Word Priming Experiment
PSY310: Lab in Psychology
Lab Report

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GitHub link:

https://github.com/devanship-stack/PSY310

Introduction

The human brain performs many processes including thinking, reasoning, learning, etc. One of the important processes that need to be studied is memory- how the brain learns, and stores new information in the memory and retains it. We can understand the process of unconscious encoding of memory through the experiment of word priming and to compute the priming score. A word priming experiment helps in assessing how one stimulus (prime) can affect the way an individual reacts to a subsequent stimulus (target). Priming can speed up or alter responses, revealing implicit memory and associations.

Semantic priming is the effect of context on retrieving information from memory. It can explain the connection between semantic representations and perceptual systems, i.e. between word meanings and the world (McNamara & Holbrook, 2003). To understand such connections and effects, this word priming experiment uses familiarity rating and word fragmentation tasks.

Method

Participants

The experiment was conducted among a group of four 19- year old undergraduate students from Ahmedabad University, who were briefed about the procedure of the experiment. Their informed consent was taken and confidentiality was assured.

Procedure and materials

The study was conducted with the help of PsychoPy3 v2021.2.3. It was conducted on a laptop with a resolution of 1440 x 900 pixels. In this task, the participants were presented with 15 words, and based on their memory, they had to rate how familiar the words were (shown in figure 1) with respect to the ones they were presented (primed with). These words were from the 'study list' and were expected to prime the participants' responses in the next phase.

Following the study phase and the familiarity rating was the test phase, where they were presented with the word fragmentation task. It had all the old 15 'primed' words that were presented in the first phase, along with 5 new words which were 'nonprimed'. The words were fragmented (with some blank spaces) and the participants were supposed to fill and type the full word within a time limit of 10 seconds (figure 2 and figure 3).
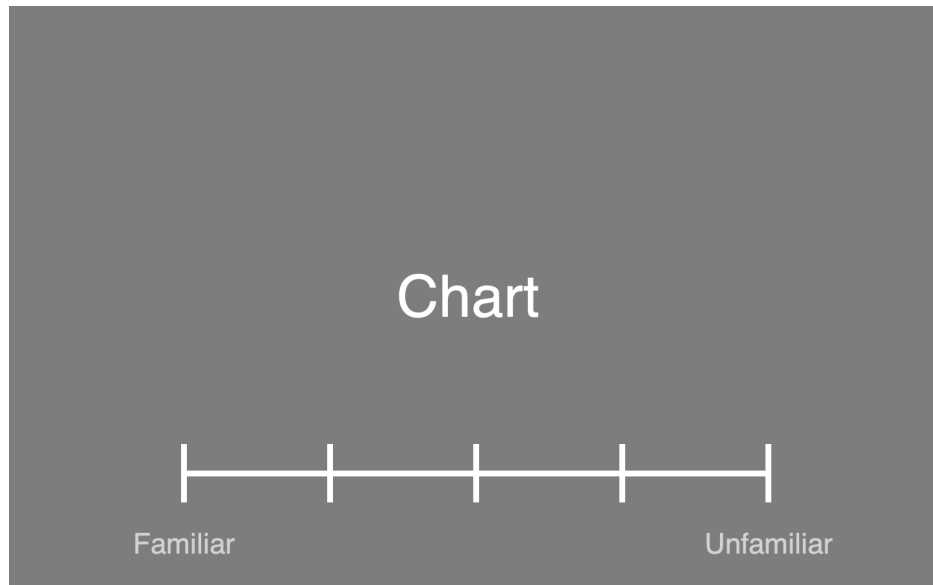
Figure 1. The word "chart" from the familiarity rating phase of the test, and a part of the 'study list'
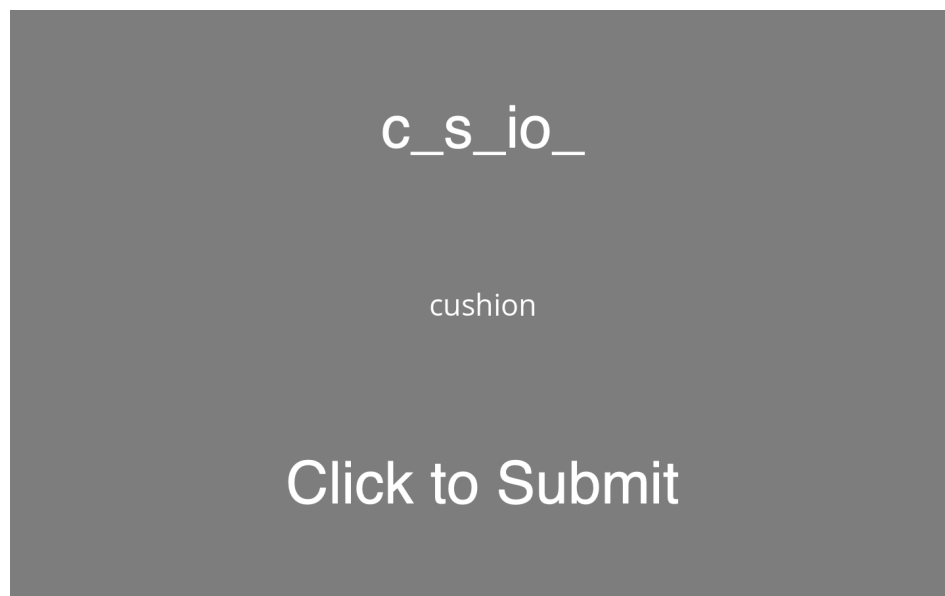

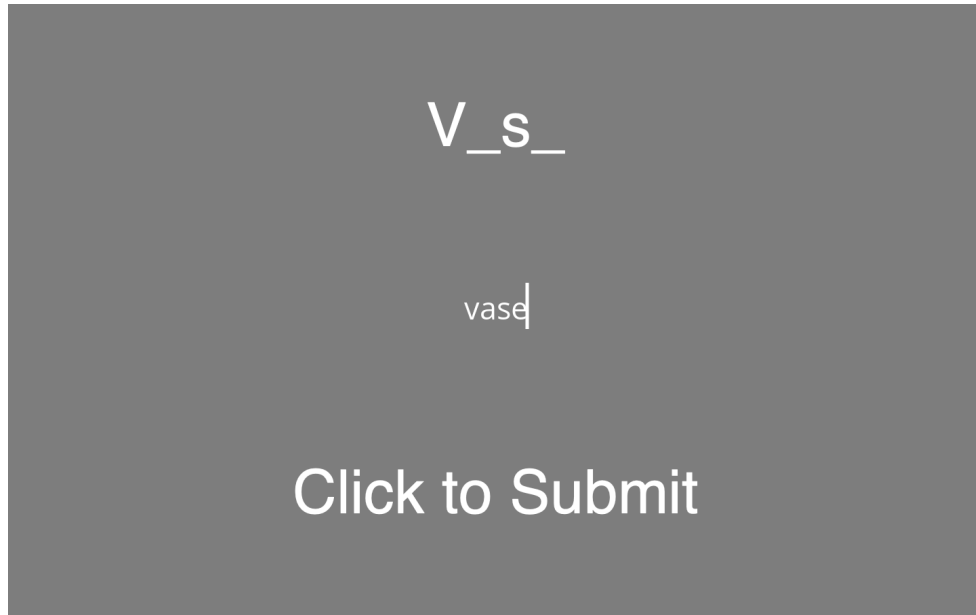*Figure 2. Fragmented word from the 'study list' that was primed*

Figure 3. Fragmented word that was new and not primed, and not present in the familiarity task

The fragmented words were such that more than one word could be formed by filling in its blank spaces.

Fragmented test word	Full word ('hits')	Primed/non-primed (old/new) from the list
L_pt_p	Laptop	Primed
_ha_t	Chart	Primed
T_hi_t	Tshirt	Primed
_ou_se	Mouse	Primed
P_as_tr_	Pastry	Primed
C_s_	Case	Primed
_ru_is_	Cruise	Primed
P_li_e	Police	Primed
K_y_	Keys	Primed
P_st_r	Poster	Primed

_o_rd	Board	Primed
_a_bl_	Marble	Primed
_ho_e	Phone	Primed
_oo_	Book	Primed
c_s_io_	Cushion	Primed
ta_l_	Table	Non-primed
p_nc_l	Pencil	Non-primed
V_s_	Vase	Non-primed
Bo_t_e	Bottle	Non-primed
C_m_ra	Camera	Non-primed

Table 1: The list of words from the 'study list' (primed) and the words that weren't primed, along with their fragments and responses that would be considered as 'hits'.

While filling in the fragmented words, if the participant typed the correct word for the 'study list' words that they were primed with from the 'study list', the response was considered as a 'hit'. For example, if we consider the word '_ho_e'. It could be interpreted as 'chore', or even 'chose'. The correct expected response with reference to the primed words' list and the familiarity task would be 'phone'. If the participant types the correct response, it is considered as a 'hit'. Similarly, if the participant correctly responded to the presentation of fragmented non-primed words with the expected response, it was considered as a 'hit'. If the participant was unable to answer and the time elapsed, the participant was presented with the next word.

Result

The number of 'hits' for the study list words were divided by the total number of the study list words from which the proportional hit from the study list was calculated. We found the proportional hit for the non-primed words by dividing the number of hits for the non-primed words by the total number of non-primed words. The priming effect was calculated by subtracting the proportional hit for the non-primed words from the proportional hit of the words from the study list.

The following are the results for each participant:-

Participant WP1:

Proportional hit from the 'study list': 15/15 = 1
Proportional hit from the nonprimed words: 5/5 = 1
Priming score: 1 - 1 = 0

Interpretation: The participant performed accurately on both sets of words, so there's no observable priming effect -performance was at ceiling. It is possible that the participant found the task to be too easy, or performed the task focusfully and mindfully, thus masking any potential difference between primed and unprimed items.

Participant WP2:

Proportional hit from the 'study list': 10/15 = 0.667
Proportional hit from the nonprimed words: 4/5 = 0.8
Priming score: 0.667 - 0.8 = -0.133

Interpretation: A negative priming effect here shows that the participant performed poorly for the 'study list' words than for the non-primed words. This could be due to random or inattentive performance variability or chances of fatigue and other such factors accountable for lack of focus and attention while performing the task. Another possibility could be overfamiliarity or confusion due to similarity among studied words.

Participant WP3:

Proportional hit from the 'study list': 11/15 = 0.733
Proportional hit from the nonprimed words: 4/5 = 0.8
Priming score: 0.733 - 0.8 = -0.667

Interpretation: This participant has a slightly negative priming score, meaning that there was no benefit from prior word exposure. It could be affected by individual variability, insufficient encoding, or confusion over various word formations, or small sample size effects (because there were only 5 non-primed items).

Participant WP4:

Proportional hit from the 'study list': 13/15 = 0.867
Proportional hit from the nonprimed words: 5/5 = 1
Priming score: 0.867 - 1 = -0.133

<u>Interpretation</u>: Similar to the second participant, this participant has a negative priming score. This participant performed perfectly for new words, but slightly worse on the studied ones. This suggests either no implicit memory advantage or potential test fatigue/confusion effects.

Discussion

In this word-fragment task, the 'study list' words act as primes- indicating that exposure makes later identification of the same or related words faster or more accurate.

Priming can be seen in daily life examples as well. For example, when you have an examination and you revise all the topics the night before, it primes you and helps in retaining information to write in the examination. Similarly, if you listen to cheerful music and then meet a new person, you are more likely to perceive them as friendlier.

Similarly, a priming experiment could be designed for faces. In the study phase, the participants study a set of faces of various genders, with various facial expressions, for a few seconds. So as to ensure encoding, they can perform a cover task of rating the faces on a scale of 1-5 based on how friendly the faces seemed.

In the test phase, the participants are shown fragmented, blurred, or briefly-flashed faces, such that they include both the primed faces, as well as new faces (non-primed). The participants should be able to recognise the faces (explicit task), and be able to quickly judge the gender, or the emotion portrayed (implicit task). The reaction times for the primed and non-primed faces can be measured and compared to understand the effect of perceptual and emotional priming.

References

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