Multidisciplinary Approaches to Understanding Auditory Hallucinations in Schizophrenia and Nonschizophrenia Populations: The International Consortium on Hallucination Research

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This special theme issue of Schizophrenia Bulletin presents a series of related articles focusing on auditory hallucinations, prepared by members of the International Consortium on Hallucination Research [InCoHR] working groups. The InCoHR is a large collaborative framework that serves as a platform for researchers to meet and collaborate on multidisciplinary projects relating to auditory hallucinations [AH] and discuss methodological issues facing transdiagnostic research. Laroi et al. observe the similarities in characteristic features of AHs in different clinical and nonclinical groups, but they also note that differences exist, reflecting the contribution of disease-related process. Waters et al. use findings of shared cognitive impairments across different diagnostic groups with AHs to propose a novel theoretical cognitive framework. Allen et al. describe that the neurobiological substrates of AHs include neural systems involved in language processing, as well as sensory and nonsensory brain regions and that studies are increasingly using fine-grain analysis of patients’ characteristics in analyzing neuroimaging data. Ford et al. discuss different neurophysiological approaches and describes hallucination-related alterations in activity in temporal and frontal regions of the brain and particularly in auditory cortical areas. Finally, Sommer et al. review different treatment options for AHs in schizophrenia and other disorders, including pharmacological treatment, cognitive-behavioral therapy [CBT] and acceptance and commitment therapy [ACT], transcranial magnetic stimulation [TMS], and electroconvulsive therapy [ECT]. These related publications describe the current substance and direction of research on AHs across different diagnostic groups.

Key words: hallucinations/nonclinical/psychosis

Early European psychiatrists such as Kurt Schneider noted that psychopathological symptoms such as auditory hallucinations [AH] should not be taken as evidence of a schizophrenia diagnosis in individual cases, yet most AH research has been conducted in patients with schizophrenia. Lately, however, there has been a rapid increase in the number of publications on AH in different clinical and nonclinical groups [eg.,1,2]. This methodological strategy is particularly useful given its potential for understanding AH independently of other symptoms associated with schizophrenia, and it is therefore likely to assist in discovering novel information.

This special theme issue of Schizophrenia Bulletin presents a series of related articles focusing on AH, prepared by members of the International Consortium on Hallucination Research [InCoHR] working groups. The 2011 meeting3 served as a platform for researchers to meet and collaborate on multidisciplinary projects relating to AH, reflect on the current state of knowledge, and discuss methodological issues facing transdiagnostic research. The articles presented in this special issue comprise the reports from the phenomenology, cognitive sciences, neuroimaging, electrophysiology, and treatment working groups.

In the first article, Laroi et al. reports on the characteristic features of AH in different clinical and nonclinical groups. While the features of AH in schizophrenia have been well described, detailed information from other groups is still lacking. Existing studies describe many transdiagnostic similarities. For example, voice characteristics are frequently identifiable and several voices may be present. While many similarities exist, notable differences have been noted in emotional valence, level of control, and the degree to which insight is present, reflecting the contribution of disease-related processes. Altogether, this suggests that the multidimensionality of hallucinations...
can be investigated using adequate instruments, although sophisticated methodologies capable of capturing phenomenological similarities and differences between participants need to be developed as a matter of priority.

The cognitive mechanisms of AH are explored in the second article by Waters et al. They review and contrast the cognitive processes associated with AH in schizophrenia and other population groups. The findings demonstrate parallels in top-down processing, inhibitory dysfunctions, and contributions arising from negative emotions, pointing to shared cognitive impairments. A theoretical cognitive framework is then presented that can be used for AH across diagnostic groups. It suggests that AH arise from an interaction between abnormal neural activation in auditory brain networks and several cognitive processes that include deficits in signal detection and inhibition, top-down influences, and contributions from cognitive emotional processes. Clearly, much work needs to be done given that considerably little information exists about how cognitive profiles differ between diagnostic groups.

In the next article, Allen et al. discuss the neurobiological substrate of AH. Trait- and state-studies using anatomical, physiological, and neurochemical imaging tools show that AH arise from a combination of early and specific morphogenesis deviations, as well as metabolic and functional abnormalities during AH that encompass several brain regions. Neural systems involved in language processing are critical to AH, although additional sensory and nonsensory brain regions are involved. This is consistent with the idea that multiple brain areas and functions contribute to the different AH phenomenological features. Studies conducted in nonschizophrenia samples are few in number, but existing studies show similar AH-related activation to that seen in individuals with schizophrenia.

In the next article, Ford and colleagues discuss different neurophysiological approaches employed to study AH. Symptom-capture findings are generally consistent with neuroimaging studies in showing alterations in activity in temporal and frontal regions of the brain and particularly in auditory cortical areas. The assessment of trait factors in AH with electrophysiological features such as the P1, MMN, and P300 suggests that external sound appears to compete with auditory processing and that individuals with AH are “tuned in” to internal auditory stimuli rather than external sound. Electroencephalography [EEG] and magnetoencephalography [MEG] demonstrate that individuals with AH have “noisier” brain systems and elevated resting states in the auditory cortex, perhaps explaining how auditory signals occur in the first place. In addition, auditory cortical responsiveness in response to speech sounds may be altered in AH, showing support for models positing self-monitoring failures. Interestingly, a study using healthy people who hallucinate shows opposite findings on the P300 to those seen in schizophrenia, highlighting the utility of nonschizophrenia studies for understanding processes specifically linked to AH.

The final study on this theme from Sommer et al. reviews different treatments options for AH in schizophrenia and other disorders. Antipsychotic medication is effective in reducing hallucination severity. Transcranial magnetic stimulation [TMS] has also been shown to be effective, but its treatment in AH is only recommended in combination with pharmacological treatment. Cognitive-behavioral therapies such as cognitive-behavioral therapy [CBT], by contrast, target specific components of AH, such as distress, anxiety, and management of voices, but do not generally reduce the frequency of voices. Electroconvulsive therapy [ECT] is considered a last resort and findings of effectiveness of ECT for AH are rather mixed.

Overall, there is great overlap in the type of challenges cited by researchers using different methodological approaches. One relates to the need to collect important clinical and phenomenological characteristics on AH so that their contribution to the underlying deficits may be assessed. Another issue concerns the boundaries of AH and that of other symptoms like delusions and insight, so that shared and unique processes may be identified. Yet another challenge relates to understanding the role of medications in neurobiological and cognitive measurements. Altogether, this issue highlights the urgent need for well-designed studies of AH in a range of clinical and nonclinical groups, which can elucidate and test hypotheses about the causes of AH without interference from other symptoms associated with schizophrenia.

In conclusion, this large InCoHR collaborative framework has created greater engagement between hallucination researchers than ever before, and such interdisciplinary discussions will hopefully be of broad benefit by promoting high-quality research with translation opportunities for clinical work.

References