

Introduction

In addition to how environmental cues are perceived, behavior is regulated by the self-evaluation of perception in terms of reliability, or metacognitive confidence. Virtually all studies investigating metacognitive confidence have used tasks where the perceived environmental cues consist of real, actually presented stimulation^{1,2,3}. Under certain conditions, however, healthy individuals can be induced to perceive objects that are not actually present^{4,5}. We do not know of metacognitive confidence studies focused on those so-called hallucinatory experiences. **The aim of the current study was to investigate the relationship between an individual's proneness to experience expectation-induced hallucinations and his/her metacognitive confidence.**

Two different types of metacognitive confidence were studied: the self-evaluation of one's performance in a perceptual task, and confidence in the correctness of such self-evaluation. Relationship between the two self-evaluations as well as the relationship of each with an individual's hallucination proneness was investigated.

Results

Out of 25 participants, 23 "hallucinated" on at least one trial, rating the square as visible when it was actually absent.

There was a significant negative correlation between hallucination proneness, as measured by the average clarity rating in the six critical trials, and self-confidence in performance, as measured by the self-rating ($r=-0.52$, $p < 0.01$). **The more clearly a subject perceived non-existent squares, the lower he/she rated his/her performance in the face recognition task.**

Most subjects underestimated their performance, making higher ratings more accurate. A significant positive correlation was found between hallucination proneness and the inaccuracy of self-rating ($r=0.48$, $p < 0.01$): **people with higher hallucination proneness had more inaccurate ratings of their own conscious perception.**

The actual percentage of correct answers was unrelated to the self-rating of performance. No correlation was found between confidence in self-rating, as measured by the second follow-up question, and hallucination proneness. **There was also no association between the two questions measuring self-confidence.**

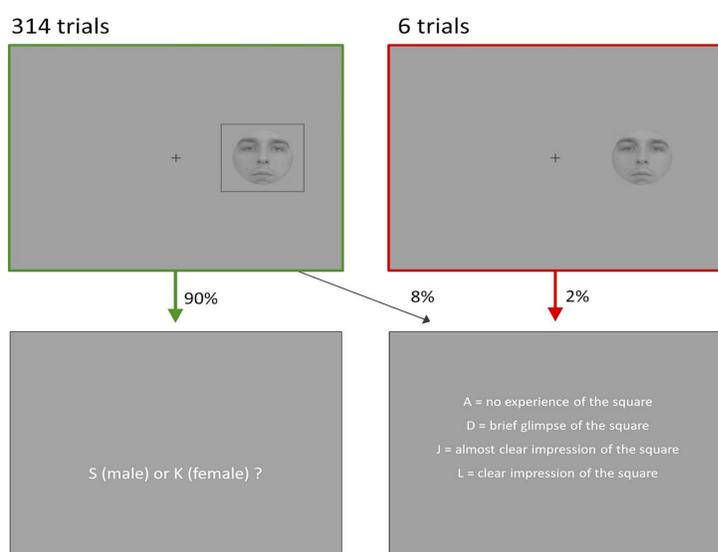


Figure 1. Experimental design showing the face stimulus of the main task and the square of the auxiliary task which was absent during critical trials; response screens for the main task and the auxiliary visibility task are depicted below.

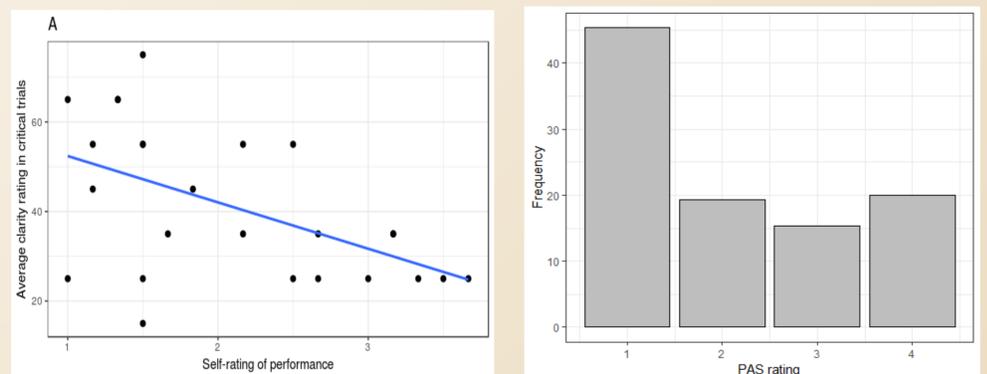


Figure 2. A – Scatterplot with regression line and 95% confidence interval for hallucination proneness and self-confidence ratings. B – Barplot illustrating the percentage of PAS ratings (1 – “no experience of the square”, ... 4 – “a clear experience of the square”) provided during trials where no square was presented.

Methods and Materials

25 participants (20 F, 5 M) took part in the experiment (age $M=25.4$). Central arrow pre-cues pointing to the left or right side were used to indicate the expected target location (80% valid, 20% invalid cueing trials); peripherally presented male or female faces, surrounded by the lines of a square-shaped figure, were used as target stimuli. On 90% of the trials, the task was to discriminate the gender of the face (male or female). On 10% of the trials participants had to rate how clearly they perceived the square on a four-point Perceptual Awareness Scale (PAS). **On six critical trials no square was presented**, although participants were asked to give a perceptual clarity rating. The main experiment consisted of four blocks of 80 trials.

After the experiment, participants were asked to rate their performance in the face recognition task by indicating **what percentage of the faces they believed to have correctly identified** (scale 0-100%). In addition, they were asked **whether or not they were certain in their self-rating**.

Summary

We found that individuals more prone to expectation-induced hallucinations were less confident in the correctness of their responses in the perception task. **People whose perception is more easily manipulated by context appear to be less willing to trust their perception.** Given that less confident ratings were also less accurate, hallucination-prone individuals made less accurate judgments about their perception.

It was also found that metacognitive confidence manifesting as high self-rating of one's performance in a perceptual task was not significantly related to metacognitive confidence expressed as certainty in the correctness of such self-rating. **This indicates that metacognitive self-evaluation has several independent facets.**

Metacognitive confidence had no connection with the actual performance in a perception task. This means that while higher confidence might accompany a lower likelihood of experiencing expectation-induced hallucinations, it does not necessarily indicate a more accurate perception of actually presented stimuli.

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Contact

Sandra Vetik
University of Tartu
sandravetik@gmail.com



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