The Relationship Between Punishment History and Skin Conductance Elicited During Swearing

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Despite its theoretical importance, the effect of past punishment on verbal behavior is often overlooked in research due to the difficulty of measuring it. The present study explores the relationship between physiological arousal in humans and swearing; a behavior likely to have been punished in the typical conditioning history of an individual. Participants' skin conductance was measured as they read aloud a list of words containing swear words, emotionally salient words, and neutral words. The association between SCR measurements and participants' scores on questionnaires on previous punishment for swearing was then analyzed. Findings suggest that people have significantly higher physiological arousal when saying swear words than neutral words, and that this arousal is higher for participants who have previously received more frequent punishment for swearing, according to self-report.

Key words: swearing, skin conductance, physiological arousal, punishment, classical conditioning

People cannot go around saying anything they want. Other people's feelings and secrets, or their need for a pause to speak, require that a person cannot impulsively say anything that has been reinforced in a particular situation. Social punishment teaches us to pause before we blurt something out, say certain things to some people and not to others, say some things quietly, and say other things silently (Skinner, 1957). The effects of punishment on verbal behavior are numerous. For example, according to Skinner (1953), a history of punishment often leads to increased physiological arousal when engaging in verbal behaviors that have previously been punished, such as being deceptive, possibly explaining the results acquired by polygraph tests. Despite the theoretical and practical importance of demonstrating these effects, the difficulty of controlling punishment histories experimentally has made research on these effects rare. One way of addressing this issue is to examine a type of verbal behavior that is likely to have been punished in the individual's past.

Swearing is a type of verbal behavior that is likely to have been punished (Jay, King, & Duncan, 2006). Although there is nothing inherently harmful in speaking or hearing a

swear word, cultural, historical, and social contingencies (e.g., being spoken by lower classes), have caused them to become undesirable in many social circumstances (Jay & Janschewitz, 2008). As such, parents and other authority figures often punish the use of swear words (Jay et al., 2006). The typical child will receive some form of punishment, ranging from mild to severe, for the use of words such as "fuck" in the wrong company. This punishment may be expected to leave a tendency for swear words to elicit increased physiological arousal, providing an opportunity to test the hypothesis that increased arousal is associated with previous punishment.

Studies have shown that the presentation of taboo words, such as swear words, elicits stronger skin conductance responses (SCR) than the presentation of neutral words (Dinn & Harris, 2000; Gray, Hughes, & Schneider, 1982). Harris, Aycicegi, and Gleason (2003) tested the skin conductance exhibited by multilingual participants to taboo words presented visually and auditorially in their primary and secondary languages. They found a higher SCR to taboo words in participants' native language than in their secondary language. This finding is consistent with the fact that a person is likely to have been exposed to more punishment for swearing in their primary language than in other languages learned, especially in early childhood (Schrauf, 2000). Indeed, historically, the physiological arousal caused by swear words was explained by punishment received in

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childhood via one's parents (Harris et al., 2003). It should be noted, however, that a person is likely also exposed to other sources of punishment, such as from friends, colleagues at work, and other social encounters in which verbal behavior that is appropriate in one context become inappropriate.

Physiological arousal is not only caused by swear words, but can also be stimulated by other words that a person encounters or speaks. For example, emotional reactions can be caused by words associated with negative events (e.g. illness, death, misfortune; see Hill & Kemp-Wheeler, 1989; Wischner & Gladis, 1969). It is not likely that such words have acquired their arousal effect because of direct punishment for their usage, but rather because they tend to be used in situations with an increased probability of aversive events. When one uses the word "cancer," for example, it is more likely that they are discussing a traumatic event in their life than when they use the word "duck." Given their tendency to elicit emotional arousal, and their likely lack of a direct punishment history, emotional words provide a good opportunity to compare the effect of directly punished words to words without a direct punishment history.

The previously mentioned studies (Dinn & Harris, 2000; Gray et al., 1982) used taboo words presented to the participants in either the visual (printed word) or auditory (spoken word) modality. However, it seems likely that most of the punishment received in connection with swear words has followed verbal utterances of the word, rather than simply reading the word silently or hearing it. Accordingly, the present study expanded upon prior studies by comparing participants' SCR when they said swear, emotional, and neutral words aloud, to test whether swear words elicited more arousal than other word types. It was expected that a higher SCR would be associated with swear words, especially in participants with a greater self-reported history of punishment for swearing. Additionally, a tendency to swear more often was expected to be associated with a lower SCR when swearing.

METHOD

Participants

Twenty-six undergraduate psychology students participated in this study (24 female

and 2 male). The participants had a mean age of 19.9 ($SD = 1.7$) years. The participants were recruited through the Psychology Department's online participant pool, and received course credits for participation. All participants provided informed written consent prior to participating.

Verbal Stimuli

The study used a list of words compiled by the authors, consisting of 10 swear words (e.g., "shit"), 10 emotional words (e.g., "cancer"), 10 neutral words matched to the swear words for both word length and frequency in common usage, using the spoken word frequency list by Leech et al. (2001), and 20 commonly used words of similar length used as fillers to break up the trials (see Appendix A for a complete list). Each word was between 4 and 12 letters long ($M = 6.0$; $SD = 2$ letters). For each word in the swear word list, an emotional and matched word of the same length ($\pm$ one letter) was selected that had roughly the same spoken frequency in the English language ($\pm 5\%$).

After the experiment was completed, the participants were asked to rate the offensiveness and emotionality of all words on a Likert scale ranging from 1 (lowest) to 5 (highest). A one-way repeated-measures analysis of variance (ANOVA), with word type (swear words vs. emotional words vs. neutral words) as a within-subject factor found a significant effect of word type on the rated offensiveness of words: $F(2, 50) = 209.22$, $p < .001$. A series of follow-up protected t -tests comparing each word type to the others found that swear words were rated as significantly more offensive than emotional words; $t(25) = 8.01$, $p < .001$, and more offensive than matched words; $t(25) = 27.63$, $p < .001$. Emotional words were rated as more offensive than matched words; $t(25) = 10.38$, $p < .001$. A one-way repeated-measures ANOVA found a significant effect of word-type on emotionality rating: $F(2, 50) = 123.19$, $p < .001$. Follow-up protected t -tests found the rated emotionality of the emotional words to be significantly higher than swear words; $t(25) = 3.16$, $p < .005$, and significantly higher than matched words: $t(25) = 16.03$, $p < .001$. Swear words were

also significantly more emotional than the matched words: $t(25) = 13.95, p < .001$.

Apparatus

The experiment was conducted in a small, quiet room containing a desk and two computers. The computers were organized such that the participants could be seated before one computer monitor, on which the stimuli were presented, while unable to see the screen of the other computer, which was used to measure skin conductance and control the experiment. Measurement of participants' skin conductance was carried out by an ADInstruments PowerLab 2/25 data acquisition system (model ML825) and the accompanying skin conductance amplifier (ML116). Finger electrodes (MLT116F) were attached to the palmar surface of the intermediate phalanges of the first and third fingers of the nondominant hand. Participants were instructed to rest this hand on the table, and to refrain from talking and moving their hand during the session to avoid interfering with the measurement. The skin conductance data were recorded and analyzed using ADInstruments Chart 5.2 software. A program written in LabVIEW was used to present the words on the display computer and time trial events.

Response Measures

SCR for each trial was scored as the magnitude (in microSiemens) from trough to apex of the first response occurring with an onset latency of 1–4 s after the response-onset (participant's speaking the word aloud). This is a common response window for SCR conditioning studies (e.g., see Purkis & Lipp, 2001). For between-subject analyses, each participant's SCR in each trial was scaled to a maximum of 100. The skin conductance responses across all trials of each word type were averaged for each participant, and statistical analysis was conducted on the means.

Procedure

Each participant was exposed to 50 trials during a single, 20-minute experimental session. At the start of each trial, a word

was presented on the screen, and remained visible until the participant read the word aloud and pressed the space bar. Participants were instructed in the pre-experimental briefing to simply read aloud each word that was presented on the screen. During the experiment, an experimenter remained sitting in the room and monitored the participant's skin conductance. The experimenter interacted with the participant as little as possible, and gave no feedback regarding any of the words read aloud. Each trial was followed by a random intertrial interval (ITI) of between 6 and 9 seconds before the next trial began. The list of words was randomized prior to the experiment, and presented individually on a computer monitor. The words were presented in standard font, with letters 15 mm tall. No word was presented more than once.

Following the last trial, participants were asked to rate each the offensiveness and emotionality of each word, as previously described. In addition, they were given a third questionnaire that was designed by the experimenters to measure the participants' previous history of punishment for swearing and frequency of swearing (see Appendix B).

To analyze the association of skin conductance with punishment history and swearing frequency, scores on the punishment history and swearing frequency questionnaires (questions 6 and 7) were used to divide participants into high and low groups for punishment history and swearing frequency based on a median split. This procedure created a group that had previously been punished more often for swearing ($N = 13$), and a group that had previously been punished less often for swearing ($N = 13$). It also created a high swearing frequency group ($N = 13$) and a low swearing frequency group ($N = 3$).

RESULTS

Word Type

Figure 1 displays the average SCR across participants for swear words, emotional words, matched words, and filler words. Participants exhibited a larger average SCR following swear words than other types.

Figure 1. Average SCR across participants for swear words, emotional words, matched words, and filler words.

Emotional words had slightly stronger responses than the matched and filler words. A repeated-measures ANOVA, with word-type (swear vs. emotional vs. matched vs. filler) as a within-subject factor revealed a statistically significant effect of word-type: $F(3, 75) = 122.60, p < .001$.

Because word type yielded a significant effect, a series of follow-up protected *t*-tests comparing each word type to the others was conducted. A significantly higher SCR was found to swear words than to emotional words: $t(25) = 9.92, p < .001$, matched words: $t(25) = 12.93, p < .001$, and filler words: $t(25) = 14.20, p < .001$. Likewise, there was a significantly higher SCR to emotional words than to matched words: $t(25) = 5.39, p < .001$, and filler words $t(25) = 5.47, p < .001$. There was not a significant difference between matched and filler words ($p > .87$).

Previous Punishment and Swearing Frequency

Because the analysis found a higher SCR to swear words than other word types, a follow-up analysis examined the association between SCR and past punishment for swearing.

Figure 2 shows the average SCR to swear words for participants in the high and low

punishment (left side) and swearing frequency (right side) groups. There was a slightly higher SCR to swear words in the high-punishment group than in the low-punishment group. A matched one-tailed *t*-test supported this, finding a significant difference between high and low punishment groups; $t(24) = 1.85, p < .04$. However, there was no difference in SCR between the high and low swearing frequency groups ($p > .24$).

DISCUSSION

The present study found that participants exhibit stronger physiological arousal when saying swear words aloud than when saying emotional or neutral words. Further, participants who reported a history of being punished more frequently for swearing exhibited greater arousal when saying swear words than those who reported a history of being punished less frequently. Reported swearing frequency, however, was not associated with SCR when swearing, as had been expected.

The results support previous findings showing that swear, or taboo, words elicit a stronger SCR than matched, neutral words (Dinn & Harris, 2000; Gray et al., 1982; Harris et al., 2003), and extend them by showing that this is also the case when the

Figure 2. Average SCR to swear words for high and low punishment history groups (left), and high and low swearing frequency groups (right).

words are spoken aloud by participants. Interestingly, it was also found that swear words elicit stronger physiological responses than emotional words. There is evidence that emotional words elicit stronger physiological responses than control words (Hill & Kemp-Wheeler, 1989; Wischner & Gladis, 1969). This is understandable, as emotional words tend to be spoken and heard in situations in which some sort of negative consequence is particularly probable, as mentioned above. Arguably, swear words have an even closer connection to negative consequences. Punishment is often directly socially contingent upon the very utterance of swear words, meaning that the physiological arousal that speaking such words elicits may be more directly related to punishment in the individual's history than in the case of emotional words. This is not, of course, always the case. An individual currently undergoing a crisis in which a loved one is diagnosed with cancer will very likely exhibit a far stronger emotional response to the word cancer than to many swear words. It is therefore likely that individual variance in SCR for different types of words may be found based on the specific contingencies that an individual has been exposed to.

Likewise, the context in which a person swears is likely an important factor in determining the physiological arousal they exhibit during swearing (e.g., swearing in front of one's mother might elicit a stronger response than swearing in front of one's friends). In

the present experiment, the only person present while the participant was swearing was the experimenter. Future research might benefit from exploring the effect of different contexts on the responses exhibited during swearing (e.g., the presence of a friend rather than an experimenter, or an experimenter of the opposite sex). Additionally, the present study could only establish a correlation between previous punishment and the physiological arousal exhibited during swearing. Further studies manipulating the context and even contingencies of punishment could go further towards establishing a causal relationship.

These limitations aside, the present findings support a conditioning-based explanation for the association between physiological arousal and certain types of verbal behavior, as presented, for example, by Skinner (1953). They also have practical implications, such as for the polygraph. The polygraph measures the physiological arousal accompanying instances of deception, but the lack of understanding of the origin of this association has limited its success (U.S. Congress, OTA, 1983). If this association is a conditioned response, it is reasonable that conditioning could be used to strengthen it and improve polygraph reliability. At the very least, a behavioral understanding of how the responses are conditioned could inform reliance upon polygraph results in different situations.

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Appendix A
Words Used in Experiment

Swear		Emotional	
1	cunt	1	weapon
2	shit	2	hate
3	fuck	3	death
4	asshole	4	suicide
5	cocksucker	5	humiliation
6	motherfucker	6	execution
7	wanker	7	torture
8	crap	8	violence
9	bastard	9	cancer
10	twat	10	murder

Filler		Matched	
1	light	1	land
2	window	2	film
3	animal	3	glass
4	building	4	chair
5	green	5	concentrate
6	brick	6	candlestick
7	plaza	7	noisy
8	science	8	feed
9	waffle	9	bowl
10	game	10	pencil
11	glass		
12	carpet		
13	dreams		
14	local		
15	bird		
16	throw		
17	coast		
18	shirt		
19	camera		
20	clock		

5