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# A phenomenological survey of auditory verbal hallucinations in the hypnagogic and hypnopompic states

Simon R. Jones · Charles Fernyhough · Frank Larøi

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**Abstract** The phenomenology of auditory verbal hallucinations (AVHs) occurring in hypnagogic and hypnopompic (H&H) states has received little attention. In a sample of healthy participants ( $N=325$ ), 108 participants reported H&H AVHs and answered subsequent questions on their phenomenology. AVHs in the H&H state were found (1) to be more likely to only feature the occasional clear word than to be clear, (2) to be more likely to be one-off voices than to be recurrent voices, (3) to be more likely to be voices of people known to the individual than unknown persons, (4) to be more likely to talk directly to the person rather than not, and (5) to only rarely give commands, ask questions, or to result in an interactive conversation. Their phenomenology was similar to normative AVHs in wakefulness (as established by previous research) in that the voice-hearer was usually the target of the voice, and the voice was more likely to be of a recognized person. However, H&H AVHs differed from AVHs in wakefulness in that commands and questions were rare, and there was typically no dialogical engagement with the voice. We conclude by proposing that two distinct types of H&H AVHs may exist (which we term “dialogic” and “monologic”), based on an analysis of the phenomenology of the experience, and suggest avenues for future research.

**Keywords** Auditory verbal hallucination · Dialogic · Hypnagogic · Hypnopompic · Phenomenology

## Introduction

“Just before falling asleep” observed Vladimir Nabokov, “I often become aware of a kind of a one-sided conversation going on in an adjacent section of my mind, quite

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independently from the actual trend of my thoughts” (Nabokov 1999, p. 20). Nabokov also recorded experiencing, on the verge of sleep, images of “gray figures walking between beehives, or small black parrots gradually vanishing among mountain snows, or a mauve remoteness melting beyond moving masts.” (p. 20). In addition to the auditory and visual hallucinations Nabokov reported, hallucinations in other modalities are also found on the borders of sleep. These can include olfactory experiences, tactile experiences (such as the sensation of being touched), or a sensed or felt presence in the absence of any perceptible evidence (Cheyne et al. 1999). This no man’s land between sleeping and waking has long been known to be a fertile state for hallucinatory experiences. Not only have artists such as Nabokov noted this but also many religious figures, such as St. Teresa of Ávila and Emanuel Swedenborg (Jones and Fernyhough 2008). While the richness of Nabokov’s “hypnagogic mirages” (p. 21) may be unusual, almost all individuals in the general population will undergo hallucinatory experiences on the borders of sleep during their lifetime (Ohayon 2000).

Hallucinations on the border of sleep are referred to as hypnagogic if occurring in the transition between waking and sleep or hypnopompic if occurring in the transition between sleep and waking (Mavromatis 1988). As Mavromatis has argued that there are no clear differences between hypnagogic and hypnopompic hallucinations, we treat them here as belonging to the same group of phenomena. However, in this paper, we will focus on specifically auditory verbal hallucinations (AVHs) which have been defined as hearing a voice in the absence of a corresponding external verbal stimulus, with a sufficient sense of reality to resemble a veridical perception (e.g., David 2004). Such experiences may be accompanied by varying degrees of cognitive insight (i.e., the knowledge that one is hallucinating). We focus on verbal, as opposed to nonverbal auditory hallucinations, as it has been proposed that the different phenomenologies of these two experiences may suggest different underlying causes (Jones 2010).

AVHs, of course, may occur both in wakefulness as well as on the borders of sleep. However, historically, AVHs in the hypnagogic/hypnopompic (henceforth “H&H”) state and those occurring in wakefulness have been treated as separate phenomena. The reasons for the development of such a position is unclear, although it likely stems from the nineteenth century view that AVHs in the H&H state are not associated with pathology, whereas those in wakefulness are (Leudar and Thomas 2000).

### AVHs in wakefulness

Much systematic research has been performed into the phenomenology of AVHs in wakefulness. As these are experienced by 60–74% of those diagnosed with schizophrenia, the phenomenology of this population’s AVHs has received particular attention (e.g., Nayani and David 1996). However, it has long been recognized that such AVHs are not necessarily a sign of mental disorder (Jones and Fernyhough 2008), and some studies have examined the phenomenology of AVHs in wakefulness experienced by those without a psychiatric diagnosis (e.g., Leudar et al. 1997).

Although a number of differences exist between the AVHs of schizophrenia patients and those of healthy voice-hearers, it has been argued that there are no radical or

qualitative differences in the structure and function of their voices (Leudar et al. 1997). Sufficient similarity exists to allow a general picture of the phenomenology of AVHs in wakefulness to be summarized as follows. The majority of such AVHs are clear, the voices are likely to be recognized, i.e., like a person known to the voice-hearer (as opposed to being incognito), and are typically recurrent, as opposed to one-off voices (ibid). Approximately 50% of those who experience AVHs in wakefulness understand to be themselves the target of their voices (ibid). In terms of the pragmatics of the voices, the voices often issue commands to the voice-hearer. The voices also often ask questions and make suggestions for performing actions. Indeed, a notable feature of AVHs in wakefulness is that they often involve regulating the activities of the voice-hearer (ibid). It has also been found that the majority of individuals with AVHs in wakefulness are able to ask questions to their voices and to get responses to these questions from the voices (ibid).

### AVHs in the hypnagogic/hypnopompic state

In contrast to the comparatively rare experience of AVHs in wakefulness, AVHs in the H&H state are common (Jones et al. 2009; Ohayon 2000). Ohayon observed that 25% of participants from the general population (in three different countries) reported hypnagogic hallucinations and 18% reported hypnopompic hallucinations. However, in contrast to the detailed work on the phenomenology of AVHs in wakefulness and despite the rich autobiographical descriptions of H&H experiences bequeathed to us by those including artists and theologians, no systematic research has been performed into the corresponding properties of AVHs in the H&H state.

What is known about the phenomenology of AVHs in the H&H state can be drawn from the most recent large-scale review of H&H experiences (Mavromatis 1988). Mavromatis reported that H&H AVHs can include hearing one's name being called, neologisms, irrelevant statements, nonsense, quotations, references to spoken conversation, and remarks directed to oneself. Voices may also take the form of meaningful responses to one's current thoughts, but such statements are typically not directed to anybody (ibid). However, Mavromatis's information was drawn from selective examinations of individual reports and anecdotes of voice-hearing in the H&H state, rather than a systematic study of such experiences.

There are a number of reasons for believing that establishing the phenomenology of H&H AVHs is likely to prove beneficial. Firstly, it will provide us with a better understanding of the phenomenology of such AVHs in and of themselves. This will, in turn, allow a systematic comparison of the phenomenology of H&H AVHs with the phenomenology of AVHs in wakefulness. This should help to establish whether the former are a qualitatively different type of phenomenon as compared to the latter. Such a phenomenological comparison forms one strand of a wider research goal, not addressed in this paper but likely to be of importance, of understanding the potential relations between H&H AVHs, AVHs in wakefulness, and other cognitions, such as intrusive thoughts. Are H&H AVHs, for example, a developmental precursor of AVHs in wakefulness? Do AVHs in these two states share underlying cognitive and neurobiological mechanisms, and are the mechanisms underlying the loss of agency for self-produced cognitions, such as inner speech or memories, the same in each of

these states? What is the difference, if any, between intrusive thoughts in wakefulness and intrusions in the H&H state which are experienced as alien?

The present paper set out to firstly establish the phenomenology of AVHs in the H&H state in a student population. Our specific interest was in phenomenological properties of AVHs previously documented for AVHs in wakefulness, namely (1) clarity, (2) whether the same voices reoccur, (3) whether the voices were of people known to the voice-hearer, (4) whether the voices directly address the voice-hearer, (5) whether the voices issued commands or asked questions, (6) the emotional content of the voices, and (7) whether the voices can be engaged with. We then aimed to compare the phenomenology of the H&H AVHs in our sample with the phenomenology of typical AVHs in wakefulness, as established by previous research. We also intended to compare the phenomenology of the H&H AVHs of individuals high and low in proneness to hallucinations in wakefulness. The rationale for this was to establish whether those with a greater tendency to experience AVHs in wakefulness had qualitatively different AVHs in the H&H state as compared to those with a lesser tendency to experience AVHs in wakefulness.

## Method

### Participants

Undergraduate and postgraduate students ( $N=325$ , 212 women) with a mean age of 22.5 years ( $SD=5.8$ , range=18–60) participated in the study. Participants were recruited through e-mail invitation, and there was no financial incentive to participate; the likelihood of repeated participation was thus considered negligible. Answers were given anonymously, with only the age and gender of the participants being recorded.

### Measures

Participants completed the following online questionnaires in the order stated below:

*Durham Hypnagogic and Hypnopompic Hallucinations Questionnaire* (Jones et al. 2009) The Durham Hypnagogic and Hypnopompic Hallucinations Questionnaire (DHQ) is a 14-item scale assessing the presence of auditory and visual H&H hallucinations as well as the feeling of a sensed presence in the H&H state. Items are scored on a six-point Likert scale ranging from: “never” (0) to “very frequently” (5). Scores are calculated for three subscales: auditory H&H hallucinations (DHQ<sub>aud</sub>), visual H&H hallucinations (DHQ<sub>vis</sub>), and felt presence H&H experiences (DHQ<sub>pres</sub>). This instrument has been shown to have satisfactory psychometric properties (ibid).

After completing the DHQ, participants who had reported experiencing hearing a voice in the H&H state were asked to answer follow-up questions, also presented online. Participants were asked (1) whether the voice they heard was typically clear, unclear, or a voice with the odd clear word; (2) whether the voices they heard were typically recurrent (i.e., the same person), one-off voices, or a mix of one-off voices and recurrent voices; (3) how often they had heard a voice that was known to them,

and how often they had heard a voice they did not recognize. This latter item had the same response options as the DHQ. Finally, participants were asked the questions shown in Table 1 (with the response options therein), which investigated (4) whether the voice directly addressed them, (5) whether the voice issued commands or asked questions, (6) the emotional content of the voices, and (7) the extent to which the voices were engaged with.

*Proneness to hallucinations in wakefulness* This was assessed using the revised Launay–Slade Hallucination Scale (LSHS-R; Bentall and Slade 1985). Participants were instructed that they should only respond in the affirmative to questions on this scale if they had had the relevant experiences in wakefulness, and not in the H&H state. The LSHS-R is a 12-item instrument designed to measure predisposition to hallucination-like experiences. Each item is scored on a five-point Likert scale ranging from “certainly applies to me” to “certainly does not apply to me.” Total scores can range from 0 to 48. Higher scores indicate a greater predisposition to hallucination-like experiences.

## Results

Of the 325 participants who took part, 108 individuals (termed H&H voice-present) indicated that they had heard voices in the H&H state and were happy to answer questions on their phenomenology. Nonparametric analyses (using Mann–Whitney’s  $U$ ) showed that the H&H voice-present group scored significantly higher than the H&H voice-absent group on all scales of the DHQ ( $p < 0.001$ ). There was no significant difference in age,  $t(323) = 1.12$ , ns, or gender composition,  $\chi^2 = 0.15$ , ns, between the H&H voice-present and H&H voice-absent groups.

**Table 1** Phenomenology of H&H AVHs ( $n = 108$ )

	Yes (%)	No (%)	Can't tell (%)	Difference between “yes” and “no” groups ( $\chi^2$ )
Do the voices talk to you directly (i.e., you feel they are directly addressing you)?	42	24	34	5.09, $p < 0.05$
Does the voice ever command you to, or advise you, to perform an action (i.e., do this)?	4	68	28	62.82, $p < 0.001$
Do the voices ever ask you questions?	12	56	32	30.26, $p < 0.001$
Does the voice say nice things?	17	22	61	0.86, non-significant
Does the voice say nasty things?	9	34	57	15.51, $p < 0.001$
Does the voice say mundane things?	35	16	49	8.01, $p < 0.01$
Have you ever spoken back, aloud, to this voice you heard?	32	53	15	5.26, $p < 0.05$
Have you ever spoken back, silently in your thoughts to the voice?	53	36	11	3.38, non-significant
Have you ever managed to engage the voice in a form of conversation?	8	74	18	56.64, $p < 0.001$

Correlations between the DHQ subscales were examined in the voice-present and voice-absent groups using a Bonferroni-corrected significance level of  $\alpha=0.01$ .  $DHQ_{aud}$  scores correlated with  $DHQ_{vis}$  scores for both the H&H voice-present group,  $r(106)=0.51$ ,  $p<0.001$ , and the H&H voice-absent group,  $r(215)=0.43$ ,  $p<0.001$ . The correlation between the  $DHQ_{aud}$  and  $DHQ_{pres}$  scores was significant in the voice-present group,  $r(106)=0.42$ ,  $p<0.001$ , but not in the voice-absent group,  $r(215)=0.16$ , ns. The correlation between  $DHQ_{aud}$  and  $DHQ_{pres}$  scores was significantly stronger in the voice-present group compared to the voice-absent group,  $\chi^2=5.45$ ,  $p<0.05$ .

The phenomenology of the voices reported by the H&H voice-present group was then analyzed. In terms of clarity, 35% of participants said their voices were unclear, 43% said they only included the odd clear word, and only 22% said they were clear. This distribution differed significantly from chance,  $\chi^2=6.89$ ,  $p<0.05$ . Post hoc tests showed that voices were significantly more likely to only include the odd clear word than to be clear, but not significantly more likely to be unclear than clear. In terms of recurrence of the voices, 46% reported one-off voices, 12% reported the voice of the same person all the time, and 42% reported a mix of one-off and recurrent voices. This distribution differed significantly from chance,  $\chi^2=24.22$ ,  $p<0.001$ . Post hoc tests showed AVHs were more likely to be either one-off voices or a mix of one-off and recurrent voices than to be solely the voice of the same person all the time. Eighty-one percent of participants who had heard a voice in the H&H state had had the experience of hearing a voice of a person they recognized, whereas 70% had had the experience of hearing a voice of a person unknown to them. Nonparametric analysis (using Wilcoxon's  $Z$ ) indicated that participants more frequently heard a voice that they recognized than the voice of a person unknown to them.

Table 1 gives further details on the properties of the voices reported, which we summarize here. The majority of the H&H voice-present group reported never having heard a voice that gave them a command. Questions from the voices were also rare. The majority of the H&H voice-present group were unsure of the emotional content of their voices. However, of those who could identify an emotional content (or lack thereof), affectively neutral content was most common (38%), with positive content (18%) and negative content (10%) being less common. In terms of dialogical positioning, it was significantly more likely for voices to talk directly to the person than not to. In terms of responding to the voice, people were more likely not to have done this than to have done it. Although a majority of people had responded in their thoughts to the voice, this proportion was not significantly greater than those who had not. Only a minority of people had been able to engage the voice in a form of conversation, and significantly more people had not been able to engage the voice in conversation.

In order to probe further the relation between AVHs in wakefulness and those in the H&H state, the phenomenology of H&H AVHs in the current sample was analyzed by the propensity of such individuals to experience AVHs in wakefulness. A quartile split was performed on the 108 participants who indicated they had heard voices in the H&H state, based on their LSHS-R scores. The phenomenology of the AVHs in the hypnagogic state experienced by those in the top quartile of LSHS-R scorers ( $n=27$ ,  $M=34.11$ ,  $SD=3.45$ ) was compared with the phenomenology of the AVHs in the hypnagogic state experienced by those in the bottom quartile of LSHS-

**Table 2** Comparison of the phenomenology of H&H AVHs of groups with high and low proneness to AVHs in wakefulness

	High LSHS-R (% yes)	Low LSHS-R (% yes)	<i>p</i>
Do the voices talk to you directly (i.e., you feel they are directly addressing you)?	52%	65%	0.52
Does the voice ever command you to, or advise you, to perform an action (i.e., do this)?	13%	0%	0.24
Do the voices ever ask you questions?	33%	0%	0.02
Does the voice say nice things?	33%	20%	0.65
Does the voice say nasty things?	35%	8%	0.17
Does the voice say mundane things?	88%	50%	0.04
Have you ever spoken back, aloud, to this voice you heard?	62%	47%	0.05
Have you ever spoken back, silently in your thoughts to the voice?	74%	23%	0.002
Have you ever managed to engage the voice in a form of conversation?	14%	0%	0.23

R scorers ( $n=27$ ,  $M=10.48$ ,  $SD=3.29$ ). The clarity of the voices heard did not differ between the two groups,  $\chi^2=0.64$ , ns, with most in each group hearing clear voices, or voices with the odd clear word. The recurrence of voices also did not differ,  $\chi^2=3.78$ , ns, with the majority of respondents in each group claiming to hear one-off voices or a mix of one-off and recurrent voices.

The percentage of affirmative responses to the remaining questions asked was then calculated as a proportion of the total “yes” and “no” responses to each question (i.e., unsure responses were excluded). The two groups were compared using Fisher’s exact probability test. The results of this comparison are summarized in Table 2. It was found that those who had a high level of hallucination proneness in wakefulness were significantly more likely (compared to those who were low in such hallucination proneness) to experience AVHs in the hypnagogic state that were affectively neutral, that asked questions, and to which they responded both aloud and in their thoughts.

## Discussion

The present study set out to establish a number of the phenomenological properties of AVHs in the H&H state and to perform the first systematic comparison of these AVHs with those experienced in wakefulness. We also aimed to compare the phenomenology of AVHs in the H&H state of those who were high and low in hallucination proneness in wakefulness to see if these two groups had phenomenologically different AVHs in the H&H state.

In terms of the phenomenology of the AVHs experienced in the H&H state, it was first found that there was no significant difference between the number of people who found their voices to be clear and those who found their voices to be unclear. However, participants were more likely to have heard an odd clear word than their



voices being entirely unclear. Second, such voices were more likely to be one-off voices or a mix of one-off voices and recurrent voices than a recurrent voice of the same person. Third, voices in the H&H state were more likely to be voices of people known to the individual than unknown people. Fourth, it was more common for voices to talk directly to the person than not to. Fifth, it was found that AVHs giving commands were rare. Participants were more likely to have never heard a command in this state than to have heard a command. Similarly, AVHs asking the voice-hearer questions were also rare, with participants more likely to have never heard a question in this state than to have heard a question. Sixth, it was found that the majority of participants were unsure as to the emotional content of their voices. However, of those who could identify an emotional content, affectively neutral content was more common than positive and negative content. Seventh, participants were more likely to have not responded aloud to their voices than to have responded. Finally, only a minority of participants (9%) had been able to engage the voice in a form of conversation, and participants were significantly more likely not to have been able to engage in such a conversation.

Establishing the phenomenology of AVHs in the H&H state allowed comparison with the known phenomenology of AVHs in wakefulness established by previous research. The broad trends are shown in Table 3. In terms of similarities, AVHs in the H&H state were like AVHs experienced in wakefulness in that they were more likely to be voices of people known to the individual than unknown people. The finding that most voices heard in the H&H state were neither positive nor negative in emotional content but merely affectively neutral is in line with voices heard in wakefulness. Furthermore, like AVHs in wakefulness, those in the H&H state were more likely to talk directly to the person than not. Also, in line with AVHs in wakefulness, the majority of participants had responded to their H&H AVHs, although most people responded in their thoughts to the voice rather than aloud.

A number of differences were also noted. First, whereas voices in wakefulness are typically clear, we found that AVHs in the H&H state were more likely to be unclear

**Table 3** Phenomenology of AVHs in the H&H state and in wakefulness

Property of voice	AVH		Comparable?
	H&H state	Wakefulness	
Clarity	Generally unclear or just the odd clear word	Generally clear	No
Recurrent nature	Generally one-off voices or a mix	Generally recurrent voices	No
Known speaker	Majority known	Majority known	Yes
Address the voice-hearer	Generally directed at the voice-hearer	Generally directed at the voice-hearer	Yes
Commands	Rare	Common	No
Questions	Rare	Common	No
Emotional content	Generally affectively neutral	Generally affectively neutral in nonclinical populations, generally abusive in clinical sample	Yes

or involve voices with only the odd clear word. Second, we found voices in the H&H state to be more likely one-off voices or a mix of one-off voices and recurrent voices, differing from voices in wakefulness which are more likely recurrent voices. Third, whereas AVHs in wakefulness often involve the voice giving the voice-hearer a command, only 4% of participants reported hearing a voice in the H&H state that gave them a command. Similarly, voices asking questions are common in AVHs in wakefulness but were rare in H&H AVHs. However, we were not able to perform statistical tests to establish whether these differences were (statistically) significant.

We also examined whether the phenomenology of H&H AVHs differed according to the proneness to hallucinations in wakefulness of participants in our study. It was found that those with high (as compared to low) hallucination proneness in wakefulness were more likely to experience H&H AVHs that were affectively neutral, asked questions, and to which they responded either in their thoughts or overtly. No command AVHs in the H&H state were reported by those low in proneness to hallucinations in wakefulness, but three were reported by those high in proneness to hallucinations in wakefulness. Similarly, none of the former group reported being able to engage their voices in conversation, whereas three of the latter group could. Although neither of the previous two comparisons was statistically significant, this was likely due to the limited power of these comparisons, which due to the relatively small sizes involved were only able to detect medium to large effect sizes. We noted in the “[Introduction](#)” that AVHs in wakefulness ask questions to the voice-hearer, are responded to by the voice-hearer, and involve commands and questions. Our findings suggested that those who are more prone to hallucinations in wakefulness are more likely to experience AVHs in the H&H state with phenomenological properties typical of AVHs in wakefulness.

We now turn to a consideration of how we may interpret these findings. We propose that the present study offers preliminary evidence consistent with an interpretation that suggest that at least two types of phenomenologically distinct AVHs may exist in the H&H state. The first type is similar to the AVHs that occur in wakefulness. These H&H AVHs are likely to ask questions, issue commands, and be responded to by the hearer. We term these “dialogic” H&H AVHs. These are more likely to be experienced by those who are prone to experience hallucinations in wakefulness. The second type of AVH we propose to exist can be negatively characterized by their failure to involve commands or questions and their tendency to lack a dialogic, interactive nature. We term these “monologic” H&H AVHs. Such AVHs are more likely in those who are not prone to experience hallucinations in wakefulness. Naturally, we would call for the replication of these findings in a larger sample before any firm conclusions can be drawn, and such a typology remains, at present, tentative. If such a distinction does exist, it may be that only “dialogic” H&H AVHs predict onset of AVHs in wakefulness (such as those associated with psychosis), and this may have important implications for early detection and interventions with those likely to develop clinically relevant AVHs in wakefulness.

In this context, it would be important for future research to examine the psychological mechanisms that underlie AVHs in the H&H state in general (and compared to those experienced in wakefulness) and, furthermore, to compare those mechanisms that underlie our two postulated types (i.e., dialogic versus monologic). For instance, due to the fact that participants could rarely tell the emotional content

of their voices in the H&H state and when they did it was rarely of a “nasty” character, emotional and motivational factors probably play a lesser role in these experiences than they do in AVHs in wakefulness. In contrast, the “dialogic” type perhaps involves various emotional and motivational factors due to the fact that they often ask questions and issue commands, which may result in participants reacting with negative emotional states (e.g., anxiety, distress, depression). Identifying the relative role of such (negative) affective processes in hallucinatory experiences (whether in the H&H state or in wakefulness) is important as those with elevated levels of negative affects may be more likely to “cross over” to more problematic experiences which furthermore could later develop into frank psychotic hallucinatory experiences in wakefulness. Moreover, while AVHs in the H&H state and in the clear conscious state are likely to both involve metacognitive processes (such as self-monitoring and source monitoring skills), the presence of negative affects (whether as reactions to the experiences themselves or in terms of content of the experiences) may likely have a negative impact on these metacognitive skills, thus further aggravating the situation (e.g., resulting in increased frequency of these experiences, decreased level of cognitive control, etc.). Furthermore, although requiring future research, we suggest that it may be that the dialogic AVHs are not simply longer and grammatically better formed but are qualitatively different from the monologic AVHs, in that the former but not the latter attempt to communicate with the hearer. Indeed, the lack of felt communicative intent in monologic AVHs suggests that they may have more in common with nonauditory AVHs than dialogic AVHs. This proposal echoes Jones’ (2010) proposal that there may exist multiple types of AVHs in wakefulness, with distinct phenomenological properties and different underlying mechanisms.

A number of limitations of the present study need to be acknowledged. Firstly, the present study’s reliance on self-report raises the question as to the reliability and validity of data obtained from introspection (e.g., Nisbett and Wilson 1977). This, in conjunction with the hypnagogic state, might potentially make it hard for participants to report on the phenomenological properties of such experiences. However, we note that the majority of participants did not reply that they were “not sure,” indicating that they believed themselves to know what such experiences were like. However, in line with Hurlburt and Heavey’s (2001) argument that concerns about introspection should not lead us to dismiss the approach altogether, we acknowledge the need to develop improved methods for collecting such material. Secondly, it is unclear how the drowsy state in which AVHs in the H&H state are experienced may affect their content. Thirdly, we did not distinguish between voices in hypnagogic and hypnopompic states. Future research may wish to investigate whether the phenomenology of voices is significantly different in these two states. Fourthly, the generalizability of the present findings from a student sample to the general population is unclear, and this study needs to be replicated with a sample from the general population. Finally, it may be that some of the participants experienced H&H AVHs during sleep paralysis (Cheyne et al. 1999). It would hence be worthwhile to examine how the phenomenology of H&H AVHs differ between those experienced during sleep paralysis and those that are not.

In terms of future research, a number of avenues building on the initial findings here are likely to prove fruitful. Firstly, it would be desirable to examine the phenomenology of AVHs in the H&H state via an alternative methodology, for

example one involving instant recording of the properties of the voices via bedside diaries. Secondly, it is possible that H&H AVHs may act as developmental precursors to AVHs experienced in wakefulness (Jones and Fernyhough 2009). Longitudinal studies would be needed to test such a hypothesis. Thirdly, it is known that there is a relation between trauma, such as physical or sexual abuse, and AVHs in wakefulness (Read et al. 2005). Such a relation may also hold for AVHs in the H&H state. Such a hypothesis seems plausible given (a) the tendency for trauma to lead to cognitive intrusions (Brewin et al. 1996) and (b) the finding that the tendency to experience intrusive thoughts is associated with both waking AVHs (Jones and Fernyhough 2006) and those in the H&H state (Jones et al. 2009). Fourthly, it would be interesting to employ a within-subjects design to study how the H&H AVHs of patients with psychosis compare to the H&H AVHs such patients may have in wakefulness (although it is worth noting that the occurrence of specifically H&H AVHs in those with psychosis has not yet been examined). Fifthly, it may also be profitable for future work to examine the relation, particularly in populations where AVHs are more frequent, between the form and content of an individual's AVHs in the wakeful state, their AVHs in the H&H state, and auditions in their dreams. Sixthly, it appears likely that the degree of insight into H&H hallucinations (i.e., the degree to which the individual recognizes that such experiences are hallucinations) is greater than in those who have hallucinations in wakefulness. Future research may wish to examine this question, however, and investigate the level of insight individuals have into their H&H experiences and the consequences this has for them. Finally, it would be intriguing to examine how the nature of individuals' H&H AVHs may alter if individuals are encouraged to interact with them. Contemporary studies of individuals who engage with AVHs they experience in wakefulness have found that the number and nature of the AVHs may alter when they are dialogically engaged with (e.g., Davies et al. 1999). In conclusion, it appears there is still much work to do before we stop being in the dark about the voices in the dark.

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