

## Report on the 2nd International Consortium on Hallucination Research: Evolving Directions and Top-10 “Hot Spots” in Hallucination Research

Flavie Waters<sup>\*1</sup>, Angela Woods<sup>2</sup>, and Charles Fernyhough<sup>3</sup>

<sup>1</sup>Clinical Research Centre, Graylands Campus, North Metro Health Service Mental Health and School of Psychiatry and Clinical Neurosciences, The University of Western Australia, Perth, Western Australia; <sup>2</sup>Centre for Medical Humanities, Durham University, Durham, UK; <sup>3</sup>Department of Psychology, Durham University, Durham, UK

\*To whom correspondence should be addressed; Clinical Research Centre, Graylands Campus, North Metro Health Service Mental Health, and School of Psychiatry and Clinical Neurosciences, The University of Western Australia, Perth 6010 Western Australia; tel: (+61)-8-9347-6429, fax: (+61)-8-9384-5128, e-mail: [flavie.waters@health.wa.gov.au](mailto:flavie.waters@health.wa.gov.au)

This article presents a report on the 2nd meeting of the International Consortium on Hallucination Research, held on September 12th and 13th 2013 at Durham University, UK. Twelve working groups involving specialists in each area presented their findings and sought to summarize the available knowledge, inconsistencies in the field, and ways to progress. The 12 working groups reported on the following domains of investigation: cortical organisation of hallucinations, nonclinical hallucinations, interdisciplinary approaches to phenomenology, culture and hallucinations, subtypes of auditory verbal hallucinations, a Psychotic Symptoms Rating Scale multisite study, visual hallucinations in the psychosis spectrum, hallucinations in children and adolescents, Research Domain Criteria behavioral constructs and hallucinations, new methods of assessment, psychological therapies, and the Hearing Voices Movement approach to understanding and working with voices. This report presents a summary of this meeting and outlines 10 hot spots for hallucination research, which include the in-depth examination of (1) the social determinants of hallucinations, (2) translation of basic neuroscience into targeted therapies, (3) different modalities of hallucination, (4) domain convergence in cross-diagnostic studies, (5) improved methods for assessing hallucinations in non-clinical samples, (6) using humanities and social science methodologies to recontextualize hallucinatory experiences, (7) developmental approaches to better understand hallucinations, (8) changing the memory or meaning of past trauma to help recovery, (9) hallucinations in the context of sleep and sleep disorders, and (10) subtypes of hallucinations in a therapeutic context.

*Key words:* meeting report/hallucinations/psychosis

### Introduction

Since 2011, the International Consortium on Hallucination Research (ICHR) has existed as a platform for researchers to meet and collaborate on hallucination research projects and as a vehicle for the cross fertilization of ideas amongst individuals with different areas of expertise. The second meeting of the ICHR was held on September 12th and 13th 2013, at Durham University, UK. The meeting was an energetic, collegial, and interactive forum that created an exciting degree of cooperation and communication between different specialists from around the world. This report presents a summary of this meeting and identifies 10 “hot spots” for future research. The ICHR is led by F.W. (Australia) and an international steering group committee comprising André Aleman (Netherlands), Paul Allen (UK), C.F. (UK), Frank Larøi (Belgium), Iris Sommer (Netherlands), and Todd Woodward (Canada). The summary of the inaugural meeting of the ICHR was published in the September 2011 issue of *Schizophrenia Bulletin*.<sup>1</sup>

The 2011 meeting at the Institute of Psychiatry, London, UK, had a specific focus on auditory hallucinations and covered research primarily conducted in the fields of psychiatry and psychology. During the discussions, it was concluded that (1) future meetings should broaden their scope to include hallucinations across different modalities, and that (2) perspectives from the humanities and social sciences should be adopted in order to obtain a deeper understanding of hallucination phenomenology and to locate hallucinatory experiences in richer personal and social contexts. Further aims were to (3) improve phenomenological descriptions by conducting studies in different population groups and developing scales applicable to different diagnostic groups;

(4) study the contribution of social context and affective processes; (5) refine the identification of biomarkers and specific cognitive domains, brain networks, and phenomenological features as targets for translational research; (6) improve the quality of reporting and grouping of research participants and use tasks with high construct validity; (7) enhance cross-disciplinary work and international collaboration; and (8) energetically pursue alternative treatment options.

The 2013 ICHR meeting was hosted jointly by C.F., F.W., and A.W. There were 60 attendees comprising academics, clinicians, and “experts by experience.” The ICHR followed a meeting of the “Hearing the Voice” project (<https://www.dur.ac.uk/hearingthevoice/>). Hearing the Voice is an interdisciplinary project on voice hearing led by C.F. and A.W. and funded by a Wellcome Trust Strategic Award. It includes a broad range of academics with expertise in medieval history, English literature, cultural studies, philosophy, theology, and medical humanities, as well as psychology, psychiatry, and cognitive neuroscience. The contributions from these academics provided rich and fascinating perspectives about the meaning of hallucinations and the variety of contexts in which they may be explored.

The ICHR meeting involved the presentation of 12 working groups, comprising leading researchers in each area and individuals with specific interest in the topic. Through formal presentations and in brainstorming sessions, each working group sought to summarize the available knowledge, determine the consistencies and inconsistencies in the field, and identify ways to progress and opportunities for future collaboration. The working group reports will be published in a special open-access supplement of *Schizophrenia Bulletin* in 2014, with funding support from the Wellcome Trust.

#### *Presentations and Working Group Reports*

The first day of the meeting opened with a welcome note from C.F. and F.W., who reflected on the rapidly changing landscape of hallucination research and the continuing need for interdisciplinary perspectives for understanding the complex experience of hallucinations. Since the last meeting, and in keeping with the ICHR ethos, several ICHR members had formed new collaborations, or submitted multicentre grants, while others had been sharing data to create new database pools to benefit from large sample sizes.

Richard Bentall gave a brief opening address noting the considerable changes in hallucination research in the past 30 years. The “medical model” dominant in the 1980s saw hallucinations as symptoms of mental illness requiring medical attention. By contrast, the rise of symptom-based approaches, increased focus on the social determinants of psychosis, and a growing emphasis on the role of psychological therapies and empowerment as

a process for recovery speak of radical changes in how hallucinations are currently understood.

Key points from the 12 working group presentations were as follows.

*Cortical Organization.* Cindy Wible (Harvard Medical School) presented a model of cortical architecture that aimed to provide an understanding of visual, tactile, and auditory hallucinations. This view starts with the observation that cortical regions and sensory modalities are organized in a hierarchical fashion, and that perceptual processing proceeds through several stages that represent increasingly complex features. The flow of this information converges on higher order multimodal association areas in the temporal parietal junction (TPJ) and lateral temporal regions. There, visual representations merge with those from audition and touch. The TPJ also matches how we experience others and the self in the real world and codes for higher-order constructs such as agency, intention, and social prediction. Altogether, it was proposed that an understanding of cortical organization can be used to understand complex hallucinations and delusions.

*Nonclinical Hallucinations.* Frank Larøi (University of Liege) discussed what these experiences reveal about the risk for psychosis and the continuum model of psychosis. The cognitive domains in nonclinical hallucinations were also explored (presentation by Kristiina Kompus, University of Bergen). Converging evidence was reported toward reduced inhibition and difficulties with controlling attention, as well the influence of semantic expectations on stimulus processing. With regards to clinical characteristics, studies are increasingly examining the role of psychosocial events such as trauma and negative life events although some important differences emerge compared with the type of experiences seen in clinical samples. With regards to weaknesses in this literature, concerns were raised regarding the methods of assessing nonclinical hallucinations and the lack of descriptions of sample characteristics. The need to use cognitive tasks with high construct validity was also raised as having important implications for the interpretability and replicability of the findings. Overall, the need for more methodologically rigorous approaches to improve items and scaling of existing measures was highlighted.

*Interdisciplinary Approaches to the Phenomenology of Auditory Verbal Hallucinations.* Presenting findings from the ICHR’s largest and most disciplinarily diverse working group, A.W. (Durham University) outlined the benefits of adopting an interdisciplinary approach to understanding the experience of auditory verbal hallucinations. The humanities and social sciences offer valuable conceptual and methodological tools with which to study hallucinations in biographical, social, cultural, and historical context. By opening up new perspectives on

the phenomenology of auditory verbal hallucinations, an interdisciplinary approach can suggest new avenues for empirical research and therapeutic management.

*Culture and Hallucinations.* Frank Larøi highlighted the paucity of attention given to the role of culture in shaping hallucinations. The presentation reviewed published research investigating hallucinations in different countries, cultures, and organized religions. The findings show that culture affects the way unusual experiences are conceptualized and treated and that it has measurable effects on hallucination characteristics (frequency, appraisal, modality, and content). However, most hallucination research has been carried out in Western and democratic countries and so reflects culturally specific beliefs, eg, about the nature of self and psychosis. In-depth reflections regarding the potential effects of culture on hallucination need to be conducted within interdisciplinary contexts, with potentially significant implications for the design and provision of clinical interventions, and stigma.

*Subtypes of Auditory Verbal Hallucinations.* In an intriguingly titled talk (“Better than mermaids and stray dogs?”), Simon McCarthy-Jones (Macquarie University) presented a taxonomy of auditory verbal hallucinations with implication for research and practice. He first reviewed approaches that involved parsing hallucinations according to their phenomenology, and then examined subtypes uncovered by factor analytic methods. Next, he considered how subtypes may be created by an examination of distinct cognitive and neurological correlates, causal antecedents, treatment response, and consumer perspectives. Guy Dodgson (Northumberland, Tyne and Wear National Health Services Trust) then presented evidence supporting a specific hypervigilance subtype of auditory hallucination and reported on initial therapeutic work specifically informed by this approach.

*Psychotic Symptoms Rating Scale Multisite Study.* Todd Woodward (University of British Columbia) presented the results of a multisite study of auditory hallucinations phenomenology using the Psychotic Symptoms Rating Scales. The study pools data from 6 countries and 523 participants experiencing hallucinations and seeking treatment for mental health problems. Statistical analyses with generalized structural component analysis were conducted to examine the factor structure of the hallucination and delusions scales. A 6-factor model emerged, with constructs of emotionality and cognitive interpretation emerging for both hallucination and delusions, with physical features and control unique to hallucinations. However, the only statistical association between hallucinations and delusions was in emotional content.

*Visual Hallucinations in the Psychosis Spectrum.* F.W. (University of Western Australia), Daniel Collerton (Newcastle University), Renaud Jardri (Centre Hospitalier

Regional Universitaire de Lille), Dominic ffytche (King’s College), and Frank Eperjesi (University of Birmingham) presented together on visual hallucinations. These experiences have been well described in the context of eye disease and neurological conditions although largely neglected in psychiatric conditions. This group reviewed what is currently known about visual hallucinations in the psychosis spectrum and the specific treatment options available. The review identified that visual hallucinations are relatively common in psychosis (30%) and are typically associated with degraded higher-order visual processing and/or cognitive impairments. Altogether, these findings suggest that these experiences deserve considerably more attention and research in psychosis than they have been given and that they are a clinically meaningful phenomenon for transdiagnostic studies, interdisciplinary research, and as a target for treatment.

*Hallucinations in Children and Adolescents.* Renaud Jardri described the epidemiological factors, assessment methods, cognitive factors, and therapeutic strategies for hallucinations in children and adolescents. Hallucinations are present at high rates during childhood. The risk of psychopathology is often a cause of concern although the risk is low. However, hallucinations occurring during adolescence become increasingly associated with psychopathology, especially when associated with poor functioning. Imaginary companions are a normal experience during childhood and are typically associated with positive developmental outcomes. Altogether, research with this population provides fascinating opportunities to assess prospectively for the role of social contributors and evolution of symptoms from a longitudinal perspective.

*Relating Research Domain Criteria Behavioral Constructs to Hallucinatory Experiences.* Judith Ford (University of California) and Sarah Morris (National Institute of Mental Health [NIMH]) presented a summary of how the NIMH Research Domain Criteria (RDoC) constructs might be used to frame new research questions about hallucinations. They considered whether hallucinatory experiences can be examined across basic dimensions of functions as determined by the RDoC’s units of analysis (genes, molecules, cells, circuits, physiology, behavior, and self-reports). The group discussed the challenges in mapping current knowledge of hallucinations onto this framework and the extent to which some units of analyses (eg, neural circuitry) are related to others (eg, self-reports about hallucinatory experiences). The key question is whether such an approach can provide an integrative understanding of hallucinations and translate into rapid progress in basic neuroscience and treatment.

*New Assessment Methods for Hallucinations.* Iris Sommer (Utrecht University) presented a new scale, “The Questionnaire for Psychotic Symptoms (QPS).” The QPS

quantifies and describes the characteristics and frequency of hallucinations in the visual, auditory, tactile, and olfactory domains, as well as cooccurring delusions. It consists of 35 items scored from 0 (not present) to 5 (more severe) that can be administered without the need for training and can be used to monitor the effects of treatment.

*Psychological Therapies for Auditory Hallucinations.* Neil Thomas (Swinburne University) presented evidence for psychological therapies for voice hearing. For a long time, psychological therapy had been dominated by behavioral and subsequently by cognitive-behavioral approaches. One weakness of such approaches is their reliance on applying therapies developed for depression and anxiety to the experience of voice hearing. More recent developments in therapeutic approaches include mindfulness-based approaches, imagery training, and addressing personal life contexts as a means of reconceptualizing voices. Such approaches foreground the personal recovery of voice hearers and are more likely to target psychosocial factors linked to voices. Evidence presented in support of different therapies was presented, as well as a short description of the future of psychological therapies.

**Table 1.** Ten Hot Spots for Hallucinations Research

1.	Social determinants of hallucination onset and recovery
2.	Use of experimental tasks with high construct validity, and translation of basic neuroscience findings into targeted therapeutic interventions
3.	Shared and unique processes in different modalities of hallucinations (auditory, visual, olfactory, gustatory, tactile)
4.	Domain convergence and divergence in cross-diagnostic studies of hallucinations (nonclinical groups, psychosis, personality disorders, neurological disorders, sensory disorders)
5.	Improved methods for defining and ascertaining hallucinations in nonclinical samples
6.	Harnessing insights and methodologies from the humanities and social sciences in enriching scientific explorations and recontextualising the personal significance of hallucinations
7.	Developmental changes and hallucinations (studies in children, adolescents, old age)
8.	Reframing the past: investigating whether the memory or meaning of past traumatic events can be changed, and whether it is possible to influence semantic expectations to change stimulus processing pathways
9.	Hallucinations experienced in the context of sleep and sleep disorders
10.	Subtypes of hallucinations in a therapeutic context

*Hearing Voices Movement Approach to Understanding and Working With Voices.* Simon McCarthy-Jones started the presentation with examples, drawn from across history, of how voices have been found by mental health professionals to be meaningfully related to traumatic/emotional events in voice hearers' lives. Eleanor Longden (University of Leeds) illustrated this view with reference to her own experience of hearing voices, trauma, and dissociation. Her story is a testimony to the powerful role that accepting and making sense of voices plays in recovery. Finally, Dirk Corstens (Hearing Voices Maastricht) summarized the links between life histories and voice hearing by examining the experience of 100 voice hearers—where emotional conflicts occur in 94% of cases—providing further evidence of the link between trauma and hallucinations.

## Conclusion

The 12 working groups presented comprehensive, up-to-date reviews, and perspectives on the study of hallucinations and used brainstorming sessions to develop these research ideas and plan future collaborative work. At the conclusion of the meeting, discussions reiterated the value of the ICHR as a forum for the cross fertilization of ideas and the importance of interdisciplinary research in this area. Identified hot spots for future research are shown in [table 1](#). The next biannual meeting and working group presentations will take place in Melbourne, Australia, in October 2015. In the meantime, a satellite “open” meeting of the ICHR is being held in Trondheim, Norway, on September 9th and 10th 2014, hosted by Bodil Kråkvik, Einar Vedul-Kjelsås, and Kenneth Hugdahl. Further details about the ICHR, future meetings, and current working groups are available from [hallucinationconsortium.org](http://hallucinationconsortium.org).

## Funding

Wellcome Trust Strategic Award (WT098455MA).

## Acknowledgments

The authors have declared that there are no conflicts of interest in relation to the subject of this study.

## References

1. Waters F, Aleman A, Fernyhough C, Allen P. Report on the inaugural meeting of the International Consortium on Hallucination Research: a clinical and research update and 16 consensus-set goals for future research. *Schizophr Bull.* 2012;38:258–262.