Cover Page for Study Protocol Document
Official Study Title: What makes people better at naming pictured objects?
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These experiments test for relationships between age, a brief mindfulness intervention, and word retrieval indices. Under the TDH model, and consistent with previous research, older adults demonstrate slower and less accurate word retrieval, more TOT states, and decreased speech fluency than young adults. Under the TDH extension proposed by James et al. (2018a) anxiety is suggested to reduce the transmission of priming throughout the entire system of nodes. The reduction in anxiety experienced due to mindfulness suggests that priming transmission may be amplified when participants practice mindfulness. Participants in the mindfulness condition should thus have faster and more accurate word retrieval than participants in the control condition. Prior research and the TDH predict main effects such that young adults will outperform older adults. Two possible versions of how the mindfulness exercise will interact with age according to the TDH model are presented with each experiment. Here, I describe aspects of the methodology shared by the three experiments, and then present specific details unique to the approach of each experiment.

Participants, Power Analysis, and Sample Sizes. Each experiment will include comparisons between extreme groups of young (ages 18-30) and older adult (ages 65-80) participants. The Mini-Mental Status Exam (Folstein et al., 1975) will be administered to older participants. Data from anyone scoring fewer than 26 out of the maximum score of 30 will be excluded from analyses (Kim & Caine, 2002), with the resulting sample characterized as non-demented elderly (see Mitchell, 2009). Any data that are not useable for any reason (e.g., attrition, low mental status scores, equipment malfunction) will be replaced with data from a new participant.

Effect sizes for the behavioral impact of aging on word retrieval were obtained from relevant previous research (e.g., James, 2006; James et al., 2018a), and fell in the medium- to large-range (Cohen, 1992). I am aware of recent calls for the need to keep publication bias in mind when determining adequate sample sizes (e.g., Anderson et al., 2018). However, for the previously untested interactions between age and the mindfulness manipulation, I know of few existing papers (published or not) from which to determine effect sizes. I considered designating a minimum effect size that would be considered useful, and determined that a medium-sized effect could be of practical use (as discussed by Anderson et al.). Cohen's "conventions… found to be reasonable by reasonable people" (1988, p.13) were then adopted, with interaction effect sizes expected to be smaller than main effects. For each experiment, age group and mindfulness condition are independent-groups variables, so sample size has been determined for four groups of participants. Following Cohen (1992; Table 2), to achieve power of .80 with alpha set to .05 for medium-sized interaction effects, each experiment includes 90 young and 90 older participants.

Mindfulness Manipulation. The critical contextual manipulation will be identical to that used in our pilot study (Silver et al., 2018) and similar to that used in Wilson et al. (2015). Participants in the mindfulness intervention condition will listen to a 10-minute guided meditation presentation. The presentation instructs participants to engage in breathing exercises, and includes music intended to be calming, with binaural beats, which have sometimes been found to provide a benefit above and beyond other mindfulness components. Participants in the control condition will be deceived by the experimenter that equipment has been left elsewhere and told the experimenter must go retrieve it. The experimenter will leave the participant in the room for 10 minutes, the same time required for the mindfulness exercise. This control condition leaves the participant to wonder what is happening and engage in naturalistic mind wandering. After the delay, the experimenter will return and say the equipment could not be located.

EXPERIMENT 1: Aging, Mindfulness and Picture Naming Speed and Accuracy

People anecdotally claim that retrieving known words becomes harder and fails more often when they are in an anxiety-provoking setting or being evaluated (such as during public speaking), a claim consistent with the findings of James et al. (2018a) and Schmank and James

(2018). The present experiment takes a different approach to understanding how the anxiety-provoking nature of the speaking context can affect word retrieval: A mindfulness manipulation will be introduced to decrease participants' anxiety, after which they will perform a naming task. Because TOTs occur relatively rarely, this experiment follows Silver et al. (2018) and measures word retrieval via the speed and accuracy of picture naming.

Specific materials and procedure. Participants will be given the brief mindfulness exercise or control procedure described above, following which they will be given a naming task. Participants' response onset times will be recorded while they name pictures that appear on a computer screen as quickly and accurately as possible. Stimuli will be those used in Silver et al. (2018): Fifty-two line drawings of non-ambiguous, relatively common objects selected from a set of stimuli that have been normed on wide range of factors (Szekely et al., 2004). Selected drawings have high name agreement in spite of being fairly difficult to name.