Age Related Aspects of the Processing of Emotional Language and Detection of a Vehicular Warning Sound: a Preliminary Investigation.

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1. INTRODUCTION

Keeping a driver's mind 'on the road' means more than keeping a driver's hands 'on the steering wheel'. According to the National Highway Traffic Association, there are four basic kinds of distractions, which can occur during driving. These include: visual distractions such as reading a street sign or checking your mirrors; auditory distractions such as corn horns, kids arguing; biomechanical distractions such as manipulating a knob on the radio or CD player or the buttons on a cell phone; and cognitive distractions which involve the mental attention you pay to driving or to something else.

The results of this study represent preliminary findings of a larger investigation involving driving skills, distractions, and age. The general purpose of this initial investigation was to assess a more illusive distraction in driving than those listed above, that of emotion. Human emotion involves an interplay between emotions, physiology, and psychology (Murray & Arnott, 1993). As an initial step this study investigated threshold measurements for a vehicular warning sound in the presence of a single word and a narrative text.

2. METHOD

Experiment 1

2.1 Participants

Eight university undergraduate students (mean age 23.4 years) served as participants in this first experiment. All participants held a valid Alberta driver's license had been driving for at least 3 years. All participants had clinically normal audiograms for the octave frequencies of .5 kHz to 8 kHz.

2.2 Stimuli

Stimuli consisted of 2 single syllable English words (bomb and ball). These words were chosen based on the rating of 8 independent judges who judged a list of words in terms of their emotional or an affectively neutral content. The target stimulus was a car horn of 450 ms. Each of the words was 600 ms in duration.

2.3 Procedure

A two interval forced choice paradigm was used to determine the threshold of the car horn. The participant's task was to indicate via a button push as to whether the car horn occurred in the first or second interval. Each interval consisted of either the word 'bomb' or the word 'ball' and the car horn was always present in one interval. The computer program randomly determined the order of presentation of the words. During the presentation of the stimuli, low level recorded road noise was continuously played during the trials. An adaptive procedure, which determined the attenuation level of intensity, required for threshold of the siren. Maximum intensity level was 90 dB SPL. Thresholds were determined from the last 8 reversals of the attenuation levels for each of 3 presentations.

3. Results

There were no differences in the attenuation levels for either the word 'bomb' or the word 'ball'. The mean attenuation level for 'bomb' was 78 dB and the mean attenuation level for 'ball' was 80 dB.

4. Discussion

The results of this experiment indicate that even if listeners perceived the words as having a different emotional content, that this was insufficient to have any impact on the threshold of a car horn. Greasley, Sherrard and Waterman (2000) have shown that valency ratings for the emotional aspect of words depends upon presenting them in a context. A second experiment was conducted to determine if the thresholds would be affected if the target stimulus was embedded in a full narrative of text.

1.2 Experiment 2

The results of experiment one indicated that a single word without context is insufficient to produce any effect. Experiment 2 was conducted to determine the impact of a narrative text on the threshold for a vehicular warning sound.

2.2 Method

2.2.2 Participants

7 listeners participated in this study. The youngest group of listeners (n = 4, mean age = 26.5 years) were recruited from the University of Calgary undergraduate population. The older group of listeners (n = 3, mean age = 57.7 years) were volunteers from the outside community. All participants had clinically normal hearing for the octave frequencies of .5 kHz to 6 kHz though the older group of listeners had higher thresholds relative to the younger listeners.

2.2.3 Stimuli

Two passages of text chosen to represent 'emotional content' and 'neutral content' were a passage on the life of Dimitry Shostakovitch (emotional) and a passage by Thoreau (neutral). These were recorded by a male speaker, who spoke both passages in a neutral tone of voice.

Three separate listening conditions were tested: two where the listener attended to the narrative, and one where the listener merely had to listen for the presence of the target stimulus. These are referred to as: neutral attend, emotion attend, and emotion not attend. To ensure that listeners would focus on the content of the narrative, they were informed that they would be asked some simple questions about the content of the passage at the conclusion of the experiment.

2.2.4 Procedure

The method is the same as described in experiment one except for the presence of a continuous narrative of text, which played for a possible total duration of 30 minutes. In this experiment, participants were instructed to attend to 2 lights, which flashed above each of 2 buttons on a response box. First the light above the button on the left flashed followed by the button on the right. The listener's task was to depress the button corresponding to the light flash that occurred with the car horn. The target stimulus was always present in either the first or the second interval though the computer program randomly determined which interval.

3.2 Results

Table 1 shows the mean attenuation level for each listening condition for each age group. There appears to be no effect for the 'content' of the passage (neutral attend versus emotion attend). Average thresholds were lower for the attended condition than for the non-attended conditions (greater attenuation levels mean lower thresholds). Additionally, there is no age effect for the non-attended listening condition.

Table 1. Mean attenuation levels and standard deviations (in parentheses) for each age group of listeners for all 3 listening conditions.

	Neutral attend	Emotion attend	Emotion Not attend
Young	73.78 (5.8)	71.6 (6.1)	68.19 (9.78)
Older	68.9 (.98)	61.4 (3.4)	67.64 (2.46)

4.2 Discussion

The lack of an effect for the content could possibly be explained by the fact that both passages were read in a neutral tone of voice. The important factor appears to be whether or not a listener is required to attend to the information. Furthermore, the judgement of what is emotional content is a highly individual process (Vakoch & Wurm, 1997). Further studies are examining the role of the intonation contour; the content of the information, and whether the listener is required to interact with the information.

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