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Perception of self and other in psychosis: a method for analyzing the structure of the phenomenology

Claire Dean¹, Brita Elvevåg^{1,*}, Gert Storms², and Catherine Diaz-Asper¹

¹ Clinical Brain Disorders Branch, National Institute of Mental Health National Institutes of Health, Bethesda MD, USA

² Department of Psychology, University of Leuven, Belgium

Abstract

Introduction—Although the phenomenology accompanying psychoses is fascinating, hitherto empirical examinations have been qualitative and thus limited in their clinical conclusions regarding the actual underlying cognitive mechanisms responsible for the formation and maintenance of the delusion, which is often distressing to the patient.

Methods—We investigated the internal cognitive structure (i.e., connections) of some delusions pertaining to self and others in a patient with psychosis who was very fluent and thus able to provide a lucid account of his phenomenological experiences. To this end we employed a clustering method (HICLAS disjunctive model) in conjunction with standard neuropsychological tests.

Results—A well-fitting, but parsimonious solution revealed the absence of unique feature sets associated with certain persons, findings that provide a compelling case underlying the confusion in certain instances between real and delusional people.

Conclusions—We illustrate the methodology in one patient and suggest that it is sensitive enough to explore the structure of delusions, which in conjunction with standard neuropsychological and clinical assessments promises to be useful in uncovering the mechanisms underlying delusions in psychosis.

Keywords

HICLAS; CLUSTERING; FEATURES

1. Introduction

Delusions are a core feature associated with schizophrenia and other psychotic disorders, and typically cause a great deal of distress for patients. Phenomenological analyses of delusions have generally been qualitative in nature, and have focused on disordered self-experience, metacognition, perceptual processing, or attributional biases (e.g., Bell, Halligan & Ellis, 2006; Gilleen & David, 2005).

*Corresponding author: Clinical Brain Disorders Branch, National Institute of Mental Health, National Institutes of Health, Building 10, Room 4S235, MSC 1379, Bethesda MD, USA, Tel. 301-451-2123, brita@elvevaag.net.

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In contrast, we adopted a quantitative approach called “hierarchical classes” (HICLAS; De Boeck & Rosenberg, 1988) to illustrate the usefulness of a clustering method in mapping the internal structure of delusions. HICLAS is based on a set theoretical model which simultaneously computes hierarchical relationships between targets and features, and their associative relationships. It has been shown to reveal useful insights in the perception of self and other in major depression (Gara et al., 1993) and in schizophrenia (Gara et al., 1989), and in delusional misidentification syndrome (de Bonis et al., 1994), as well as in the integration of self-structure in late adolescence (Elbogen et al., 2001), and in examining semantic concepts in general (Storms et al., 1994).

To demonstrate with maximum clarity the richness of this technique when applied to delusions, we present data from a patient who was exceptionally detailed in their experiential description. Specifically, we sought to explore the nature of and connection between self and others since this patient presented with multiple notions of self (e.g., me, me as God, me as Messiah) and two (illusory) wives.

2. Methods

A standard comprehensive neuropsychological examination of the patient was performed, in which the following neuropsychological functions were assessed: intelligence (WAIS-R and WRAT-R), attention (CPT, Trail Making Part A and WAIS-R Digit Symbol), language (verbal fluency and WAIS-R Similarities), visuo-perceptual ability (Judgment of Line Orientation Test), working memory and executive ability (Trail Making Part B, Letter-Number Sequencing and Wisconsin Card Sorting Test), and memory (California Verbal Learning Test). Positive and negative symptoms were rated with the PANSS.

The technique used to explore the patient’s concept of self and others was as follows: First, the patient was asked to generate a list of people who were important to him. Excluding any redundancies, this resulted in the following list of 11 persons: my father, my mother, my wife (the Hollywood starlet), my wife (the woman from a previous hospital), me as the Messiah, my brother, God, me as I usually am, me as an angel, psychiatrists, and nurses. Second, the patient was required to state at least one important attribute or feature that characterized each of these persons. This resulted in the following list of 17 attributes: supportive, believes me, a delusion, a real person, cheats, punishes me, “wild and crazy”, loving, powerful, is concerned for me, intelligent, is rewarding, is perfect, causes me pain, betrays, is critical of me, and is all-knowing. Third, the persons and attributes were arranged on a sheet of paper in a matrix form (persons by row and attributes by column) such that the patient was asked to rate dichotomously (yes or no) as to whether each of the 11 persons possessed (or not) each of the 17 attributes.

The resulting matrix, consisting of 11 persons (as rows) and 17 attributes, was analyzed with the disjunctive version of the set-theoretical model HICLAS (De Boeck & Rosenberg, 1988; the computer program “HiClas” developed by Eva Ceulemans and Kristof Meers can be obtained from Iven Van Mechelen via <http://ppw.kuleuven.be/okp/home>) in order to provide a quantitative description of the structure of the matrix. [Footnote: We note that although the term “features” is used commonly in cognitive psychology and in the context of HICLAS, in the current study “features” could be considered to represent “characteristics” or “traits”.] HICLAS directly operates upon binary person by attribute data matrices. The model decomposes a matrix into the Boolean product of a person by bundle and a bundle by attribute matrix in a way that is consistent with the set-theoretical formulation of the model. The main advantage of using this model, as opposed to multidimensional scaling (MDS), or more traditional clustering methods, is that HICLAS groups equivalent persons (i.e., persons with identical sets of attributes) and equivalent attributes (i.e., attributes that characterize the same set of persons) in hierarchically ordered clusters, and at the same time shows the relationship

between the person structure and the attribute structure. The hierarchical nature of the model implies that a person class is below another person class if its associated attribute class is a proper subset of the associated feature class of the hierarchically higher person class. Likewise, an attribute class is hierarchically below another attribute class if the person class that is associated with the higher attributes is a proper subset of the person set with which the lower attributes are associated.

In practical applications, the HICLAS model assigns persons and attributes to those classes that maximize the number of concordances between the model and the empirical data, given a predetermined level of complexity of the model, called the model rank. The rank is the number of bundles used in the matrix decomposition and it is equivalent to the number of factors used in a factor analysis, or the dimensionality of a multidimensional scaling solution. Choosing the appropriate rank is, as in many statistical techniques, balancing model fit, complexity, and interpretability. The final solution of the model can be graphically displayed in a chart that shows hierarchically organized equivalence classes of persons and attributes and that, at the same time, shows which person classes are associated with which attribute classes, that is, which persons possess which attributes.

3. Results

Neuropsychological testing revealed that while broadly within normal limits across many neurocognitive domains (e.g., attention, language, visuo-perceptual ability, working memory and executive ability), the patient exhibited some decline in intellectual function (WAIS-R IQ = 84) from putative estimated premorbid levels (WRAT-R IQ = 108). Also, performance was in the impaired range on all measures of verbal memory function, with immediate recall of two short stories from the WMS-R falling in the mildly impaired range (4th percentile), and recall of this information following a 30-minute delay being similarly impoverished (5th percentile). Similarly, learning and immediate recall of a 16-word list (California Verbal Learning Test) fell in the severely impaired range, and the patient showed no evidence of a learning curve across the 5 trials (from 5/16 correct for Trial 1 to 5/16 correct for Trial 5). At the time of study, the patient's symptoms (PANSS) were in the mild range (positive = 15, negative = 14 and general psychopathology = 35). [Complete details of neuropsychological performance available upon request].

The person by attribute data matrix was analyzed using the disjunctive HICLAS model (De Boeck & Rosenberg, 1988). Analyses were carried out in ranks 2 to 4. The solution in rank 2 was best interpretable. As shown in Table 1, for each person and each attribute a goodness of fit is derived, and yielded an overall good fit index (Jaccard index of 0.75). In this solution (of rank 2) there were the same three features in the null class. The features 'is perfect', 'is all-knowing', and 'a delusion' were put in the null class by the model, which means that according to the model they apply to none of the persons and thus have to be left out of the interpretation of the solution. There was no person null class, meaning that none of the persons are left out of the interpretation of the solution. The differentiation and overlap between the persons and their ascribed features was charted and the relationship between self and others graphically illustrated (see Figure 1).

Figure 1 gives a graphical representation of the HICLAS solution of the data matrix. This figure at once captures the hierarchy of the persons (above the zigzag lines) and the hierarchy of the attributes (shown inverted below the line), as well as the connection between the two hierarchies. There are three person classes in the solution and three attribute classes. The arrows denote hierarchical relations. For example, the arrow between [my wife in hospital] and [my father, my mother, my brother, psychiatrists, nurses] indicates that, in terms of attributes, the first is hierarchically above the second. Two of the three person classes do not subsume any

other person class and are linked directly to the attribute classes by zigzag lines. These are so-called “bottom” person classes. Likewise, bottom attribute classes are directly linked with the bottom person classes.

The zigzag lines that connect the attribute classes with the person classes, together with the arrows in Figure 1, can be used as follows to determine which persons are characterized by which attributes in the model. First, each person in a bottom class has all the attributes in the bottom class to which the bottom person class is directly linked (with a zigzag line), as well as the attributes in any attribute class that is hierarchically above (and thus below in the Figure) that attribute class. Consequently, it can be derived that, for instance, ‘my father’ and ‘psychiatrists’ have the features ‘cheats’ and ‘concerned for me’. Second, the superordinate person class [my wife in the hospital] has all the attributes that characterize the bottom person classes to which it is linked. Thus ‘my wife in the hospital’ has, for instance, the attributes ‘cheats’, ‘loving’, and is ‘concerned for me’.

4. Discussion

With reference to Figure 1, it is noteworthy that the real people (A) are associated with features (A') that can be summarized as ‘betrayal’ (cheats, wild and crazy, betrays), whereas the delusional people (C) are associated with features (C') that can be summarized as ‘trust’ (believes me, loving, rewarding). This well-organized differentiation between self (as defined by real people) and other identities (as defined by delusional people) and the clear hierarchy of the associated features is very striking, and suggests a significant amount of insight in the presence of delusions (David, 1990) (which was corroborated by interview with the patient). There is also a large overlap of the features, both positive and negative, that describe both real and delusional people (‘B’). The presence of such rich generally applying features may over time serve to strengthen the delusion since characters with positive as well as negative features may appear more real than one-sided positive (or negative) characters. That his wife in hospital (B) was in a class of her own (literally) is important since there were no specific features attributed to her that were unique to real people (A) or delusional people (C), a finding that makes sense in light of the “enduring” nature of this delusion. (He talked a great deal over many different interviews about the need to find out who his real wife was, and that it was probably someone he had met in hospital.) Clearly, finding the identity of this person was made difficult by the fact that she does not possess any unique (to real or delusional people) feature sets (unlike a true partner or spouse), and thus was the source of a great amount of (painful) effort (i.e., seemingly bizarre reasoning and discussion) to discover whom in fact she was.

We speculate that in the absence of unique associations (i.e., sets of features) of delusional persons, it is eminently possible to acquire a “distorted” view of the world and so confuse self with others (e.g., God, Messiah), and also confuse who one is associated with (e.g., who one is married to), and to confuse others (as in delusional misidentification syndrome; de Bonis, de Boeck, Lida-Pulik, Bazin, Masure & Féline, 1994). Indeed, the notion of “self” is fluid and changes with age, dramatically in adolescence (Elbogen, Carlo & Spaulding, 2001), and of course in illness (e.g., major depression; Gara, Woolfolk, Cohen, Goldston, Allen & Novalany, 1993). A HICLAS study in a sample of patients with schizophrenia concluded that they had a “poorly elaborated view of self” (p.253; Gara, Rosenberg & Mueller, 1989). Our current study suggests that this lack of elaboration in the current patient may in part be due to the absence of unique features associated with various persons (e.g., various wives), but interestingly there is sufficient insight when it comes to the general distinction between real versus delusional people (i.e., A versus C in Figure 1, but not B).

Interestingly, some psychological accounts of delusional misidentification (e.g., Capgras', Frégoli and intermetamorphosis) suggest information processing problems in different stages

of face recognition (e.g., Ellis & Young, 1990). Based on our current observation we speculate further that this “information processing” is hampered in cases where there is an absence of unique feature sets associated with persons. This notion of blurring of boundaries between self and others is striking in light of the current patient’s comment that his delusions make “categories lose their exclusivity”, and things just “melt into each other”, which obviously makes life very confusing.

There has been a growing interest in the role of metaphors in the formation and maintenance of our basic concepts (e.g., Lakoff & Johnson, 1980). Recent work by Rhodes and Jakes (2004) illustrates (with real patients) how figurative thinking in the “pre-delusional period” may pave the foundation for later delusions. “At some stage, thoughts such as ‘am I *like* someone possessed by a devil’ become ‘I *am* possessed by a devil’” (Rhodes & Jakes, 2004 p.6; our italics). Although there are serious limitations on such qualitative and highly speculative work, it is indeed possible that “the delusional statement is a *literal* statement about aspects of the world or self which are transformed by metaphor” (p.15; Rhodes & Jakes, 2004). Parenthetically, we note the patient stated that he believes his godson to be the Messiah. While both the boy’s parents are “mortals”, the patient in our case-study is his “god” father. Since the boy is the patient’s godson (i.e., son of God) this makes the boy the Messiah (but we note that the patient also refers to himself as the Messiah).

In summary, this clustering technique is well suited to explore specific “aberrant” relationships between persons and attributes and thus may be used to speculate on mechanisms for the formation and maintenance of particular sets of delusions. In this case-study we find the absence of unique feature sets associated with certain persons to provide a compelling case underlying the confusion in certain instances between real and delusional people (i.e., the wife in hospital). Furthermore, we suggest that such a method may be easily and gainfully employed at numerous time points during the exploration and treatment of several psychiatric illnesses, for example depression.

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Figure 1.

HICLAS illustration of the structure and hierarchical organization of self and others in the patient (Numerical values indicate goodness of fit, with a maximum of 1.0 for perfectly fitting entities, i.e., features that, according to the model, only apply to those persons with which they were associated in the analyzed data set, and to no other, and persons that are, according to the model, only characterized by those features with which they were associated in the analyzed data, and by no other features.)

Table 1
HICLAS structure Rank 2 disjunctive solution

(Overall goodness-of-fit = 0.748)

	Goodness of fit	Bundle pattern
- Persons -		
my father	0.818	10
my mother	0.750	10
my wife in Hollywood	0.750	01
my wife in hospital	0.786	11
me as the Messiah	0.846	01
my brother	0.667	10
God	0.643	01
me as usually	0.750	01
me as an angel	0.727	01
psychiatrists	0.667	10
nurses	0.833	10
- Attributes -		
supportive	0.818	11
believes me	1.000	01
a delusion	0.000	00
a real person	0.909	11
cheats	0.833	10
punishes me	0.909	11
"wild and crazy"	0.500	10
loving	0.714	01
powerful	0.545	11
is concerned for me	0.909	11
intelligent	0.727	11
is rewarding	0.625	01
is perfect	0.000	00
causes me pain	0.727	11
betrays	0.833	10
is critical of me	0.909	11
is all-knowing	0.000	00