral). In the preparatory stage dialogues with conflicting emotions were rejected.

Among all negative emotions described in literature, sadness and anger have received the greatest attention of researchers. In this study we focus our attention on other and perhaps more complex emotions such as impatience, indifference or malice which occur in natural communication and which might be more difficult to recognise. All dialogues were performed by professional actors and were recorded as video clips. The clips varied in exact length between 7 and 20 s. Next, using the Audacity computer program, the soundtrack from the clips was separately recorded. The dialogues were either presented as a film displayed on a computer screen or as a recording played in headphones.

Procedure

Three groups of participants (blind, sighted and sighted blindfolded) were asked to analyse the same material, presented as a recording (blind and blindfolded participants) or film (sighted participants). Each participant was allowed to listen to the recording or watch the film only once. In order to examine the participants on their recognition and assessment of emotions, they were asked to complete a questionnaire. The questionnaire had been prepared in a printed version for sighted participants, adapted in Braill for blind participants and an electronic version was also available for users of Braill displayers.

After each dialogue was presented, the participants were asked to read a question and mark their answers immediately. The participants were individually tested

in an isolated room and the time for the completing of the task was not controlled. All participants were informed of the general purpose of the study and appropriately instructed before the sessions started. The exact purpose of the study was revealed only after the experiment was over. That was to make sure the participants did not concentrate predominantly on emotions in the dialogues, which does not normally take place during natural communication and which might have had a negative effect on the obtained results.

The emotion recognition task

In the emotion recognition task (ERT) the participants were tested on their ability to distinguish target negative emotions from unintended positive, neutral or other negative emotions. For this purpose, they were asked to listen to or watch four short dialogues in which speakers demonstrated negative emotions (aggression, impatience, indifference, indignation). The emotions could be inferred from the person's voice and behaviour. After listening to or watching each of the dialogues the participants were asked to choose the target emotion from the emotions suggested in the questionnaire. The participants were asked to mark just one answer and if they were unable to do that, they were asked to choose the "I don't know" option. For each correct response the participants were given one point. The example of the dialogues and the testing question (correct answer in bold) is provided in (1) below.

(1)
Woman: What do you have there?
Man: I've bought Sting's new single.
Woman: Let's hear it.
(after a short while)
Woman: Just pull the tab! (the utterance uttered with falling intonation indicating impatience)
Testing question:
The woman in this situation is:
a) impatient with the man's clumsiness
b) trying to be helpful
c) curious about the new album

The emotion judgement task

In the emotion judgement task (EJT) of the study the blind, blindfolded and sighted participants were presented with four short dialogues (similar to the one shown in (1) above) and asked to judge the intensity of the speakers' emotions (sadness, disappointment, despair, anger) using five-item Likert scales (1 = strong negative, 2 = moderate negative, 3 = neutral, 4 = moderate positive, 5 = strong positive). The target emotions which the participants were expected to judge were

specifically indicated in the questionnaire. The participants were asked to mark just one item on a scale and if they were unable to judge a particular emotion, they were instructed to mark the option 'I don't know'. The example of the task and the testing question is given in (2) below.

(2)

Woman: Darling, I've bought you a new sweater.

Man: Did you buy it in that shop for fat people? Do you always buy clothes for me there? (the utterance uttered with a raised voice indicating anger)

Woman: It's also a shop for tall and well-built people. Besides, they use very good fabrics.

Testing question:

The man in this situation is:

very angry	angry	neutral	happy	very happy	I don't know
1	2	3	4	5	0

Results

The measure of the participants' emotion recognition in the ERT was the total score from all correctly recognised emotions manifested in the dialogues. The data collected from the task was computed with SPSS 20.0. The responses of the participants were entered into an analysis of variance (ANOVA) to identify differences in the recognition of emotions between the blind, blindfolded and sighted participants.

Compared to the sighted and blindfolded, the blind participants performed below chance level (41%) and were less successful in the emotion recognition task than the sighted (54%) and the blindfolded participants (64%) . More often than the blindfolded and sighted participants they chose alternative options (positive or neutral emotions) instead of target emotions, but only 2% of the respondents did not provide any answer or chose the 'I don't know' option. The ANOVA revealed statistically significant differences between the three groups ($F(2,56) = 9.53$, $p = .000$). The post-hoc test (Tukey's HSD) showed significant differences between the blind and the sighted participants ($p = .008$), and between the blind and the blindfolded ($p = .000$). No such differences, however, were found between the sighted and the blindfolded subjects($p = .515$). Descriptive statistics are presented in Table 2. below.

Table 2. Central tendencies and mean accuracy for the target emotion recognition.

	Mean	*Standard deviation*	*Accuracy (%)*
Blind participants	1.94	1.08	41
Blindfolded participants	3.30	0.98	64
Sighted participants	2.95	0.94	54

In the EJT, the mean intensities of all the target emotions were calculated for all three groups (see Table 3.). The participants who were blind were observed to perceive the target emotions slightly as neutral or more positive than it was suggested by speakers' message and behaviour. The ANOVA revealed statistically significant differences in the judgement of the emotions between the groups ($F(2,56) = 3.34$, $p = .042$). The post-hoc Tukey's HSD test indicated main differences between the blind and sighted groups ($p = .046$). No differences were found between the blind and the blindfolded ($p = .856$) and between the sighted and the blindfolded ($p = .137$).

Table 3. Central tendencies and mean accuracy for the target emotion recognition.

	Mean	*Standard deviation*
Blind participants	2.19	0.53
Blindfolded participants	2.10	0.74
Sighted participants	1.74	0.45

Discussion

The goal of the study was to investigate the effect of visual impairment on the recognition and judgement of emotions during natural communication. In particular, the study was intended to reveal differences between blind and sighted adults in identifying negative affect.

The analysis of the data obtained from the study shows that people who are blind may encounter some difficulties in the recognition of negative emotions. The problems are probably more likely to occur when the target emotions are not basic (as was the case in the present study), sufficiently pronounced or when the speaker is trying to conceal his or her true feelings. In other words, it may be more difficult for blind people to recognise emotions if other available cues (such as auditory cues or linguistic context) do not come to the assistance in the interpretation process.

In the ERT blind people differed from the sighted and blindfolded participants of the study. This suggests that being born blind people with visual impairment (VI) may not have learnt to interpret the same signals as people with normal vision and whose access to visual cues is limited. The study also revealed significant differences between blind and sighted people in the judging the intensity of the target emotions. In general, people who were blind assessed the emotions more positively than sighted people. This suggests that visual information supplies essential cues for the more accurate judgement of emotions.

Surprisingly, no differences between the sighted and blindfolded groups were found in the ERT and EJT. This shows that even without access to visual cues sighted people may be able to infer emotional states of other people (e.g. during phone

conversations). However, the study also indicated that inferring other people emotions is generally much more difficult than it might be expected. The best evidence is the fact that in the ERT sighted people (with and without access to visual information) performed slightly above chance level. There may be several explanations of this observation. First of all, it is possible that emotions may be best recognised at the moment of speaking and the effect they evoke may wear off the moment the conversation is over. Secondly, it might be the case that what a speaker says escapes any clear categorisation and the emotions a listener infers are too complex to indicate. Finally, the listener may not analyse the speaker's emotions in such a great detail, but focuses on the general meaning of a message. The meaning may be the composite of deciphered words, phrases and structures spoken by the speaker and inferred mental states the speaker makes manifest.

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RÓŻNICE W ROZPOZNAWANIU I OCENIE NEGATYWNYCH EMOCJI POMIĘDZY LUDŹMI WIDZĄCYMI A OSOBAMI Z NIEPEŁNOSPRAWNOŚCIĄ WZROKOWĄ

Streszczenie

Celem artykułu było zbadanie wpływu niepełnosprawności wzrokowej na umiejętność rozpoznawania i oceniania emocji podczas komunikacji. Przedstawione w artykule badanie z udziałem dorosłych osób niewidomych i widzących wskazuje, iż osoby niewidome mogą napotykać pewne trudności w rozpoznawaniu stanów emocjonalnych innych osób.

Słowa klucze: niepełnosprawność wzrokowa; emocje; komunikacja; interpretacja.

DIFFERENCES IN RECOGNITION AND JUDGEMENT OF NEGATIVE EMOTIONS BETWEEN BLIND AND SIGHTED PEOPLE

Summary

This study was designed to investigate whether people who are blind are able to recognise and judge negative emotions during natural communication similar to people who are sighted. In the current study, blind, sighted and blindfolded participants were given two tasks and they were tested on their ability to recognise target emotions (the emotion recognition task) and to judge the intensity of the emotions (the emotion judgement task). The results revealed significant differences between the groups in the recognition and judgement of negative emotions. The study shows that people who are blind may encounter difficulties in recognising emotions and judging their intensity during natural communication. This may be related to their lack of access to the speakers' gestures, facial expressions and body postures

Key words: blindness; emotions; communication; interpretation.