

The Changing Face of Hallucination Research: The International Consortium on Hallucination Research (ICHR) 2015 Meeting Report

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This article reports on the Third Biennial Meeting of the International Consortium on Hallucinations Research, held in Melbourne, Australia, in October 2015. Following a public conference in which research findings were considered in relation to subjective experience and practice, 9 multidisciplinary working groups examined key current issues in progressing the conceptualization and research of hallucinations. Work group topics included: multicenter validation of the transdiagnostic and multimodal Questionnaire for Psychotic Experiences; development of an improved outcome measure for psychological therapies; the relationship between inhibition and hallucinations across multiple levels of explanation; hallucinations in relation to sleep phenomena; emotion and hallucinations; multiple interactions between the experience of self and hallucinations; interactions between language, auditory and memory networks; resting state networks including the default mode; and analyses arising from functional magnetic resonance imaging (fMRI) data-sharing. Major themes in hallucinations research identified during the meeting included (1) progression beyond the auditory verbal modality in schizophrenia to consider hallucinations across modalities and different populations; (2) development of new measures; (3) the central role of multisite collaboration through shared data collection and data pooling; (4) study of time-based and interactive models of hallucination; and (5) the need to increase the accessibility and availability of “real-life” interventions for people with persisting and distressing hallucinations.

Key words: hallucinations/voices/schizophrenia

More refined measurements of hallucinations in different population groups were at the heart of

discussions at this year's International Consortium on Hallucination Research (ICHR) meeting, held in Melbourne, Australia, on 21–23 October 2015. The ICHR was established in 2010 as a collaborative platform to foster conceptual and methodological advancement, and energize basic and translational research, between the world's main clinical and academic centers conducting research on hallucinations. Previous meetings had been held at Kings College London¹ and Durham University.² This year's meeting was hosted by Neil Thomas and Susan Rossell at Swinburne University of Technology, and was attended by clinicians and researchers from Australia, Canada, France, New Zealand, the Netherlands, Norway, South Korea, the United Kingdom and the United States.

Prior to the ICHR meeting, a public conference was held, titled *Hearing Voices and Hallucinations: Research Practice and Recovery*, with a format deliberately designed to encourage dialogue between people who experience hallucinations, scientists and practitioners. Our discussions raised a number of issues which included: the frequent neglect of positive aspects of voice hearing; the potentially therapeutic and transformative aspects of exploring meaning associated with voice content; and advantages of integrating cognitive models with subjective experience. A particular topic of discussion was the current lack of access to nonpharmacological interventions for hallucinations, with there being wide agreement on the need to improve the availability of alternative interventions.

The next 2 days comprised a meeting of the working groups to review their main findings, consider recent trends, and solicit new collaborations. The working

Table 1. Working Group Titles, Contents and Conclusions

Working Group	Contents	Conclusions	More Information
Measure development			
1. The Questionnaire for Psychotic Experiences (QPE) development and validation: Multicenter collaboration	This workgroup reported on a multicenter collaboration to develop and validate the QPE interview. Validation data in individuals with schizophrenia, affective psychosis, medical conditions and neurodegenerative disorders showed dimensional models with theoretically sound dimensions.	The QPE is suitable for multiple participant populations and across modalities. Future directions include confirmatory factor analyses and inter-rater reliability. Other centers and sites needed for collaborative partnerships and translation into further languages.	Maya Schutte, Iris Sommer, (University Medical Centre Utrecht); I.sommer@umcutrecht.nl; www.qpeinterview.com
2. Western Australian Multimodal Misperceptions and Hallucinations Inventory (WAMMHI): Development and validation	Developed for nonclinical populations, the WAMMHI assesses the continuum of misperceptions and hallucinations in 6 sensory modalities (visual, auditory, olfactory, gustatory, somatic and sensed presence). Confirmatory data analysis shows a general factor plus 6 unique sensory modalities.	Different sensory modalities should be systematically assessed, else important dimensions of sensory experiences might be omitted. Other centers and sites needed for collaborative partnerships.	Claire Mitchell, Flavie Waters (University of Western Australia) Flavie.waters@health.wa.gov.au
3. The Voice Impact Scale (VIS): A new scale to evaluate the effectiveness of psychological therapies for AVHs	To address limitations of psychological treatment trial outcome measurement, ³ this international group began with the question “What is a good outcome for psychological interventions for distressing voices?” and used the Delphi method to reach a consensus on psychological therapy outcome targets for AVHs among experts (researchers, practitioners and lived experience).	This process established consensus on top 3 desired outcomes: Emotional response to voices (endorsed by 87% respondents), Interference of voices on day-to-day functioning (73%) and Impact of voices on quality of life (53%). The group will be continuing work into 2016 to develop an item pool for the measure, the psychometric properties of which will be tested in the next phase of development	Clara Strauss (Sussex Partnership NHS Foundation Trust & University of Sussex) C.Y.Strauss@sussex.ac.uk
Major processes implicated in hallucinations			
4. A multi-scale account for inhibitory dysfunction in hallucinations	This group examined the role of excitatory/inhibitory imbalance in hallucinations by integrating findings from molecular, electrophysiological, brain imaging, computational and cognitive explanations. ⁴ It documented reports of inhibitory dysfunction in hallucinations at the level of cortical activation, connectivity, glutamate, cellular phase synchrony, cortical excitability, and cognition.	The findings point to excitatory/inhibitory imbalance as key mechanisms of hallucinations. These can be incorporated into a multi-scale computational modeling frame of reference, such as the one employed by Bayesian inference frameworks. ⁵	Renaud Jardri (Université de Lille) and Sophie Denève (École Normale Supérieure Paris) Renaud.jardri@chru-lille.fr
5. The relationship between sleep-related perceptions (eg, hypnagogic phenomena, dreams) and hallucinations	This group explored 3 key questions: (1) what are the similarities and differences in phenomenological descriptions between sleep-perceptions and hallucinations?, (2) what are the overlaps in neurobiological and neurophysiological mechanisms? And (3) is consciousness needed to sustain true hallucinations?	Key differences were identified, namely that perceptions during sleep do not blend with reality, and fail to involve frontal/ top-down processes. The group concluded that sleep-related perceptions and hallucination are different types of mental phenomena and should not be equated.	Flavie Waters (University of Western Australia); Flavie.waters@health.wa.gov.au

Table 1. Continued

Working Group	Contents	Conclusions	More Information
6. Hallucinations and the self	This group reviewed the relationship between AVHs and different aspects of self-perception, including: self-referent AVH content; disturbances to ipseity and the core self; source monitoring biases; dissociation; self-representations such as schemas and goals; self-stigma; and public identity.	Phenomenology of the core self can integrate with cognitive explanations of hallucinations, ⁶ but applicability outside schizophrenia requires further examination. Self-perceptions and hallucinations are related in multiple ways, including basic phenomenology, voice content and attempts to make sense of experiences. ⁷	Neil Thomas (Swinburne University of Technology); Neilthomas@swin.edu.au
7. Hallucinations and emotions	The group examined the emotional aspects of hallucinations in clinical and nonclinical samples	The rich emotional content of hallucinations was discussed as well as further examining the broader relationship of affect perception and regulation, ⁸ in order to present a comprehensive multidisciplinary model of the interaction between emotion and hallucinations.	Susan Rossell (Swinburne University of Technology); Srossell@swin.edu.au
Brain networks			
8. Interaction of auditory, language and memory networks in AVH	This group reported on a comprehensive review of the dysfunctions within the language, auditory and memory networks that underpin AVH, referencing both structural and functional connectivity brain imaging data.	A synthesis of the findings show that AVH is associated with aberrant connectivity of language, memory and auditory processes network, characterised by resting-state hyper-coupling but task-related hypo-coupling, and that “hybrid” models ⁹ are possibly best placed to incorporate these findings.	Brani Ćurčić-Blake (University of Groningen); b.curcic@med.umcg.nl
9. Hallucinations, the default mode, and the resting state	This group viewed current knowledge of the brain’s intrinsic activity in 4 major resting state networks (default mode, central executive, salience and sensory) in relation to both auditory and visual hallucinations.	The findings show increased activity of default network, and compromised network activity involving central executive, salience and sensory networks, in auditory hallucinations. ¹⁰ Visual hallucinations involve an additional connectivity with medial prefrontal cortex and the visual cortex.	Ben Alderson-Day (Durham University); benjamin.alderson-day@durham.ac.uk
10. Brain networks underlying AVH in schizophrenia: A multisite task-based fMRI study	The objective was to define functional brain networks in hallucinations by analysing shared imaging data using an in-house and newly-developed multivariate software (fMRI-CPCA). ¹¹ Using this new method, they were able to examine shared networks that are activated during tasks of fluency, speech monitoring and auditory processing, collected across multisites in individuals with and without hallucinations, and healthy controls.	They revealed unique spatial and temporal characteristics related to hallucinations (“hyperactive” superior-temporal network during language comprehension, and “hyper-suppressed” default mode network) when individual task components were considered	Todd Woodward (University of British Columbia); todd.woodward@ubc.ca; www.nitrc.org/projects/fmricpca

Note: AVH, auditory verbal hallucination; fMRI = functional magnetic resonance imaging.

groups covered 3 main topics: Measure development, major processes, and brain networks. (table 1).

During the meeting, major themes were identified relating to progress in hallucination research and future priorities.

Multiple Types of Hallucinations

The first theme regards the continuing shift in research focus since 2011¹ beyond the focus on auditory verbal hallucination (AVH) in schizophrenia to considering hallucinations across all modalities, and across different clinical and nonclinical populations. While most research efforts to date have concentrated on auditory and visual domains, other sensory experiences (somatic, tactile, olfactory, gustatory, sexual, kinaesthetic, coenesthetic, motor, sensed presence, etc) remain under-researched. At the forefront of researchers' minds was the need for validation of theoretical models of auditory hallucinations outside of schizophrenia, and how they may apply across the spectrum of presentations of this experience. Studies are needed to establish whether there are different categories of psychological and neurobiological changes for each modality, or whether they all stem from one system coupled with unique sensory network vulnerabilities.

Measure Development

A second, related, theme was to progress measure development and reach a consensus on the best measures to use in research and practice. The development of the multimodality Questionnaire for Psychotic Experiences and Western Australian Multimodal Misperceptions and Hallucinations Inventory assessment tools (Groups 1 and 2, table 1) is advancing this goal by providing measures of key hallucination dimensions which can be used across all populations. Similarly, development of consensus-based outcome measurement for therapy trials with the Voice Impact Scale (Group 3, table 1) should facilitate comparisons between future intervention studies. An agreement to use these tools in different centers will facilitate data pooling and research efforts. The next challenge is to develop consensus around cognitive tasks used in hallucinations research to facilitate cross-center collaboration in a similar way to what has been achieved with the MATRICS battery in schizophrenia research. Mechanisms currently acknowledged in hallucinations include compromised perceptual processing, memory, emotion, inhibition and top-down control.¹² A working group developing such a consensus is deemed to be valuable. Similarly, new imaging and electrophysiological scanning is rapidly developing, needing the development and agreement of specific research methodology (eg, fMRI technical protocols and data analysis methods; example in group 10, table 1).

Multisite Collaborations

A third theme was an agreement on the central role of multisite collaboration in supporting research efforts.

Several options exist for collaborative partnerships, including: (1) the registration of best-practice manuals, consensus guidelines and data analysis methods through reporting platforms, (2) data sharing and joint analysis of preexisting datasets to enhance statistical power, maximize usage of data collected, and explore heterogeneity between population groups, and (3) sharing of information, methodological expertise and avenues with secured data storage and analysis capacities. The currently topical issue of ensuring replicability of findings was also discussed. Proposed strategies to reduce biases included registration of planned (pre-analysis) approaches and working with other sites to test replicability prior to publication.

Brain Networks

A fourth theme was advancing the conceptualization of processes associated with hallucinations from the level of specific deficits towards an understanding of more time-based and interactive models, both in terms of networks and temporal dynamics. This meeting's focus considered mainly resting state and task based magnetic resonance imaging data. At the next meeting in France 2017, more work is expected regarding the temporal dynamics of hallucinations with symptom capture data, for which the pooling of multicenter magnetoencephalography (MEG) data will become fruitful.

More Accessible Treatments

Finally, a topic prominently addressed in both the public conference and the scientific meeting was with regard to the need for better availability of interventions for people with persistent and distressing hallucinations. Such barriers are not about the lack of knowledge, but the lack of use of existing knowledge, given that practice guidelines (eg, cognitive behavioral therapy for psychosis, and family interventions) are rarely offered systematically in clinical practice.^{12,13} Difficulties include the transfer of knowledge gained under rigorous experimental conditions to clinical settings, which are often under-resourced and under pressure to provide services to clients with varied capacity and multiple comorbidities. Discussions considered the value of stepped-care models for hallucinations that provide low-intensity, low-cost, and highly accessible treatments, suitable for use by different practitioners and enhanced collaborative efforts amongst "voices clinics" to develop, test, and make widely available educational materials and resources for use across internationally varied mental health service systems.

Altogether, with such rapid changes in the landscape of hallucination research we look forward to the next ICHR meeting which will take place in 2017 in France. An interim public ICHR conference will take place in 2016 in Chicago, IL, United States. See website for latest updates (hallucinationconsortium.org).

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