Strong involvement of ketamine in ACC function is firmly established, and the ACC is a relatively late (top down?) generator of MMN (Waberski et al. 2001). It is reasonable to speculate that the dynamics of blindness-induced NMDA-receptor hypofunction in visual cortex extends to NMDA-receptor gains in the ACC, which in turn increase some types of context sensitivity, perhaps ultimately resulting in protection against schizophrenia.

In the light of these results, the answer to point 11 in P&S's concluding section – "Is the molecular and regional diversity of NMDA receptor channels . . . crucial?" (target article, sect. 8) – is likely to be "Yes!" (see de Belleroche et al. 1998 for direct evidence). The impression of dynamic, heterogeneous, and compensatory processes produced by research on visual deprivation is enhanced when deafness is added to the picture. Loss of auditory input produces a pattern of loss and gain in NMDA-receptor function in some ways similar to and in other ways different from the effects of dark-rearing or blindness (e.g., Nakagawa et al. 2000; Oleskevich & Walmsley 2002). Most unlike the effects of blindness, deafness does not serve to prevent schizophrenia (e.g., Schonauer et al. 1999).

Many of the issues raised by P&S may be better understood following certain comparisons among blind, deaf, schizophrenic, and control samples. For example, how might blind people respond to ketamine antagonism of their ACC NMDA-receptors? It would be especially interesting to extend to blind and deaf samples the work on cortical rhythms reviewed in section 5 of the target article. Patterns of beta and gamma frequencies, and their modulation by ketamine, may reveal differences in local and top-down cognitive coordination in blind versus deaf people, thus helping explain the dramatic difference in their susceptibility to schizophrenia.

Phenomenology, context, and self-experience in schizophrenia

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Abstract: Impairments in cognitive coordination in schizophrenia are supported by phenomenological data that suggest deficits in the processing of visual context. Although the target article is sympathetic to such a phenomenological perspective, we argue that the relevance of phenomenological data for a wider understanding of consciousness in schizophrenia is not sufficiently addressed by the authors.

Phillips & Silverstein (P&S) propose an innovative model of the characteristic cognitive disorganization of schizophrenia, based on neurobiological, pharmacological, and cognitive data. The authors also refer to the classic psychiatric writings of Matussek (1952/1987) and Conrad (1958), who adopt a Gestaltist perspective and describe subjective experience in schizophrenia in detail. Although we applaud the mention of such Gestaltist work with its emphasis on phenomenological data, we believe that the theory of P&S neglects important aspects of consciousness in schizophrenia that are central to the understanding of the condition.

In Anglophone psychiatry, *phenomenology* generally refers to the study of observable signs and symptoms. In philosophy and phenomenological psychiatry, however, *phenomenology* refers to the systematic study of conscious experience from a first-person perspective and is tied to certain philosophical positions regarding mind and its relationship to the world. We believe that inclusion of a phenomenological perspective (in the second sense) is essential to gain insights into the cognitive abnormalities and their wider relevance for understanding the schizophrenic condition (Sass & Parnas, in press a).

Gurwitsch (1964) offers a phenomenological analysis that may help to clarify the subjective dimension of these disorders and the role of context in consciousness. In Gurwitsch's view, the field of consciousness always involves a "theme," "thematic field," and "margin" of awareness. Gurwitsch's first domain, the "theme," is that which engrosses the subject, stands in the focus of his attention, and "upon which his mental activity concentrates" (p. 4). The theme is characterized by the kinds of relationships classically described by Gestalt psychology: Here, each constituent "exists in the very qualifications by which it is defined and made to be that which it is in a given case, only in conjunction with, and determined by, co-constituents" (p. 139). The second domain, the "margin," is the realm of objects of awareness that are simultaneously present to consciousness but not experienced as relevant to the focal theme; it includes elements of ongoing bodily existence, the perceptual surround, and the stream of consciousness (p. 11). The third domain – a kind of middle realm – is that of the "thematic field," defined as "the totality of facts, co-present with the theme, which are experienced as having material relevancy or pertinence to the theme" (p. 55).

Constituents of the thematic field are not merely copresent; they hang together in a mutually implicative way, and have relevance for the focal theme. Thus, the *way* in which each of these constituents is experienced is a function of some larger unifying significance that also determines the *aspect* of the theme that will emerge as significant. Gurwitsch (1964) speaks here of "unity by relevancy," which is bound up (as both source and product) with the unity of *context* (p. 341); it can be distinguished from the even tighter form of unity inherent in "Gestalt-coherence."

The main disturbance in schizophrenia, according to P&S, concerns the capacity for "context-processing." From a phenomenological and experimental perspective, a disturbance in context-processing is most obvious at the level of context that Gurwitsch calls the "the thematic field," because schizophrenia patients are not deficient in the ability to perceive basic Gestalts (Knight et al. 2000; Sass, in press). The work of Matussek (1952/1987) and Conrad (1958) supports this view. Examination of Matussek's clinical illustrations shows that there is seldom, if ever, a breakdown of the basic spatial form; indeed, the integrity of the visual object may even be heightened as it stands out with special clarity while the background recedes in dullness and indifference (Matussek 1952/1987, p. 92). The main perceptual alteration Matussek emphasizes is a "loosening of the natural perceptual context" or of the "coherence of perception."

Impairment in context-processing at the level of the thematic field has wide implication for the understanding of consciousness in schizophrenia. According to Gurwitsch (1964), the "thematic field" determines the "*perspective* under which, the *light and orientation* in which, the *point of view* from which" the theme appears to consciousness (p. 359). Accordingly, weakening of the "thematic field" is associated with a loosening of perceptual context that may alter the organization or salience of the theme. The phenomenological evidence suggests that this is so. Matussek, for example, describes everyday objects that are framed in isolation, and thus come to seem strange or to acquire exaggerated and often enigmatic symbolic "weighting" as a result of the "loosening of the natural perceptual context" (Matussek 1952/1987).

Relevancy relationships (characteristic of the thematic field) are the kind that are most directly related to the ongoing *projects* or *concerns* of the subject; for this reason they may be especially closely linked to fundamental aspects of *self*-experience, that is, to the underlying sense of existing as a vital and unified *subject* of awareness or first-person perspective, which has been referred to as "ipseity" (from the Latin *ipse,* which means *self* or *itself;* Sass 2000; Sass & Parnas, in press b). The typically schizophrenic alterations of the cognitive/perceptual field are, in fact, usually accompanied by disruptions in this most basic sense of selfhood (Klosterkoetter et al. 1997; Møller & Husby 2000; Parnas et al. 1998). Such a patient may complain of an "inner void," of "painful distance to self," of being "occupied by, and scrutinizing, my own

https://doi.org/10.1017/S0140525X03430021 Published online by Cambridge University Press

inner world," of not feeling himself, or even having no consciousness at all (Møller & Husby 2000, pp. 221–23, 228).

Normal ipseity (and the normal tacit-explicit structuring of experience this implies) is a condition for the experience of appetite, vital energy, and point of orientation: It is what grounds human motivation and organizes our experiential world in accordance with needs and wishes, thereby giving objects their *affordances* – their significance for us as obstacles, tools, objects of desire, and the like. In the absence of this vital self-affection and the lines of orientation it establishes, there can no longer be clear differentiation of means from goal; no reason for certain objects to show up in the focus of awareness while others recede; no reason for attention to be directed outward rather than inward toward one's own body or processes of thinking (i.e., "hyperreflexivity"; Sass 2000).

Most attempts to explain the disturbances of schizophrenic cognition have assumed they are rooted in purely cognitive and often rather modular dysfunctions, such as associational disturbance, failures of attention or working memory, or an incapacity for the planning or monitoring of discourse or thought. Such functions may indeed be abnormal. It is possible, however, that these disturbances are secondary to a more fundamental distortion of psychological processes that are relevant for adopting a practical, goal-oriented stance toward the world, and for constituting a lived point of orientation and the correlated pattern of meanings that make for a coherent and significant world. We believe that P&S's view of schizophrenia as an "impairment in cognitive coordination" may be relevant for identification of such a fundamental distortion of psychological processes in schizophrenia. However, future research would benefit from incorporating phenomenological approaches to examine relationships between disorders of cognition and self-experience.

Cortical connectivity in high-frequency beta-rhythm in schizophrenics with positive and negative symptoms

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Abstract: In chronic schizophrenic patients with both positive and negative symptoms (see Table 1), interhemispheric connections at the high frequency beta2-rhythm are absent during cognitive tasks, in contrast to normal controls, who have many interhemispheric connections at this frequency in the same situation. Connectivity is a fundamental brain feature, evidently greatly promoted by the NMDA system. It is a more reliable measure of brain function than the spectral power of this rhythm.

Recently we have studied several EEG measures revealing some abnormalities in schizophrenia (Burgess et al., submitted; Strelets et al., under review). In our work aimed at the study of different brain rhythms' spectral power and connectivity, it was revealed that, in schizophrenic patients with positive and negative symptoms, the spectral power of all brain rhythms except the beta2-rhythm was decreased in comparison with normal controls (Strelets et al. 2002). We refer to this rhythm, consisting of oscillations with a frequency of 20–40 Hz, more precisely as 38 Hz. Therefore, the spectral power of this rhythm in schizophrenic patients does not differ significantly from that of the normal controls, though the literature on this point is controversial. The interhemispheric connections at this rhythm, studied by the coherence method, in contrast to those in normal controls, were absent, while at other rhythms we can observe in patients normal connections or even hyperconnectivity. One can propose that the high frequency rhythms aren't well organized enough to form necessary connections during cognitive tasks in schizophrenic patients. The glutamatergic ionotropic NMDA system and other neurotransmitters evidently play a great role in this disorganization of connectivity at the beta2-rhythm in schizophrenic patients.

The EEG was recorded from ten derivations using the standard scheme in the rest condition (eyes closed) and during task performance – silently counting the hours on an imaginary clock dial.

EEG traces of 100 seconds were recorded. Subsequent analysis of each EEG segment consisted of selection of 10 to 20 five-second EEG fragments, free from artifacts. These fragments underwent Fast Fourier Transform, the results of this procedure being used for subsequent analysis.

The study of connectivity was carried out using two methods: (1) Coherence, the most commonly used method – measure of synchronization, based on the evaluation of functional integration between the brain areas at the frequency, averaged across frequency domain for each subject; and (2) the method of typical connections analysis, developed by our group (Strelets et al. 2002), based on the analysis of the peaks, precisely coinciding in frequency in individual power spectra of different derivations for each frequency domain. The most typical connections for the group were selected by their probabilities, and their significance was tested by a Monte-Carlo method. Therefore, this method enables us to detect the real (not averaged) frequency at which the connections between cortical areas are established.

Coherence study. In the rest condition in the beta2-range (20–40 Hz), in normal subjects there were two interhemispheric connections. During the task performance, the number of connections at this rhythm increased to eight in comparison with the rest condition. The connections were revealed mostly in the anterior cortical areas.

In patients with positive symptoms, in the beta2-range interhemspheric connections were absent, and the number of intrahemispheric connections was significantly more, the latter including the temporal areas. During task performance, a paradoxical reaction was observed in this group: opposite to the norm, the number of connections decreased compared to the rest condition.

In comparison with the norm, in both experimental situations patients with negative symptoms had no interhemispheric con-

Table 1 (Strelets). *Demographic characteristics of three subject groups*

	Group		
	Normals	Patients with "positive" symptoms	Patients with "negative" symptoms
Age (years)	20–50 (32.56±8.67)	25–47 (33.21±7.94)	20–53 (34.94±9.18)
Education (years)	10–15 (12.56±2.25)	8–15 (11.25±2.40)	7–15 (10.20±62.52)
The age of first onset (years)	—	17–39 (26.57±5.80)	19–53 (28.10±10.95)
Chronicity:			
since the last admission (years)	—	0–9 (1.42±1.31)	0–4 (1.05±0.93)
since the first admission (years)	—	0–23 (6.43±6.01)	0–29 (6.68±6.16)
Number of admissions	—	1–24 (5.34±5.11)	1–9 (3.47±2.34)

https://doi.org/10.1017/S0140525X03430021 Published online by Cambridge University Press