

# Another white christmas: fantasy proneness and reports of 'hallucinatory experiences' in undergraduate students.

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# Another White Christmas: fantasy proneness and reports of ‘hallucinatory experiences’ in undergraduate students

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## Abstract

In the current experiment, 44 undergraduate students were asked to listen to white noise and instructed to press a button when they believed hearing a recording of Bing Crosby’s White Christmas without this record actually being presented. Fourteen participants (32%) pressed the button at least once. These participants had higher scores on fantasy proneness and the Launay–Slade Hallucination Scale (LSHS) compared to participants without hallucinatory reports. Both groups did not differ in terms of imagery vividness or sensitivity to social demands. Logistic regression suggested that fantasy proneness is a better predictor of hallucinatory reports than are LSHS scores. This might imply that hallucinatory reports obtained during the White Christmas test reflect a non-specific preference for odd items rather than schizophrenia-like, internal experiences. © 2002 Published by Elsevier Science Ltd.

*Keywords:* Hallucinatory experiences; White Christmas test; Fantasy proneness; Imagery; Schizotypy

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## 1. Introduction

In literature on the experimental psychopathology of hallucinations, Barber and Calverey’s (1964) study on the White Christmas test is often cited (e.g., Bentall, 1990). In that study, healthy volunteers were instructed to close their eyes and to imagine hearing the famous Bing Crosby song. After 30 s, participants were asked to rate the intensity of their imagery of the White Christmas song. Interestingly, “more

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than half of the subjects stated that they heard the phonograph record clearly” (p. 16). While Barber and Calverey (1964) interpreted this finding as evidence for the ease with which normal people come to accept suggested hallucinations, subsequent studies employed the White Christmas test as a paradigm for examining the broader category of normal and abnormal hallucinatory experiences. For example, using less suggestive instructions, Mintz and Alpert (1972) administered the White Christmas test to hallucinating schizophrenic patients and non-psychiatric control patients. They found that the large majority of the hallucinating patients (85%) reported a clear auditory image during the test. Yet, similar reports were provided by a non-trivial minority (40%) of the control patients. The authors concluded that vivid auditory imagery is a necessary, but insufficient condition for pathological hallucinations to occur. They argued that only in combination with impaired reality testing, vivid imagery would produce hallucinations. Meanwhile, Mintz and Alpert (1972) interpreted hallucinatory reports during the White Christmas test as a reliable indication of vivid imagery.

Using more sophisticated designs (e.g., series of trials with signals and/or noise) than the White Christmas test, some studies have called into question the contribution of vivid imagery to hallucinatory reports. For example, Bentall and Slade (1985) reasoned that if people with hallucinatory experiences have an unusual vivid imagery, one would expect that they perform poorly on an auditory signal detection task due to their lowered sensitivity to external signals. However, that is not what these authors found. Compared to control participants, individuals scoring high on the Launay–Slade Hallucination Scale (Launay & Slade, 1981) and hallucinating schizophrenic patients were found to display a greater willingness to believe that an auditory signal was present (i.e., a judgment bias) rather than lowered perceptual sensitivity. This finding underscores Bentall’s (1990; p. 85) conclusion that “hallucinators make rapid and overconfident judgments about the nature of their perceptions”.

The crux of the White Christmas test is that some people are inclined to report auditory events that are suggested, but not actually presented to them. As both hallucinating patients and normal participants scoring high on the Launay–Slade Hallucination Scale typically report vivid auditory images during the White Christmas test, the relevance of this phenomenon to clinical and non-clinical hallucinations has been taken for granted (Mintz & Alpert, 1972; Young, Bentall, Slade, & Dewey, 1987). Although it is true that previous work (e.g., Young et al., 1987) has ruled out the possibility that hallucinatory reports during the White Christmas test are related to hypnotic or interrogative suggestibility, it may well be the case that such reports have nothing to do with a predisposition to hallucinate, but rather reflect heightened sensitivity to comply with the expectations of the experimenter (i.e., social desirability).

Alternatively, hallucinatory reports during the White Christmas test might reflect a general tendency to endorse odd items, a tendency that is typical for fantasy prone individuals (e.g., Merckelbach, Muris, Horselenberg, & Stougie, 2000a). Fantasy proneness refers to a deep and profound involvement in fantasy and imagination (Lynn & Rhue, 1988). Even though it is not an inherently pathological trait (Lynn &

Rhue, 1988), individuals scoring high on this trait are susceptible to pseudomemories (Hyman & Billings, 1998), display a positive response bias on questionnaires asking for detailed, but trivial autobiographical events (Merckelbach et al., 2000a), tend to report paranormal experiences (Irwin, 1990), and are good at simulating dissociative amnesia (Merckelbach & Rasquin, 2001). So, if one would find that the only or most important difference between those with and those without hallucinatory reports during the White Christmas test is heightened fantasy proneness levels in the former group, the possibility that these reports originate from a positive response bias rather than a genuine internal experience deserves serious consideration. Note that such a fantasy proneness account of the White Christmas effect differs from the position taken by Bentall (1990) and Bentall and Slade (1985). Whereas these authors seem to assume that the contribution of response or judgment bias to hallucinatory reports is rather specific and amounts to an overinterpretation or misattribution of internal sensations, the fantasy proneness account points in the direction of a non-specific tendency to endorse rare items in the absence of internal sensations that are misinterpreted. Plainly, if a fantasy proneness-linked tendency to endorse atypical items would underlie the White Christmas effect, this would cast doubts on the White Christmas test as a simple and straightforward paradigm for studying hallucinations.

The current study was a first attempt to examine whether fantasy proneness is related to hallucinatory reports during the White Christmas paradigm. Thus, it sought to elucidate the characteristics of those who come up with hallucinatory reports during the White Christmas test. With this in mind, the test was administered to a sample of undergraduate students and then a set of individual difference variables was measured. More specifically, we obtained data about imagery vividness, social desirability, hallucinatory predisposition, and fantasy proneness.

## **2. Method**

### *2.1. Participants*

Forty-seven psychology or medical undergraduate students (14 men) volunteered to participate in the study in return for a small financial compensation. Their mean age was 20 yr (range: 18–27 yr). Participants were told that the study was about auditory perception and to enhance the credibility of this cover story, they were asked to answer some questions about auditory impairments.

### *2.2. Procedure and questionnaires*

There are several versions of the White Christmas paradigm. In the older studies (e.g., Barber & Calverey, 1964; Mintz & Alpert, 1972), participants were instructed to close their eyes and imagine hearing the White Christmas record playing. Following this, participants were asked whether they had had subjectively compelling imagery of the record. Apart from the fact that this version of the

White Christmas task more or less invites people to come up with hallucinatory reports, it is a short-term memory rather than an auditory perception task. For that reason, we relied on a more neutral version that was similar to a signal-detection paradigm (e.g., Bentall & Slade, 1985). Thus, people were told that the White Christmas song might be played and that their task was to signal online in case they believed hearing the song. More specifically, participants were brought to a sound-isolated lab room. While they entered this room, Bing Crosby's White Christmas song was playing and participants were asked whether they were familiar with the song. All participants indicated that they were. Next, they were told that they would hear over headphones a tape with white noise for a 3-min period. They also were told that:

“the White Christmas song you just heard might be embedded in the white noise below the auditory threshold. If you think or believe that you hear the song clearly, please press the button in front of you. Of course, you may press the button several times if you think that you heard several fragments of the song”.

Participants were then given the headphones and the tape with white noise was started. As a matter of fact, the White Christmas song was never presented during the 3-min period. The frequency with which participants pressed the button was recorded online. After the 3-min period, they were asked to complete a 100 mm Visual Analog Scale (VAS) about how confident they were that they had actually heard the White Christmas song (anchors: 0 = *I heard absolutely nothing of the song*; 100 = *I heard the song loud and clearly*).

Next, participants were asked to complete the Questionnaire upon Mental Imagery (QMI; Sheenan, 1976), the Launay–Slade Hallucination Scale (LSHS; Launay & Slade, 1981), the Social Desirability Scale (SDS; Crowne & Marlow, 1964), and the Creative Experiences Questionnaire (CEQ; Merckelbach, Muris, Schmidt, Rassin, & Horselenberg, 1998; Merckelbach, Horselenberg, & Muris, 2001).

The QMI ( $\alpha = 0.88$ ) is a 35-item self-report instrument that aims at measuring individual differences in imagery ability. Items relate to several sensory modalities. Sample items are “How vividly and lively can you imagine the taste of salt?” and “How vividly and lively can you imagine the sound of escaping steam?” Participants indicate on 7-point scales (1 = *as perfectly clear as true*; 7 = *I think about it, but I cannot imagine it*) how vividly and lively they can imagine each item. Scores are summed such that a low overall score implies excellent imagery ability.

The SDS ( $\alpha = 0.64$ ) is commonly used to measure the tendency to provide socially desirable responses across many situations. It consists of 33 true-false items (e.g., “I never hesitate to help someone who is in distress”). True-answers are summed to obtain a total score, with higher scores reflecting a higher sensitivity to demand characteristics.

The LSHS ( $\alpha = 0.79$ ) is a widely used instrument for measuring the disposition to hallucinate. It consists of 12 statements that refer to hallucinatory experiences. Sample items are “Sometimes my thoughts seem as real as actual events in my life”

and “I have been troubled by hearing voices in my head”. Participants score each item on a 5-point scale (0 = *certainly does not apply*; 4 = *certainly applies*). Scores are summed to obtain a total score, with higher scores indicating a stronger disposition towards hallucinatory experiences.

The CEQ ( $\alpha = 0.77$ ) is an index of fantasy proneness. It comprises 25 dichotomous items that were derived from extensive case descriptions of fantasy proneness provided by Wilson and Barber (1983). Sample items are: “In general, I spend at least half of the day fantasizing or daydreaming”; “My fantasies are so vivid that they are like a good movie”; and “I tend to confuse my fantasies with memories of real events”. CEQ’s internal and test-retest reliabilities are sound and the scale correlates strongly with concurrent measures of fantasy proneness (Merckelbach, Wiers, Horselenberg, & Wessel, 2001).

### 3. Results

Of the 44 participants, 14 (32%) pressed the button at least once, indicating that they believed hearing the White Christmas song clearly. The mean frequency of button pressing in this subgroup was 2.9 ( $SD = 2.5$ ; range: 1–12). Table 1 shows the mean scores on the subjective confidence VAS, QMI, SDS, LSHS, and CEQ of those who reported hallucinatory experiences (i.e., did press the button) and those who did not. As can be seen, participants with hallucinatory reports scored higher on the subjective confidence VAS relative to participants without such reports [ $t(42) = 4.4$ ,  $p < 0.01$ ; two-tailed]. Note, however, that participants with hallucinatory reports were not very confident about their reports, as evidenced by their relatively low VAS scores. Interestingly, the two groups did not differ with regard to imagery ability [ $t(42) = 1.4$ ,  $p = 0.17$ ; two-tailed]. Thus, it was not the case that participants with hallucinatory reports had superior imagery ability. This was even true when the analysis was restricted to scores on auditory imagery items of the QMI: again, those with and those without hallucinatory reports did not differ, means being 12.0

Table 1  
Mean scores on VAS, QMI, SDS, LSHS, and CEQ of participants with ( $n = 14$ ) and without ( $n = 30$ ) hallucinatory reports<sup>a</sup>

Measures	Ss with hallucinatory reports	Ss without reports
VAS <sup>b</sup>	17.8 (22.1)	0.4 (0.8)
QMI	84.9 (18.4)	98.8 (34.8)
SDS	12.9 (5.9)	15.5 (5.3)
LSHS <sup>b</sup>	13.3 (7.1)	8.9 (6.3)
CEQ <sup>b</sup>	8.4 (4.1)	5.2 (4.0)

<sup>a</sup> Notes: VAS = subjective confidence rated on 100 mm Visual analogue scale; QMI = questionnaire upon mental imagery; SDS = social desirability scale; LSHS = Launay–Slade hallucination scale; CEQ = creative experiences questionnaire. Standard deviations appear between parentheses.

<sup>b</sup>  $p < 0.05$ , two-tailed.

(SD = 3.5) and 13.8 (SD = 4.5), respectively [ $t(42) = 1.3$ ,  $p = 0.20$ , two-tailed]. Likewise, those with and without hallucinatory reports did not differ in terms of social desirability scores [ $t(42) = 1.4$ ,  $p = 0.16$ ; two-tailed]. Meanwhile, participants with hallucinatory reports had higher scores on the hallucination disposition (LSHS) and fantasy proneness scale (CEQ), compared to participants without hallucinatory reports [ $t(42) = 2.0$ ,  $p < 0.05$ , two-tailed, and  $t(42) = 2.4$ ,  $p < 0.02$ , two-tailed, respectively].

LSHS and CEQ scores were correlated significantly with each other ( $r = 0.56$ ,  $p < 0.01$ ). To test which of these two variables is a better predictor of hallucinatory reports, backward stepwise logistic regression analysis was carried out. In the final step, only CEQ scores were retained in the model ( $Wald = 4.6$ ,  $p < 0.03$ ), while LSHS and the interaction term were removed on the third and second step, respectively ( $Wald = 1.4$ ,  $p = 0.24$  and  $Wald = 2.3$ ,  $p = 0.13$ , respectively).

#### 4. Discussion

The main results of the current study can be catalogued as follows. To begin with, in accordance with previous studies (e.g., Barber & Calverley, 1964; Mintz & Alpern, 1972; Young et al., 1987), a non-trivial minority (i.e., 32%) of our healthy control participants indicated that they had heard the White Christmas song. Secondly, such “hallucinatory reports” were not found to be related to imagery ability. Thus, our results concur with those of Bentall and Slade (1985), who found no evidence that superior imagery ability is involved in high LSHS participants’ false alarms on auditory perception tasks. Third, reports of hallucinatory experiences were not associated with a heightened sensitivity to situational demands. This finding further underscores Young et al.’s (1987) conclusion that the White Christmas phenomenon cannot be simply accounted for in terms of suggestibility or compliance to expectancies of the experimenter. Fourth, relative to participants without White Christmas reports, participants with such reports had higher scores on both the LSHS and a fantasy proneness scale. Follow-up logistic regression analysis suggested that the contribution of fantasy proneness to the White Christmas phenomenon was more substantial than that of hallucinatory predisposition. This issue is important for the following reason. Reports of the White Christmas phenomenon by normal controls have often been interpreted to mean that “the disposition to report hallucinatory-type experiences may be present in a significant proportion of normal individuals” (Young et al., 1987, p. 46). The current results suggest another possibility, namely that such reports originate from fantasy prone persons’ tendency to endorse odd items (Merckelbach et al., 2000a). Germane to this issue is also our finding that those who reported hearing the White Christmas record during the experiment were not very confident about their experience afterwards.

While it is true that early studies (e.g., Wilson & Barber, 1983) claimed that fantasy prone individuals are able to produce fantasies with hallucinatory intensities, subsequent research (e.g., Lynn & Rhue, 1988) has made it clear that, as a rule, these individuals do not have lifelike hallucinations. Interestingly, Lynn and Rhue (1988)

explicitly refer to the possibility that fantasy prone persons adopt lax criteria when they classify internal experiences as hallucinations. That this possibility is not far-fetched is suggested by the intimate link between fantasy proneness, on the one hand, and confabulatory responses during memory tasks (e.g., Hyman & Billings, 1998; Merckelbach et al., 2000a), reports of paranormal experiences (Irwin, 1990), and successful simulation of amnesia (Merckelbach & Rasquin, 2001), on the other hand. Indeed, a non-specific response bias characterizing fantasy proneness is the most parsimonious explanation for this pattern of associations.

Admittedly, our findings do not rule out a scenario in which fantasy proneness drives a specific response bias reflecting impaired reality testing, which in turn fosters hallucinatory reports (e.g., Bentall, 1990). One could even argue that the overlap between fantasy proneness and the broader category of experiences and traits commonly referred to as schizotypy (e.g., Allen & Coyne, 1995; Merckelbach, Rassin, & Muris, 2000b) supports such an interpretation. Indeed, our findings raise the following, critical question: is fantasy proneness responsible for a wide variety of atypical reports (including hallucinatory reports) that are unrelated to genuine experiences or does this trait reflect impaired reality testing that gives rise to odd and schizophrenia-like experiences? To the extent that the first interpretation is the correct one, the White Christmas task loses its relevance for the study of hallucinatory experiences in non-clinical samples. A wider implication of this view might be that the relatively high prevalence of hallucinatory reports found in the general population does not necessarily demonstrate that schizophrenic symptoms occur in less intense, persistent, and debilitating forms in normal people (e.g., the dimensional interpretation of schizophrenic symptomatology; see, for an extensive discussion, Costello, 1994), but rather shows that a non-trivial minority of people tend to overendorse bizarre items. Clearly, this issue warrants further study. For example, it would be informative to systematically examine the links between hallucinatory reports, fantasy proneness, and highly specific experiences such as those tapped by the Magical Ideation and Perceptual Aberration Scales (Chapman, Chapman, & Kwapil, 1995).

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