# EMPIRICAL EVIDENCE FOR FREUD'S THEORY OF PRIMARY PROCESS MENTATION IN ACUTE PSYCHOSIS

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**ABSTRACT**

Freud (1895/1966; 1900/1953; 1915/1957) has proposed that primary process functioning is typical for acute psychosis. A non-verbal method, the '*Geocat*' (Brakel, Kleinsorge, Snodgrass and Shevrin, 2000), measures primary processes operationalised as attributional categorisation, which considers exemplars as similar if particular features match, even if these components are arranged in a quite different configuration. With the use of *GeoCat* we explored primary process mentation in 127 psychiatric patients. Results show that (1) there are substantially higher levels of attributional choices in our sample of psychiatric patients, independently of diagnosis, than in a non-patient population; (2) psychotic patients tend to have more attributional choices than non-psychotic patient; patients with acute psychotic symptoms show more attributional responses than patients without acute psychotic symptoms; (3) this increase of attributional choices with the psychotic condition is independent of self-rated anxiety or medication intake. We propose that, instead, this increase of attributional levels in the acutely psychotic patients reflects a predominance of primary processing which is specifically tied to the acutely psychotic condition, as proposed by Freud.

**keywords: psychosis, primary process, Freud, measurement, GeoCat**

## INTRODUCTION

The issue of what constitutes psychotic thinking has been a long-standing focus of interest in psychopathology. Building on previous work (Brakel, 2009; Brakel, Shevrin, & Villa, 2002; Brakel, 2004; Brakel & Shevrin, 2005; Vanheule, Roelstraete, Geerardyn, Murphy, Bazan, & Brakel, 2011), this empirical study proposes to test if there is predominance of primary process mentation in psychosis as was proposed by Freud by applying a new method that has shown promise in mapping primary and secondary processes, called the *GeoCat*, an abbreviation of "Geometric Categorisaton" (Brakel, Kleinsorge, Snodgrass, & Shevrin, 2000; see further) in a population of psychiatric patients.

### *Primary and secondary processes*

In Freud's concept of the mental apparatus (Freud, 1895/1966), the primary process is earlier both in ontogeny and phylogeny and reflects the primary function of the nervous system: the flight from incoming excitations by the shortest pathway possible by means of free flowing quantities which follow directly connected or contiguous neural pathways. At the mental level, the primary process denotes mechanisms of association that are characteristic of unconscious mental life, including "(…) faulty reasoning, absurdity, indirect representation, representation by the opposite" (Freud, 1905/1960, p. 88-89). Rapaport (1951, pp. 395-398) proposes that "pre-logical" states are dominated by the primary-process mechanisms of condensation, displacement, the toleration of contradictions, symbolisations, substitutions and "pars pro toto". Holt (1967, p.

354) also speaks about an association on the basis of "non-essential" features. The overall outcome is a search for identity of perception (Freud, 1900/1953, p. 602), implying identity of visual but also phonological characteristics: "The ideas which transfer their intensities to each other stand in the loosest mutual relations. They are linked by associations of a kind that is scorned by our normal thinking and relegated to the use of jokes. In particular, we find associations based on homonyms and verbal similarities treated as equal in value to the rest." (Freud 1900/1953, p. 596). The secondary process reflects a more developed functioning of the nervous system: the search for an adequate act as a response to the actual situation of need of the organism by means of a refrained flow of quantities under the inhibitory influence of the ego (Freud, 1895/1966). The secondary process functions to inhibit and control primary process tendencies that follow the pleasure principle: this process is "attuned to the efficient attainment of goals in reality with the delayed gratification of impulses that is necessary" (Holt, 2009, p.3). At the mental level, the secondary process refers to rational thinking and can be found in our waking and conscious thinking ruled by the reality principle (Freud, 1911/1958). It builds on the "thought identity" or the content of ideas (Freud, 1900/1953, p. 602), and functions to make logically plausible connections between ideas, while ignoring the intensity of the excitation related to to them.The distinction between these two principles of mental functioning has proven a useful tool for many authors after Freud (for a recent review of literature see Vanheule et al., 2010).

***Measuring primary and secondary process mentation***

The first effort to find non-clinical confirmation of Freud's primary process theory of dream formation was undertaken by Schrötter (1911/1951) who used hypnosis to track symbolic transformations in dreams of prior hypnotic suggestions (see also Roffenstein, 1924/1951; Nachmansohn, 1925/1951). Using brief exposures of pictures, Pötzl (1917) found that parts of a stimulus presented below the perception threshold appeared in the manifest content of the subsequent dreams but that these fragments had undergone significant distortions closely resembling the mechanisms of the primary process (see also Fisher, 1954, 1957).For the assessment of the primary process, Shevrin and Luborsky (1961) introduced the rebus method – e.g. a rebus composed of e.g. the pictures of a pen and a knee - directly inspired from Freud's *Interpretation of dreams*. Primary process reading of this subliminally presented picture-puzzle leads to the phonemic condensation of the sounds and therefore to the new word *penny* or its related associations, appearing in dreams following the subliminal presentation. Moreover, for the first time, brain markers for secondary and primary process effects were demonstrated linking the study of primary process to neuroscience (see Shevrin, 1973 for a review of these studies). A recent study by Villa, Shevrin, Snodgrass, Bazan and Brakel (2006), based on the same theoretical principles, has brought further evidence that unconsciously words are treated as sensorimotor objects while consciously the same words are treated as counters in meaning.

However, not all studies dealing with primary process thinking used the method of subliminal stimulation. Rapaport, Gill and Schafer (1945-46) and Holt (Holt, 1956, 1977, 2002; Holt & Havel, 1960) independently developed methods to identify primary process in Rorschach responses . Recently, Holt has published an extensive manual for his “Primary Process System” (PRIPRO-system; Holt, 2007, 2009) which assesses both content and formal characteristics of primary process but also examines whether manifestations of condensation, displacement, symbolization, contradiction and distortion can be discerned in people’s thinking.Auld, Goldenberg and Weiss (1968) constructed a rating scale fort the scoring of primary process thinking in dreams. Finally, Martindale and Dailey (1996) developed a computerized scoring system (the Regressive Imagery Dictionary) that can be applied in computerized lexical analyses of a variety of text materials. It focuses primarily on content characteristics of primary process

However, these different methods are often complex and lengthy and they are at least partially based on content analysis, implying an interpretation of the materials produced by the subject, which often requires clinical skills and (extensive) training. Finally, these different methods are based on linguistic materials, limiting their use in children or for cross-cultural comparisons. The present study uses a *geo*metric *cat*egorization task, called *GeoCat* (Brakel et al., 2000), which is an example of a formal, non-verbal index of primary and secondary process mentation which can be administered independently of the psychoanalytic clinical interpretation or training as well as independently of language. Previous studies have confirmed the validity of the *GeoCat* for the measurement of primary and secondary process mentation (Brakel et al., 2000; Brakel et al., 2002; Brakel & Shevrin, 2005; Vanheule et al., 2011).

### *The Present Study*

We wished to determine if using *GeoCat* method we would find a predominance of primary process mentation in psychosis as was proposed by Freud. Indeed, in the Freudian model of psychosis, psychodynamic processes typical for the unconscious are present in conscious mental life: “As regards the relation of the two psychical systems [the conscious and the unconscious], all observers have been struck by the fact that in schizophrenia a great deal is expressed as being conscious which in the transference neuroses can only be shown to be present in the *Ucs.* by psycho-analysis.” (Freud, 1915/1957, p .197). Fenichel (1945) agrees: « In non-psychotic persons, this mode of thinking is still effective in the unconscious. Therefore the impression arises that in schizophrenia “the unconscious has become conscious”.» and he adds: « Because the ‘*primary process*[i]’ and the archaic ways of thinking have come to the fore again, schizophrenics are not estranged by these mechanisms any more. ». Freud (1900/1953, p. 568) underscores that psychosis, in this respect, is similar to the dream: the same regression, which in the dream leads to predominance of the primary process, is also seen in psychosis where it can lead to hallucinatory regression. In particular positive psychotic symptoms, such as hallucinations, perceptual distortions and delusions, function along primary process principles (Freud, 1895/1966, pp. 326-327; 1900/1953, p. 605). Finally, Freud indicates that the verbal transformations, typical for the language of schizophrenics (see e.g., Robbins, 2002), also reflect primary process functioning: « In schizophrenia, words are subject to the same process as that which makes dream images out of dream thoughts, the one we have called the primary process They undergo condensation, and by means of displacement transfer their cathexes to one another in their entirety. The process may go so far that a single word, if it is especially suitable on account of its numerous connections, takes over the representation of a whole train of thought. » (Freud, 1915/1957, p. 186; see also, Bazan, 2006). Previously and more recently, several authors have argued along the same lines that language use in schizophrenics typically reflects a lesser functioning of the secondary processes (e.g. Bazan, 2007*b*; Bazan & Van de Vijver, 2009*a*, *b*; Bonnard, 1969; Roulot, 2004).

On the basis of Freud's propositions according to which psychotic thinking can be understood as a form of primary process mentation, we collected *GeoCat* responses in a residential psychotic population and sought to explore three questions: 1) will hospitalized (residential) psychiatric patients show significantly more attributional responses compared to the healthy adults of a previous study with the GeoCat; 2) will hospitalized psychotic patients show more attributional responses than non-psychotic psychiatric patients and 3) will psychotic patients in an acute hallucinatory or delusional state show more attributional choices than patients without acute psychotic symptoms.

## METHOD

### *Participants*

The research included 127 psychiatric patients, either psychotic ($n$=72) or not psychotic ($n$=55). The participants were recruited from three different institutions: Clinique de la Borde in Cour-Cheverny ($n$=25) in France, Psychiatric

Centers Dr. Guislain in Ghent (*n*=59) and St.-Amandus in Beernem (*n*= 43) in Belgium. Research language was either French (Clinique de la Borde) or Dutch (Psychiatric Centers Dr. Guislain and St.-Amandus). The ethics oversight committees of the respective institutions approved the research; individual participants gave informed consent for the research as well as for access to their medical files. All data obtained were registered and stored anonymously.

There are no significant demographic differences between the two populations. The mean age of the psychotic versus non-psychotic patients is 40.3 (± 1.41) versus 42.0 (± 1.77) years (± standard error of the mean, SEM). The gender proportion is 81/19 versus 73/27 in the psychotic respectively the non-psychotic population. Both the psychotic and the non-psychotic group include substantially more men than women; this is due to the fact that the Psychiatric Center Sint-Amandus is (historically) a psychiatric center for male patients only. The mean number years of education is 11.8 (± .24) and 12.4 (± .29) years and the mean length of hospitalisation is 15.3 (± 1.21) and 11.8 (± 1.75) years for the psychotic respectively the non-psychotic patients (±SEM).

Though psychotic patients take more neuroleptics than non-psychotic patients (97.2 versus 73.1%; $\chi^2(2)=17.011$, $p<.001$), remarkably, a very substantial portion of the non-psychotic patients also receive neuroleptic medication in their use as so called “behaviour stabilisators”. Psychotic patients also have more anxiolytics (53.5 vesus 32.7%; $\chi^2(2)=6.926$, $p=.031$, two-tailed test); intake of other medication was comparable in both patient groups.

### *Diagnoses*

Information concerning the differential diagnosis was obtained from the treating psychiatrist and psychologist, who both knew the patient for at least 6 months. The first author was the treating psychologist at the psychiatric centre Sint-Amandus in Beernem (*n*=47); K.V.D. and L.D.C. were psychology interns in the psychiatric Center Dr. Guislain in Ghent (*n*= 43) and in Clinique de la Borde in Cour-Cheverny in France (*n*=25) respectively, at the time of the study[ii]. Patients diagnosed as "psychotic" had one the following DSM-IV-R-diagnoses: schizophrenia [disorganized type, 295.10 (*n*=8); catatonic type, 295.20 (*n*=3), paranoid type, 295.30 (*n*=43); residual type, 295.60 (*n*=2); schizoaffective disorder, 295.70 (*n*=3) and undifferentiated type, 295.90 (*n*=5)] and psychotic disorders [bipolar I disorder, 296.54 (*n*=2); delusional disorder, 297.1 (*n*=4) and psychotic disorder NOS, 298.9 (*n*=2)]. Patients diagnosed as "non-psychotic" had one the following DSM-diagnoses: personality disorders [301 (*n*=17)], mood disorders [296 (*n*=13)], alcohol intoxication [303.90 (*n*=13)], adjustment disorders [309 (*n*=4)], autistic disorder [299.00 (*n*=2)], dysthymic disorder [300.4 (*n*=2)], cannabis intoxication [292.89 (*n*=1)], amnestic disorder [294.0 (*n*=1)], obsessive compulsive disorder [300.3 (*n*=1)] and pathological gambling [312.31 (*n*=1)].

### *Procedure and Stimuli*

All participants were personally asked for their voluntary participation and briefly informed about what the research program included. They were not promised any kind of compensation, financial or other and were told that they could withdraw at any time. After giving consent, the participant was invited into a quiet room and shown a *GeoCat* form. This form consists of six squares presenting in the bottom both attributional and relational variants of a top "master" figure (Brakel et al. 2002, p. 486)[iii].

The theoretical basis of the *GeoCat* is that primary and secondary processes are reflected in two distinct modes of mental organization which are called "attributional" and "relational" cognition in cognitive psychology (see Brakel et al., 2000). Briefly, in attributional thinking exemplars are regarded as similar if particular features or attributes match, even if the configurational disposition of these features are quite different. As attributional similarity thus associates objects on the basis of common but inessential features, it is proposed to reflect primary process mentation. Attributional thinking is contrasted with "relational" thinking which is a mode of cognitive categorization that builds on logical relationships between even very different features and takes the total configuration of these components into account. From a Freudian point of view, this type of cognitive process is based on the thought identity of given cues and reflects secondary process mentation.

The written instruction was read by the researcher: "On this form there are six squares. Each square contains one item at the top and two below. Look at the top central figure; decide which of the two choices below is more similar to the top central one. Circle your answer to each.". To this the researcher added that no item was either correct or incorrect, and that we were simply interested in the participant's own choice. The dependent variable was ***the number of attributional choices (ATTs) on the GeoCat***: it varies between 0 and 6 (the number of relational choices or *RELs* then is the mirror reverse and varies between 6 and 0). Two ways of calculating were used: (1) the mean (and median) *number of ATTs* and (2) the % *of participants* favouring ATTs.

After the *GeoCat*, the participants completed the State-version of the Spielberg's State-Trait Anxiety Inventory (STAI, Spielberger, Gorsuch & Lushene, 1970; Spielberger, 1979). In Belgium the Dutch translation (Van Der Ploeg, Defares and Spielberger, 1980) and in France the French translation (Spielberger, Gorsuch, Lushene, Vagg and Jacobs, 1993) were used.

## RESULTS

**Met opmaak:** Engels (Groot-Brittannië)

### ***Attributional Responses in Psychiatric versus Non-psychiatric Adult Population***

A Kolmogorov-Smirnov (*KS*) goodness of fit test revealed that the distribution of ATTs is non-normal in our sample of psychiatric patients ($KSZ$=2.496; $p$<.001). Inspection of the histogram shows that the distribution of ATTs in the psychiatric population conforms to a J-curve rather than to a normal distribution (Figure 1, left graph). The Wilcoxon Signed-Ranks (*WSR*) test ($WSRZ$=-3.043, $p$=.002), and Sign (*S)* test ($SZ$=-2.626, $p$=.009) show that ATTs predominate over RELs to a significant degree. The psychiatric patients are compared with a normal non-psychiatric population of a previous study called *LifeCat* in which the *GeoCat* was administered in exactly the same manner (Brakel et al., 2002), In this study, the distribution was already also non-normal but conformed to an *inverse* J-curve ($KSZ$=4.634; $p$<.001; see Figure 1, right graph). The Wilcoxon Matched-Pairs test ($Z$=6.70, $p$<.001) and Sign test ($Z$=7.45, $p$<.001) in the non-psychiatric participant group of comparable age had shown that RELs were selected significantly more often than ATTs.

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The mean number of ATTs in the present study (called "*AcuteCat*", psychiatric patients; 3.66±0.21) is more than double the mean in the *LifeCat* study (non-patient participants; 1.76±0.14) ($p$<.001, one-tailed; Mann-Whitney U or $MWU$=9389.0; Wilcoxon W or $W$=41774.0; $Z$=-6,941). The differences between the two samples are even more clear-cut for the medians[iv] (4 and 0) and the modes (6 and 0) in the psychiatric, respectively the non-psychiatric samples. These results are summarised in Table 1.

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There is a highly significant shift in number of ATTs in the psychiatric population when compared to a non-psychiatric population of comparable age; psychiatric patients show a complete inversion of their response pattern, with 60% of the psychiatric patients, selecting a majority of ATTs while in the *LifeCat* sample, 24% selected a majority of ATTs. This difference is highly significant ($p$<0.001; $\chi^2$=50.870; see Figure 1). The skewness of the number of ATTs in the *AcuteCat* sample is -.448, indicating a long left tail, while the skewness in the *LifeCat* sample is +.955, indicating a long right tail.

The level of self-rated anxiety in this psychiatric population, as measured by the STAI, is high: the mean self-rated anxiety is 45.0±1.2. Though we have no anxiety measures for the *LifeCat* study, the STAI-values of the present study are substantially and significantly higher than normal values, as given by the Dutch (36.4; $p<.001$) or French (35.73; $p<.001$) norms for populations of comparable age. The level of anxiety did not correlate with the number of ATTs in the total psychiatric population (Spearman $\rho=.009$; $p=.923$).

***Attributional Responses in Psychotic versus Non-Psychotic Patients***

The distribution of ATTs is non-normal in both the sample of psychotic and of the non-psychotic patients (*KSZ*=2.060 and 1.561; $p<.001$ and =.015 respectively). The distribution of ATTs in the psychotic population conforms to a J-curve, while the distribution in the non-psychotic sample conforms to a U-curve (Figure 2, left and right graphs respectively). In the psychotic sample, ATTs predominate over RELs to a significant degree (*WSRZ*=-3.363, $p=.001$ and *SZ*= -2.889, $p=.004$), while in the non-psychotic sample there is no significant predominance of ATTs over RELs or vice versa (*WSRZ*=-.800, $p=.424$ and *SZ*=-.549, $p=.583$).

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The mean number of ATTs in the psychotic patients (3.97±.27) is higher than in the non-psychotic patients (3.25±.34) but the difference is only marginally significant ($p$=.06, one-tailed; $MWU$=1671.5; $W$=3211.5; $Z$=-1.555). Both samples have different medians (5 and 4 in the psychotic and the non-psychotic patients respectively). These results are summarised in Table 2.

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The difference between the proportion of psychotic versus non-psychotic patients showing predominantly respectively ATTs (65.3% and 52.7% respectively) or RELs (30.6% versus 43.6%), though in the expected direction, is only marginally significant ($p$=.065, one-tailed; $\chi^2$=2.291; see Table 2). The skewness of the number of ATTs in the psychotic sample is -.690, indicating a long left tail, while the skewness in the non-psychotic sample is -.160, indicating a more or less symmetrical distribution (see Figure 2).

The levels of self-rated anxiety does not differ between psychotic and non-psychotic patients (44.7±1.5 and 45.5±2.0 respectively) nor does it correlate with the number of ATTs in any of the two populations (Spearman $\rho$=.041 and .001; $p$=.742 and .994 for psychotics and non-psychotics respectively).

***Attributional Responses in Patients with and without Acute Psychotic Symptoms.***

In a second step, we verify if we obtain more clear-cut differences if we compare patients with acute psychotic symptoms (part of the psychotic patients) and patients without acute psychotic symptoms (the rest of the psychotic and all non-psychotic patients). Patients are judged to have acute psychotic symptoms if at least one of the following positive symptoms was reported: hallucinations, perceptual distortions, voices, intrusive experiences or delusions, at the moment of or on the day preceding the experiment. Inpatients considered without acute psychotic symptoms were those who registered no symptoms for at least a week before and at least a weak after the experiment. Monitoring of positive symptoms in the patients is continuous as patients are taken care of day and night by competent nursing professionals (well staffed with approximately one nurse for four patients); this staff meets five times a day, including three times a day with the treating psychologist and once a week with the psychiatrist. The psychologist has his or her consulting room in the residential department and/or is among the patients when not consulting. By doing so the psychotic patient group sorted into in two even groups: psychotic patients with acute psychotic symptoms ($n$=36) and psychotic patients without acute psychotic symptoms ($n$=36)[v].

The distribution of ATTs is non-normal in both the patients with and without acute psychotic symptoms ($KSZ$=1.872 and 1.855; $p$=.002 and .002 respectively). The distribution of ATTs in the patients with acute psychotic symptoms conforms to a J-curve, while the distribution in patients without acute psychotic symptoms conforms to a U-curve (Figure 3, left and right graphs respectively). In the sample with acute psychotic symptoms, ATTs predominate over RELs to a significant degree ($WSRZ$=-3.275, $p$=.001 and $SZ$=-2.572, *p*=.010), while in sample without acute psychotic symptoms there is no significant predominance of ATTs over RELs (*WSRZ*=-1.522, *p*=.128 and *SZ*=-1.386, *p*=.166).

Verwijderd: while in the non-psychotic sample

The mean number of ATTs in the patients with acute psychotic symptoms (4.31±.37) is significantly higher than in the patients without acute psychotic symptoms (3.41±.26) (*p*=.019, one-tailed; MWU=1262.0; W=5448.0; Z=-2.083). Both samples have different medians (5 and 4 in the patients with, respectively without, acute psychotic symptoms). These results are summarised in Table 3.

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The proportions of patients with versus without acute psychotic symptoms showing predominantly ATTs is 69.4% and 56.1% respectively. The difference is more marked for the proportions of patients with versus without acute psychotic symptoms showing predominantly RELs (25.0% versus 40.7%). These differences are marginally significant (*p*=.056, one-tailed; $\chi^2$=2.533; see Table 3). The skewness of the number of ATTs in the sample with acute psychotic symptoms is -.906, indicating a long left tail, while the skewness in the sample without acute psychotic symptoms is -.294, indicating a more symmetrical distribution (see Figure 3).

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The levels of self-rated anxiety, though *lower* in the group with acute psychotic symptoms, did not differ significantly from the level in the group without acute psychotic symptoms (42.4±2.3 and 46.0±1.5 respectively; $t$=-1.337; $p$=.184). This level of anxiety did not correlate with the number of ATTs (Spearman ρ=.032 and .017; $p$=.858 and .879 for patients with and without acute psychotic symptoms respectively).

It thus seems that the psychotic patients without acute psychotic symptoms behave as non-psychotic patients when it comes to their choices on the *GeoCat* test. Indeed, the mean number of ATTs in these two groups (non-symptomatic psychotics, $n$=36 and non-psychotics, $n$=55) did not differ (3.64±.39 and 3.25±.34 respectively) ($p$=.29, one-tailed; MWU=925.0; W=2465.0; Z=-.542).

***The Influence of Medication on Attributional Choices.***

As indicated, psychotic patients take significantly more neuroleptics and anxiolytics than non-psychotic patients. When comparing patients with and without acute psychotic symptoms, we found that, similarly, the patient group with acute psychotic symptoms takes more neuroleptics (97.2 versus 82.8%; $\chi^2(2)$=4.707, $p$=.030) and more anxiolytics (58.3 versus 39.1%; $\chi^2(2)$=3.818, $p$=.051) than the patient group without these acute symptoms (two-tailed tests). However, the number of ATTs in the whole patient group did not correlate with medication intake, neither for the neuroleptics nor for the anxiolytics (Spearman ρ=-.104 and -.132; $p$=.250 and .146 respectively). Therefore, we have no indications that the differences in medication between the groups could explain the differences in ATTs. Note that there is also no correlation between the levels of self-rated anxiety and the intake of anxiolytics or neuroleptics (r=.053 and -.019; *p*=.567 and .838 respectively).

The potential interaction effect of the neuroleptics intake with the patient group could not be verified, as there were only two psychotic patients, respectively one patient with acute psychotic symptoms, not taking neuroleptics. However, there were no differences between the two patient groups in correlations between ATTs and neuroleptics intake (ρ=-.178; *p*=.138 versus ρ=-.150; *p*=.281 in the psychotic versus in the non-psychotic patients and ρ=-.150; *p*=.383 versus ρ=-.140; *p*=.195 in patients with and without acute psychotic symptoms).We verified the potential interaction effects of the anxiolytics with the patient group on the number of ATTs with a nonparametric method, the adjusted rank transform test (Leys & Schumann, 2010). However, no interaction effect was found, neither for the comparison between psychotic and non-psychotic patients (Factorial Anova on the adjusted ranks, F=.260; *p*=.611), nor for the comparison of the patients with and without acute psychotic symptoms (F=2.231; *p*=.138). When subtracting possible interaction effects of the anxiolytics intake, the main effect of the patient group on ATTs remained non-significant in the case of the comparison between psychotics and non-psychotics (F=2.032; *p*=.157) and significant in the case of the comparison between patients with and without acute psychotic symptoms (F=5.438; *p*=.021) (two-tailed tests).

## DISCUSSION AND CONCLUSIONS

Three questions were investigated with the *GeoCat* method in which the number of ATTs are proposed to probe for primary process mentation: 1) will psychiatric patients show significantly more ATTs compared to non-patients; 2) will psychotic patients show more ATTs than non-psychotic psychiatric patients and 3) will psychotic patients in an acute hallucinatory or delusional state show more ATTs than patients without acute psychotic symptoms.

First, in the present study it is found that, regardless of the psychotic condition, the mean number of ATTs in the psychiatric patients is more than double the mean in a non-patient adult population, ("*LifeCat*") with about 60% versus about 30% of ATTs respectively. Accordingly, it is proposed that mentation is much more dominated by primary processes in residential psychiatric subjects. This is not surprising as it may be assumed that general levels of anxiety are substantially higher in this population, which correlates well with the self-rated anxiety measure showing significantly above normal levels of anxiety in the psychiatric population. Using the same *GeoCat* instrument, we have shown before that anxiety correlates highly with primary process mentation (Brakel & Shevrin, 2005). In this respect it is important to note that in the present study the anxiety measure did not correlate with the number of ATTs, However, it must be noted that the levels are generally very high in this psychiatric population so that a ceiling effect probably masks the sort of correlation previously found. Another factor may be important for the attributional shift in the psychiatric population, namely the infantilising effect expected from living in a residential setting. This regressive influence is also thought to lead to more primary process mentation.

Therefore, we believe that the substantial shift to more ATTs correlates with a genuine higher level of primary process mentation in a population of residential psychiatric patients.

When comparing the results on the *GeoCat*, we found that psychotic patients had a higher mean number of ATTs than non-psychotic patients, but the result is only marginally significant. When we compare the patients with acute psychotic symptoms with patients without acute psychotic symptoms , we do find a significant increase. Therefore, we think that the increase of ATTs in the group of psychotic patients is real but not large enough to become significant in the present sample, and that it is carried by the subgroup of psychotic patients with acute psychotic symptoms. Comparison of the distribution graphs in the different populations indicates that the sensitive part related to the acutely psychotic condition is the relative absence of subjects who give an "all relational" response pattern, with zero attributional choices. This fits well with the proposition that "relational" choices are based on secondary processes, and with stabilised psychotic patients being indistinguishable from non-psychotic psychiatric patients in that respect. In other words, it is psychotic decompensation which is specifically related to a a relative absence of secondary processes and to primary process predominance, producing both positive psychotic symptoms and preferential attributional categorisation.

Finally, the influence of medication should be considered since there is more neuroleptics and anxiolytics intake in the psychotic patients. The intake of these medications does not correlate with the number of ATTs. This is not surprising, since there was also no influence of the medication on the level of self-rated anxiety. For comparison, we report two previous studies on neuroleptics, where the effects of the typical antipsychotic phenothiazines on primary process thinking were measured on schizophrenic patients. Research data were obtained from pre- and postdrug Rorschach protocols, which were scored using Holt's (1959) method for measuring primary process. In one study, as patients improved, so did the control of primary process mentation (Saretsky, 1966); in the other (Ebert, Ewing, Rogers, & Reynolds, 1977), there were progressive decreases on formal primary process scores. In these studies, however, the within-subjects design measured changes in each subject's primary process-parameters before and after drug treatment, while in the present research, between-subjects measures are employed which are not sensitive to the ameliorative effects of medications on individual participants.

There are some limitations to this study, which are tied to the diagnostic procedures. Differential diagnosis between psychotic and non-psychotic patients is based upon the psychiatric diagnosis made by the treating psychiatrist on the basis of the DSM-IV in accord with the treating (psychodynamically trained) psychologist. Distinction between patients with and without acute psychotic symptoms is based upon reports by the caregivers as described above. Standardized questionnaires or checklist procedures were not used. Though this is a limitation, we want to underscore that all the patients of this study were residential patients for many years in the institution with well documented medical files and that different authors of the study (A.B., K.V.D., L.D) were practicing clinicians in the institutions at the time of the research.

In conclusion, our results show that there is an increased level of attributional choices in psychotic patients when they are in an acute state of their condition, and that that level is significantly higher than the already increased levels in the other psychiatric patients without acute psychotic symptoms. As self-rated anxiety levels are identical in the psychotic and non-psychotic population, anxiety can not be related to this further increase. Instead, as suggested above, we propose that this further increase of attributional levels in the acutely psychotic patients reflects an emergence of primary process thinking, and a lesser proportion of secondary processing, reflective of the acutely psychotic condition as described long ago by Freud (1895; 1900; 1915) and others (Bleuler, 1911). This also coheres with Holt (2002)'s general conclusion, resulting from a review of fourteen empirical studies based on Holt's PRIPRO-system in Rorschach protocols in schizophrenia. Although the results are somewhat scattered, Holt (2002: 474) concludes that, on the whole, they support the psychoanalytic expectation that schizophrenia is "accompanied by the disruptive emergence of primary process thinking into conscious thought". These results are also in line with the concept of "thought disorder" (e.g. Kasanin, 1944; Andreasen, 2008) in schizophrenia, i.e. thinking which contains "incoherence, tangentiality, or derailment (loose associations)" (Andreasen, 2008, p. 436). Remarkably Von Domarus (1944) calls it "paralogical thinking", namely thinking for which identity is based on partial identification rather than on total identity.

The fact that we were able to show more attributional mentation in acute psychosis confers supplementary convergent validation for *GeoCat* as a test of primary process mentation. Obviously, this supports the test as a useful diagnostic tool which may contribute valuable clinical information, indicating if a patient is in a predominantly primary process mode at the moment of the testing. However, some caution is advised since this new instrument is still in development. Moreover, the predominance of primary processes is not indicative of psychosis per se, as a diverse number of pathological conditions (such as trauma, anxiety) and non-pathological states (such as regression, creativity, hypnosis) are also characterised by primary process predominance. However, provided this caution, the tool promises to be clinically most useful as it is rapid, non-linguistic, easy to use and independent of clinical interpretation.

Finally, the present results also fit well with a number of recent neuroscientific accounts for the Freudian primary and secondary processes, which all associate the psychotic condition with a lesser control of secondary over primary processes. Recently, indeed, the neuroscientists Carhart-Harris and Friston (2010) have proposed that Freud's descriptions of primary and secondary processes are consistent with self-organized activity in hierarchical cortical systems where the secondary process provides top-down predictions to reduce free-energy associated with the primary process. The authors propose that the high-levels of this inferential hierarchy form a cortical network of regions which they call the "default-mode network" (DMN). The DMN is a cortical network of strongly interconnected nodes (including the medial prefrontal cortex, the posterior cingulate cortex, the inferior parietal lobule, the lateral and inferior temporal cortex and the medial temporal lobes) which show high metabolic activity and blood flow at rest but which deactivate during goal-directed cognition (Raichle, MacLeod, Snyder, Gusnard, & Shulman, 2001). Recent work has shown reduced task-evoked suppressions of DMN activity in schizophrenia (Pomarol-Clotet, Salvador, Sarró, Gomar, Vila, Martínez, et al., 2008; Whitfield-Gabrieli, Thermenos, Milanovic, Tsuang, Faraone, McCarley, et al., 2009) the severity of which correlated positively with connectivity in the DMN (Whitfield-Gabrieli et al., 2009). Therefore, Carhart-Harris and Friston (2010) propose that schizophrenia is associated with a loss of top-down control of the DMN over limbic activity in hierarchically lower systems and that this is equivalent to a loss of control from the ego and the associated secondary process over the primary process (p. 3). This, of course, would fit well with the results of the present study.

We have proposed a parallel account for the Freudian primary and secondary processes before (Bazan, 2007*a*, 2007*b*), which could also fit in Carhart-Harris and Friston's view. Freud (1895, p. 326-327) had said: "[Wishful discharges] to the point of hallucination and complete generation of unpleasure which involves a complete expenditure of defence are described by us as psychical primary processes; by contrast, those processes which are only made possible by a good engagement of the ego, and which represent a moderation in the foregoing, and are described as psychical secondary processes. It will be seen that the necessary preconditions of the latter is a correct employment of the indications of reality, which is only possible when there is inhibition by the ego.". The differentiating criterion between primary and secondary process in a Freudian account, then, are the so-called "indications of reality". Based on historical, anatomical, functional and semantic arguments, a parallel between these "indications of reality", which Freud derived from a Helmholtzian model of perception, and the recent "efference copy models", which is also rooted in the model developed by von Helmholtz, was proposed (Bazan, 2007*a*, 2007*b*). Starting from this parallel, it was further proposed that the dorsal pathway (involving dorsal and prefrontal cortices), which makes use of these efference copies for the organisation of contextualised action, might be considered as a neurophysiological correlate for the secondary process. This dorsal pathway hierarchically controls selection of activations in the ventral pathway (Friedman-Hill, Robertson, Desimone & Ungerleider, 2003; Hamker, 2003; Rousselet, Thorpe & Fabre-Thorpe, 2004), which for this (and other) reason(s) might be considered as a neurophysiological correlate for the primary process (Bazan, 2007*a*, 2007*b*). Indeed, selective impairment of the dorsal "*where*" route (but not of the ventral "*what*" pathway) has been associated with the psychotic condition (Daniel, Mores, Carite, Boyer, & Denis, 2006). Therefore, this dorsal/ventral neurophysiological account also fits well with the diminished secondary processes and increased primary processes in the acute stage of psychosis observed in our data.

The results of this research then contribute to support three important propositions: Freud's proposition that psychosis is characterised by a predominance of primary process mentation, the usefulness of the *Geocat* as a measure of primary process mentation, and the possibility of empirically testing psychoanalytic hypotheses with methods independent of the psychoanalytic clinic.

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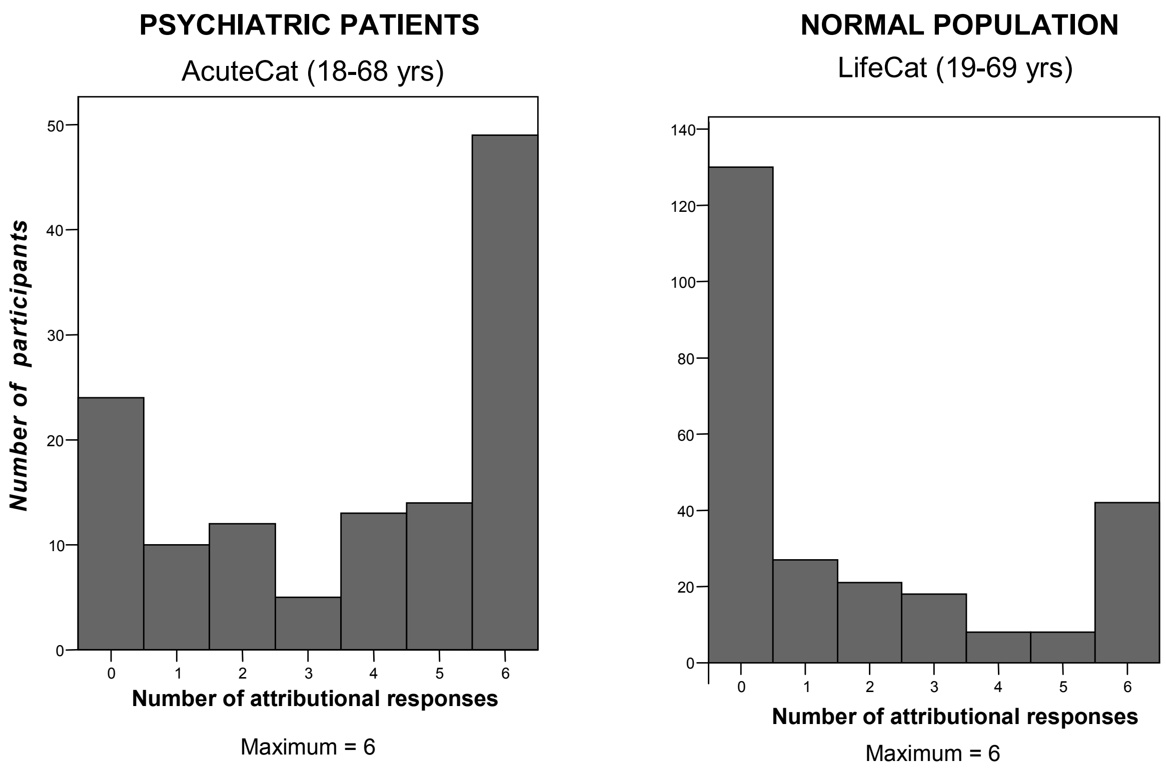


Figure 1: Distributions of attributional responses in the psychiatric population of the present study (left) and in a healthy (non-psychiatric) population of comparable age (*LifeCat* study, Brakel et al., 2002; right).

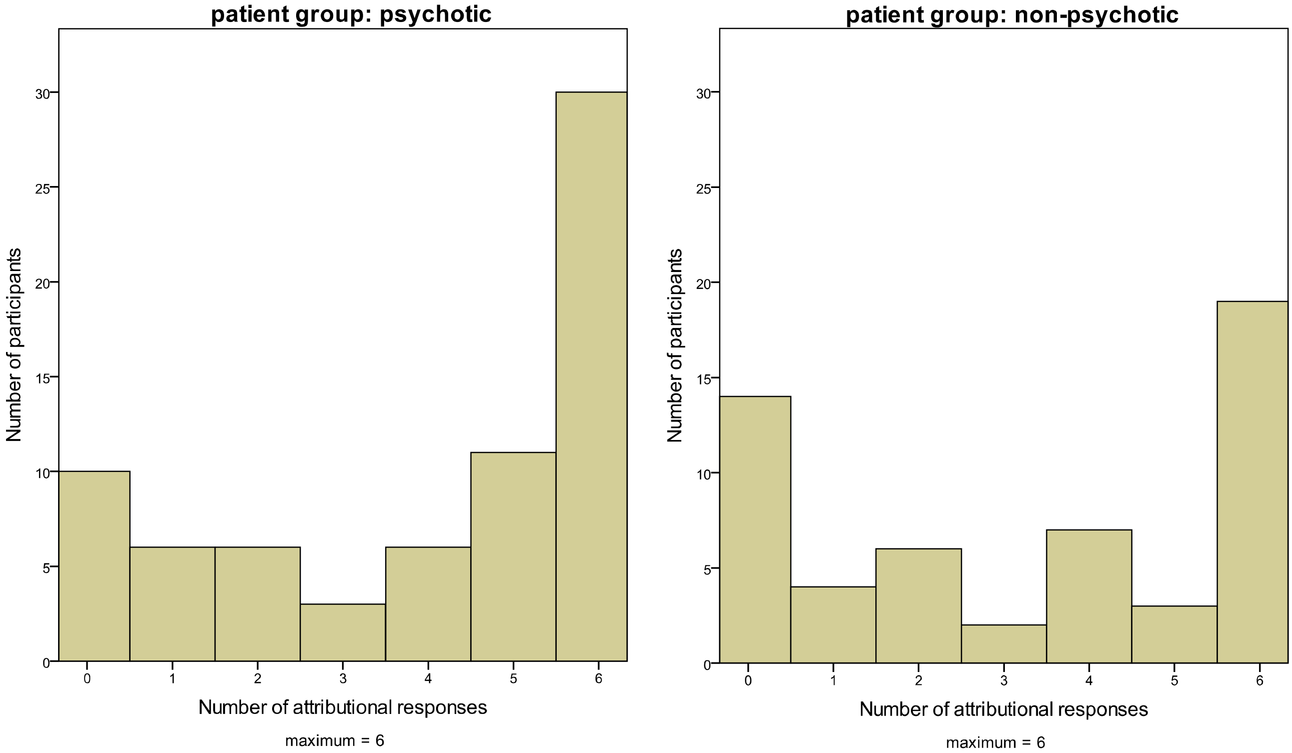


Figure 2: Distributions of the attributional responses in the psychotic patients (left) and in the non-psychotic psychiatric patients (right).

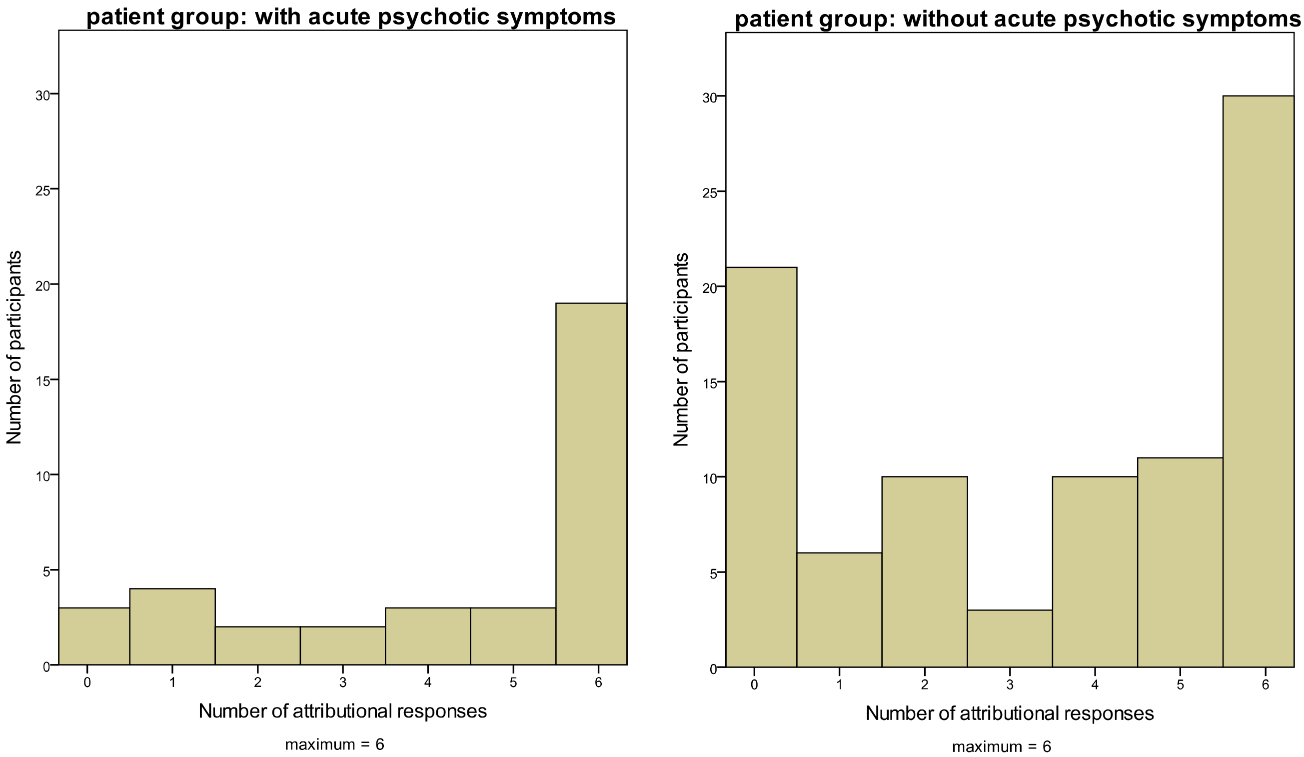


Figure 3: Distributions of the attributional responses in the patients with (left) and without (right) acute psychotic symptoms.

Table 1: Mean (± SEM), median and mode number of attributional responses (out of maximum 6) and percentage of participants favouring attributional (ATT) above relational (REL) choices in a psychiatric population (*AcuteCat*, present study) versus in a non-psychiatric population of comparable age (*LifeCat*, Brakel et al., 2002); mean anxiety score (± SEM) on the Spielberger State Trait Anxiety Inventory (STAI).

| *Study* | **population (age)** | *n* | mean | median | mode | % ATT > REL | STAI |
|---|---|---|---|---|---|---|---|
| *AcuteCat* | **total (18-68)** | *127* | 3.66 ± 0.21* | 4 | 6 | 59.8* | 45.0 ± 1.2** |
| *LifeCat* | **adults (19-69)** | *254* | 1.76 ± 0.14 | 0 | 0 | 24.0 | / |

* $p < 0.001$ as compared to non-psychiatric participants of comparable age; one-tailed

** $p<.001$ as compared to the Dutch (36.4) or French (35.73) norms for a population of comparable age

Table 2: Mean (± SEM), median and mode number of attributional responses (out of maximum 6) and percentage of participants favouring attributional (ATT) above relational (REL) choices in psychotic patients versus non-psychotic patients; mean anxiety score (± SEM) on the STAI.

| Patient population | *n* | mean | median | mode | % ATT > REL | STAI |
|---|---|---|---|---|---|---|
| **Psychotic** | *72* | 3.97±.27* | 5 | 6 | 65.3 | 44.7 ± 1.5 |
| **Non-Psychotic** | *55* | 3.25±.34 | 4 | 6 | 52.8 | 45.4 ± 2.0 |

* $p$ =.060 as compared to non-psychotic patients; one-tailed

Table 3: Mean (± SEM), median and mode number of attributional responses (out of maximum 6) and percentage of participants favouring attributional (ATT) above relational (REL) choices in patients with and without acute psychotic symptoms (∑); mean anxiety score (± SEM) on the STAI.

| Patient population | | *n* | mean | median | mode | % ATT > REL | STAI |
|---|---|---|---|---|---|---|---|
| **with** | **acute** | *36* | 4.31±.37* | 6 | 6 | 65.3 | 42.4 ± 2.3 |
| **without** | **psychotic Σ** | *91* | 3.41±.26 | 4 | 6 | 52.8 | 46.0 ± 1.5 |

* p <.05 as compared to patients without acute psychotic symptoms; one-tailed

[i] Italics added

[ii] The *GeoCat* forms were administered with the help of the "naïve" researchers Stijn Van Eeckhoven and Bram Herrebout, who were blind to the hypotheses and to the test rationale.

[iii] For use of the *GeoCat*, please contact Pr. Brakel (brakel@umich.edu).

[iv] Medians are a useful measure especially for skewed distributions.

[v] This leads to uneven groups for comparison, with $n$ = 36 for the patients with acute psychotic symptoms and $n$ = 91 (36 psychotic patients + 55 non-psychotic patients) for the patients without acute psychotic symptoms. However, as we are using non-parametric statistics, which do not require the assumption of homogeneity of variance, this is not a problem.