



# Effects of context and individual differences on the processing of taboo words

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## ABSTRACT

Previous studies suggest that taboo words are special in regards to language processing. Findings from the studies have led to the formation of two theories, global resource theory and binding theory, of taboo word processing. The current study investigates how readers process taboo words embedded in sentences during silent reading. In two experiments, measures collected include eye movement data, accuracy and reaction time measures for recalling probe words within the sentences, and individual differences in likelihood of being offended by taboo words. Although certain aspects of the results support both theories, as the likelihood of a person being offended by a taboo word influenced some measures, neither theory sufficiently predicts or describes the effects observed. The results are interpreted as evidence that processing effects ascribed to taboo words are largely, but not completely, attributable to the context in which they are used and the individual attitudes of the people who hear/read them. The results also demonstrate the importance of investigating taboo words in naturalistic language processing paradigms. A revised theory of taboo word processing is proposed that incorporates both global resource theory and binding theory along with the sociolinguistic factors and individual differences that largely drive the effects observed here.

## 1. Introduction

If a tree falls in the forest onto the foot of a lumberjack, who swears loudly, but no one else is there to hear it, is it offensive? How about if we turn that lumberjack into a nun, the tree into a boiling teakettle, and the forest into a room full of Catechism students? The nun utters the exact same word as the lumberjack, and just as loudly. Now is it offensive? Taboo words express highly emotional messages and are uttered by people in social contexts. The way people process these words has been increasingly studied in psycholinguistic research over the last few decades. Yet most of this work has employed paradigms and offline memory tasks involving the rapid presentation of individual words divorced from speakers, hearers, and social contexts, the results of which are the basis of the two main current theories about taboo word processing, global resource theory and binding theory. In the present study we argue that previous research examining the processing of taboo words without considering speaker and context has missed some crucial observations about how taboo words affect attentional and memory resources, as well as how sociolinguistic and individual difference factors interact in the moment-by-moment, real-time (online) processing of potentially harmful, taboo stimuli. Furthermore, we propose that combining aspects of global resource theory and binding theory

results in a theoretical framework that can incorporate the sociolinguistic biases people hold about taboo words and the contexts in which they are used. This approach thus accounts for the online and offline results obtained here.

### 1.1. Defining taboo words

Taboo words are words that are restricted from societal use under the assumption that they will cause harm in some way. Words come to be recognized as “taboo” through aversive classical conditioning during childhood when parents and other authoritative figures scold or punish children for using them (Jay, 2009b). While taboo words can be used for positive purposes, such as humor and in-group slang, two-thirds of swearing data has been linked to expressions of anger and frustration, such as through sexual harassment, blasphemy, and hate speech (Jay, 2009a). Research has found that taboo words used in certain contexts can and do cause harm to people (Jay, 2009a).

### 1.2. Previous studies of taboo word processing

Early studies on taboo word processing focused on the aversive nature of taboo words and developed the idea of “perceptual defense”

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against harmful stimuli. In one of the earliest of these studies, participants had to report what word they saw when taboo and neutral words were flashed quickly on a screen (McGinnies, 1949). Results showed that participants were much slower at responding to a taboo word than a neutral word; this was seen as support for the idea that there exists a subconscious defense mechanism to protect people from perceiving these highly emotional stimuli (see also Sales & Haber, 1968). However, Zajonc (1962) speculated that results such as these were likely due to participants desiring to avoid embarrassment by having to say aloud the taboo words that they saw. Postman, Bronson, and Gropper (1953) disputed the idea of perceptual defense and found that participants actually had lower recognition thresholds for taboo words than for neutral words. As further evidence against the theory, they also found that warning participants about the presence of taboo words in the study and encouraging them not to hesitate when reporting these words also lead to faster response times.

Although most studies focus mainly on the psychological effects of encountering taboo words, many have also found that taboo words elicit significant physiological responses through observations of heart rate (Buchanan, Etzel, Adolphs, & Tranel, 2006), skin conductance levels (Buchanan et al., 2006; Calef, Calef, Kesecker, & Burwell, 1974; Eilola & Havelka, 2010; Zajonc, 1962), and event-related potentials (ERPs) in the brain (Severens, Janssens, Kühn, Brass, & Hartsuiker, 2011). These responses have been correlated with increased memory for taboo words over neutral words (Buchanan et al., 2006) and with being asked to say the taboo words aloud in the presence of the experimenter, a situation likely to cause discomfort in some participants (Zajonc, 1962). When participants monitor their speech to avoid saying taboo words aloud, a negative-going wave around 600 msec after the covert editing has been observed, which is interpreted as an internal response to suppress socially unacceptable behavior (Severens et al., 2011). Other recent studies have shown interesting physiological responses to taboo words. Tipples (2010) found that participants spent more time looking at taboo words than neutral and emotional words when presented individually on a screen, but reported feeling as though they had spent less time looking at those items. This phenomenon is interpreted as evidence that taboo words drain resources normally used by the body's internal clock.

### 1.3. Global resource theory and binding theory

Thus far, most studies on taboo words have used paradigms lacking communicative contexts, such as the taboo Stroop test, based on the original Stroop test used to investigate psychological interference and inhibition (Stroop, 1935). In this paradigm, taboo words are printed in different colored fonts and participants are asked to name the font color as quickly as possible (Eilola & Havelka, 2010; MacKay, Hadley, & Schwartz, 2005; MacKay et al., 2004; Siegrist, 1995). Results from these studies have shown a robust effect of slower naming times for colors of taboo words, as well as a better memory for the words and font colors consistently associated with them. The effect of taboo words slowing down processing on concurrent tasks is also reflected in results from other studies involving attentional blink (Mathewson, Arnell, & Mansfield, 2008), taboo word distractors during picture naming (Dhooge & Hartsuiker, 2011), and taboo word distractors before lexical, animacy, and rhyme decision, and nonword naming tasks (Zeelenberg, Bocanegra, & Pecher, 2011). Increased memory for taboo words has also been found in studies involving presentation of word lists (Buchanan et al., 2006; Grosser & Walsh, 1966; Hadley & MacKay, 2006), repetition priming (Thomas & LaBar, 2005), and different levels of processing (Jay, Caldwell-Harris, & King, 2008).

These results showing increased memory and decreased ability on tasks involving taboo words over neutral words has led to two hypotheses by MacKay et al. (2004). The first is called *binding theory*, which attempts to explain why people remember the font colors of taboo words better than those of non-taboo words. The claim of binding

theory is that emotional stimuli “strongly engage the binding mechanisms” and link these stimuli to their contexts, including “the time, place, and manner of learning about it and other events going on at the time” (p. 485). The second hypothesis to explain why people perform worse on memory tasks involving taboo words is called *global resource theory*, which states that “allocation of limited-capacity attentional resources to threatening stimuli reduces resources required to process and respond to all other stimuli” (p. 483). Essentially, attentional resources are disproportionately allocated to the taboo word, and in a situation involving a limited amount of time for processing, surrounding words are neglected.

Binding theory and global resource theory both assume that taboo words draw attention. The resulting effect of this heightened attention is what sets the two theories apart. Binding theory assumes a more advantageous result, as the context surrounding the emotionally charged taboo word can be remembered and potentially avoided in the future. Global resource theory, on the other hand, assumes a memory and processing disadvantage as a result of the increased attention allocated to the taboo word. It is possible that these theories are part of a larger phenomenon, in which taboo words might receive a greater allocation of resources, but whether they do or not depends more on the context in which they are encountered and/or individual differences in the given comprehender's attitude toward taboo words. In other words, it is possible that at least some processing effects ascribed in previous research to taboo words themselves might be modulated by, or even driven by, factors associated with when, where, and by whom taboo words are uttered, and the personal attitudes of a hearer/reader who encounters a taboo word. The present study aims to understand these potential effects on taboo word processing, and results presented below indicate that context and individual differences play roles in the processing of taboo words. In the discussion, we propose a revised theory, which synthesizes both binding and global resource theory and also integrates these other factors.

A few recent studies have looked at how taboo words are processed in more naturalistic paradigms. Guillet and Arndt (2009) examined memory for other words embedded in sentences containing taboo words. The sentence-reading task was thus more contextually situated than previous studies, but the measure was an offline, fill-in-the-blank test. They found that participants had improved memory for words that appeared within the same context as a taboo word, even when the words appeared in the periphery and were unrelated to the sentence. These results provided evidence for binding theory, as taboo words led to better memory for surrounding context, as well as evidence against global resource theory because the context being bound to the word was broader than merely the font color of the taboo word. Weaver, Lauwereyns, and Theeuwes (2011) examined eye movements in the presence of taboo and neutral distractors and showed that participants had larger saccade trajectory deviations when having to avoid a taboo distractor on the way to the target. Neither of these studies, however, considered potentially relevant sociolinguistic factors. As suggested at the outset here, in the real world, taboo words are uttered (or written) by people in specific situations. Depending on the identity of the person and the (in)appropriateness of the situation, a given taboo word might well have variable perlocutionary effects (Austin, 1962), i.e., stronger or weaker psychological and/or physiological effects, on the one who is perceiving it.

## 2. Current investigation

The present study extends previous research by using online measures of eye movement data during naturalistic sentence reading, as well as offline accuracy in probe word recognition, investigating implicit memory for the rest of the sentence (minus the taboo word). The combination of online reading measures and offline memory measures has not previously been used to research taboo word processing (cf. Raizen, Vergis, & Christianson, 2015). Additionally, the present study

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