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Auditory and visual hallucinations in university students

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Summary—One-hundred and thirty-six university students were administered the Launay–Slade Hallucination Scale (LSHS). Low and high scorers then completed a visual and an auditory task that utilized non-hypnotic suggestion and ambiguous stimuli. The high LSHS group reported a significantly greater number of meaningful visual and auditory experiences in response to the ambiguous stimulation. It is argued that these phenomena are hallucinations and demonstrate the possibility of researching hallucinations in non-psychotic populations in a laboratory setting.

INTRODUCTION

Although hallucinations have long been regarded as one of the most prominent phenomena associated with psychopathology, this presumed association has recently been called into question. Recent experimental research has indicated that people without any evidence of pathology report hallucinations (Young, Bentall, Slade & Dewey, 1987; Jakes & Hemsley, 1986; Bentall & Slade, 1985). Moreover, survey studies have suggested that the experience of hallucinations is not necessarily restricted to people with known psychiatric diagnoses (West, 1948).

Studies in the late 1950's through to the 1970's concerned with sensory deprivation raised the possibility that normal *Ss* hallucinate under particular environmental conditions (See Zubeck, 1969 for a review). More recently, Launay and Slade (1981), Young *et al.* (1987) and Jakes and Hemsley (1986) have provided experimental evidence that non-psychotic patients report hallucinations on a self-report questionnaire [the Launay–Slade Hallucinations Scale (LSHS) (Launay & Slade, 1981); the Verbal Hallucination Questionnaire (Barrett & Etheridge,1992), and in experimental tasks (Jakes & Hemsley, 1986; Young *et al.*, 1987)].

Young *et al.* (1987) report that brief instructions can elicit both auditory and visual hallucinatory experiences in non-psychotic *Ss*. In an auditory task, *Ss* were instructed to hear a tape recording of the song "Jingle Bells", where in fact no such recording was being played. The visual task required *Ss* to look at their lap and see a cat laying there. *Ss* scoring high on the LSHS were more likely to report hearing "Jingle Bells" and seeing the cat than low scorers. One difficulty with this study is that these former *Ss* might not have been hallucinating at all, but may have been more susceptible to the demand characteristics of the experimental situation. The nature of the tasks made it easy to fulfil the expectations of the experimenter without the chance of being caught out falsifying the experience. It is noteworthy that no *Ss* reported a belief that their experience was veridical. Some *Ss* reported experiencing the suggested item but did not believe it was actually there; however this may only indicate, at most, higher vividness of imagery among high LSHS scorers rather than a genuine hallucinatory experience.

Young *et al.* (1987) claim their data validate the LSHS and the assertion that non-psychotic normal *Ss* have hallucination-type experiences but this cannot be the case. The LSHS is reputedly a measure of disposition to hallucinate but no *Ss* excepting one psychiatric patient reported an experience that they actually believed had occurred. The hallucinating psychiatric group did have a significantly higher LSHS score than did the psychiatric control which is supportive of the LSHS. The only difference on the hallucination tasks was a significant difference between the groups on the auditory task and in that case seven out of the 10 hallucinators reported that they not hear anything. The three *Ss* that did report hearing "Jingle Bells" selected the statement that indicated they did not believe the recording was actually playing. This suggests that they correctly recognized that their imagination was the source of the stimulus. Given that no *Ss* actually hallucinated, Young *et al.* (1987) cannot claim validation of the LSHS. The failure to find any differences on the Gudjonsson Interrogative Suggestibility Scale was taken by the authors to indicate that demand (note not suggestibility) was not a contributor to the group differences. Our hesitation in agreeing with Young *et al.* (1987) stems both from the ease at which demand could affect the results and from the research of Bowers (1967). Bowers (1967) demonstrated with the same tasks as used by Young *et al.* (1987) that suggestions to hallucinate are confounded by demand.

Although Jakes and Hemsley (1986) did not attempt to address the demand issue, their experimental design offers less opportunity for the *Ss* to construe the expectations of the experimenter. Rather than providing *Ss* with explicit instructions to experience some stimulus, they were asked to attempt to detect and report shapes that had been programmed to appear in a randomly shifting dot pattern presented on a monitor. Suggestion on the part of the experimenter is evident here, but what distinguishes this study from that of Young *et al.* (1987) is that *Ss* were naive as to what *particular* images should be reported. Thus responding to demand was made more difficult as *Ss* received no specific guidance from the experimenter as to what images they were expected to see. Jakes and Hemsley (1986) report a significant correlation (0.75, $P < 0.01$) between LSHS scores and the number of complex hallucinations reported. This study was small though, relying on the reports of 11 *Ss*.

The present study is an attempt to replicate and extend the Jakes and Hemsley study with the use of criterion groups based on the LSHS. In addition to a visual task an auditory task was constructed. As people with psychotic disorders such as schizophrenia more often report auditory than visual hallucinations (Mueser, Bellack & Brady, 1990), any attempt to establish

Table 1. Means and standard deviations for high and low hallucinations on the auditory and visual tasks

LSHS	Auditory	Visual I	Visual IIa	Visual IIb
Low group				
x	1.8	1.67	2.5	0.0
SD	1.39	1.66	2.02	0.0
High group				
x	4.33	1.38	6.25	0.73
SD	2.53	1.55	2.62	1.00

a general theory of hallucinations must then establish that auditory as well as visual hallucinations occur under the same conditions. Commensurate with the finding that hallucinations are in part affected by exposure to unpatterned or ambiguous stimuli (Feinberg, 1962), the auditory as well as the visual task in the present study involve ambiguous stimuli. It is predicted that *S*s scoring high on the LSHS will experience more hallucinations in both the auditory and the visual task than will low scorers.

METHOD

Subjects

One-hundred and thirty-six first year psychology students (males = 33, females = 103; mean age = 19 yr, SD = 3.5 yr; the gender bias reflects a corresponding gender bias in the student population) participated in the experiment for course credit. *S*s were asked if they had ever visited a mental health professional, and those who reported having done so were screened.

*S*s were administered the LSHS on Macintosh Classic computers in groups between four and 12 *S*s. *S*s scoring less than 13 were selected as the low scoring group and *S*s scoring higher than 30 were selected as the high scoring group.

Apparatus

The auditory task was administered on a Panasonic RX-FT510 portable cassette player with Sony DR-S3 headphones. *S*s listened to a 5 min recording of a male voice consisting of randomly spliced 1 sec sections played backwards at 52 dB (as measured by a Bruel and Kjoer Impulse precision sound level meter Type 2209 with a Pressure Condensor Microphone 4144, Artificial Ear 4152 and Sound Level Calibrator 4230 attachment).

The visual task was administered on a Macintosh LCII computer from which the *S*s were seated approx. 40 cm directly in front. The stimulus presented was a set of 30,000 2-pixel black dots generated on a 13in. monitor with a white background. The computer was programmed to randomly add 50 black dots and then 50 white dots for the duration of the task (10 min). The result of this is a slowly changing random dot presentation on the monitor.

Procedure

The auditory task was always administered first. The experimenter was blind to the status of the *S* but not to the task, and remained in the laboratory seated behind the *S* to administer instructions and control the apparatus.

*S*s were seated in a sound dampened room and instructed: "I want you to listen closely to a recording. At certain points in the recording, words and phrases will appear. Try to detect these words and phrases, and when you hear them, write them down on the sheet of paper in front of you."

The visual task followed immediately after and *S*s were instructed: "Now I want you to look carefully at the computer screen. At certain points, patterns have been programmed to appear on the screen, the patterns can be in any form. Try to detect these patterns, and when you see them, report them out loud."

Data analysis

Auditory task. Only incidences of words of more than one syllable or incidences of more than one word were scored, in order to reduce the effect on the data of the reporting of backwards single syllables which sounded like real single syllable words.

Visual task. As in the Jakes and Hemsley (1986) study the visual reports were scored according to Zuckerman's (1969) criteria. Type I experiences are simple geometric shapes. Type II experiences involve meaningful objects. Type II experiences can be further divided into singular experiences (IIa) and experiences of multiple objects or integrated scenes (IIb). This further complexity distinction was utilised in the current study.

RESULTS

Analysis

The mean LSHS score was 21.9 (SD = 8) for 136 *S*s. There was no effect for gender ($t = 0.0.16$; d.f. = 134; $P < 0.8$). No *S*s reported having visited a mental health professional for schizophrenia or bipolar affective disorder.

Data from 12 high LSHS scorers and 10 low LSHS scorers was obtained for the auditory task, and from 13 high LSHS scorers and nine low LSHS scorers for the visual task. One *S*'s auditory data and one *S*'s visual data were dropped due to technical difficulties during the course of the experiment. Table 1 contains the means and standard deviations for both groups from both tasks.

A t-test revealed significant differences between the groups on the auditory task ($t = 3.02$, $P < 0.005$ one-tailed). As with the Jakes and Hemsley study there were no differences between groups on Type 1 experiences (in fact the low LSHS group scored slightly more incidences than the high LSHS group—see Table 1). t-Tests for both the Type IIa and IIb visual stimuli were significant ($t = 1.88$, $P < 0.05$ one-tailed and $t = 2.18$, $P < 0.025$ one-tailed, respectively).

DISCUSSION

As predicted, high scorers on the LSHS were more likely to report auditory and visual hallucinations than low scorers. In line with the findings of Jakes and Hemsley (1986) Type II but not Type I visual reports were reported more often by high LSHS scorers than low LSHS scorers (Table 1). A finding without precedent is that on the auditory task. Significantly more Type II verbal hallucinations were reported by the high LSHS group. Apart from the questionable results of Young *et al.* (1987) there are no reports of verbal hallucinations being elicited in laboratory situations with non-organically disordered or non-psychotic *Ss*.

It may be asserted that what is being reported in the current study is merely what the *Ss* imagine and not an hallucination as experienced by psychotics. To answer this, a perusal of the instructions leaves no doubt as to what *Ss* were required to report, i.e. visual patterns or shapes and auditory words or phrases. At no stage were *Ss* asked to imagine. Informal questioning of some *Ss* revealed that they did believe what they reported was actually presented. However the possibility does remain that demand can account for our data: It may be that the high LSHS scorers respond more to the demand and were thereby predisposed to report seeing and hearing experiences while being aware that their reports were untrue. Zuckerman's review (1969) of sensory deprivation research is relevant here: He suggests that demand only plays a role in Type I experiences and not in the more complex Type II experiences, where demand effects are presumably overshadowed by vastly more powerful personality variables.

In the auditory task, one high LSHS *S* reported hearing the phrase "I hate you", though often reports were not so emotionally laden. The same *S* also reported during the visual task seeing a "heart with an arrow through it" and the word "help" which changed to "hell" and back again repeatedly. Other less emotive reports were also obtained from this *S*. Often Type II reports included figures of people and animals.

It is also important to distinguish our *Ss*' reported experiences from the much more commonplace experience of illusions. Illusions are defined by their repeatability across *Ss*, whereas hallucinations are unique to individuals in their content (Rantzen, 1993). We believe it is accurate to describe our *Ss*' experiences as hallucinations rather than illusions.

In an investigation of the role of auditory input on schizophrenic hallucinations (Margo, Hemsley & Slade, 1981) unstructured or ambiguous stimulation increased the incidence of hallucinations in a 2-min period. White noise was found to increase the duration and loudness of hallucinations in the *Ss* compared to a control condition with no stimulus presented. Other conditions that involved structured material being presented showed a reduction in these hallucination characteristics. Margo *et al.* (1981) note that this effect is confounded somewhat by attention demanding characteristics of the conditions that are also said to contribute to hallucinatory experience. The results nonetheless suggest that an ambiguous environment may facilitate hallucinations in psychotic *Ss*. A similar role for environmental ambiguity is implicated by the present study with regard to hallucinations in non-psychotic *Ss*.

In addition to stimulus ambiguity, our experimental design relies on non-hypnotic suggestion to elicit hallucinations. Perhaps it could be argued the high LSHS group are more suggestible and it is this suggestibility that is being measured. There are both empirical and theoretical objections to such an argument. To date there is just one empirical attempt to distinguish between low and high LSHS groups in terms of suggestibility. Young *et al.* (1987) investigated the role of suggestibility utilising direct measures of responses to suggestion and the Gudjonsson scale of Interrogative Suggestibility. Data analysis did not reveal any significant differences that would indicate a difference in suggestibility contributing to the differences in data (Young *et al.*, 1987). Though this does not necessarily indicate a non-significant effect for suggestibility in the experimental task utilised presently, it offers less support for the position that individual differences in suggestibility can account for the cognitive errors identified.

Although our results are consistent with a continuum view of hallucinations, it would be premature to claim that the same processes are involved in psychotic and non-psychotic hallucinations. Though Bentall and Slade (1985) find similar effects in hallucinating psychotics as they did with normal *Ss* on their tasks, methodological problems mentioned previously preclude any firm conclusions being made. To date research has centered on establishing if normal *Ss* do hallucinate and the research thus far indicates that they do so. It also provides support for the claim (Jakes & Hemsley, 1986) that ambiguity of the environment is implicated in this phenomenon.

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