Word Priming Experiment

PSY310: Lab in Psychology

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Github Link:
https://github.com/SaanchiBhatt13/Psy310/tree/Word_Priming_Experiment

Introduction

It is well known that attention determines memory: the more we focus on a stimulus, the more likely we are to remember it later. According to studies on implicit memory, our brains tend to encode information into the unconscious memory without conscious awareness by expanding beyond focused attention. Priming is the term for this phenomenon.

Priming happens when prior exposure to stimuli influences subsequent behavior without the conscious effort to recollect the contextual information. This unconscious memory encoding manifests itself in faster reaction times to primed stimuli. Priming tests involve exposing participants to prime words and testing their ability to identify new words mixed in with them. Reaction times indicate how rapidly information may be retrieved from memory. Research has repeatedly shown that people respond faster to primed stimuli, implying that they have unconsciously encoded them into memory.

However, as with any other cognitive process, priming has limitations when exploring memory. Priming effects are context-dependent and frequently transient, limiting their efficacy for long-term behavior change. Furthermore, priming can have a negative impact on performance, as seen by slower reactions to recognize stimuli that are similar but not identical to those previously tested.

Priming has many practical applications, particularly in marketing, media, therapy, and education. Marketing promotes consumer behavior by associating items with appealing images or messages, increasing brand memory. In therapeutic contexts, cognitive behavioral therapy uses priming to help clients recall reinforcing memories, whereas educators utilize it to activate prior learning, increasing student engagement.

Method

The participants, who were 20 years old and female, were all Ahmedabad University undergraduates majoring in psychology, all of whom shared a standardized, average level of memory and attention. Before the experiment began, they were informed about the aim and methodology of the study and their consent was obtained. A 14.5" laptop screen and PsychoPy-2024.1.5 software were used to create the experimental setup.

The experiment includes displaying a full-screen window, with the first 10 slides being the priming process. A word is flashed on the screen (for 8s), and the participant must respond with the level of familiarity by clicking on a slider bar of 5 levels, with levels 1 (most familiar) and 5 (most unfamiliar). This method is the precursor to the test phase of the experiment and displays only the words from the “study list (fig1)” that contain the prime words.

A test phase of 20 trials then follows this priming phase. This phase flashes words from a “test list (fig2)” that contains 10 primed and 10 non-primed words. These words are set to appear at random. An example of the words displayed in this phase is- “b_tt_e” for the word (bottle).
The participant must fill in the blanks, type the correct word in the provided space, and click the submit button to move to the subsequent trial. If the stipulated time for every trial (10s) is up before the participant enters the word, the experiment moves on to the subsequent trial, and the response is recorded as blank.

Randomization of primed and non-primed trials enables counter-balancing by negating effects like task fatigue or sensitization. The font properties of the words are kept at a standard to minimize external influence on the performance. The properties are as follows:

- Font: Arial
- Letter Height: 0.05
- Foreground (font) color: White
- Contrast: 1

The responses were recorded in a CSV (comma delimited format) and analyzed to calculate the proportions of hits for primed and non-primed words and priming score per participant and across all 4 response datasets.
The experiment was conducted in controlled laboratory conditions to minimize the influence of distractors on attention or memory.

Fig 1

study_word
vase
tiger
book
cushion
piano
nine
apple
worm
ring
table

Fig 2

test	reference	condition
w_ _m	worm	P
t_g_r	tiger	P
t_b_e	table	P
s_o_d	sword	NP
p_p_r	paper	NP
n_ne	nine	P
h_r_e	horse	NP
f_o_e_	flower	NP
f_ _ e	fire	NP
cl_c_	clock	NP
c_s_i_n	cushion	P
c_m_ _ a	camera	NP
ap_l_	apple	P
a_ _ y	army	NP
_oo_	book	P
ian	piano	P
_i_g	ring	P
_es_	desk	NP
_a_e	vase	P
_ _ ll	cell	NP

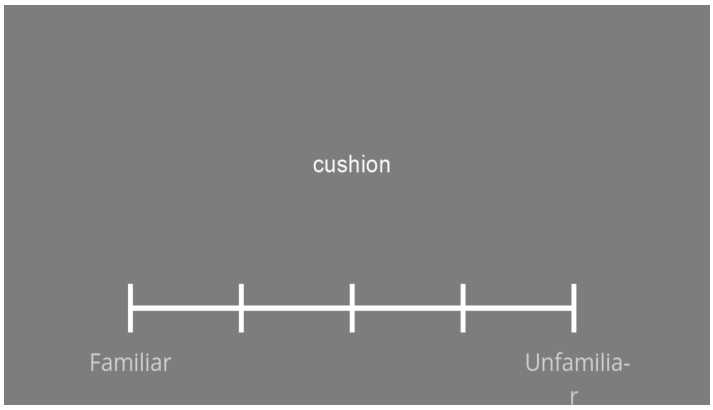

Fig 3

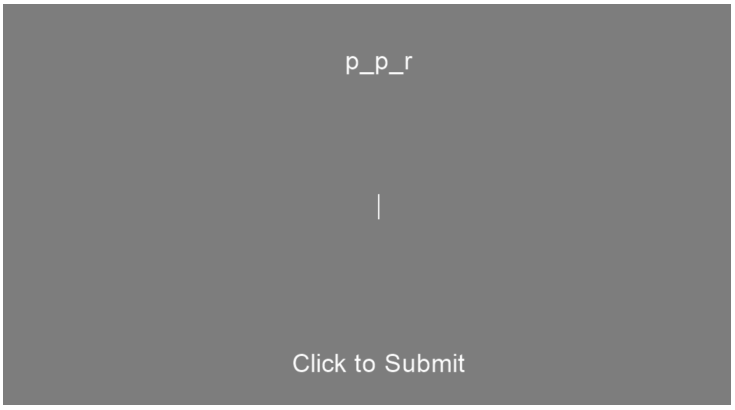

Fig 4

Fig 1: Study Words List (Primed Words)
Fig 2: Test Words List (Non-Primed Words)
Fig 3: Priming Phase
Fig 4: Test Phase

Results

	Proportion of Correct Word Completion (Primed)	Proportion of Correct Word Completion (Non-Primed)	Prime Score
Participant 1	**1.00**	**0.50**	**0.50**
Participant 2	**0.90**	**0.90**	**0.00**
Participant 3	**1.00**	**0.70**	**0.30**
Participant 4	**1.00**	**0.70**	**0.30**
Total	**0.98**	**0.66**	**0.32**

Discussion

The strength of the priming effect, which shows how exposure to a stimulus (the prime) affects a participant's response to a subsequent stimulus (the target), is measured quantitatively in psychological research using a priming score. In this experiment, this score is computed using the proportion of primed and non-primed words that are successfully completed. A priming score is obtained by subtracting the proportion of primed hits from the proportion of non-primed hits.

A resulting priming score of 0.32 as an overall average across all the participants suggests the presence of a comparatively more substantial priming effect, reflecting a high impact of prior exposure to the words, despite them being presented as a part of the task- even though the participants were tasked with rating the familiarity of the word, there seems to have been an encoding of the words in their unconscious/implicit memory, which resulted in higher accuracy in completion of primed words as opposed to non-primed words. This effect is uniformly observed across all 4 participants.

Designing a similar priming effect study with facial images as stimuli rather than words is possible. This experiment can be used to investigate the priming impact of various emotions with different valencies and distinctive strengths, as explained in the introduction. This study would involve participants being made to view a series of faces expressing various emotions (like happy, sad, or angry) in a randomized trial sequence to negate any patterns being created.

Following the priming phase, participants' screens would flash numerous facial images, including primed and non-primed neutral and emotionally charged expressions. It would be necessary for the respondents to evaluate and categorize their emotions. Faces in the priming phase are predicted to influence the evaluation. While primes emoting anger would result in more negative emotions being evaluated, primes with happy expressions might result in positive evaluations of even neutral faces.

Data analysis would aim at reaction times or accuracy of responses, along with a possible hypothesis of greater sensitivity towards an emotion of a specific valency. This research aims to better understand how emotional priming—triggered by facial or emotionally charged stimuli—affects memory and perception in social contexts. It can also be grounded in a variety of evolutionary ideas. This can be a valuable study to assess various mental disorders like paranoia, delusion, anxiety, etc.

Gaining insight into the priming effect has significant implications for cognitive psychology and applications in learning, marketing, and mental health research.

Citations

1. Keane, M. M., Cruz, M. E., & Verfaellie, M. (2014). Attention and implicit memory: priming-induced benefits and costs have distinct attentional requirements. *Memory & Cognition*, *43*(2), 216–225. https://doi.org/10.3758/s13421-014-0464-4