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AUDITORY HALLUCINATIONS OF HEARING VOICES IN 375 NORMAL SUBJECTS

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ABSTRACT

Jaynes' elaborate theory of the evolution of human consciousness speculates that unconscious language use by the right hemisphere produced frequent auditory hallucinations in primitive people [1]. Jaynes offers some explanation as to why hearing voices would now be less common. It is parsimonious, however, to predict that hearing voices is still common, although usually unreported, in the modern normal population. Some clinical literature gives support to this prediction. This study tested the prediction by means of surveying 375 college students with a two-part questionnaire. The first section presented fourteen different examples of auditory hallucinations and asked whether the subject had experienced such occurrences. The second section asked for information concerning the characteristics of any hallucinated voices and for information about the subject that might relate to cerebral laterality. The results support the prediction that hearing voices is common within the normal population. Overall, 71 percent of the sample reported some experience with brief, auditory hallucinations of the voice type in wakeful situations. Hypnagogic and hypnopompic hallucinations were also reported. The most frequent incidents were hearing a voice call one's name aloud when alone (36%) and hearing one's thoughts as if spoken aloud (39%). Interviews and MMPI results obtained from twenty selected subjects suggested that these reports of hearing voices were not related to pathology. Further findings of a significant relationship between high rates of auditory hallucinations and the extent to which subjects reported skills in music, art, and poetry were interpreted as weak support for Jaynes' speculation that right hemisphere activity may account for auditory hallucinations. Overall, the results are seen as supportive of several of Jaynes' theoretical points.

Julian Jaynes has developed an elaborate and highly speculative theory of the evolution of human consciousness [1]. In keeping with the behavioristic tradition, he views self-awareness as the result of the internal use of language. An intriguing aspect of the theory is Jaynes' assertion that unconscious language use

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by the right hemisphere routinely produced auditory hallucinations in primitive people. This experience of hearing voices was a nonpathological phenomenon resulting from the lateralization of cognitive functions in the human cerebral hemispheres. According to Jaynes, "hearing voices" is a historically significant stage in the evolution of human self-awareness. Jaynes believes that hearing voices is reduced in frequency among modern people due, in part, to an inhibitory action of the language and self-awareness areas of the left hemisphere. Jaynes offers some additional and rather awkward speculation to explain why hearing voices is less prevalent in modern people [1, see particularly pp. 220-221]. It may be more parsimonious, however, to predict that hearing voices is still prevalent, although usually unreported, in the modern population. In fact, it can readily be predicted from Jaynes' theory that these hallucinations should be fairly common within the general, nonpsychotic population.

At first thought, the idea that normals hear voices would seem unsupported. The literature of psychology and medicine has traditionally attributed auditory hallucinations to either psychopathology or abnormal environmental effects (extreme fatigue, sensory deprivation, drugs, starvations, etc.). It is common for "hearing voices" to be thought symptomatic of schizophrenia [2]. There are, however, studies that describe auditory hallucinations in normals. Johnson, in his comprehensive review of the hallucination literature, reports an 1897 survey by Parish as showing a 10 to 30 percent rate of auditory hallucinations among normals [3]. McKellar studied hypnagogic imagery in a group of 182 college students and found auditory experiences the most common sensory type, being reported by 43 percent of the sample [4]. Hypnagogic and hypnopompic auditory "images" were studied as early as 1853, and, according to Johnson, are well known in the literature. Forrer described five cases of what he termed "benign hallucinations" among his friends and acquaintances and suggested that, "under exceptional circumstances 'normals' may . . . hallucinate." [5] Mott, Small, and Anderson compared the rates and types of hallucinations of fifty schizophrenics, fifty medically ill alcoholics, and fifty normals using a hospital interview method [6]. They reported auditory hallucination rates of 66, 76, and 32 percent, respectively, but did not describe different types of auditory hallucinations.

The purpose of the research reported here was to measure the rate of several different types of auditory hallucinations in a normal (college) population and to relate the results to Jaynes' theory.

METHOD

A questionnaire was constructed by collecting fourteen types of auditory hallucinations that had reportedly occurred in normals. One of these, No. 14, is cited by Jaynes [1], No. 10 is used as an introductory quote by Johnson [3],

No.'s 5 and 11 were constructed by the authors based on comments in Jaynes [1], and the other ten are quotes collected from subjects interviewed by the authors in pilot research. These fourteen items were arranged in an order that was believed to represent decreasing frequency of occurrence. Questions after each item asked the subject if such an event had ever happened to him/her, how often, and for additional information. Questions in a second section of the questionnaire asked for information on the direction and characteristics of hallucinated voices as well as for the subject's age, sex, handedness, and interest and skills in music, art, poetry, and math. The informed consent statement and directions were explicit in their references to hearing voices.

The questionnaire was administered to 375 college students (125 men, 249 women, and 1 no response), in seven groups, ranging in size from twenty-one to eighty-one subjects over a period of seven months. All subjects were volunteers from introductory psychology classes who received a small amount of extra course credit for psychology department subject pool participation. It was stressed before the questionnaire was administered that the subject's extra credit was awarded for having been present for the explanation of the research (oral presentations describing the research and questionnaire); that they were not required to fill out the questionnaire; and that they could leave without any loss of credit. Subjects were given assurances of confidentiality and the signed informed consent statements were collected prior to the subjects' filling out the anonymous questionnaire.

Subjects were then read the directions and any questions were answered. The same experimenter gave all directions to all subjects. The fact that "hearing voices" meant hearing a voice fully aloud "as if someone had spoken" was repeatedly emphasized. Subjects were then asked to fill out the questionnaire and told to leave when they had finished. For the last four groups (203 subjects), the subjects were interrupted after a few minutes and told that the researchers would greatly appreciate an opportunity to interview people who had had some of the questionnaire experiences and would contact anyone who would write his/her name and phone number on the last page. Twenty-eight subjects responded to this request and twenty were subsequently interviewed.

The interviewed subjects were asked to come to the first author's office where they signed an additional informed consent statement agreeing to have the interview taped and to take the Minnesota Multiphasic Personality Inventory (MMPI) following the interview. The interviews followed a standard outline and were used to verify whether these twenty subjects, all of whom had some positive answers on the questionnaire, had in fact understood the directions and had "really heard a voice as if spoken by someone aloud." The MMPI responses were scored and interpreted by two colleagues of the authors who were not involved in the research and who are experienced in the clinical uses of the MMPI.

RESULTS

The number of subjects responding "Yes" to each item on the first part of the questionnaire is shown in Table 1. An analysis of responses by subjects showed that 268 subjects, or 71 percent of the sample, had answered yes to at least one of the Items: 7, 8, 10, 12, 13, and 14. These six items were believed, *a priori*, to be the best measure of non-hypnagogic/hypnopompic voice hallucinations. One hundred fifty-eight subjects (42%) answered yes to two or more items. One subject answered yes to all six items.

Ten of the fourteen items (1, 3, 4, 5, 7, 8, 10, 12, 13, and 14) asked subjects to describe any personal experiences similar to the one in the item. A total of 664 comments was obtained. Table 1 shows the number of those comments for each item. Some selected examples of these comments from different subjects are shown below. The number of the eliciting item is shown in parentheses.

> I was sitting on a hillside letting my mind fully wander when I actually heard someone or something say, "It's beautiful isn't it." It scared the hell out of me. (#1)
>
> I've been walking down the street and I *know* I've heard someone say my name, and I'll look around and won't know anybody there – so no one could've known my name. (#1)
>
> I had a big test, but had stayed up late studying. I was tired and didn't want to get up. The voice said, "You know you'll feel worse if you stay in bed." I can remember my mom saying that on several occasions. (#3)
>
> I sometimes hear my name or parts of a conversation but don't understand what is being said. This had just recently, or in the last eight years, started. I have heard what I thought to be male and female voices alone and sometimes together. (#4)
>
> When I'm alone – I get kinda scared cause I hear voices blurt out. (#4)
>
> We live out in the country and when I'm alone I hear my name called very often but never think anything about it. (#7)
>
> Often this has happened. But to me this is scary. I really hate to be alone in the house at night because of this. (#7)
>
> It has happened only about twice in my life. I was in my dorm room early, making up my bed. I thought I heard a man's voice in my left ear say my name. It scared me because it seemed like he was really there and close. On an earlier occasion I heard a more muffled voice from behind me that sounded further away in the same dorm room. Also when I was little I had to practice the piano in the basement. When I would stop (this only happened a couple of times), I could hear people whispering like they were crouched down on my left side. (#7)
>
> It still scares me when I hear it. I get so frustrated at the same time. I strain my ear to try to hear more but never more than my name one short time. I never know the voice. (#7)

Table 1. Number of Subjects Answering Yes to Each Item (N = 375)

Item	*Number Yes*	*Percent Yes*	*Number of Similar Experiences*
1. "Sometimes I have thought I heard people say my name . . . like in a store when you walk past some people you don't know . . . but I know they didn't really say my name so I just go on." Has something like this ever happened to you?	212	57	93
2. "Sometimes when I am just about to fall asleep, I hear my name as if spoken aloud." Happened to you?	111	30	[a]
3. "When I wake up in the morning . . . but stay in bed for a few minutes, sometimes I hear my mother's voice . . . when she's not there. Like now when I'm living in the dorm. What I hear is her voice saying stuff like, 'Now come on and get up' or 'Don't be late for school.' I'm used to it and it doesn't bother me." Has a similar experience happened to you?	53	14	50
4. "I hear a voice that is kind of garbled . . . can't really tell what it says . . . sometimes just as I go to sleep." a) Happened to you?	78	21	[a]
b) Have you any experience with hearing something just when going asleep or waking up?	153	41	75
5. "When I was little, I had an imaginary playmate. I remember that I really thought I heard her voice when we talked. That went away . . . hearing her voice . . . but for awhile it was just like a real voice." a) Did you have an imaginary playmate?	92	25	30
b) Did you hear his/her voice aloud?	22	6	[a]
6. "Every now and then — not real often — I think I hear my name on the radio." Happened to you?	22	6	[a]

[a] Similar experiences not requested.

Table 1. (Cont'd.)

Item	Number Yes	Percent Yes	Number of Similar Experiences
7. "Sometimes when I'm in the house all alone, I hear a voice call my name , ... No, it really isn't scary. It was at first, but not now . . . it's just once . . . like 'Sally' . . . . . kind of quick and like somebody's calling me. I guess I kind of know that it really isn't somebody and it's really me . . . but it does sound like a real voice." Happened to you?	135	36	114
8. "Last summer I was hanging-up clothes in the backyard. Suddenly I heard my husband call my name from inside the house. He sounded like something was wrong and was loud and clear. I ran in . . . but he was out in the garage and hadn't called at all. Obviously I guess I made it up . . . but it sounded like a real voice and it was my husband's." This or something similar happen to you?	145	39	128
9. "I've heard the doorbell or the phone ring when it didn't." Happen to you?	268	71	[a]
10. "I hear my thoughts aloud." Happen to you?	146	39	82
11. I have heard God's voice . . . not that he made me know in my heart . . . but as a real voice." Happen to you?	43	11	[a]
12. "When I am driving in my car . . . particularly when I'm tired or worried . . . I hear my own voice from the backseat. It's behind me over my right shoulder. I know that it's really coming from my head, but it sounds like it's little short statements . . . usually soothing . . . like 'It'll be all right' or 'Now, just calm down down.' " Similar things happen to you?	40	11	40

[a] Similar experiences not requested.

Table 1. (Cont'd.)

Item	Number Yes	Percent Yes	Number of Similar Experiences
13. "I drive a lot at night. My job has a lot of travel to it. Sometimes late at night, when I'm tired, I hear sounds in the backseat like people talking . . . but I can't tell what they say . . . just a word here and there. When this first started happening . . . when I first started driving at night so much . . . four or five years ago . . . it scared the hell out of me. But now I'm used to it. I think I do it because I'm tired and by myself."			
Anything similar happen to you?	23	6	24
14. "Almost every morning while I do my housework, I have a pleasant conversation with my dead grandmother. I talk to her and quite regularly hear her voice actually aloud."			
Anything similar happen to you?	20	5	28

[a] Similar experiences not requested.

I would be cleaning up in the room singing to myself and I would hear somebody call my name. I thought it was my mother and I would go check and see; I would find out that she didn't call my name. Mother used to tell us that that was the devil after us. (#7)

I hear my mother's voice like this very often. (#8)

When I think about someone, sometimes I hear his voice calling me. (#8)

Maybe three or four times a week. (#10)

Sometimes I can't decide if I said something or not. (#10)

Very seldom – usually when I'm under a lot of stress/preparing for a game. (#10)

When I'm alone driving I started hearing me talk to me. It is as if I'm beside myself engaging in a conversation with myself. (#12)

I'm scared of driving at night and I sometimes hear something or someone telling me to slow down and take it easy. (#12)

This happens when I am running at lot! (#12)

I use it to calm myself if I'm angry. (#12)

If I drive at night alone – it seems to happen. If I start thinking about it, or wondering if it's gonna happen, it usually always happens. (#13)

I have only had this experience on one occasion in which my grandfather was talking to me. It was some time ago, but I remember it was some sort of lecture. I was really worried about not doing what he said. (#14)

Sometimes when I do something wrong, or about to do something wrong, or not doing something I'm supposed to do, I can hear a sweet voice from my mother telling me to do it or not to do it. (#14)

They seem extremely real. (Section II)

I think these experiences usually happen when I'm in a rush or worried about something. The few times it has happened have really surprised me. (Section II)

I seem to have to be in a place of solitude or at least openminded and unrestrained to hear a voice. (Section II)

I always thought everyone heard voices occasionally. I don't hear them all the time, but occasionally. It doesn't really bother me, except when I'm alone. (Section II)

The voices seem not to want to harm me, but to calm me down or to warn me. (Section II)

They never last very long, just a few seconds. (Section II)

It's usually a deep male voice that comes from another room when no one is really there. (Section II)

For the purpose of further analysis, a scoring system was devised that gave 1 point for items 7, 8, and 10; and 2 points for items 12, 13, and 14. The mean of this positively skewed score distribution was 1.59 with a standard deviation of 1.56. This hallucination score was found to be unrelated to sex or handedness. Indeed, none of the fourteen items yielded significant differences for sex or handedness.

A second derived score was based on the self-reported interest and skill of the subjects in music, art, poetry, and math – activities sometimes associated with right hemisphere function. The correlations of this score with hallucination score, sex, and handedness, were all non-significant. However, an examination of the eighty-eight subjects with the highest scores (three or more expressed skills in music, drawing, painting, sculpting, poetry, or math) showed them to have significantly higher hallucination scores than the remainder of the sample ($t = 2.98, df = 373, p < .01$).

None of the twenty subjects who were interviewed provided reason to question the validity of their questionnaire responses. Indeed, each of these subjects confirmed the fully auditory characteristics of their experience; and nineteen of them added experiences to those on the questionnaire. None of the interviewed subjects reported any hearing deficit or a history of psychotic problems. None of the MMPI profiles of these twenty subjects were judged to

show psychosis by the two independent judges. While one profile was selected out by both judges as suggesting some possibility of schizophrenia, the judges independently reached the conclusion that this group did not appear different overall from the general college population.

Fourteen of the interviewed subjects were able to describe the experience of having heard their thoughts aloud, another group of fourteen had experienced hearing their names called. Subjects showed high agreement in their descriptions of these two experiences. The first experience was described as the hearing of one's own voice saying some brief, usually declarative, statement in the context of an ongoing thought. Some subjects experienced this phenomenon two or three times a week and some "only once or twice a year." Three subjects described this voice as always coming from the right side. Five others characterized the voice as coming from behind or above. The other six did not remember any particular direction. The second experience of hearing one's name called was described as occurring in situations in which the subjects knew they were alone and as involving quite clear and distinct voices. All fourteen of the interviewed subjects who had reported this experience indicated that the voice (or voices) usually seemed to come from a particular direction or location ("from my mother's room," . . . "the front porch") and was usually heard as if at some distance.

DISCUSSION

The results of this study demonstrate that brief and occasional auditory hallucinations of particular types are reasonably common among the college student population. Indeed, the results suggest that perhaps more than half of the normal population may have some experience with voice hallucinations, particularly those of hearing one's name called, and/or hearing one's thoughts aloud. The results also confirm earlier reports [3, 4] as to the incidence of hypnagogic and hypnopompic hallucinations. McKellar's reported rate of 43 percent of college students reporting hypnagogic auditory hallucinations is closely matched by the 41 percent of the current sample which reported hearing "something" when going to sleep (hypnagogic) or waking up (hypnopompic). However, 30 percent of our subjects reported having the particular hallucination of a voice speaking their names during falling asleep.

The finding of such high rates for the non-sleep related experiences described in Items 7, 8, and 10 (36%, 39%, and 39%, respectively) was surprising, as was the implication that 5 to 10 percent of the population may have hallucinations of the sort described in Items 12, 13, and 14. If our results are reliable, one would wonder why such common experiences are widely believed to be so uncommon. Our initial response was to question the extent to which a portion of the responses, particularly to later items, was related to psychopathology. However, the twenty subjects who agreed to be interviewed and take the MMPI

removed this concern. At least seventeen of these twenty subjects showed no indication of psychopathology, and of the other three, only one was judged by both clinicians to show a possible disorder. All twenty subjects had reported hallucinations, and the most frequent and involved were reported by some of the seventeen "healthy" subjects. Interestingly, the one subject selected by both judges as showing some possible signs of schizophrenia did not answer "yes" to any of Items 11, 12, 13, or 14, and was the only interviewed subject to report that the rate with which she heard voices was increasing.

A second concern arising from our finding of these high hallucination rates was that perhaps our subjects had somehow not understood the directions. For example, subjects might have labeled a thought image as an hallucination. (This labeling issue has been discussed by several authors [7].) However, our interviewed subjects showed no cases of misunderstood directions. All subjects received the same written directions which were also read aloud. In giving the directions and answering any questions, the experimenter had given a general introduction to the research and had explained that the experiences described "hearing a voice as if someone had really spoken." As the data collection progressed, however, we believe that the full auditory nature of these phenomena was progressively more stressed to the subjects in later groups. If the earlier subjects had in fact misunderstood the directions and had over-reported hearing voices by including non-auditory experiences, then the rates should show a drop across groups. Chi square analyses of response rates across subjects arranged into three groups (which reflected increases in the emphasis on the fully auditory nature of voice/voices) showed a significant drop for items 2, 3, and 11, but no significant change for the other items (item 2, $\chi^2 = 8.26$, $df = 2$, $p < .05$; item 3, $\chi^2 = 15.90$, $df = 2$, $p < .001$; item 11, $\chi^2 = 6.28$, $df = 2$, $p < .05$). The items that showed significant drops in reported rate are two of the sleep-related experiences (items 2 and 3) in which some subjects apparently are not sure if the voice they hear is the result of dreaming or not; and hearing God's voice (Item 11) which some subjects described as not like a real voice, but more of a "feeling." Importantly, items 7, 8, 10, 12, 13, and 14 showed no significant change. These items deal with hearing a voice in situations in which the subject is awake and usually alone and are also the items which were used to construct the hallucination score. We conclude that the rates reported are reasonably reliable and are not due to misunderstood directions or to an uncommon incidence of psychopathology within our sample.

We believe our results suggest the existence of five general types of auditory hallucinations in normals. These are, hypnagogic/hypnopompic events, hearing one's name called, hearing one's thoughts aloud, hearing a voice giving advice or comfort, and hearing a voice as if in conversation.

The first of these, the hypnagogic/hypnopompic events, are reasonably well known and described in the literature. Because of their association with sleep, they may (or may not) be of a different nature than the other four. McKellar,

who referred to these as auditory imagery, pointed out that Freud called them hallucinations [4]. Both of these experiences would appear to very often consist of hearing one's name called, but with greater likelihood of the voice being a familiar one in the hypnopompic stage. Many of our subjects reported hearing additional statements, often advising them to wake up, and often in the voice of a familiar person (i.e., Mother, roommate) just as they were awakening. On the other hand, the hypnagogic experience appeared more likely to be restricted to one's name and also more likely to be an unfamiliar voice. While some subjects did report that they had on occasion gotten out of bed to find the person who had called their names, many reported they were used to these experiences. It was, for them, simply something that sometimes happens and was not upsetting. An interesting aspect of the hypnagogic voice is that it is sometimes experienced by some persons as a garbled or mumbled voice (see Item 4). This may be similar to the experience described in Item 14. It is also suggested as a sometime property of voices by Jaynes [1].

A second prevalent type of normal hallucination would appear to be hearing a voice calling one's name when awake (see Items 1, 7, and 8). We believe that Item 7 is probably the best measure of the incidence of this experience and we would, therefore, estimate that just over a third of the population has this sort of experience. The responses to Item 7 illustrate an interesting range of individual reaction to this experience. Some subjects readily dismiss the voice as their "imagination," while others are frightened, and still others find it as evidence to support some spiritual or supernatural belief. Sometimes the voice in this case is a familiar one, but more often it is an unknown voice. Occasionally, subjects are not able to say if the voice is male or female. It seems that knowing that one is alone and then either expecting to hear someone (i.e., a family member coming home), or being fearful that someone may be in the house may increase the likelihood of this phenomenon. Further common characteristics of hearing a voice call one's name are that the voice only says the first name (or common name) and is experienced as coming from a specific direction. No subjects, either in written comments on the questionnaire or in interviews, described hearing their full names. The directionality of these hallucinations is interesting. Subjects could almost always report from where the voice came. What was missing in the reports of direction or location was voices coming from directly in front of the subjects. Voices not assigned a location (i.e., the kitchen, upstairs, inside the chest) were experienced as coming from, above, behind, or from one side or the other. Overall, there was no left vs. right side preference although some subjects did report that the voice always came from the same side.

The third type of auditory hallucination, hearing one's thoughts aloud, was reported by 39 percent of our sample and is, we believe, an important and essentially unknown (in the psychological literature) cognitive phenomenon. The interviewed subjects were very helpful in helping us understand this

experience. Subjects report a very wide range of frequency of occurrence for hearing their thoughts aloud – some subjects saying "often" or "a lot" and others reporting just one or two memorable instances. This event is apparently the sensation of hearing what is recognized as ones own thought being spoken either in one's own voice or by an unknown voice. According to several of the interviewed subjects, this is usually in the form of a brief statement. One of these subjects described hearing his own voice say "That one's wrong" as he was looking back over a math exam. Another subject described hearing an unknown voice say "You can't do that" in the context of thinking over various ways of dealing with a problem. Still another subject described an unknown but familiar voice, that he often heard, repeat his thoughts aloud as he studied. We question the extent to which this phenomenon may play a role in problem solving, recall, and other cognitive processes.

A fourth type of normal hallucination is the experience of hearing a comforting or advising voice that is not perceived as being one's own thoughts. It is of course possible that this is very similar to hearing one's thoughts. Our questionnaire may have led to an underestimation of this experience by not including a more direct example. Our current estimate is that approximately 10 percent of the population has had this experience. This experience is described by some subjects in response to Item 12 and by others to Items 13 or 14. The main characteristic of this phenomenon is the comforting or advising nature of the content of what is heard. Typically the individual is told to do something and/or is reassured. In these cases the voice may be the person's own, an unknown voice, a familiar voice (living or dead), or God. Interestingly, the statements made by voices perceived to be dead relatives may be quite ordinary in their content. One interviewed subject recounted hearing her grandfather's voice from next to her ear shortly after learning that he had died. She described standing in her closet selecting a dress to pack for the funeral when the voice said "Wear that one, I've always liked it." Two other interviewed subjects reported being reminded of directions while driving by their own voice (i.e., "Don't miss the turn." "Go this way."). The advising role of voices is of course pointed out by Jaynes [1].

The last type of hallucination experience we wish to discuss is holding a conversation with a voice. Usually the voice in these cases is that of some other familiar person (i.e., a dead grandmother, an absent friend, one's mother), although one interviewed subject described this experience with her own voice. This event seems to be accepted without much concern by some individuals in our sample. While it is apparently the rarest of the five types we are describing, we estimate it may occur in as much as 5 percent of the normal population.

Our findings, in offering evidence for these five types of auditory hallucinations in normals, also support parts of Jaynes' theories. The finding of high rates of hearing voices in normals lends some support to Jaynes' assertion that hearing voices may have been common in ancient people. While Jaynes

argues that hearing voices was prevalent in the historic past, he seems to accept a very low present-day rate. Our data indicate that hearing voices is actually rather common in the present normal population and would, therefore, make the validity of Jaynes' point less dependent on the idea of the recent genetic selection which he suggests. In fact, it would seem compatible with our data and Jaynes' views to imagine that whatever genetic mechanisms may predispose toward voice hallucinations have not changed appreciably in a few thousand years; the acquisition and use of modern languages coupled with changes in cultural expectations may have lead to the lower modern reporting rate.

Jaynes' more specific suggestion that hearing voices is the product of right hemisphere mechanisms is given some indirect support by this study. One would speculate that if the hearing of voices is due to right hemisphere activity, then individuals who skillfully engage in behaviors thought to be more dependent on the right rather than the left hemisphere would show higher rates of auditory hallucinations. Such behaviors have been listed to include those pertaining to music, art, poetry, and some (spatial) types of math skills [1, 8, 9]. This speculation was supported by our finding that subjects who painted, sculpted, played musical instruments, wrote poetry, drew, and/or enjoyed mathematics (three or more activities), did show higher rates of hearing voices. We would point out, however, that alternative explanations may be available for this effect. Additionally, we call attention to the fact that the variables of sex and handedness, which are also thought to be related to hemispheric laterality, did not significantly relate to hallucination rates in this study, either overall or on specific items. The possibility that a more direct and neurological-based measurement of functional laterality might support this possible relationship between right hemisphere activity and the incidence (or type) of auditory hallucinations in normals should be investigated.

The results of this study lead us to additional comments in two areas. First, we suggest that to the extent that hearing voices is reasonably common in the normal population, the clinical finding of hallucinations of a mild sort (as reported here) should not be taken as suggestive of psychopathology. For example, we suggest that the inclusion of auditory hallucinations in the description of somatoform disorders contained in the *Diagnostic and Statistical Manual of Mental Disorders* is simply due to these anxious clients' willingness to report what they believe are symptoms. If this is the case, the auditory hallucinations reported are probably of the type described in this study and not connected to the somatoform disorder *per se.*

Secondly, we would suggest that it is highly likely that normal auditory hallucinations may play a significant role in the mediation and support of various religious and other supernatural belief systems. For example, one subject who hallucinated the voice of a dead grandfather interpreted the experience as support of her belief in life after death. Several subjects apparently believed that the common experience of hearing their name called while they were alone was

evidence for E.S.P. or supernatural phenomena. One interviewed subject, who showed no sign of pathology on the MMPI, described the experience of hearing God's voice aloud as if coming from the middle of his chest. Upon questioning, this subject said the voice sounded something like his own voice, but he attributed it to God. This phenomenon is, of course, very similar to experiences Jaynes attributes to one of the historical "voice of the gods" mechanisms (see for example Jaynes' discussion of phrenes). One would suspect that these apparently widespread, but seldom reported or discussed, experiences continue to play an important role in the formation and reinforcement of supernatural beliefs.

If, as this study suggests, hearing voices may be experienced at one time or another by a majority of the normal population, the question might be put as to why some individuals report no experience in this area at all. This study cannot offer an answer, but we will speculate along two lines. First, it may be that personality factors lead some individuals to, in effect, suppress what would otherwise be functional mechanisms. Secondly, there may be variable neurological features that provide for greater inhibition of these processes in some individuals. The possibility that normal hallucination rates may relate to cerebral anatomical asymmetry should be examined.

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