The Same or Different? A Phenomenological Comparison of Auditory Verbal Hallucinations in Healthy and Psychotic Individuals

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Submitted: *October 26, 2009; accepted January 27, 2010 (doi:10.4088/JCP.09m05797yel).*
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Objective: Whereas auditory verbal hallucinations (AVHs) are most characteristic of schizophrenia, their presence has frequently been described in a continuum, ranging from severely psychotic patients to schizotypal personality disorder patients to otherwise healthy participants. It remains unclear whether AVHs at the outer borders of this spectrum are indeed the same phenomenon. Furthermore, specific characteristics of AVHs may be important indicators of a psychotic disorder.

Method: To investigate differences and similarities in AVHs in psychotic and nonpsychotic individuals, the phenomenology of AVHs in 118 psychotic outpatients was compared to that in 111 otherwise healthy individuals, both experiencing AVHs at least once a month. The study was performed between September 2007 and March 2010 at the University Medical Center, Utrecht, the Netherlands. Characteristics of AVHs were quantified using the Psychotic Symptoms Rating Scales Auditory Hallucinations subscale.

Results: The perceived location of voices (inside/outside the head), the number of voices, loudness, and personification did not differentiate between psychotic and healthy individuals. The most prominent differences between AVHs in healthy and psychotic individuals were the emotional valence of the content, the frequency of AVHs, and the control subjects had over their AVHs (all P values $< .001$). Age at onset of AVHs was at a significantly younger age in the healthy individuals ($P < .001$). In our sample, the negative emotional valence of the content of AVHs could accurately predict the presence of a psychotic disorder in 88% of the participants.

Conclusions: We cannot ascertain whether AVHs at the outer borders of the spectrum should be considered the same phenomenon, as there are both similarities and differences. The much younger age at onset of AVHs in the healthy subjects compared to that in psychotic patients may suggest a different pathophysiology. The high predictive value of the emotional content of voices implies that inquiring after the emotional content of AVHs may be a crucial step in the diagnosis of psychotic disorders in individuals hearing voices.

J Clin Psychiatry 2011;72(3):320–325

Auditory verbal hallucinations (AVHs) are most characteristic of schizophrenia, in which they occur in 70% of the patients.[1] As with other psychotic symptoms, AVHs have been described along a continuum of individuals, ranging from severely psychotic schizophrenia patients, to patients with schizotypal or borderline personality disorder to individuals with infrequent hallucinatory experiences who function within the normal range.[2–15] It is usually assumed that AVHs in all individuals along this spectrum are the same phenomenon, and differ predominantly in terms of severity and associated dysfunction.[16–19] However, it is currently unclear if AVHs at different parts of this continuum are phenomenologically similar or distinct.[20] It could be that AVHs in healthy subjects are more similar to normal verbal thoughts, while the abnormal perceptual quality of AVHs may be more pronounced in psychotic individuals. Knowledge of specific qualities characteristic of AVHs in individuals with psychosis that are absent in healthy subjects with AVHs would facilitate the conceptualization of the continuum hypothesis. Should AVHs in healthy subjects be viewed as a symptom similar to that in schizophrenia but experienced at a lower frequency? Or, alternatively, should AVHs in healthy individuals be viewed as an intermediate between true perceptual aberration and normal verbal imagery?

In addition to the scientific consequences, clear phenomenological distinctions between AVHs in psychotic and healthy individuals may be helpful to diagnose the presence or absence of a psychotic disorder in individuals hearing voices. The current diagnostic systems, the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision (*DSM-IV-TR),* and *the International Statistical Classification of Diseases and Related Health Problems*, *Tenth Revision*, are not very helpful for this clinical distinction, as individuals with "persistent auditory hallucinations in the absence of any other feature" are a subgroup of psychotic disorder not otherwise specified. The general criterion of the *DSM* system, that a disorder cause significant dysfunction, has to be applied strictly in order not to diagnose well-functioning individuals with persistent hallucinations as being psychotic. This phenomenon may not be straightforward

For Clinical Use

- Mean age at onset of auditory verbal hallucinations (AVHs) differs between healthy individuals (12.4 years old; SD = 13.6) and psychotic patients (21.4 years old; SD = 11.7).
- Emotional valence of content is the main predictor of the presence of a psychotic disorder and therefore is a crucial question in each diagnostic interview.
- Other important factors to explore in the differential diagnosis of psychosis are the amount of control over AVHs and the frequency of AVHs.

in every individual, and some diagnostic aid derived from the phenomenology of AVHs could therefore be very useful.

Several authors have tried to define characteristics of AVHs specific for a psychotic disorder. Junginger and Frame[21] hypothesized that voices perceived as being from the outer world are indicative of a psychotic disorder, while voices perceived as being inside the head are not. Likewise, the (delusional) attribution of voices, ie, externalizing the voices as alien, is considered specific to patients with a psychotic disorder. Ziskind[22] pointed out that hallucinations cannot be classified as true hallucinations when there is no lack of insight. Frequency of AVHs is often used as a diagnostic tool and some suggest that this discriminates well between psychotic patients and nonpsychotic individuals with AVHs.[23] However, most of these hypotheses lack empirical corroboration, leaving the question of their diagnostic value unanswered.

The purpose of this study is 2-fold: first, to investigate if AVHs are the same phenomenon in the 2 extreme limits of the spectrum and, second, to investigate which characteristics have most prominent diagnostic value in predicting the presence or absence of a psychotic disorder.

We therefore describe, with the help of a validated standard questionnaire, the phenomenology of AVHs in a large sample of healthy subjects with AVHs and compare it to that of AVHs in psychotic patients.

METHOD

Subjects

All participants were between 18 and 65 years of age, and they experienced persistent AVHs, ie, at least once a month for over 1 year. Healthy participants with AVHs were recruited and selected with the help of a Dutch Web site, called "Explore Your Mind" (www.verkenuwgeest.nl). This Web site, which is linked to several mental health and general health Web sites, provides a self-test which was the incentive for most visitors to fill out the questionnaire.

The questionnaire on the Web site was based on the Launay and Slade Hallucinations Scale (LSHS),[24] a self-report questionnaire designed to quantify the tendency to hallucinate in healthy individuals. Over 5,000 visitors have filled out the questionnaire on the Web site. From these, subjects with high scores on items 8 ("In the past, I have had the experience of hearing a person's voice and then found that no-one was there") and 12 ("I have been troubled by voices in my head") of the LSHS were selected. Trained psychologists interviewed these respondents by telephone. Individuals were invited to participate if they met the following inclusion criteria: (1) voices were distinct from thoughts and had a perceptual quality; (2) voices were experienced at least once a month, for over 1 year; (3) no diagnosis or treatment for psychiatric disorders other than depressive or anxiety disorders in complete remission; (4) no alcohol or drug abuse for at least 3 months; and (5) no chronic somatic disorder.

One hundred sixty individuals who fulfilled all these criteria were invited to visit our clinic to undergo a psychiatric interview for diagnosis, applying the Comprehensive Assessment of Symptoms and History (CASH) interview[25] and the Structured Clinical Interview for Personality Disorder.[26] Depressive and anxiety disorders in complete remission were not exclusionary criteria. A total of 111 participants with AVHs, who did not meet criteria for a *DSM-IV* diagnosis, were included. The reason these 111 individuals with persistent hallucinations were not diagnosed as having psychosis not otherwise specified, was the absence of professional, psychological, or social dysfunction.

Although the healthy subjects with hallucinations did not have clinical delusions, they did have an elevated schizotypal tendency, as shown with the Schizotypal Personality Questionnaire.[27] The combination of hallucinations (perceptual aberrations) and magical ideation present in most healthy subjects with AVHs made them score on at least 3 items on the *DSM-IV-TR* criteria for schizotypal personality disorder. However, there was no lack in social capacity, nor did these 111 participants have inadequate or constrained affect. Other important arguments for why these subjects did not meet criteria for schizotypy were that their magical beliefs were largely socially accepted (mainly spiritual ideas) and that they were functioning well.

Urine samples were used to screen for cannabis, amphetamine, cocaine, methadone, and heroin use, which were exclusion criteria. History of drug or alcohol abuse did not precede the first experience of voices in these healthy participants.

In addition, a total of 118 outpatients with a psychotic disorder from the University Medical Centre Utrecht, who also experienced AVHs at least once a month for over 1 year, were included. These patients visited our clinic for regular treatment for psychosis or, as a second opinion, for intractable psychosis. In this group, clinical diagnoses were confirmed by an independent psychiatrist using the CASH interview. Ninety-one patients (77.1%) were diagnosed with schizophrenia, 4 (3.4%) with schizoaffective disorder, and

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23 (19.5%) with psychosis not otherwise specified. Demographic and clinical details are shown in Table 1. Details about medication use are provided in Table 2.

The mean age of both groups differed significantly ($t_{227} = 3.023$; $P = .003$), as did sex ($\chi^2_1 = 22.701$; $P < .001$). To adjust for these differences, both variables were entered as covariates in all further analyses.

The study was approved by the Human Ethics Committee of the University Medical Center Utrecht. After complete description of the study to the participants, written informed consent was obtained. The study was performed between September 2007 and March 2010 at the University Medical Center, Utrecht, The Netherlands.

Table 1. Demographic and Clinical Characteristics of the Participants

Characteristic	Patients (n = 118)	Nonpatients (n = 111)
Male, n (%)	71 (60)	32 (29)
Age, mean (SD), y	36.6 (10.9)	41.5 (13.5)
Age at onset of AVHs, mean (SD), y	21.4 (11.7)	12.4 (13.6)
Time since onset of AVHs, mean (SD), y	14.8 (12.6)	28.7 (16.8)

Abbreviation: AVHs = auditory verbal hallucinations.

Table 2. Medication Use

Medication, n (%)	Patients (n = 118)	Nonpatients (n = 111)
Antipsychotic		
Classic antipsychotic	23 (20)	0 (0)
Atypical antipsychotic	78 (66)	0 (0)
No antipsychotic	17 (14)	111 (100)
Previous antipsychotic	13 (11)	2 (2)
Antidepressant		
Current antidepressant	32 (27)	6 (5)
Previous antidepressant	4 (3)	18 (16)

Measurements

For the characteristics of hallucinations, we applied the PSYRATS Auditory Hallucinations Rating Scale (AHRS)[28] and 5 additional questions, written by the authors (see below).

The AHRS was used to examine the following phenomenological characteristics: frequency, duration per hallucination, perceived location (inside and/or outside the head), loudness, explanation about the origin of the AVHs, emotional content (positive/negative), degree of negative content, number of positive versus negative voices, controllability, and total distress. The variable "emotional valence of content" was operationalized as the sum of 3 items from the AHRS: "amount of negative content of voices," "degree of negative content," and "amount of distress," ie, an ordinal variable expressing the overall burden of voices with negative content. The variable "total distress" was operationalized as the sum of 2 items from the AHRS: "intensity of distress," and "disruption to life caused by voices."

Additional questions addressed

- Age at onset: "At which age did you first hear a voice?"
- Number of voices: "How many different voices have you heard during the past month?"
- Personification (ie, attribution to a real and familiar person): "Do the voices sound like someone you know in person?"
- Voices in third person, conversing voices ("Schneiderian hallucinations"): "Do the voices use the words "he" or "she" when they address you?"; "Do the voices speak with each other or simultaneously?"
- Explanation of origin: "Where, in your opinion, do the voices come from?"

Statistics

Multivariate analysis of covariance (MANCOVA) was used to assess any differences in the characteristics of AVHs between the 2 groups. The outcome measures were derived from the AHRS and the additional questions as described above. The grouping variable was the presence/absence of a psychotic disorder as assessed in the CASH interview. Sex and age were entered as covariates.

Although some of our variables are measured on an ordinal scale, fixed effects analysis of variance is robust against deviations from normality (for a detailed discussion see Lindman[29]), particularly when differences in group sizes are small.

To investigate which AVH characteristics best predict the presence of a psychotic disorder, we used logistic regression analysis with diagnosis (patient vs nonpatient) as dependent variable, age and sex as indicators, and the AVH characteristics as binary variables. Auditory verbal hallucination characteristics were dichotomized using a median split in order to avoid potential problems from nonlinear relationships and deviations from normal distributions. The logistic regression model was optimized for explained variance and model fit using a conditional forward approach as implemented in SPSS for Windows, version 15.0.[30]

Age and sex were kept in the model to adjust for possible confounding. Sensitivity, specificity, and positive predictive value were subsequently calculated. All analyses were performed using SPSS.

RESULTS

Characteristics of AVHs

The characteristics of AVHs in the 2 groups are summarized in Table 3. The Willks Λ multivariate test of overall differences among groups was significant ($F_{22,204} = 4815.8$, $P < .001$). A significant main effect for group was present for the variables frequency, duration, emotional valence of content, controllability, voices speaking in third person, total distress, and age at onset (all P values < .001). The patients experienced less control, heard voices talking in the third person more frequently, were older (mean difference of 9 years) when they first heard a voice, and scored significantly

Table 3. Comparison of AVHs in Healthy Individuals and Patients With Description of Mean Scores

Characteristic of AVHs	Questionnaire	Healthy Individuals, Description of Mean	Patients, Description of Mean	Healthy Individuals, Mean (SD)	Patients, Mean (SD)	Statistic $F_{1, 225}$	Statistic *P* Value
Frequency	PSYRATS item 1	1 AVH every 3 days	1 AVH every hour	3.53 (1.26)	5.09 (1.05)	83.19	<.001
Duration	PSYRATS item 2	2–3 minutes	40 minutes	1.53 (0.73)	2.68 (1.23)	63.08	<.001
Location	PSYRATS item 3	Inside head, and further from body	Inside head, and near ears	2.21 (1.15)	2.08 (1.20)	1.25	.265
Loudness	PSYRATS item 4	Little softer than own voice	Little softer than own voice	1.81 (0.65)	1.80 (0.83)	0.29	.594
Explanation of origin	PSYRATS item 5	60% external, 40% internal	50% external	3.17 (1.13)	2.49 (1.23)	17.12	<.001
Emotional valence	Sum item 6, 7, and 8 PSYRATS	Seldom unpleasant voices/content	Majority of voices are unpleasant and/or annoying	1.69 (3.05)	8.58 (2.70)	276.29	<.001
Controllability	PSYRATS item 11	60% of the time	20% of the time	1.77 (1.49)	3.09 (1.08)	39.07	<.001
Number of different voices	Additional question	7.62	11.44	7.34 (17.21)	11.90 (22.34)	2.21	.139
Total distress	Sum item 9 and 10 PSYRATS	Almost no discomfort, almost no disruption of daily life	Moderate to severe distress, and disruption of daily life	0.63 (1.33)	5.01 (1.83)	353.02	<.001
Age at onset	Additional question	12.38 years old	21.36 years old	12.38 (13.59)	21.36 (11.66)	43.20	<.001
Personification	Additional question	Some voices belong to acquaintances	Some voices belong to acquaintances	0.55 (0.70)	0.69 (0.72)	1.64	.202
Voices speaking in third person	Additional question	25%	50%	0.50 (0.66)	1.02 (0.84)	21.62	<.001

Abbreviations: AVHs = auditory verbal hallucinations, PSYRATS = Psychotic Symptoms Rating Scales.

Table 4. Attribution of AVHs to an External Agency

Variable	Healthy Individuals (n = 111)	Patients (n = 118)
Participants with a (predominantly) external explanation, n (%)	82 (74%)	57 (48%)
Among the subjects who considered an external explanation:		
External, yet unspecific explanation	35 (43%)	11 (19%)
Spiritual explanation	47 (57%)	16 (28%)
God	0 (0)	1 (2%)
Demons/devil	0 (0)	5 (9%)
Other (living) people	0 (0)	19 (33%)
Device implanted in brain	0 (0)	5 (9%)

Abbreviation: AVHs = auditory verbal hallucinations.

Table 5. Logistic Regression Model: AVH Characteristics Predicting the Presence of a Psychotic Disorder

Characteristic	B	SE	Wald	Significance
Control	1.020	0.482	4.486	*P* = .034
Frequency	2.134	0.565	14.260	*P* < .001
Age at onset	2.271	0.527	18.566	*P* < .001
Emotional valence of content	3.515	0.523	45.214	*P* < .001
Sex	–0.445	0.493	.817	*P* = .366
Age	–0.018	0.019	.901	*P* = .342

Abbreviation: AVH = auditory verbal hallucination.

Table 6. Logistic Regression Model: Emotional Valence of Content

Variable	B	SE	Wald	Significance
Emotional valence of content	3.693	0.405	83.168	*P* < .001
Sex	–1.062	0.411	6.665	*P* = .010
Age	–0.019	0.016	1.423	*P* = .233

higher on frequency, duration, distress and emotional valence of content than nonpatients. No differences were found for perceived location (ie, inside/outside the head), loudness, number of different voices, and personification.

Attribution to an External Agency

Healthy individuals fostered an external explanation significantly more often than patients. Descriptions of the external explanations are shown in Table 4.

Predictors of a Psychotic Disorder Based on the Characteristics of AVHs

A binary logistic regression model was used to investigate which characteristics best predicted whether a person experiencing AVHs has a psychotic disorder. The optimal model had a satisfactory fit (Hosmer-Lemeshow test, $\chi^2_8 = 13.7$, $P = .09$), and the Nagelkerke approximation of R^2 was high (0.77).

Table 5 shows the statistics of the 4 indicators in the model. Having control over the AVHs for most of the time, hearing voices less than once a day, age at onset before 16 years of age, and hearing voices with a predominantly positive content are good predictors that a person does not have a psychotic illness. The sensitivity and specificity of this model were both 92% (implying that there is a 92% probability of a correct diagnosis using these characteristics).

An explorative binary logistic regression was carried out with only the strongest predictor (emotional valence of content of AVHs), age and sex, and group membership (having a psychotic disorder or not) as the dependent variable. Emotional valence of content provided a better fit and substantial explained variance (Hosmer-Lemeshow test, $\chi^2_8 = 8.7$, $P = .37$), and the Nagelkerke approximation of R^2 was high (0.64).

Table 6 shows the statistics when only emotional valence was included in the model. There was a sensitivity of 86%

and 87% specificity using only this characteristic. The positive predictive value was 88%.

DISCUSSION

A comparison was made between the phenomenological characteristics of AVHs in 111 well-functioning, nonpsychotic individuals and 118 psychotic patients in an attempt to determine if AVHs in both groups are the same phenomenon and to reveal specific characteristics of AVHs that may be helpful in establishing a correct clinical diagnosis. The most prominent difference between the groups concerned the emotional valence of the content of AVHs. This feature appeared to be an important characteristic for diagnosing a psychotic disorder, as negative emotional valence of content (defined as more than half of the comments with a negative content) had a positive predictive value of 88% for a psychotic disorder in this sample. Other significant differences were the higher frequency of AVHs, the lower degree of control over AVHs, and the later age at onset in individuals with a psychotic disorder as compared to otherwise healthy individuals with AVHs. These 4 characteristics together could accurately predict the presence or absence of a psychotic disorder in 92% of the subjects in this sample. Perceived location (voices heard inside or outside the head), loudness, number of voices, and personification (attribution to a real and familiar person) were similar in both groups. In contrast to expectations, having an external explanation for AVHs was not an indicator for the presence of a psychotic disorder. Patients more frequently believed that the voices originated from their own mind (internal explanation), while healthy participants were more inclined to attribute them to an external—often paranormal—source.

While the characteristics of AVHs in schizophrenia patients have been well described,[31] only 1 previous study provided details about the phenomenology of AVHs in healthy subjects. Honig et al[7] examined 15 healthy subjects with AVHs and compared them to 18 patients with schizophrenia. They noted that the healthy group experienced AVHs as positive, while the patient group experienced them predominantly as negative, which was similar to our findings.

Historically, some characteristics of AVHs have been considered of particular significance for the purpose of establishing a diagnosis of psychosis. Junginger and Frame[21] suggested that AVHs in psychotic patients are more frequent, tend to be heard outside the head, and lead to an explanation of a delusional nature. In line with the first assumptions, the frequency of AVHs in the patient group was higher than that in the nonpatient group. In both groups, however, the perceived location of AVHs was inside as well as outside the head, while the explanation of their origin was not diagnostically predictive in the way envisaged by Junginger and Frame. Long before Junginger and Frame, Schneider[32] considered audible thoughts, voices conversing and commenting, and voices addressing the subject in the third person as particularly relevant for a clinical diagnosis of schizophrenia. Subsequent studies investigating the specificity of these Schneiderian criteria for schizophrenia were inconsistent.[33–37] In our study, voices talking in the third person, along with voices conversing, were indeed more prevalent in the patient group, but also occurred in 25% of the healthy individuals.

The question of whether AVHs constitute the same phenomenon at the two extreme ends of the spectrum cannot be answered unequivocally with the results of this study. The finding that aspects such as loudness, location, and attribution are similar in both groups would imply a similar phenomenon, differing mainly in severity. It has become clear that AVHs in healthy subjects are not more akin to normal verbal imagery than AVHs in psychotic patients. On the other hand, the age at onset was largely different between the groups. Patients were approximately 21 years when they first experienced AVHs, compared to a mean age at onset of 12 in the nonpatients. This finding might be indicative of a difference in the etiology of AVHs in psychotic and nonpsychotic subjects, as the onset of AVHs may be associated to aberrant synaptic connectivity.[38] Synaptic density peaks during childhood, followed by an extensive decrease of neuronal connectivity (pruning) during adolescence, to reach normal levels in adulthood.[37] Thus, the age at onset of AVHs in nonpsychotic individuals coincides with maximal synaptic density. In contrast, the age at onset of AVHs in psychotic patients coincides with synaptic elimination (pruning). Further research using neuroimaging techniques such as functional connectivity and diffusion tensor imaging to compare the biologic basis of AVHs in both groups, for example, may be helpful to determine if hallucinations in clinical and in nonclinical individuals are the same phenomenon or not.

A limitation of this study is that the group of healthy individuals with AVHs constituted a selected sample that may not be representative of the whole group of healthy subjects with AVHs. It should also be noted that the predictive model we present needs to be replicated in an independent sample, and it serves the sole purpose of distinguishing between hallucinations in otherwise healthy individuals and psychotic patients. It should be borne in mind that the positive predictive value is highly influenced by the a priori chance. Considering the lower frequency of healthy subjects with hallucinations in clinical practice, the usefulness of this clinical distinction may be lower.

In conclusion, the most prominent differences between AVHs in healthy and psychotic subjects were the negative emotional valence of content, the higher frequency, the lower degree of control, and the later age at onset in the patient group. Using these 4 characteristics, we found that 92% of the subjects in our sample could be diagnosed correctly as having a psychotic disorder or not. Negative emotional content of the hallucinations had high sensitivity and specificity (86% and 87%, respectively) for the presence of a psychotic disorder.

On the basis of these results, we cannot conclude whether AVHs in the outer borders of the spectrum should be considered the same phenomenon. It became clear that

the perceived location of voices (inside/outside the head), the number of voices, loudness, personification and attribution did not differentiate between patients and nonpatients, suggesting a similar phenomenon in both groups. On the other hand, the large difference in age at onset may suggest a different pathophysiology.

Disclosure of off-label usage: The authors have determined that, to the best of their knowledge, no investigational information about pharmaceutical agents that is outside US Food and Drug Administration–approved labeling has been presented in this article.

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Financial disclosure: **Mss Daalman** and **Diederen**, **Mr Weijer**, and **Drs Boks**, **Blom**, **Kahn**, and **Sommer** have no personal affiliations or financial relationships with any commercial interest to disclose relative to the article.

Funding/support: This study was supported by a grant from the Dutch Science Organisation (Nederlandse Wetenschappelijke Organisatie NWO, nr 916.56.172).

Acknowledgment: We are grateful to Anthony David, MD, of the Institute of Psychiatry, King's College London, for commenting on our manuscript. Dr David has no personal affiliations or financial relationships with any commercial interest to disclose relative to the article.

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