What is Schizophrenia?

"Schizophrenia names a persistent, often chronic and usually serious mental disorder affecting a variety of aspects of behaviour, thinking, and emotion. Patients with delusions or hallucinations may be described as psychotic. Thinking may be disorganized and illogical. Peculiar behaviours may be associated with social withdrawal and disinterest." DSM-IV

Schizophrenia is not a simple disorder; it is composed of various symptoms usually divided into positive (an excess of function) and negative (a deficiency of function) (Bleuler, 1950), and any individual patient may have a different balance and different strength of exhibited symptoms.

Symptoms include:
- *Positive-symptom dimension: psychosis - hallucinations and delusions*
- *Negative-symptom dimension: changes in drive and volition - lack of motivation, social withdrawal, reduction in spontaneous speech*
- *Cognitive-symptom dimension: alterations in recognition - difficulties in memory, attention, and executive functioning*
- *Affective dimension: affective dysregulation giving rise to depressive and manic (bipolar) symptoms*

(Johnson, O'Connor, & Cantor, 1997)

This makes it extremely difficult to formulate one hypothesis that could cover schizophrenia in its entirety.

Deficits in time perception in Schizophrenic patients

Deficits in time perception have been observed in a range of disorders, and there is typically a trend to misjudge durations:
- Manic patients tend to overestimate duration
- Depressiv patients tend to underestimate duration

However, schizophrenic patients show poor estimation without a trend. Results are not significant (Nyagva and Kuppe, 2007)

Schizophrenic patients were asked to answer two kinds of discrimination questions:
- Do two stimuli have the same duration?
- Are they short or long?
They performed worse than controls but without a systematic bias towards over or underestimating. (Elvevag, 2003)

Dopamine transmission plays a large role in schizophrenia. Goldsmith et al (1997) found an increased number of dopamine receptors in post-mortem and PET scan studies of schizophrenics. Interestingly, increase in dopaminergic transmission increases the speed of one's 'internal clock', whilst inhibition slows it down. (Rammsayer, 1993)

As schizophrenia is characterised by a disruption of communication in the brain, the unsympathetic nature of impairment is not surprising. It demonstrates that in healthy individuals, integration across the brain is key for temporal perception.

Connectivity and Communication in the Brain

The brain exhibits 'small world network' properties (Liu, et al., 2008)

"Small-world networks offer a structural substrate for functional segregation and integration of the Brain... and facilitate rapid adaptive reconfiguration of neuronal assemblies in support of changing cognitive states" (Liu, et al., 2008)

Comparing healthy and schizophrenic subjects, Liu et al (2008) found that the schizophrenic group had broadly disrupted connectivity. They concluded that "schizophrenia is a disorder of dysfunctional integration among large, distant brain regions." (Liu, et al., 2008)

Bavest et al (2008) also describe schizophrenia as a ‘dysconnectivity syndrome’,

Furthermore, Rubino et al (2009) describe the abnormal connectivity in schizophrenia as a “sudden relapsism and consequent networks disconnection” in the links in the network, due to which the perceptual whole breaks down.

As we perceive time through the integration of multimodal sensory information, this breakdown of connectivity in schizophrenia is likely to be responsible for the disturbed time perception in schizophrenic patients.

Re-defining Schizophrenia

Eugene Bleuler took the term “schizophrenia” from the Greek words ‘schilosis’ (split) and ‘phren’ (mind) (Bleuler, 1995)

In 2002, the Japanese Society of Psychiatry and Neurology replaced the old term for Schizophrenia, “Seishin Bunsetsu Byo” (“split-sick disease”), with “Togo Shisho Byo” (“integration-disregulation disorder”). This appears to be a name which reflects the nature of the disorder far better.

Cognitive Dysynchrony is a disturbance of coordination in motor and mental activity. Nyagva and Kuppe (2007) post this as the core deficit in schizophrenia: “Schizophrenia... is interpreted as a structural disturbance of time consciousness.”

Conclusions

Time awareness has been found to be disturbed in patients with schizophrenia. As schizophrenia is often linked to the prefrontal cortex, it is perhaps not surprising that schizophrenic patients often also exhibit impairment in working memory.

Working memory provides a kind of cognitive workspace, likely a part of a global workspace, in which we can combine current perceptions with past memory, so it is a strong candidate for part of what forms our subjective experience of time.

Schizophrenia has recently been described as a breakdown of connectivity, where there is both a loss of connection between large, distant brain areas and a reconfiguration in existing connections.

As our sense of time is a built up combination from across different sensory modalities, and schizophrenia is a breakdown in integration, temporal awareness is broken down in schizophrenic subjects in a way which does not exhibit a clear trend.

References


