

IGSN - SYMPOSIUM

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Auditory perception: the meaning of sounds, their relevance in decision making and crossmodal integration in healthy and disease individuals

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Multisensory integration across the schizophrenia continuum

The coherent experience of the self and the world, typically altered in schizophrenia, depends on the ability to combine sensory information from different modality occurring at different points in time and space. Temporal sensitivity in the sub-second range is pivotal in a broad range of unisensory and multisensory experiences. Using the Simultaneity Judgement Task with auditory, tactile and audio-tactile stimuli, we found a general reduction of temporal sensitivity in patients with schizophrenia, compared to healthy controls. Interestingly, reduced multisensory temporal sensitivity, associated to excitation-inhibition imbalance, was already present in high-schizotypy individuals. We confirmed this evidence using another task, the Double Flash Illusion (DFI), which assesses the individual temporal sensitivity implicitly, rather than explicitly. Using the auditory-induced DFI, we showed higher proneness to illusions in high-schizotypy individuals, which was fully explained by a significantly reduced temporal sensitivity to integrate sensory information. In a separate study, using the tDFI, we found high-schizotypy individuals to have wider temporal window of illusion.

In addition to the temporal, also the spatial aspect of multisensory integration seems to contribute to core self-disturbances in the schizophrenia continuum, especially those associated with abnormal bodily-self experiences, such as blurred body boundaries. We hypothesized that specific deficit of the representation of the space immediately surrounding the body, i.e. the peripersonal space (PPS), could be found in schizophrenic patients and already individuals with high schizotypal traits. PPS is indeed a multisensory interface that mediates every interaction between the body and the environment. We used a well-consolidated PPS task with dynamic approaching sounds and tactile stimuli administered on the participants' hand to localize the boundary of PPS across the continuum from low-schizotypy to schizophrenia. PPS was smaller in participants with schizophrenia, compared with healthy controls, and already in individuals with high schizotypal traits.

All in all, these results suggest that not only patients with schizophrenia, but already high-schizotypy individuals, are characterized by reduced ability to combine sensory information from different modality occurring at different points in time and space. These deficits may strongly contribute to incoherent perception and self-disturbances in the schizophrenia continuum. Moreover, our results open the door to new early markers for psychosis proneness, at the behavioral and neural levels.

