Multimodal hallucinations: a transcultural perspective

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General discussion & summary

In this thesis I explored the occurrence and phenomenology of multimodal hallucinations (i.e., hallucinations experienced in two or more sensory modalities) in the context of psychosis, with a special focus on these hallucinations reported by Muslim patients who attribute these sensations to jinn, voodoo or the evil eye. This chapter provides a summary of the main findings and my recommendations for clinical practice and further research.

Main findings

Chapter 1 provides an introduction on the subject of the thesis. In *Chapter 2* I provided a review of the medical literature on jinn as an explanatory model in the context of biomedical disorders. As indicated in the review, in Muslim culture the origins of the notion of jinn are very old. Jinn are not only described in the Qur'an but also in pre-Islamic texts from Egypt, Babylon, Greece, and Assyria, where they are strongly connected with beliefs in possession and magic. An important difference between religious interpretations and those in Muslim folk beliefs is that in the first jinn are considered neutral entities capable of being good as well as bad, whereas in the latter they are mostly deemed bad or else seen as instrumental in achieving important goals in life with a serious risk of negative consequences. In the 105 biomedical articles that I reviewed, I found 47 case descriptions mentioning an attribution to jinn, voodoo, or the evil eye. Among these cases, there were ten describing patients who thought their multimodal hallucinations were instigated by and/or featured jinn. I analyzed the phenomenological features of these hallucinations as well as other symptoms reported on, which ranged from anxiety and depression to neurological pathology. Since multimodal hallucinations are rarely reported in Western populations, I assumed on the basis of my analysis and previous publications on hallucinations in non-Western patient groups that Muslim patients might experience these complex hallucinations more often. An additional preliminary conclusion was that patient delay was common in this group. To further elaborate on the combined findings and verify my assumptions, I carried out four empirical studies on the nature and prevalence of multimodal hallucinations in people with a Muslim background coping with schizophrenia spectrum disorders.

To find out whether multimodal hallucinations are indeed experienced more often in Muslim and other non-Western populations of psychotic patients, I analyzed data from the longitudinal, multi-site Dutch GROUP (Genetic Risk and Outcome of Psychosis) study. Contrary to expectations, my analysis, presented in *Chapter 3*, revealed that the opposite is true in that multimodal hallucina-

tions are simply underreported in Western patients. The GROUP study provided data on more than 1,000 patients diagnosed with a schizophrenia spectrum disorder and in the 750 patients who had fully completed the CASH (Comprehensive Assessment of Symptoms and History) I calculated an 80% lifetime prevalence for hallucinations in general, while the lifetime prevalence of multimodal hallucinations proved to be almost twice as high (53%) as that of unimodal hallucinations (27%). Again contrary to my hypothesis, I also found no significant differences between participants with a Dutch background and those descending from the four largest migrant groups residing in the Netherlands (i.e., Morocco, Turkey, Surinam, and the former Dutch Antilles). Since not all sensory modalities were explored in the GROUP study, I venture that even higher prevalence rates would have been found for multimodal hallucinations had all modalities been investigated.

Given that a relatively high number of GROUP participants reported hallucinations in three or four sensory modalities with relatively high rates for hallucinations involving the auditory and visual senses, I put forward that the mechanism underlying multimodal hallucinations is likely to be a stochastic process in that having hallucinations in these latter two modalities increases the chance for the additional recruitment of other modalities. I also proposed a clinical classification of types of multimodal hallucination based on their serial or simultaneous presence, and on their degree of congruence or incongruence.

Chapter 4 presented data on a group of 47 patients recruited from a transcultural outpatient clinic who attributed their psychiatric symptoms (rather than their hallucinations alone) to the evil eye, voodoo, and/or jinn. The psychiatric symptoms were diverse, ranging from anxiety and obsessive-compulsive symptoms to flashbacks of traumatic events, somatic symptoms, and hallucinations. Most of the participants had been diagnosed with an anxiety disorder, a mood disorder, or PTSD, with or without hallucinations. Of this group, 43% were positive that their symptoms were caused by jinn, whereas 27% thought that they were not, and 31% were in doubt. As to the hallucinations reported on, the auditory, visual, and tactile were the most prevalent sensory modalities mentioned. A relatively large number of participants eligible for inclusion (58.8%) dropped out because of a fear of repercussions from the jinn were they to open up about them. Also, a majority did not dare to speak freely about their symptoms and their alleged causes, showing reluctance to share information on jinn and other cultural-religious matters with the attending biomedically trained health professionals.

In *Chapter 5* I presented the results from a study among psychotic Muslim inpatients experiencing hallucinations that they attributed to jinn. Since information on these specific sensory modalities is scarce, with only few case reports mentioning them explicitly, I focused on tactile and somatic components. The vast majority (96%) of the patients interviewed experienced multimodal hallucinations. Having detailed the phenomenology of these hallucinations, I assessed the interrelatedness of tactile and somatic hallucinations with those in other sensory modalities and found all of the tactile and somatic hallucinations to be congruent, meaning that the hallucinations experienced in these two sensory modalities added up to a coherent whole, often to the extent that they constituted full-blown entity experiences, which, moreover, tended to be very frightening, exerting a substantial impact on the patients' daily lives. The overriding involvement of the auditory and visual modalities as well as the pattern of frequencies of hallucinations in the olfactory and gustatory modalities provided tentative empirical confirmation for the stochastic process that I had proposed in Chapter 3 as a mechanism underlying multimodal hallucinations.

In *Chapter 6*, I reported additional data on multimodal hallucinations in the above-mentioned group of psychotic Muslim inpatients, now zooming in on the phenomenon of entity experiences, which, in the cases investigated, took the form of vivid, mostly harrowing jinn encounters, concluding the chapter by presenting several biological and psychological models that may pave the way to understanding the underlying mechanisms contributing to the mediation of such lifelike entity experiences.

Discussion

The complex challenge of multimodal hallucinations attributed to jinn

Working with patients who attribute their multimodal hallucinations to supernatural causes poses a multifaceted challenge to Western health professionals. Although the notion of jinn is well-known in Muslim communities, several reasons may explain the relative silence on the matter in case reports and research papers. On the one hand, when people from these communities (finally) decide to seek help and turn to biomedical health providers, they may find that the attending practitioners are not always sufficiently familiar with Muslim religious and cultural beliefs and practices. These practitioners may easily miss important clues or misinterpret the symptoms their patients present with, or, realizing their lack of insight, they may feel inadequate in diagnosing

and treating them, hampering effective treatment. Even though the practice to label unusual symptoms as 'exotic' and 'incomprehensible,' which prevailed in much of the 19th and 20th centuries, has largely been abandoned (Kirmayer & Minas, 2000), there is still a risk that they will be relegated to the group of 'culture-bound syndromes', especially by practitioners with divergent attributional models who have an oversimplified view on these matters. Furthermore, a lack of (in-depth) knowledge of multimodal hallucinations may further increase the risk of miscommunications, misdiagnoses, and inapt treatments.

On the other hand, and exactly because they are fearful of being misunderstood, Muslims may be reluctant to share their jinn experiences with biomedically trained practitioners. After all, how should they cope with a supposedly knowledgeable person who interprets beings they can see, hear, smell, and even touch as mere hallucinations? In addition, they may fear that fellow-Muslims will take their jinn encounters as proof that they have not been faithful to Allah or the Qur'an's teachings, and that they will therefore be frowned upon or regarded as a dishonorable Muslim. Moreover, they may dread that the mere mention of jinn may cause the entities to reappear, adding to the burden and suffering they already experience. Finally, they may be afraid of stigmatization and social exclusion (e.g., being labeled and shunned as a crazy person) if and when their mental problems become known. These factors are all likely to have contributed to the fact that a large proportion of the people I interviewed were reluctant to discuss their symptoms and attributions or at least to discuss them in more detail than they did (*Chapter 4*).

The continuing challenge of multimodal hallucinations

Although this thesis may well be the first to be devoted in its entirety to multimodal hallucinations, the phenomenon was already empirically researched in the context of the 19th-century Census of Hallucinations (Sidgwick et al., 1894; Parish, 1894). This classic study was carried out in the overlap area of biomedicine and parapsychology and designed to gather proof that hallucinations sometimes reflect metaphysical phenomena such as true contact with the dead. The study is still widely cited today, albeit stripped of its paranormal overtones. Over time, multimodal hallucinations became primarily associated with a diverse spectrum of psychiatric disorders, ranging from organic brain syndromes to neurotic disorders, sleep disorders, and drug-related disorders, and seldom with schizophrenia spectrum disorders. Subsequent findings published during the second half of the 20th century

(Chesterman & Boast, 1994; Goodwin et al., 1971; Mueser et al., 1990) did little to change that.

Be that as it may, the 1994 study by Chesterman and Boast as well as reports on multimodal hallucinations in the cultural field (Al-Krenawi & Graham, 1997; Ndetei & Singh, 1983; Zarroug, 1975) did prompt the question whether these hallucinations might be more prevalent in people with a non-Western background. However, in the GROUP data set I found no corroboration for this hypothesis. What my analysis did show was that 53% of the participants, who were all diagnosed with a schizophrenia spectrum disorder, experienced multimodal hallucinations irrespective of their country of birth or the country of birth of one or both parents. My findings on frequency confirmed previous findings by Waters et al. (2014). Also, studying psychotic patients with visual hallucinations, Dudley et al. (2018), showed that the rate of multimodal hallucinations was significantly higher in this group in comparison to the rates recorded for patients with eye disease, Lewy body dementia, and Parkinson's disease. Specifically, people with a psychotic disorder more often reported a tactile component in addition to their visual sensations than did the patients from the other groups. Similar rates for and patterns in multimodal hallucinations were noted by McCarthy-Jones et al. (2017) in their intercontinental, multi-center project comprising patients diagnosed with chronic schizophrenia spectrum disorders receiving treatment in Ireland and Australia. The authors likewise found that, besides the visual modality, the auditory modality was predominant but also that, based on the participants' accounts, the visual, tactile, olfactory, and gustatory perceptions always appeared in this particular order.

Similarly, to what is discussed in this thesis, in their study of psychotic patients Dudley et al. (2018) described congruent multimodal hallucinations with their participants experiencing auditory hallucinations that were congruent to their primary visual hallucinations. What is more, Toh et al. (2021), who studied 50 patients experiencing verbal auditory hallucinations (VAH) and 50 patients with auditory hallucinations, additionally reported hallucinations in at least one other sensory modality (VAH+), and found the latter group to be clinically more severely ill. One may thus infer that multimodal hallucinations are primarily associated with severe and acute states of psychiatric disorders. Yet, they are also experienced by people without a known psychiatric disorder as well as by individuals without any diagnosis (neurological or otherwise). Overall, auditory hallucinations are most often seen in patients with a psychotic disorder, while visual hallucinations

are observed in both psychotic and non-psychotic patients (Connell et al., 2019). Moreover, in a large online survey including 10,448 participants from the general population, Linszen et al. (2022) not only found the same pattern in the order in which the four main sensory modalities were involved but also occurrence rates that are quite similar to those presented in this thesis *(see Chapter 3)*, (i.e., auditory 29.5%, visual 21.5%, tactile 19.9%, and olfactory 17.3%). Moreover, 47.6% of Linszen et al.'s respondents reported having experienced hallucinations in two or more sensory modalities, which comes close to the 53% I recorded for people with psychotic disorders in my study of the GROUP data *(Chapter 3)*.

Indications for a stochastic process underlying multimodal hallucinations

Several hypotheses have been postulated for the origins of and mechanisms underlying (multimodal) hallucinations. For example, the perceptual release model suggests that hallucinations are outwardly projected endogenous percepts released from anatomically and phylogenetically 'lower' parts of the brain that subsequently find their way towards the cortex and thus into consciousness (West, 1962). A second model proposes that the content of hallucinations derives from previously perceived scenes, objects, or stimuli stored in memory. Aptly called the reperception model, it was first described by Ferriar (1813) and then by Kahlbaum (1866), and – more than a century later – by Penfield (1975), whose work helped to shape our current understanding of multimodal hallucinations. A third theory was introduced by Lhermitte (1922), who found reason to believe that hallucinations were mediated by areas in the brainstem and rostrum previously designated as the brain's 'dream center'. These so-called peduncular hallucinations are thought to be complex, vivid, and often brightly colored visual and multimodal phenomena. Friston et al. (2016) posited a fourth hypothesis, basing their paradigm on the assumption that a predictive coding process leads to so-called grounded expectations, which may aid higher cortical areas to form multimodal hallucinations based on relatively simple cues. Thus, perceptual experiences in one sensory modality will then give rise to the expectation that related percepts will appear in other modalities. Especially the latter hypothesis shows a good fit with what I found in our samples, where it may be plausible that the (psychotic) Muslim patients who experienced multimodal hallucinations may have expected full-blown entity experiences on the basis of relatively simple events involving auditory or visual perceptions, prompting them to go on and hallucinate sensations

in these and other sensory modalities up to and including lifelike jinn encounters. As noted, the order in which the different sensory modalities are being recruited to form multimodal hallucinations appears to follow a pattern that has been recognized by several authors (Dudley et al., 2023; Linszen et al., 2021). In the study presented in *Chapter 3*, we found the consistent successive recruitment of the auditory, visual, tactile, olfactory, and gustatory modalities to be suggestive of a stochastic process (Lim et al., 2016). Stochastic processes, first conceptualized during the 1930s (Khinchin, 1933; Doob, 1934), involve mathematical processes in which "at any point of time the precise state or value is unpredictable and neither depends on previous values or states of the system, nor on an inherent bias of the system" (Hiesinger & Hassan, 2018). Bateson (1979) conceptualized the stochastic process in his book Mind and Nature as a semi-random process because each step in the sequence has a limited range of outcomes, which then form the starting point for the next step in the sequence, which likewise has a limited range. Thus, each step is dependent on the outcome of the previous step and, in fact, impossible without the previous step having been made. Although stochastic processes may have a respectable number of outcomes, this number is still limited, rendering the process itself not completely random. As clarified by Hiesinger and Hassan (2018), this type of process is also known as non-deterministic, probabilistic, or noisy. The pattern in the recruitment of multimodal hallucinations that we observed in our collective studies suggests the involvement of a noisy process that starts with either an auditory or a visual hallucinatory component, followed by a component in a different sensory modality (i.e., usually either a visual or auditory sensation depending on the initial hallucinated sensation), which may then be followed by a tactile and/or somatic component and, finally, an olfactory and/or gustatory component. With hindsight, as early as in 1900 Störring (1900) already suggested a noisy process to explain the sequence of sensory modalities recruited in multimodal hallucinations when he wrote that "one modality will provide presence of one of the other modalities". More than a century later, David et al. (2011) made a similar observation when they recognized the "additive nature of hallucinations by the pattern of overlap". As observed above, several recent studies provide empirical data that fits the hypothesis of noisy processes in the mediation of multimodal hallucinations (Waters et al., 2018; Blom, 2021; Lim & Blom, 2021). In a systematic review of the occurrence of hallucinations after sleep deprivation, Waters et al. (2018) analyzed the data from 760 otherwise healthy individuals and found the prevalence of the

visual modality to be the highest, followed by the somatosensory and the auditory modalities. The authors noted that when sleep deprivation was prolonged to 50 hours multimodal hallucinations occurred. Describing and analyzing 226 cases in his review of lilliputian hallucinations, Blom (2021) also found the prevalence of hallucinations in the visual modality to be the highest, while in the case of multimodal lilliputian hallucinations the auditory modality was also involved quite frequently. The other sensory modalities were, again comparable to what I recorded in the study reported in *Chapter 3*, recruited in a particular order, with tactile and somatic modalities following the visual modality.

Limitations

As far as I know, the present thesis is the first to address the clinical importance of multimodal hallucinations in general and, more specifically, in Muslim patients with schizophrenia spectrum disorders who attribute these hallucinations to jinn, the evil eye and/or voodoo. I found that hallucinations involving more than one sensory modality are more prevalent than hitherto known, and not only, as was long believed, in non-Western patient groups. Of course, the weaknesses of the studies collected in this thesis warrant attention. The first and main drawback of the research reported is the relatively small number of Muslim patients that we were able to interview comprehensively in the studies on jinn encounters. During the recruitment phase we already noted that, both in the clinical and the outpatient groups, many patients were reluctant to open up about their perceived encounters with jinn because they feared repercussions and stigmatization. This led to a lower number of participants than anticipated as well as a higher dropout during the interviews. The number of patients participating in the study on tactile and somatic hallucinations (*Chapter 5*) was particularly low. It is questionable whether the results on this subgroup of clinical patients with severe psychotic disorders are generalizable to other Muslim patients with schizophrenia spectrum disorders and to other patients with these specific symptoms. Still, here too, we found indications that the actual number of patients that suffer from these phenomena may be much higher. Secondly, our studies were all cross-sectional in nature, which necessarily meant that we were unable to properly assess the development of multimodal hallucinations over time or to further corroborate the hypothesis of the involvement of a stochastic process.

Recommendations for clinical practice and further research

In clinical settings, I recommend including a routine assessment of multimodal hallucinations in the evaluation of the psychiatric history and mental state examination. Moreover, rather than limiting this to the five 'main' sensory modalities, I advocate to systematically gauge the presence of hallucinations in all 14 sensory modalities cited in this thesis to help increase our understanding of the experiences of the patients we see in our daily practice and to accordingly arrive at more precise differential diagnoses. In doing so, we, as clinician-scientists, will be enabled to gain more in-depth knowledge of the etiology and pathophysiology of multimodal hallucinations and thus improve treatment strategies. Since little is known about the effects of antipsychotics on multimodal hallucinations, let alone in the context of varying underlying disorders, another step might be to set up pharmacological clinical trials with the ultimate goal to develop targeted treatment guidelines.

To test the influence of stochastic processes empirically, we need prospective studies. If such noisy processes are indeed pivotal to the mediation of multimodal hallucinations, early interventions with antipsychotics targeting auditory or visual hallucinations might well prevent the recruitment of subsequent sensory modalities, and thus diminish the risk of multimodal hallucinations developing. Regarding non-pharmacological therapies for hallucinations (e.g., cognitive-behavioral therapy and psychoeducation), at present most are directed at unimodal hallucinations, notably in the auditory or visual modality (O'Brien & Johns, 2013; Wilson et al., 2016; Thomson et al., 2017). What is more, the efficacy of repetitive transcranial magnetic stimulation (rTMS) has chiefly been researched in the context of (treatment-resistant) auditory hallucinations (Guttesen et al., 2021). As a corollary, there is still a long way to go before these non-pharmacological therapies can be applied to multimodal hallucinations. Given that systematic research into multimodal hallucinations has only recently gained momentum and the clinical burden for patients experiencing them tends to be substantial, a further exploration of these treatment possibilities deserves our full attention and effort.