

Effect of Motivation on Results in Working Memory Tasks

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Abstract

This is the abstract. Ill keep writing it till I reach a new line and can check whether the newline indentations are present.

Theoretical Background

With the vast array of available tasks and tests to assess psychometric constructs such as working memory capacity (WMC) (Harbison2011) it is difficult to choose the right task for the right hypotheses. The nback as designed by ... in the 1960's has ever since remained a popular method to assess working memory related performance as different variants of the nback task correlate strongly with performance in other tasks that are widely used as a measurement of fluid intelligence such as raven progressive matrices or the stroop task for cognitive control. A study has even concluded that improvement in the nback task is correlated with an increase in fluid intelligence. However, the nback task is not without some serious methodological drawbacks that this report tries to draw attention to. A specific problem of the nback task is that researches usually do not use standardized nback tasks. Two common problems are addressed in some publications. First, if researches choose accuracy as dependent variable, they do not report what kind of accuracy is measured. If the task only offers to either indicate "hit" or not press a button at all, the accuracy is measured by the total number of mistakes divided by the total number of stimuli. However, there is a difference between a mistake that was made by omitting to respond or a mistake that was made by falsely indicating that the stimulus is not a hit. The possibility exists that whether a person can press two buttons that indicate "hit" and "not hit" may yield significantly different results for accuracy than a test in which the participant can only press one button to indicate a "hit" or omit an answer. Another problem that is usually not discussed at all in publications featuring the nback task is that whether certain kinds of mistakes such as false hits could be significantly more likely if one of the stimuli $k < n$ steps ahead is the same as the target stimulus. The participants could be tempted to press the button out because they remember by association that within the last n stimuli there was an identical one. However that would not be a controlled processing of the information stored in the slave systems. This issue has been addressed by Harbinson et al.

In this paper the performances between two kinds of nback tasks will be

compared. One will feature the common variant in which each stimulus is equally probable. The other variant will have an increased probability for stimuli that bait the participants into making errors of commission- specifically false positives.

Working Memory

nback

Research Question

The results of the experiment presented in this paper are supposed to emphasize the importance of controlling the probability of lures when deploying the nback task as a measure of any psychometric construct. The question the experiment tries to answer is 'Does the probability of lures in nback tasks significantly influence the performance measured by the accuracy of the participant's answers?'

Sampling Plan

Since this report mainly serves an educational purpose for the student within the scope of the "Experimental Psychology Lab Course", an α value of 0.8 is chosen. The required sample size will be calculated using the following formula.

Most of the participants are expected to be students in their twenty to thirties. This will be assessed using a short questionnaire at the end.

Materials

A simple implementation of the nback task with $n = 4$ using the __ babe framework for browser based experiments will be used. The stimuli will be integers from 1 to 9.

Procedure

Participants visit the website on which the experiment is hosted and receive instructions for their task. The instructions are followed by a 20 item test trial.

Following the test trial the participants can take a maximum two minute break and go through the following trials named "normal" and "lured". The lured trial has a 75% probability that the stimulus at $n-1$ stimuli away from the onset is a target to bait the participants into making errors of commission.

Measured Variables

Accuracy as N_c/N where N_c denotes correct presses and N is the total number of stimuli per block. Reaction times are measured for later exclusion of participants but not for analysis.

Analysis Plan

Confirmatory Hypothesis Testing