Swearing and the Brain: A Cultural and Emotional Experience

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Abstract

Swearing stems from functions involved in the brain, specifically automatic and emotional swearing. The process excludes regions involved in conscious thought, like the prefrontal cortex and language processing centers, typically active in deliberate speech. It is important to note that this exclusion does not imply that these language areas are completely uninvolved; rather, automatic swearing relies more heavily on emotional circuitry such as the amygdala and basal ganglia. Research has focused on exploring the right hemisphere and its involvement with the automatic processing of emotional information, which is crucial in spontaneous swearing. Evidence and imaging tests from cases including damage to the left hemisphere point to significant activity in the right hemisphere during instances of automatic swearing. Additionally, the concept of swearing also involves the idea of "taboo," and the brain responds to expletives in a manner similar to when responding to threats to safety, indicating a deep-rooted emotional and survival mechanism at play.

Introduction

Swears are everywhere. Expletive words are prominent in everyday discussions and environments, including family gatherings, schools, campuses, workplaces, and social settings. Given this extensive exposure, an intriguing question arises: how do these spontaneous expressions relate to the brain's wiring? According to Stapleton, a prominent researcher at Ulster University, "swearing" refers to the act of using words and phrases that stem from a negative emotional reaction and can produce an equivalent reaction in the listeners. Swear words are also categorized within a language as "taboo" words, leading the listener to experience increased physical and emotional reactivity towards them when used (Byrne, 2019; Stapleton et al., 2022). Due to the prevalence of expletives in language, the act of swearing can result from two different origins: a consciously decided path and an automatic, involuntary path (Stapleton et al., 2022). These separate pathways suggest that intentional or spontaneous swearing engages complex brain networks, contributing to a multifaceted output. Adding to the complexity, the use of swear words then incorporates a neural process from multiple pathways, including language and speech production, somatosensory processes, and the limbic system for emotional responses (Finkelstein, 2018). The emotional pathways related to automatic swearing are the focus of this discussion.

The Emotional Pathway of Swearing

Though swearing leaves the mouth in the form of speech and language, the neural process of swearing is highly connected to emotional pathways. Swearing activates parts of the limbic system such as the basal ganglia and amygdala, which respectively process memory and emotions. Based on studies done with individuals with aphasia – disorders concerning limited capabilities of language processes – their ability to swear does not lessen, suggesting that reflexive and spontaneous swearing originates from regions in the brain unrelated to the language processing centers (Stapleton et al., 2022).

With regulating emotions, extensive connections exist between the amygdala and the prefrontal cortex (PFC), the brain region that regulates executive functions such as planning, judgment, and behaviors. The amygdala sends emotional information to the PFC to process the information and respond accordingly. The medial prefrontal cortex (mPFC) in particular plays a role in emotion regulation, including swearing. It focuses on judging appropriate social behavior, including inhibiting the use of obscene language. However, in the case of automatic swearing, the mPFC does not perform at its highest capabilities, and "the performance of the inhibitory guards deteriorates and the automatic swearing wins over" (Finkelstein, 2018). Thus, while the prefrontal cortex typically regulates speech for an appropriate response, this control is lessened in instances of automatic swearing, and our deep, emotional responses manifest verbally.

The Right Hemisphere and Swearing

Broca's area, the region of the frontal cortex focused on language production, exists in the left hemisphere of the brain for most individuals. However, cases have occurred where damage to the left hemisphere leads to the inability to talk, but the ability to swear remains intact. These situations lead to the idea that the right hemisphere plays a prominent role in the production of automatic speech, including swearing. The differences in the right and left hemispheres extend to the basal ganglia, where its right portion enables swearing. Studies where the right basal ganglia was removed demonstrated the absence of automatic speech (Finkelstein, 2018).

The right hemisphere has been studied as a path for unconscious emotional processing. Behavioral studies, brain imaging, and studies focused on brain pathologies have found that the right hemisphere activates during situations involving automatic emotional responses, specifically subcortical regions such as the right amygdala and thalamus, and visual areas such as the superior colliculus and pulvinar

(Gainotti, 2012). Automatic swearing as a response to stimuli is an example of such an unconscious emotional response, following the same right hemispheric activation as explored by Gainotti.

The Taboo of Swearing

The brain activates not only when one swears, but also when one hears swearing. The "taboo" aspect of swearing is connected to the limbic system. Jeffrey Bowers and Christopher Pleydell-Pearce explored the link in their experiment which studied the idea that "the phonological form of a word can directly evoke a negative emotional response" (Bowers and Pleydell-Pearce, 2011). The researchers conducted an experiment where participants were exposed to swear words and "neutral" words, and their physical responses were recorded. Neutral words included terms not categorized as "taboo" in a language, such as "glue" and "drum." The participants read aloud words that appeared on a screen, including swear words, euphemisms referring to certain swears (i.e. "f-word"), and neutral words. The researchers recorded the participants' skin conductance levels while they read out the words, a measure of activation of the sympathetic nervous system. The results showed a drastic increase in skin conductance when swear words appeared on the screen compared to euphemisms and neutral words. The researchers concluded that "people find it more stressful to say aloud a swear word than its corresponding euphemism" (Bowers and Pleydell-Pearce, 2011). The physical responses when hearing expletives are similar to when a threat is perceived, activating the sympathetic nervous system – "increased heart rate, sweating, faster breathing" (Stapleton et al., 2022) – and reinforcing the taboo aspect of swearing.

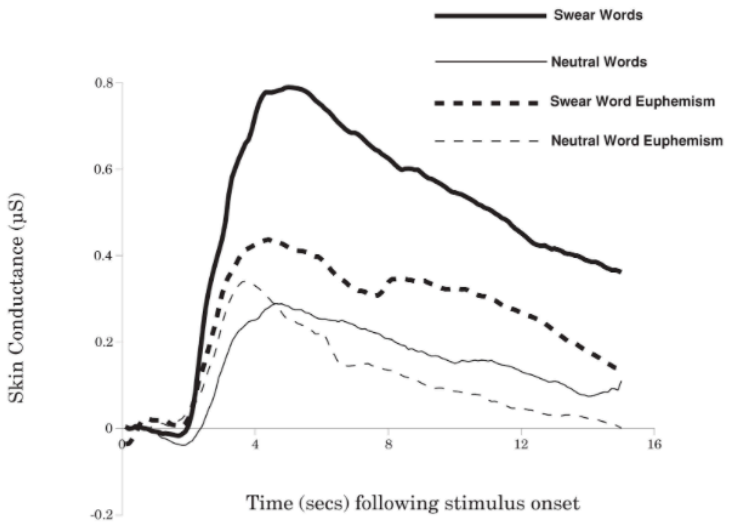

Fig. 1. Skin conductance (µS) as a variable of time (seconds) following stimulus onset. Stimuli: swear words, neutral words, swear word euphemism, neutral word euphemism (Bowers and Pleydell-Pearce, 2011).

Conclusion

The brain's functions involved with swearing highlight the complexity of its abilities. Whether the expletives originate internally or externally, the brain activates the emotional pathways when responding, limiting conscious speech typically in control via the medial prefrontal cortex. The right hemisphere of the brain in particular demonstrates high activity during emotional responses and continues the production of swears independent from the left hemisphere. This lateralization reveals the necessity of both hemispheres to allow for proper human behavior in response to one's environment. Future research may explore specific features of the right hemisphere that connect it to automatic emotional responses and details on why the right and left hemispheres are lateralized in terms of conscious versus emotional response.

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