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The Effect of Right Hemispheric Activation on Processing of Emotional Tone in Swearing

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Abstract

Undergraduate students were asked to engage in a spatial task (tetris) while recordings of a sentence involving swearing was played in the next room so that they could be heard by the participant. The participants' ability to indicate the tone of the sentences was then recorded. The sentences were either angry, happy, or neutral. The participants were 14 males and 19 females. A univariate ANOVA found that there was not a significant effect between the ability to detect emotional tone in a sentence involving profanity and the involvement in a spatial task.

The Effect of Right Hemispheric Activation on Processing of Emotional Tone in Swearing

It has been established that language processing chiefly occurs in the left hemisphere, but it may be the case that the emotional aspects of language are processed predominantly in the right hemisphere (Borod et al., 1998; 2000). One use of language that is thought to have emotional strength is the use of profanity, as exemplified by the profanities used by someone who is upset, afraid, or who has suffered an injury. People who have had certain brain disorders such as left hemispheric cerebrovascular damage tend to be very limited in their vocabulary, with the exception of profanities (Patrick, 1901). It is possible that profanities are processed in the right rather than the left hemisphere.

Emotionality and Profanity.

Pinker (2007) discussed how swearing is used as a trigger of behavior rather than productively for the exchange of ideas. Words that are considered taboo kidnap our attention and force us to consider the unpleasant ideas they refer to. An example of this is the use of abusive swearing, such as “you son of a bitch”. This comment is not to be taken literally; the speaker is not suggesting that the listener’s mother is a dog, but rather, the speaker is trying to shock and anger the listener through the use of words (Allan, 1991).

Right hemisphere and Swearing.

The earliest study of profanity made the association that a person who has lost the ability to use language correctly retains the use of profanity (Patrick, 1901). A cerebrovascular insult to the left hemisphere leaves the patient with an inability to

process and produce most aspects of language. Oddly, these people are often still able to use profanity, and in fact use it quite regularly. Patients with aphasia who were unable to speak or repeat spoken swear words were still able to spontaneously use profanities on a regular basis, as if it were a reflex. Patrick (1901) proposed that profanities are separate from the rest of language processing, suggesting that swearing is possibly processed in the right hemisphere. Furthermore, a patient with a cerebrovascular insult to the right basal ganglia was studied. It was found that although the patient could speak fluently in grammatical sentences, he was unable to use profanity, even when the swears were started for him (Pinker, 2007). From this finding, it can be suggested that not only is it possible that swearing is processed in the right hemisphere, but that it is specifically processed in the basal ganglia of the right hemisphere (Pinker, 2007).

Primate Calls and Profanity in the Right Hemisphere.

Pinker (1994) suggested that swearing is processed subcortically due to that fact that mammals' distress calls may be related to swearing, and distress calls are processed subcortically. Sobbing, laughing, moaning, and shouting in pain are all considered mammal-like vocalizations. When a person has Broca's aphasia, a speech disorder following damage to the Broca's area, he/she continues to shout out when in pain much like mammals (Pinker, 1994). In one of the earliest papers written about profanity, it was found that a person in pain swears regularly (Patrick, 1901). Pinker suggested that there is a connection between the incidence of human swearing when in pain and mammals crying in pain. He suggests that swearing for humans is related to the cries of other primates (Pinker, 1994). Patients who were unable to speak or repeat spoken swear words, for example patients with left brain damage, reflexively use profanities (Patrick,

1901). This suggests that swearing is processed subcortically in the right hemisphere like the reflex of mammals' cries.

Although there is much research to be done in general on the processing of emotions, psychology is still in the early stages of development. Swearing is an aspect of language which has some evidence to suggest that it is processed in the right hemisphere. However, most of the information on the processing of profanities is speculative and lacks empirical support. In order to come to any conclusion regarding this topic, further research needs be conducted to explore the idea that profanity is processed in the right hemisphere. One way to do this would involve testing the ability of people with cerebrovascular injuries to identify the tone of a sentence containing profanities. Because it is already known that emotional aspects of language are processed in the right hemisphere (Borod et al., 2000), it is possible that the tone of a sentence involving profanity will be recognized as negative or angry, because of the underlying negative or angry significance of the profane word. If the right hemisphere is incapable of processing emotional tone due to an injury, it is possible that the tone of a sentence containing profanity would be perceived as angry because of the lack of context.

Methods

Participants

Thirty-three undergraduate students, 14 males and 19 females participated. Some participants were offered a bonus 0.5% mark from their class for participating. Participants were randomly assigned to two groups: the experimental group who were engaged in a spatial task and the control group. From those groups, they were then split

into three more groups (to make six groups), where they would be presented with an angry sentence, neutral sentence, or a happy sentence.

Materials

A Macintosh laptop (2007 MacBook) was used to record the voice of a male speaking three sentences; the same sentence, “No fucking way”, was recorded in three different tones: angry, happy, and neutral. The Tetris game from the original Nintendo was played using an Xbox (Microsoft Inc.), and a 13” television. A pre- and post-test was used. The pretest included the questions: “How often do you play video games?” to be answered on a likart scale from “often” (every day) to “never” (once a year), “Have you ever played Tetris before?” to be answered as “yes or no”, “At what age did you start playing video games?” to be answered subjectively, and “What are your favorite video games?” to be answered subjectively. The posttest asked the participants if they had heard the male voice saying “No fucking way”, whether they found it difficult to concentrate on playing the game due to the distraction of the sentence, and if they had heard the sentence, what the tone of it was. They were to answer what the tone of the sentence was on a likart scale from one (angry) to nine (happy). The control group was not asked if the sentence had made it difficult for them to pay attention to the same, as they did not play tetris.

Procedure

Participants sat is a 9.5’x8.5’ room where they were asked to complete the pretest. Then, if they were in one of the experimental conditions, they were asked to play Tetris until the experimenter returned. The experimenter said that they would leave the room as to not distract them. A piece of paper indicated the instructions and rules of the game; if

they were to lose the game before the experimenter returned, they were to restart but not change the level. A pilot test was conducted to decide that level four was appropriate for this study. The control group was left with the pretest and the experimenter asked them to stay there until they returned.

After the participants had been playing Tetris or sitting in the room for four minutes, the experimenter played the recordings or the sentence “No fucking way” on a laptop from an office six feet away. The distance from the participant and the speakers that were playing the recording was 11.5’. The doors to both offices there opened 1.5’ so that the sentence could be heard. The volume of the sentences was 60 decibels and predetermined to be sufficient for hearing.

After the sentence was played, the participant continued to play Tetris or wait for 2 minutes, after which the experimenter returned. At that point the experimenter asked the participant to fill out the posttest. The control groups and the experimental groups were then compared based on their ability to detect the emotions in the sentences.

Results

The statistical analyses carried out included a group (control, experimental) x tone (happy, angry) univariate ANOVA as well as a post hoc analysis on the participants responses to the question “what would you say the tone of the sentence was?”. Because the neutral control condition only consisted of one person, and therefore variance did not exist. The post hoc test was used to determine whether the individual tones were heard as different depending on whether the participants were in the control or experimental condition.

For the happy control condition (n = 5, M = 4, SD = 1.15), for the neutral control condition (n = 1, M = 5, SD = N/A) (this group did not have a standard deviation as it only consisted of one person), for the angry control condition (n = 6, M = 1.7, SD = 1), for the happy experimental group (n = 3, M = 5, SD = 2.6), for the neutral experimental group (n = 4, M = 5.5, SD = 1.7), for the angry experimental group (n = 6, M = 2.7, SD = 1.9). Scores of 0 did occur, however that was due to the fact that the sentences were not heard. Therefore they were not included in the statistics.

Because there was only one person in the neutral control condition, an ANOVA was conducted less the neutral tone. There was not a significant main effect of group and tone, $F(1,19) = 3.71$, $p = 0.034$ (see Figure 1). Tukey's post hoc test found that there was a significant difference in the perceived emotion between the angry and the neutral tone.

Discussion

This study did not find a statistically significant difference between the control group and the experimental groups' ability to detect the tone in a sentence involving swearing. Although it may be the case that profanity is not processed in the right hemisphere, it is more likely that there were flaws in the design that lead to the insignificant results.

The fact that the post hoc test found a significant difference in the participants ability to detect the tones proves that the recordings correctly enacted the emotional tone in which they were supposed to represent. The differences between the groups can be seen in Figure 1. Although there appears to be a difference in the detection of the different tones from the control to experimental condition, the expected difference is not

found. That is, it is not found in the experimental group whose right hemispheres are activated had scores are more skewed towards the angry tone.

One of the main problems with this study included the fact that data from twelve participants had to be discarded because they did not hear the sentence. Although the volume of recording was predetermined during a pilot study, it is possible that the amount of noise in the hall was inconsistent from one day to another and therefore the volume of 60 decibels would be inappropriate on some days. This meant that the neutral tone had to be discarded due to an inability to compare variances (because variance did not exist). That point leads to another problem; because this experiment was carried out in a school during class hours, there was noise in the hall that could not be controlled from participant to participant. Too much noise could have easily distracted the participant from playing tetris and therefore from the experiment.

The recoding of the “happy” sentence was often rated by participants of both the control and experimental group as less happy than the “neutral” sentence. The average for the “happy” sentence was a 4.5 on the likart scale (nine being “happy” and five being “neutral”). This could indicate a problem with the recording. It is possible that the recording was not happy enough for the participants to distinguish it as happy.

Although this conclusion could show that in fact emotional processing does not occur in the right hemisphere, there is a lot of research to suggest that it is in fact processed in the right hemisphere. Therefore, it is more likely that the activation of the right hemisphere does not interfere with the processing of emotional tone. Research in the past has suggested that the processing of profanity is processed in the right hemisphere (Pinker, 2007), so future research using patients with a cerebrovascular insult to the right

hemisphere may find that they are incapable of detecting tone in sentences containing profanity. They may find that patients with insults to the right hemisphere feel that the tone of a sentence involving profanity is angry because of the lack of context.

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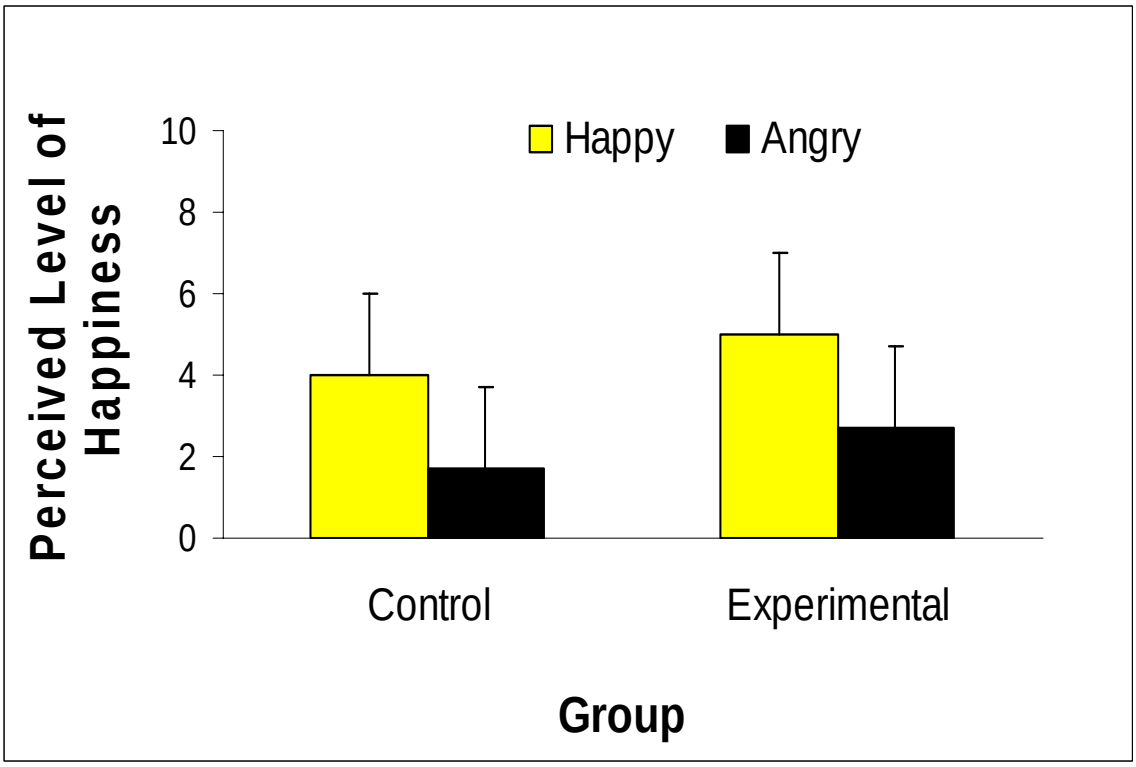
Figure Caption

Figure 1. Happy, neutral and angry represent the tone of the sentence the participants were exposed to. Control is the group that was not playing tetris, and experimental is the group that was playing. The perceived level of happiness was rated on a nine point likart scale, where 1 meant an angry tone and nine meant a happy tone.


Perceived Level of Happiness
10
8
6
4
2
0
Happy
Angry
Control
Experimental
Group