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Patients with psychotic disorders exhibit different audio-visual perceptual decision biases and metacognitive abilities

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Introduction: In the inherently noisy real world, we can rarely have full certainty about what we have just seen or heard. Thus, making a perceptual decision on sensory information, and simultaneously tracking our varying levels of certainty in these decisions (i.e., metacognitive abilities) are crucial components of everyday life.
Hallucinations, such as confidently reporting a human voice or face when none was present, are a hallmark of psychotic disorders but also occur among the normal population. Particularly in patients with psychotic disorders, these misperceptions are linked to confident beliefs in their actual existence. However, whether patients' confidence is only increased during such erroneous perceptions and whether perceptual and metacognitive decisions arise from supramodal mechanisms across sensory modalities remains unknown.
Objectives: In the laboratory, we tested perceptual and metacognitive decisions under varying levels of sensory certainty in healthy adults and patients with psychotic disorders admitted to a psychiatry ward (N_{con}=32, N_{pat}=12; age = 19-49; F2x.x diagnoses).
Methods: Specifically, participants had to detect human voices or faces against briefly presented noisy backdrops and subsequently rate their confidence in the accuracy of their perceptual decision (Fig 1A,B,C). We further hypothesised that probabilistic cues prior to blocks of trials can bias participants' choices and hallucination probability (i.e., confident false alarms).
Results: Patients exhibited higher perceptual sensitivity in the auditory than the visual task, alongside a generally stronger decision bias towards fewer 'voice/face' choices (Fig 2A,B). This bias was more pronounced in the visual domain. Decision performance was overall higher on the auditory task but lower for patients (predicted minimum > 55%; Fig 2C). Strong correlations between auditory accuracy and PANSS hallucination scores of patients and LSHS scores of healthy participants suggest an effect of these hallucinatory experiences on accurate perception.
Metacognitive abilities were reduced in patients across both modalities: They exhibited general overconfidence, which was stronger for incorrect trials (Fig 3A). Patients' confidence ratings were inversely related to the probability of choosing 'voice/face'. Combining both perceptual and confidence decisions, patients showed higher hallucinations probability in the auditory task, particularly in more difficult trials (i.e., with less informative sensory evidence; Fig 3B).

Image:

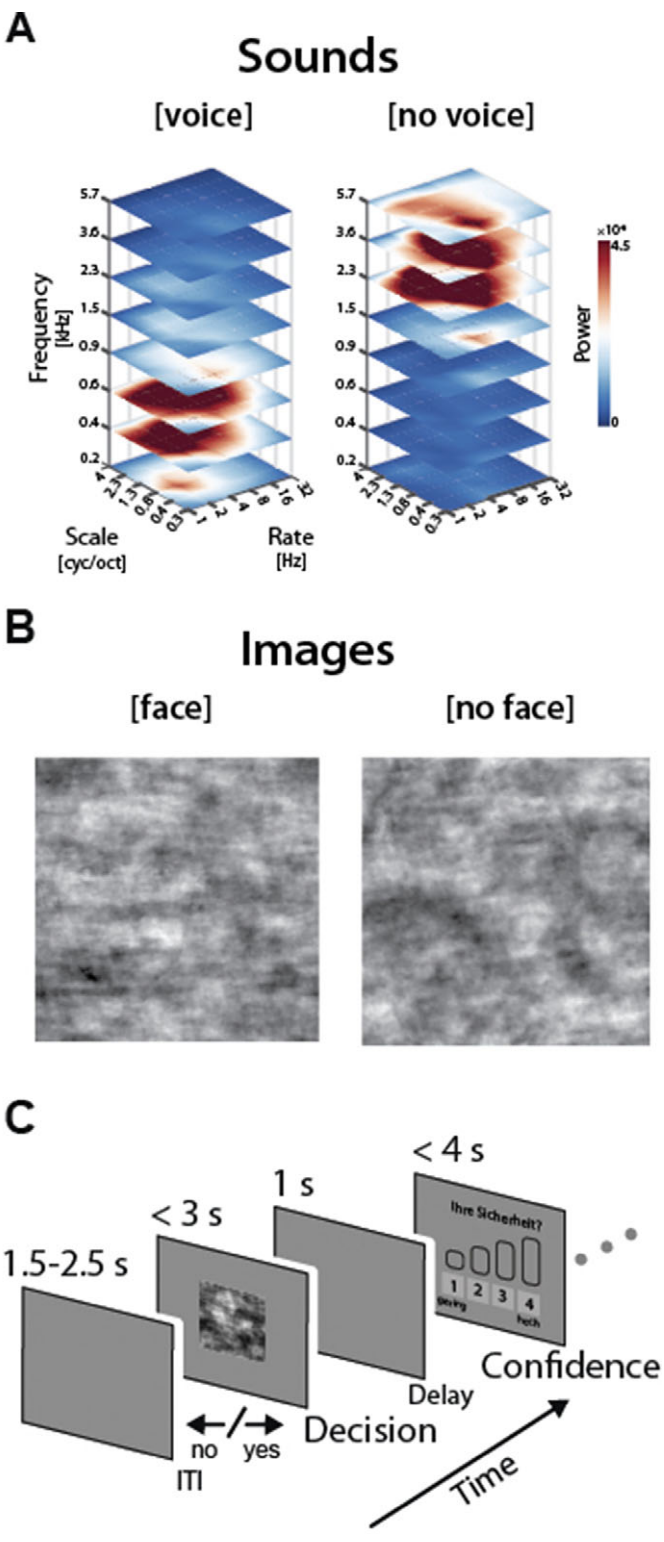


Image 2:

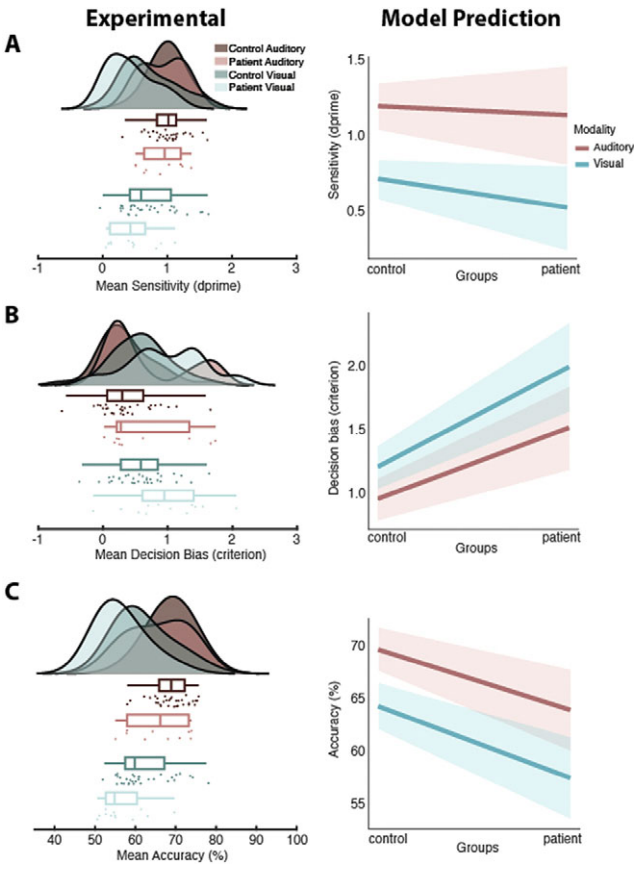
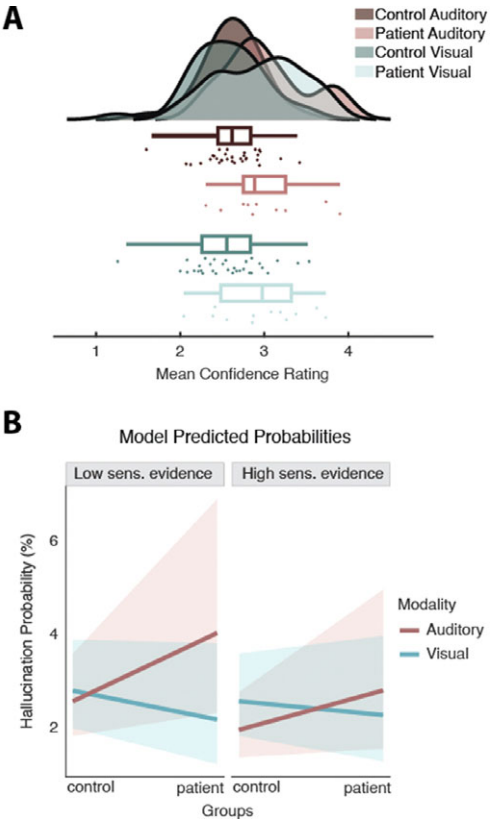


Image 3:



Conclusions: In sum, patients with psychotic disorders exhibit increased decision bias accompanied by increased confidence, and thus a reduced fidelity in their metacognitive abilities. The modality differences are in line with phenomenology and reported hallucination rates. These results suggest stronger priors in psychotic disorders resulting in worse perceptual acuity and assessment of this perception.

Disclosure of Interest: None Declared

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Time discrimination in psychosis: findings from a neuroimaging study

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Introduction: Previous functional neuroimaging studies have demonstrated a brain network responsible of time discrimination (TD) processes, which may play a significant mediating role in other cognitive processes, such as change detection and cognitive control. The study of TD and its dysfunction in psychosis has become a matter of growing interest. We hypothesize that the impairment of the TD network is involved both in the mechanisms of psychosis and in the cognitive deficit presented by patients.

Objectives:

1. To delimit the brain regions involved in TD.
2. To examine the dysfunction in TD brain network in patients diagnosed with psychosis.
3. To sudy the integrity of brain white matter pathways in psychosis.
4. To verify whether the neuroimaging findings and TD test performance predict the neurocognitive profile of the patients.

Methods: Participants included 20 patients with psychosis (PSY group) and 13 healthy controls (HC group). PSY group participants met remission criteria for 6 months prior to the study. Participants were interviewed for sociodemographic information and clinical assessments. They underwent a detailed cognitive assesment using the Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) Consensus Cognitive Battery (MCCB). Neuroimaging study was performed on a 3 Tesla MRI scanner. We designed an experimental task including a test tool to assess TD and Oddbal detection (OD) paradigms with a cognitive control component. The task was conducted under functional magentic resonance imaging (fMRI). We used the general linear model analysis of the individual data of the fMRI images and the random effects model for group inference. Group differences in DTI were tested using tract-based spatial statistics (TBSS).

Results: We find statistically significant differences (fMRI) in the activity related to TD (in HC), with greater activity in frontal cortical regions, the insular cortex and the cerebellum. In the PSY group, differences in the functionality and activation pattern of brain networks responsible for TD are observed, although voxel