Chapter 5

Multi-dimensionality of hallucinatory predisposition

Summary

A substantial percentage of normal people has been documented to report hallucinatory experiences. We investigated the multi-dimensionality of such experiences in 243 subjects from the normal population who completed the Launay-Slade Hallucination Scale. Principal components analysis with oblique rotation was performed on the data. Three factors were obtained loading on items reflecting (1) tendency towards hallucinatory experiences, (2) subjective externality of thought, and (3) vivid daydreams. An additional exploratory factor analysis revealed highly similar factors. The results support the concept of hallucinatory disposition as a multi-dimensional construct.

Introduction

Hallucinatory experiences have been reported to occur not only in psychiatric patients, but in a substantial percentage of normal subjects as well. A number of studies have established that 10 to 25% of subjects from the normal population may have the experience of hearing voices without any objective basis (Posey & Losch, 1983; Young et al., 1986; Tien, 1991). Such auditory-verbal hallucinatory experiences may, to an important degree, resemble the hallucinations characteristic of schizophrenia (Barrett & Caylor, 1998). A frequently applied questionnaire for measuring hallucinatory experiences is the Launay-Slade Hallucination scale (Launay & Slade, 1981, modified version Bentall & Slade, 1985), which was developed based on the assumption that hallucinatory experiences form a continuum with normal psychological functioning (Slade & Bentall, 1988). For example, the scale includes items related to daydreaming (e.g. “The sounds I hear in my daydreams are usually clear and distinct”), but also includes items related to psychotic hallucinations (e.g. “I have heard the voice of the Devil”). The items of the LSHS can be found in table 1.

In the original scale (Launay & Slade 1981) subjects had to respond with true/false to each of the twelve items, of which two were negatively stated. A principal components analysis on the data of 54 normal controls, 42 psychiatric patients and 200 prisoners (Launay & Slade, 1981) revealed two factors: “tendency to hallucinatory experiences” and “negative response set”. All items except items 9 and 11 loaded on the first factor, with items 9 and 11 (which were negative response items) loading on the second factor.

Bentall & Slade (1985) modified the LSHS by introducing a 5 point Likert scale instead of the simple true/false response dichotomy, and by changing the negative response items to positive ones. For research purposes, the LSHS is mainly used in subjects from the normal population (e.g., Aleman et al., 1999; Rankin & O’Carroll, 1995). The multi-dimensionality of hallucinatory disposition has not been studied yet in a sample from the normal population using the modified LSHS. Levitan et al. (1996) investigated the factor structure of the modified LSHS in a sample of 169 psychiatric patients. Principal component analysis yielded four factors, characterised as “vivid daydreams” (items 1, 3, 5, 6 and 9), “clinical auditory hallucinations” (items 7, 9, 10, 11 and 12), “intrusive thoughts” (items 1, 3, 4 and 12), and “sub-clinical auditory hallucinations” (items 8 and 9), respectively.

The aim of the present study was to investigate the multi-dimensionality of hallucinatory experiences in a normal sample of 243 undergraduate students in
Predisposition towards hallucination

order to shed more light on the nature of the concept of hallucinatory predisposition.

Method
Subjects were 243 undergraduate students from Utrecht University, who completed the Dutch translation of the modified version of the LSHS (Bentall & Slade, 1985). Mean age was 22.6 years (SD = 5.6). One hundred and eighty nine subjects were female, and the other 58 subjects were male. LSHS items were scored on a five point scale as follows: 0 = "certainly does not apply to me", 1 = "possibly does not apply to me", 2 = "unsure", 3 = "possibly applies to me" and 4 = "certainly applies to me". Factor structure of the data was examined by principal component analysis (PCA). The number of components to be retained was determined by Kaiser’s criterion (eigenvalue greater than 1) followed by inspection of the scree plot in order not to miss possible relevant factors with smaller eigenvalues. An oblique rotation (Oblimin with Kaiser normalisation) was then carried out since the phenomena under investigation may well not lead to independent factors. In order to check the fit of the PCA we also performed an exploratory factor analysis in which common variance is explored by principal axis factoring. All analyses were performed with SPSS 8.0 (SPSS Inc, Chicago).

Results
The mean total score of the subjects was 13.9, SD = 6.7 (range from 0 to 36); there was no evidence of sex differences in LSHS-ratings, t = 0.23, p > 0.8. The distribution was positively skewed, comparable to the distributions reported by Bentall & Slade (1985). A substantial percentage of subjects responded affirmative ("possibly applies" or "certainly applies") to typical hallucination-items such as item 7 (7 and 4.1%) and item 8 (25.5 and 5.3%). All items correlated significantly with the total test score (p < .01). The internal consistency coefficient (equivalent to Cronbach’s alpha; Murphy & Davidshofer, 1994) was 0.82.

The PCA revealed three factors (eigenvalues > 1) which accounted for 50% of the variance. Table 1 shows loadings of items on the three factors. The first factor accounted for 29.8% of the variance and can be characterised as general hallucinatory tendency (e.g., item 7). The second factor (accounting for 10.8% of the variance) concerned subjective externality of thought (e.g., item 3),
and the third factor (9.5% of the variance) may be described as vividness of
daydreams (e.g., item 6). Correlations between factors were $r=0.29$ for I-II,
$r=0.30$ for I-III and $r=0.12$ for II-III.

Table 1. LSHS items and factor loadings (only loadings $>0.4$ are shown)

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No matter how hard I try to concentrate, unrelated thoughts always creep into my mind</td>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. In my daydreams I can hear the sound of a tune almost as clearly as if I were actually listening to it</td>
<td>0.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Sometimes my thoughts seem as real as actual events in my life</td>
<td></td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>4. Sometimes a passing thought will seem so real that it frightens me</td>
<td></td>
<td>0.65</td>
<td></td>
</tr>
<tr>
<td>5. The sounds I hear in my daydreams are usually clear and distinct</td>
<td></td>
<td></td>
<td>0.82</td>
</tr>
<tr>
<td>6. The people in my daydreams seem so true to life that sometimes I think they are</td>
<td></td>
<td></td>
<td>0.84</td>
</tr>
<tr>
<td>7. I often hear a voice speaking my thoughts aloud</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. In the past I have had the experience of hearing a person’s voice and then found that no one was there</td>
<td>0.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. On occasions I have seen a person’s face in front of me when no one was in fact there</td>
<td>0.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I have heard the voice of the devil</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. In the past I have heard the voice of God speaking to me</td>
<td></td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>12. I have been troubled by hearing voices in my head</td>
<td>0.61</td>
<td>0.41</td>
<td></td>
</tr>
</tbody>
</table>

The results of the principal factor analysis with oblique rotation revealed the same factors as the PCA, with small differences in the items loading on these factors. Items that loaded higher than 0.40 on factor I were items 1, 7, 8, 9, 10 and 12, on factor II items 3 and 11, and on factor III items 5 and 6. The differences with the results of the PCA are mainly that item 2 did not load on factor I in this analysis and that item 4 did not load on factor II. Correlations between factors were $r=0.41$ for I-II, $r=0.45$ for I-III and $r=0.20$ for II-III.

Given the skewed distribution and the possibility that outliers (e.g., the few individuals that may endorse the more pathological items) may strongly
influence the factor structure, we conducted a third analysis. This analysis was identical to the first one (i.e., PCA with oblique rotation) with exception that ln-transformation was performed on the data prior to analysis, and outliers were excluded (defined as $z > 4$ [Stevens, 1996], which concerned five datapoints). This analysis again yielded the same three factors, with the following items loading higher than 0.40: items 1, 2, 7, 8, 9, 10 and 12 on factor I; items 3, 4, and 11 on factor II; and items 5, 6, 9 and 12 on factor III. The difference with the first PCA was that item 9 also loaded on factor III (items 4 and 5 remained loading the highest on this factor).

Discussion

In this study we investigated the multi-dimensionality of hallucinatory predisposition as measured by the Launay-Slade Hallucination Scale (LSHS) in normal subjects. A small, but clearly noticeable percentage of subjects reported hallucinatory experiences (for example item 8), which is in accordance with previous findings in college students in Great Britain (Young et al., 1986). However, the mean total rating on the LSHS was lower than that reported in previous studies (e.g. 13.9 in our study versus 19.6 reported by Bentall & Slade [1985] in a very similar sample). The observation of a small, but substantial, number of subjects from the normal population reporting hallucinatory experiences is in accordance with the view of hallucinations as existing on a continuum with normal mental events (Slade & Bentall, 1988; Aleman & De Haan, 1998).

The multi-dimensionality of the LSHS was investigated with principal component analysis, yielding three factors, which we characterised as (1) tendency towards hallucinatory experiences, (2) subjective externality (“realness”) of thought, and (3) vivid daydreams. These results indicate that hallucinatory predisposition can be regarded to be a multi-dimensional construct, which is consistent with the findings of Levitan et al. (1996) who investigated the factorial structure of the LSHS in psychiatric patients. Levitan et al. (1996) also found evidence for a vivid daydreams factor and for a factor related to vivid thoughts. However, in addition to these factors, they report two hallucination factors, “clinical auditory hallucinations” and “sub-clinical auditory hallucinations” (as described in the introduction). In contrast, our analysis revealed only one general hallucinatory tendency factor. Our failure to find two distinct hallucination factors may be explained by the different subject group: normal subjects in our
study versus psychiatric patients in the study by Levitan et al. (1996). Indeed, the subjects in the Levitan et al. (1996) study scored much higher overall and showed a greater range of LSHS scores. The finding of only one hallucination factor in normal subjects suggests that the distinction between clinical and sub-clinical hallucinations may be specific to psychiatric patients.

A number of authors have associated high scores on the LSHS with psychosis-proneness (Bentall et al., 1989; Kendler & Hewitt, 1992; Vollema & Van den Bosch, 1995). It could be hypothesised that the factors underlying the LSHS, as established in the present study, may be differentially related to vulnerability to psychopathology. For example, high ratings on items loading on factor 1 (tendency towards hallucinatory experiences) or factor 2 (subjective externality of thought) may be a better predictor of the occurrence of subsequent psychopathological symptoms than high ratings on factor 3 (vivid daydreams). Future research may be directed at such questions and should also concentrate on the cognitive processes involved in hallucinatory experiences.
References


