Intentional Binding Experiment
PSY310: Lab in Psychology
Lab Report

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GitHub link:

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

Introduction

Having a sense of control is an inherent human trait. The sense of agency is a term that defines the readiness to be proactive and impose control over the activities to influence the external world. At the implicit level, a basic, low level sense of being an agent is formed. This is referred to as Feeling of Agency. At this level, there exists no distinct agency attributions as they are non-conceptual. Sensations of action are not, instead, evaluated as being self-caused or not. This sense of agency is pre-reflective even though it is conscious (Moore and Middleton, 2012). Intentional binding is an implicit assessment of feeling of agency.

Intentional binding is the effect in which a temporal interval between a voluntary act and external sensory effect is subjectively compressed (Moore and Obhi, 2012). Our sense of agency is our knowledge about the causal relations of our actions to our sensory experiences. Agency is quantified implicitly by intentional binding paradigms, which interpret voluntary self-made actions and resultant events of sensations as being closer to each other in time (Poonian and Cunnington, 2013). The intentional binding fact that we observe as an action taking place means that we are also involved in the same processes of assigning causes to our actions actions of others and our experiences in the senses.

We are studying intentional binding to understand the perceived temporal compression between voluntary actions and their resulting outcomes, and explore the brain's role in linking actions and events by comparing the difference in interval estimation between expected and unexpected frequency.

Method

Participants

To successfully conduct this experiment, a 19 year-old male studying at Ahmedabad University was asked to participate. He was briefed about the experiment and her consent was taken.

Materials and Procedure

This intentional binding experiment was created using PsychoPy3 Experiment Builder (v2021.2.3), on a laptop window of 1440 x 900 pixels. The participant was expected to make a voluntary action by pressing a key to produce an auditory stimulus. In the experiment, two levels of expectation were manipulated : an "expected" condition, where the participant was informed that pressing the button will produce a tone in numerous trials, and an "unexpected to become expected" condition, where the frequency was unknown.

The participant was presented with a fixation circle, which when turned green, required the participant to press the spacebar, so as to initiate an auditory tone- a beep. Following that, the participant was instructed to estimate the amount of time (in ms) it took to produce the beep after he had pressed the key. 396 such trials were conducted. The time interval was saved across conditions. The degree of purposeful binding, which showed how expectation might affect the participant's sense of control over the results of the actions carried out, was calculated using the interval estimates obtained from these two situations.

Results

As per the data collected, the participant's mean of the expected conditions' estimates was **541.2126582**. And his mean of unexpected conditions' estimates was **540.7721519**. We calculated the difference in interval estimates across both the levels of expectations by subtracting the estimates of the expected conditions from those of the unexpected conditions.

The difference was **-0.4405063291**, which means that the perceived time difference between the key press and the beep sound, i.e. the action and the outcome, was slightly lesser in the unexpected condition than the expected condition. This shows that the participant had surprisingly taken longer to respond to the expected condition compared to the unexpected condition. This implies that when the participant anticipated an outcome, the interval/gap was perceived to be longer, which indicates that the participant felt less in control of his actions.

Discussion

Intentional binding should be selected because it is primarily an index of SoA because it is associated with multiple advantages. First, compared to explicit ones, implicit measures can be calculated, and they do not have the bias and inaccuracy experienced with self reports (Dewey and Knoblich, 2014). Intentionally binding generates data that might more accurately represent the subliminal evaluation by generating the impression of agency with no deliberative evaluation implied. Also, it allows quantification of agency which can be compared across conditions in an experiment.

Nevertheless, it possesses some drawbacks, as well. One is that it does not take into account other cognitive and affective facets of SoA to the extent that it does the time aspect of agency. Moreover, the present research demonstrated that intentional binding has no direct relationship with SoA as interval estimation considers a variety of extraneous variables, such as directions and personal peculiar features.

References

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