Perceiving patterns under uncertainty: the role of conspiratorial thinking

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Abstract

Conspiratorial thinking, among other things, is associated with a tendency to perceive patterns in ambiguity and jump to conclusions. In a visual pattern detection task (N = 406), participants were faster and more accurate when identifying object images compared to noise, confirming sensitivity to true signals. Participants with higher conspiracy beliefs identified more objects in noise trials, and responded faster in both object and noise trials. Drift diffusion modeling revealed that higher conspiracy scores were associated with reduced boundary separation, indicating lower decision thresholds. These results suggest that individuals who believe in conspiracy theories tend to accumulate less evidence before decision-making, confirming a tendency to jump to conclusions.

Keywords: conspirational thinking; pattern perception; decision-making; drift-diffusion model

Introduction

Conspiratorial thinking, the tendency to attribute major events to powerful, malevolent actors, is increasingly viewed as a stable cognitive trait (Douglas et al., 2019). This trait is linked to a broader susceptibility to perceive meaningful patterns in noise, even when none exist (Müller and Hartmann 2023; Whitson and Galinsky 2008; Kluen et al. 2024). For example, individuals high in conspiracy beliefs are more likely to report seeing structure in ambiguous or random stimuli (Hartmann & Müller, 2023). This pattern sensitivity may reflect a tendency to jump to conclusions or accumulate less evidence before making decisions (Frenken & Imhoff, 2022). However, few studies have jointly examined evidence accumulation and reaction time to understand the underlying decision process.

In this study, we investigate the relationship between conspiracy beliefs and visual pattern detection under uncertainty. To uncover the cognitive mechanisms, we apply the drift diffusion model (DDM), which decomposes decisions into latent parameters reflecting evidence accumulation (drift rate), decision criterion (boundary separation), bias, and non-decision time. This approach enables us to determine whether faster, less accurate decisions in individuals believing in conspiracy theories reflect reduced information processing, lower decision thresholds, or both, thereby clarifying the cognitive processes that drive perception under uncertainty.

Method

We used a modified version of the "snowy pictures task" (Whitson & Galinsky, 2008) to examine pattern perception under noise. Unlike the original version, which presents static images with no time limit, our task introduced temporal dynamics by displaying a sequence of five blurry images per trial, with clarity increasing every 500 ms, totaling 2500 ms (Figure 1). Each trial began with a fixation cross (300-500 ms), after which participants judged whether the sequence contained a hidden object or was pure noise, responding as soon as they felt confident. Across 150 trials (60 objects, 90 noise), a progress bar tracked response speed, and participants received a performance-based bonus for accuracy, encouraging both speed and precision. Conspiratorial thinking was assessed using a conspiracy questionnaire developed in a previous study (Kluen et al., 2024).

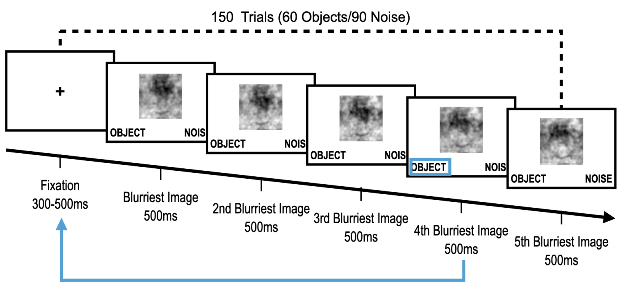

Figure 1: Snowy task procedure.

Results

Object recognition is faster and more accurate. A total of 406 U.S. participants were recruited online via Prolific. Accuracy was significantly higher for object than noise images ($t(405) = 9.51$, $p < .001$; Figure 2A), confirming effective stimulus manipulation and successful structure detection without feedback. One participant was excluded from reaction time (RT) analyses due to missing data in one condition. Correct object trials elicited faster responses than incorrect object and all noise trials (*ts*(405) > 13.86, *ps* < .001; Figure 2B), reflecting that participants accumulated more information when the evidence was ambiguous.

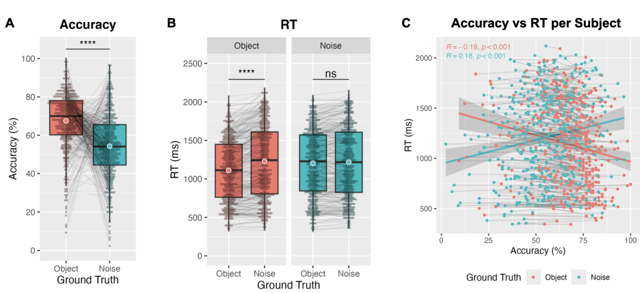

Figure 2: Snowy task performances.

Longer RTs aid noise detection. Participants who took longer to respond were more accurate in classifying noise images ($r = 0.18$, $p < .001$; Figure 2C), suggesting that extended decision time allowed for sufficient evidence accumulation. In contrast, object trials showed a negative correlation between RT and accuracy ($r = -0.19$, $p < .001$; Figure 2C), possibly indicating increased uncertainty when object recognition was more difficult.

Higher conspiracy scores are associated with faster but less deliberate decisions. Conspiracy belief scores were marginally negatively correlated with accuracy, but only during noise trials ($r = -0.097$, $p = .052$; Figure 3A), suggesting that individuals with stronger conspiratorial tendencies perceived more patterns out of noise. Conspiracy beliefs were also significantly negatively correlated with RTs in both object and noise trials ($r = -0.2$, $p < .001$; Figure 3B), indicating a general tendency toward faster decisions. This pattern may reflect a reduced tendency to engage in extended information collection or deliberation when evaluating ambiguous stimuli.

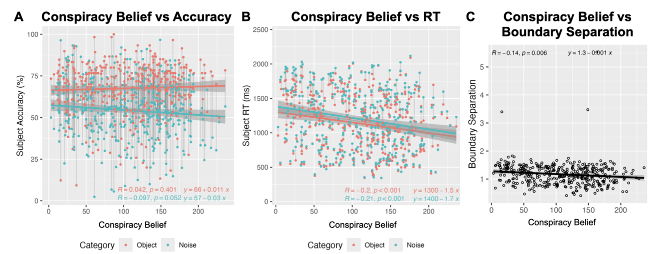

Figure 3: Conspiracy thinking and performances.

DDM reveals reduced criteria in high-conspiracy thinkers. To complement our behavioral findings, we fitted non-hierarchical DDMs to participants' trial-level choices and RTs. We modeled drift rate as a function of stimulus type (object vs noise) and leave-one-subject-out (LOSO) stimulus difficulty, while fixing non-decision time at 200 ms and starting point bias at 0.5. Boundary separation was estimated per subject as a constant. This model successfully reproduced the key behavioral patterns: simulated vs. real accuracy was highly correlated in both object and noise trials (*rs* > 0.95, *ps* < .001), as was reaction time in object and noise trials (*rs* > 0.95, *ps* < .001). Parameter recovery demonstrated strong correlations between estimated and ground-truth values for drift rate baseline, stimulus-type effect, LOSO difficulty, and boundary separation (*rs* > 0.95, *ps* < .001), confirming reliable identifiability. Critically, boundary separation was significantly negatively correlated with conspiracy belief scores ($r = -0.14$, $p = .006$; Figure 3C). Participants higher in conspiracy thinking showed reduced boundary separation, suggesting that they require less evidence to make decisions under uncertainty, consistent with the tendency to perceive meaningful structures in noise and the jumping to conclusions bias observed in prior studies.

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