Extending the Response-Time "Guilty Knowledge" Test

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General Formatting Instructions

Sometimes it is important to determine another's familiarity with privileged information despite their intention to conceal this knowledge. Following previous work showing that recognition memory can be used to index knowledge activation (Farwell & Donchin, 1991; Lykken, 1981), Seymour, Seifert, Mosmann, & Shafto (2000) proposed a new "Guilty Knowledge" Test (GKT) based on the response-time (RT) and accuracy to critical information.

In the GKT paradigm, participants are first exposed to critical "Probe" or crime information. Following a delay, and in an ostensibly novel task, participants learn a new set of "Target" phrases (e.g., "Blue Coat") and are given a speeded recognition task. When presented with Targets, participants are to press a button indicating "Old." When presented with new "Filler" phrases as well as familiar Probes, participants are to respond with a button indicating "New." If Probes are familiar, participants may respond differentially to Probes and Fillers. However, when Probes are unfamiliar no differential response is expected.

Despite being motivated to respond identically to Probes and Filler, and thus masking their knowledge of the Probes, participants' responses to Probes were reliably slower and less accurate than to Filler items. This "Guilty Knowledge Effect" (GKE) did not occur when participants responded during a block where Probes are unfamiliar (Seymour et al., 2000). This differential pattern of results for Probes and Fillers led to a high hit rate and low false alarm rate when compared to other test using physiological measures such as heart rate, or more direct measures such as EEG (Farwell & Donchin, 1991).

Limitations of the Response-Time GKT

Despite the success of the RT-GKT, it is not been shown to work with stimuli other than verbal phrases. It has been suggested that participants' difficulty in rejecting familiar Probe phrases quickly and accurately is not specific to verbal long-term memory. Instead, the GKE has been attributed to an integration of multiple stimulus-response sets (e.g. one based on the item's familiarity and one based on its source) with control and motor processes that mediate competing responses (Seymour & Seifert, 1998).

In addition, an applied version of the RT-GKT restricted to verbal stimuli would result in a considerably limited test. Thus, we have tested a variation of the RT-GKE using pictures of objects and neutral faces as stimuli.

Method and Results

Item study in Experiment 1 involved viewing color photographs of objects (e.g., a small stuffed animal) while answering a series of questions (e.g., "describe the textures in this object"). For Probe items, participants also described how each object might be used in a violent crime. Target study did not involve this additional questioning. In Experiment 2, participants studied images of neutral faces while answering a series of questions about those faces (e.g., describe this person's nose). For Probe faces, participants also rated each face for honesty, attractiveness, and age. Study for Target faces did not involve these additional questions. After studying Probes and Targets, participants in both experiments completed the Old/New task described previously (Seymour et al., 2000) except that the stimuli were either pictures of objects or faces. It was expected that a GKE would be observed in both experiments similar to previous reports using verbal phrases.

As expected, data from Experiment 1 show a GKE on RT (Probe=700ms; Filler=575ms) [$F(1,39)=82$, $p<.01$] and accuracy (Probe=77%; Filler=98%) [$F(1,39)=35$,$p<.01$]. Similarly, data from Experiment 2 show a GKE on RT (Probe=790ms; Filler=600ms) [$F(1,21)=101$,$p<.01$] and accuracy (Probe=63%; Filler=98%) [$F(1,21)=29.5$,$p<.01$].

Extending the GKT to paradigms with pictures of objects and faces not only allows for a richer applied use of the test for detecting privileged knowledge, but supports work suggesting that the GKE is not driven by dynamics in verbal long-term memory. Instead, the GKE appears to involved recognition memory more generally when participants attempt to respond based on an item's source memory despite a strong familiarity-based response tendency.

References

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