



# Where Schizophrenia and Consciousness Intersect: Disorders of Consciousness in Schizophrenia

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## ABSTRACT

The underlying biology of schizophrenia remains metaphorically an undiscovered black box and still requires a concentrated and rigorous extent of investigation. Consciousness is an enigma and an enigma cannot be defined, but it can be described. Consciousness itself requires better explanation in order to understand the symptoms of schizophrenia. Consciousness may have a neurological origin, and the Penrose-Hameroff Orch OR theory may be helpful in elucidating only the mechanical quantum consciousness. The concept of quantum decoherence has been linked with psychopathology. A neuro-quantological approach has great potential for understanding the symptoms of schizophrenia as essentially disorders of consciousness. Auditory hallucinations may be acoustic holograms of parallel thinking. Non-clinical auditory hallucinations are not uncommon and pose an interpretational challenge. The symptoms of schizophrenia may encompass disorders of consciousness. Consciousness based studies of schizophrenic symptoms would necessitate formulations of new models of brain-mind-consciousness complex. A quantum leap is overdue in schizophrenia research itself both in the theoretical and experimental fields and the present paper is focussed on the former.

**Key Words:** auditory hallucination-consciousness, metacognition, microtubules, Orch OR, quantum factors, schizophrenia

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## Introduction

Schizophrenia (SCZ) is generally regarded as an unknown and complex medical condition with several primary and secondary symptoms. SCZ is not a uniform disorder but an umbrella term for an array of unexplained problems involving recurrent psychosis, and other common symptoms. Even so, there is circumstantial evidence for a biological mechanism. Two lines of research are currently employed to ascertain the psychopathology of the clinical symptoms presented. Exploration of the neuro-anatomical networks using such techniques as positron emission tomography and functional MRI is one initiative; the other is directed at cognitive and psychological processes and life events. Several pathophysiological models including neurobiological

and neurophenomenological models of SCZ have been proposed with divergent interpretations of the illness. The current construct of SCZ are not helpful in recognizing the true aetiology of SCZ that could lead to better therapeutic interventions. SCZ is presented with positive and negative symptoms characteristically starting in youth, substantive heritability, persistent cognitive deficits and brain structural, functional and neurochemical alterations including dopaminergic dysregulation (Keshavan *et al.*, 2011). SCZ is one among the top ten causes of disability in the developed world (Murray, Lopez, 1996).

The most widespread theories regarding the aetiology of SCZ are neuro-developmental, neuro-degenerative, viral and neuro-immunological

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(Sadock *et al.*, 2009). Autoimmune aetiology has lately been in the forefront of SCZ research. A subset of SCZ may be an autoimmune disorder, caused by genes, pathogens and the immune system acting together, and perhaps preventable by pathogen elimination, or curable by the removal of culpable antibodies and antigens (Carter, 2011). At least, it is an attractive hypothesis in a subset of this condition (Pandarakalam, 2013; 2015; Benros *et al.*, 2014; Gordana *et al.*, 2018; Leon *et al.*, 2012). Neuro-scientists have been engaged in converting knowledge gained from SCZ research into a tight neuro-chemical model of mind. Unfortunately, there are no clear models of the brain–mind–consciousness complex (BMC Complex) that may be adopted in order to explain the symptoms of SCZ.

### *Failures of replication*

Replication is regarded as a final arbiter of scientific findings, a reason why physical sciences are ahead of subjective sciences. Observations and measurements should be reproducible to get acceptance as precisely scientific; this may be so in the study of inanimate objects, but human beings are inherently unreproducible. Henry H. Bauer argues that such a strict criterion would be inapplicable in the study of phenomena involving human beings (Bauer, 2017; 2018). He goes on to say that if such a formula is closely adhered, parapsychology and other subjective sciences, medical sciences and social sciences would lose the status as scientific disciplines. Bauer thinks that failures of replication in such scientific works are not due to the shortcomings of researchers to perform properly reproducible studies, but because of the nature of what is being studied affecting the dependability of research outcomes. Human behaviour and subjective experiences are variable from moment to moment. Even stray evidences are valuable in medical sciences. Bauer's statements are particularly relevant when it comes to the studies of consciousness and its relevance to SCZ symptoms.

### *Upward causation*

In the past, cognitive scientists who focussed only on the symptoms of SCZ concluded that it is an altered state of consciousness, but they studied only the epiphenomenon of a serious medical condition and did not take notice of the latter. SCZ has predominantly an upward causation and a bottom up approach to SCZ pathology is offered in this paper. Disorders of consciousness in SCZ may be due to an underlying biological disorder resulting

in abnormal neural fluctuations and microtubule (MT) irregularities. This may further cause vital disturbances of consciousness and the resulting SCZ symptoms may be the epiphenomenon of another deranged biological development. In a subset of SCZ, the underlying disorder may be an autoimmune process and the auto-antibodies may be destabilising the MTs. What exactly causes the aberrations of the MTs is unclear. MTs are the intracellular highways that transport receptors to their working sites in the brain (Jeremy and Clive, 1994). Destabilisation of them may underlie many psychiatric disorders and neurological disorders; promising targets for interventions.

Accepting an underlying medical aetiology, SCZ is comparable to a tsunami; the origin of a tsunami is not in the sea water, but it is due to shifting of tectonic plates. Likewise, the source of SCZ may be an underlying autoimmune process in a subset of patients or an unknown medical condition, but most of the symptoms are neuro-quantological and consciousness linked; the symptoms of SCZ are like the high tides and floods of a tsunami resulting due to the earthquakes beneath the sea surface. This paper is focussed on consciousness related symptoms of SCZ. We need to map out normal consciousness in order to study the abnormal states. Consciousness is like a big puzzle with many pieces still missing or misplaced and need to be discovered and rearranged.

A brief evaluation of recent directions in consciousness studies are germane to the present discourse. So, the succeeding paragraphs are devoted to consciousness in health and the possible formation of biological consciousness that may be relevant to SCZ studies.

### *Consciousness upon consciousness*

Consciousness is our primary reality and through it, we observe ourselves and our environment; our actions are planned, accomplished, appraised and recorded by our consciousness (Pereira, 2015). According to quantum physicists, un-coconscious is always there and when particles collapse, consciousness come about. In an event of quantum collapse, consciousness splits itself into what we experience as subject-object awareness or subject to object distinctions (Goswami, 2011). Conscious state becomes an outcome of such quantum collapse and brain is directly involved.

The neuro-computer model of consciousness prevailed in cognitive sciences in the second half



of the twentieth century, meeting with stringent criticism because it cannot explain many of the features of consciousness. (Table 1) It is the product of neuronal interactions. Quantum theorists posit that quantum mechanical phenomena such as quantum entanglement, uncertainty and superposition may play an important part in neurological function and could unmask the mysteries of consciousness partially. Consciousness is not just the state of awareness, of being aware of an external object or intrinsic awareness, but it is also associated with the ability to process, store and act on information collected from that external environment (Mitchell and Staretz, 2011). It is also individual awareness of one's unique thoughts, memories, feelings, sensations and observing the environment. It gives awareness to the organism of the things around in both the past and the present. Higher order of consciousness has been described as "conscious of being conscious" (Edelman, 2004).

There is consciousness upon consciousness, and it is impossible to fathom out its architecture. Consciousness may consist of a hierarchical system with different levels of functioning comparable to a multi-storeyed structure – there may be levels of primary, secondary and tertiary consciousness. Humans may be composed of layers of high- and low-energy bodies with a central celestial body like an onion ring (Alfred, 2006). Mind and consciousness are distinguished in Eastern philosophy and are treated as identical in western thinking. Mind may be a folder of consciousness and they are interdependent. In heuristic terms, mind may be the memory box if consciousness is the search engine, but certainly more than that. In Oxford dictionary, mind is described as the seat of consciousness.

There is growing evidence that certain fundamental elements of consciousness may exist independently of brain and survive physical extinction, possibly proving the coexistence of a non-biological component (Fenwick, 2008; 2012; Fontana, 2009). To accommodate such a factor, the BMC complex will have to be expanded; some argue that the non-biological factor may be the prime generator of consciousness. Biological strictly means anything

pertaining to life and that which could survive the end of biological events ought to be ideally a non-biological factor. Such a factor possibly evolved in a nonphysical dimension and later incorporated with the biological factor.

To formulate an approximate model of BMC complex, we may have to hypothesise the existence of a non-biological factor in association with the neuro-computer and the quantum computer. The non-biological factor or traditionally recognised 'individualising principle' may be a quantum-like component that is dynamic, imperious and wilful and is evolving from beyond the threshold of quantum consciousness. The non-biological factor maybe all pervasive into the BMC complex. Thus, consciousness may consist of biological and non-biological factors bonded together probably through nano-level gravitation. There are multiple ways in which conscious states can be unified with each other and any particular psychiatric disorder might involve a loss of some aspects of the unity of consciousness but not others (Bayne, 2013). SCZ symptoms are linked with the biological factor. The unity of consciousness may break down in the context of SCZ. If we consider, the existence of a non-biological factor, there may be a case for thinking that there is a certain form of the unity of consciousness that is not lost in any psychiatric disorder.

### *Nocturnal mind-a quantum state*

Studying mind in sleep is a valuable route to exploring normal consciousness and its quantum nature before we embark on studies of the abnormal conscious states. Quantum theories help to explain the dream process and help us to understand certain aspects of memory storage. Dreams reflect nonlinear thinking and have been claimed famously to be the 'royal road' to the quantum mind. Their bizarre nature is analogous to the bizarre behaviour of quantum particles. The parallel thinking postulated by neuro-quantologists may comprise the raw material of dreams. Quantum thinking goes on without our awareness while we are awake – synonymous with the data processing performed by a computer. Dreams are not confined to sleep; they may be considered a form of quantum hallucination. Carl Jung acknowledged them as the hallucinations of normal life (Jung, 1977). Dreams involve hallucination-like experiences; their definition is close to that of hallucinations in that a dreamer has sensory experiences that lack appropriate external stimuli. In

Table 1. Inadequacies of Neurocomputer Model

The hard problem of experience
The unitary sense of self
The transition from preconscious processing to consciousness itself.
Noncomputability
Free will



the latent stage of SCZ, embryonic forms of auditory hallucination have been observed in dreams. Bleuler reported that on rare occasions hallucinations first appear as an ordinary dream, then manifest in the hypnogogic state and finally in the full waking state (Bleuler, 1950).

Mind may consist of an internal observer and an outward actor/experiencer; the actor and observer change shifts to cover waking consciousness and sleep. Effectively, the actor of waking consciousness becomes the observer during sleep and vice versa; quantum mind is the observer during waking time, and it functions as the actor during sleep. In SCZ, the nocturnal actor continues to be an actor during waking periods as well (Jahn, 2001). The nocturnal quantum mind may also be compared to a postal sorting centre. The psychic postal centre has six sensory routes for the collection of mail and is as bustling as a beehive. All the sorting in the centre is done at night while we are fast asleep. In a postal centre, the mail goes through a big sorting machine that reads the addresses and keeps a record of the information that has been amassed; in the psychic postal centre the quantum mind has a record of all our waking experiences. The conscious mind retracts into the unconscious during sleep and returns back on waking; unconscious mind is always there as mentioned before and more permanent. The same phenomenon occurs during anaesthesia.

### *Biological consciousness*

The dialogue between particle physics and cognitive sciences may lead to a paradigmatic shift in psychiatry from biological reductionism and the eclecticism of bio-psychosocial models into quantum mechanical concepts (Ghaemi, 2010) and open non-reductionist pathways. Quantum is the foundation of matter and the material universe has quantum underpinnings. Heuristically, our minds are microcosms of this complex universe. Particle physicists have brought the concept of a hypothetical quantum mechanical body alongside the material body into the realm of the scientist's imagination. Borrowing ideas from astrophysicists, Gerhard D. Wassermann has developed his own hypothesis of a quantum-linked structural view of the body and the mind (Jibu and Yasu, 2004; Wassermann, 1988, 1993). The 40% placebo effect of all drugs has been attributed to the quantum mechanical body; Joe Dispenza argues that the placebo effect is not a fantasy but a quantum reality (Dispenza, 2014).

It is apposite to regard the brain, with its 100 billion neurons and their axonal firings and synaptic connections acting as information networks of 'bit' states and switches, as a biological computer. Variability in synaptic strength mediated by chemical neurotransmitters shapes its network activity and enables learning and intelligent functions (Koch, 2004). There are non-conscious functions that the brain is able to perform that merit it is being termed a biological computer; they may include perception and control of such behaviours as are termed 'zombie modes', 'auto-pilot' or 'easy problems' (Koch and Crick, 2001).

One proposal to solve the riddle of consciousness is that quantum consciousness is generated by the MTs, the nano-level filamentous web of protein strands that permeates brain tissue (Hameroff, 2007). This posits that consciousness occurs because of quantum vibrations in the MTs. Penrose and Hameroff's Orch OR theory suggests that consciousness derives from deep-level, fine-scale quantum computations in MTs inside the brain neurons (Penrose, 1989; 1994; Hameroff, 1994; 2014). According to Orch OR, quantum vibrational computations in MTs are "orchestrated" by synaptic inputs and memory stored in the MTs and terminated by "objective Reduction".

Consciousness may derive from quantum vibrations in MTs and connect brain processes to self-organising processes in the fine-scale, "proto-conscious" quantum structure of reality. Precursors of consciousness has been always there in the universe. A mechanism to convert these precursors of consciousness to actual consciousness came into play during the course of biological evolution (Whitehead, 1929; 1933). The Orch OR theory is based on this earlier assumption of the pre-existence of precursors of consciousness. It has been assumed that like the recognized four fundamental forces of the universe (gravity, electromagnetism, the strong nuclear force and the weak nuclear force) by which the elementary particles interact with one another, universe may contain a fifth force, namely consciousness. Such a speculation may serve as a conceptual framework to outline an incomprehensible reality. This working hypothesis could be validated with advanced future technology that can harness this universal force of consciousness and incorporate it with the existing robotic intelligence. The outcome of such a probable future experiment could prove whether strong artificial intelligence is a possibility.



MTs evolved in biology to compute and orchestrate objective reduction events into a rich conscious experience and causal action, successions of which give rise to our flow of consciousness. Penrose argued that a deterministic non-algorithmic process may come into play in quantum mechanical wave-function reduction and may be harnessed by the brain. The functioning of the MT network in absorbing proto-consciousness within a personal mental space could be compared with the role of solar panels in generating electricity or they are the “solar panels for consciousness.”

MTs regulate the neuronal membrane and synaptic activities and connect brain processes to fundamental space-time geometry. MTs are major components of the cytoskeletal system and protein polymers inside brain neurons, they are self-assembling cylindrical polymers 25 nanometres in diameter, made of tubulin dimers composed of alpha and beta monomers in a helical pathway. These protein lattices of the cell cytoskeleton function within the brain's neurons, organising neuronal shape and functioning as molecular-level cellular automata. They exist within dendrites in the cortex and other regions connected by dendrite-dendrite gap junctions acting as laterally connected input layers of the brain's neuro-computer architecture. Hameroff tries to explain the presence of MTs in the neurons with a simple analogy as analogies and metaphors are permitted to convey complex ideas in quantum sciences. If a cloth were put over a group of trees, the cloth would represent the cell membrane and the trunks of the trees would stand for the MTs. Cytoskeletal MTs have all the characteristics required for making a biomolecular quantum device in the neurons.

Quantum superposition and a form of quantum computation occur in MTs. Ideas start in superposition in the preconscious, then settle in the conscious mind as the superposition ends and the waveform collapses. The thesis is that the collapse is where consciousness comes in, that consciousness is situated at the edge of the quantum reduction or the point of wave collapse between the quantum and the classical worlds. Thus, there may be neural and quantum computers in the Orch OR theory, brain MTs are the key to ordinary consciousness. The three bases of the theory are non-computability, the involvement of quantum gravity and the role of tubulins, all of which are testable with modern technology.

Penrose, who does not believe in the prospects of strong artificial robotic intelligence, argued that consciousness is a physical process, a sequence of quantum computations in MTs that are connected by a specific quantum formula to an objective threshold inherent in space-time geometry (Penrose, 2015). Penrose and Hameroff explain how a tubulin-based quantum messaging system may act like a huge quantum computer that may be the site of conscious experience. Thus, quantum computations are orchestrated by axonal firings, synaptic inputs, memory and so on – and hence termed Orch OR. More simply, Orch OR promulgates the view that what humans perceive as consciousness is the result of quantum gravity effects located within the MTs. The quantum computations are orchestrated by neuronal/synaptic inputs and extend throughout the cortex by tunnelling through gap junctions. The suggestion is that each Orch OR is a conscious event occurring in consonance with brain physiology (Hameroff, 2006). The Orch OR theory is relevant to the study of SCZ symptoms that are considered as disorders of consciousness.

Hameroff found a biological structure of consciousness in brain MTs and Penrose postulated a mechanism for the generation of consciousness. The Orch OR theory is sufficient to explain ordinary, classical consciousness only. The BMC complex may consist of a neuro-computer, a quantum computer and a quantum-like computer. The biological quantum consciousness may be acting as a bridge between brain and a larger consciousness. The Orch OR theory of consciousness explains the biology of consciousness – or the quantum mechanical elements of consciousness – and it is useful in understanding the bonding between consciousness and the brain. It has great relevance in understanding SCZ symptoms. The roles of the neuro-computer and quantum computer in the genesis of SCZ symptoms are far from being clearly elucidated.

### Limitations of Orch OR

The proponents of Orch OR theory admit its inadequacies in accommodating the spiritual aspects of human existence. Quantum, being the bedrock of matter, one has to hypothesise a quantum-like consciousness to bring spiritual dimensions into the equation. Kelly and others argue that mysticism is the foundation of reality (Kelly *et al.*, 2007). There is a phenomenological affinity between SCZ and mysticism (Parnas and Henriksen, 2016). In the quantum state



of mind, SCZ sufferers are closer to their personal spiritual self. Parnas and Henriksen argue that these features of mysticism gravitate around the issue of the basic dimensions of consciousness and they importantly seem to associate a specific alteration of the very structure of consciousness-mysticism has also bearings for the understanding of consciousness and its psychopathological distortions. Penrose's consciousness is un-physical and biological, but not non-physical or non-biological, and it does not seem to have the potential to accommodate mysticism and the mounting evidence obtained through survival research for long-term discarnate existence. To put it more technically, quantum consciousness does not have the resources to offer the "fuel supply" for an everlasting existence. The Orch OR theory has survived several attempts at refutation.

### Microtubules in Schizophrenia

If an element of consciousness is generated or powered by sub-neuronal process at the level of MTs, malfunctions of MT may account for some of the symptoms of SCZ assuming that they are disorders of consciousness. Conductive resonances in single MT was observed when alternating current at specific frequencies applied. Such an occurrence has been designated as resonant oscillation and this has been confirmed supporting the potential validity of Orch OR in SCZ research. The recent discovery of warm temperature quantum vibrations in microtubules inside brain neurons by Ghosh *et al* validate the Orch OR theory (Gosh *et al.*, 2014). Their finding also suggest that EEG rhythms derive from deeper level microtubule vibrations. It has been proven that during anaesthesia, quantum vibrational resonances are arguably blocked, and they are enhanced by psychoactive substances. Anaesthetist Roderick G. Eckenhoff suggests that anaesthesia, which selectively erases consciousness while sparing non-conscious brain activities, acts via microtubules in brain neurons (Eckenhoff, 2013).

Cumulative evidence suggests that the cytoskeletal architecture involving MTs are impaired in SCZ (Benitez-King *et al.*, 2004). MT-associated protein 2 is a neuronal protein that plays a role in maintaining dendritic structure through its interaction with microtubules. In SCZ, a number of studies have revealed that the robust immunoreactivity of MT-associated protein 2 is significantly reduced across several cortical regions. Certain genes that are thought to be important

players in SCZ pathogenesis are also found to be allied with MT (Costas *et al.*, 2013). Critical cognitive failings such as diminished social functioning, executive dysfunction, impairments of memory and concentration linked with SCZ have also been found to be associated with the alterations in the dynamics of MT (Lepage *et al.*, 2014).

MT linked psychopathology has serious significance in SCZ research. There are supporting evidences to suggest that cytoskeletal proteins, in particular MTs, are dysfunctional in SCZ and affective disorders. Woolf *et al.*, propose that because cytoskeletal proteins are major mediators of neuroplasticity, there is evidence to support current theoretical model suggesting that neuroplasticity is compromised in mental illness and that the efficacy of antidepressant and antipsychotic drugs may depend, at least in part, on their ability to enhance neuroplasticity (Woolf *et al.*, 2010). One interesting observation to justify such an argument is that antipsychotics, like antidepressants take two to six weeks to be effective for the amelioration of psychotic symptoms. This delay has been a puzzle and can be solved with the recognition that the reorganization of the cytoskeleton in neurons occurs after learning takes at an interval of two weeks, suggesting that neuropharmacological agents may be exerting their therapeutic effects via the cytoskeletal system (Woolf, 2009).

Recent exploration in psychopharmacology has revealed the effects of psychotropic drugs on the MT matrix (Benitez-King *et al.*, 2007). Antipsychotic drugs seem to upsurge expression of MT associated proteins (MacDonald *et al.*, 2005; Law *et al.*, 2004) and some may also have transient untoward effects on MTs (Dean, 2006). Antipsychotics are thought to induce synaptic plasticity through cytoskeletal rearrangements and consequently, MT variations have been noted with the administration of antipsychotics (Konradi and Heckers, 2001). Chlorpromazine, the first antipsychotic was found to be impeding tubulin polymerization and in turn affecting the cytoarchitecture of MT (Thyberg *et al.*, 1977).

In mouse brain model experiments, clozapine specifically, regulated transcripts related to the glutamate system, MT function, presynaptic proteins and pathways associated with synaptic transmission indicating the differential effect of clozapine on MT function might account for its superior



therapeutic benefits (Rizig *et al.*, 2012; Sharp *et al.*, 2013). Clozapine is also linked with the immune pathogenetic perspectives in SCZ (Carter, 2009; Venkatasubramania and Debnath, 2014) and may act as a specific immunosuppressant validating the autoimmune hypothesis of a subset of SCZ. Therapeutic response to psychotropics are variable in different patients and the role of MT response to psychotropics warrant further elucidation.

One commonly thought about mechanism of the working of ECT is that it is supposed to increase the responsiveness to the stimulation of monoamine oxidase inhibitors. Such a view would be relevant to explain the beneficial effects when it is used to treat depression. One wonders whether the temporary beneficial effects of ECT treatment for refractory schizophrenia is to do with the stabilisation of MT. There are anecdotal data supporting such a postulation (Pei Q *et al.*, 1998). If such a proposal is validated; the same supposition may apply to other brain stimulation techniques as well.

### *Distortions of consciousness*

Ganesan Venkatasubramanian proposes that SCZ may be a disorder of consciousness with biological correlates (Venkatasubramanian, 2015). The symptoms of SCZ is an outcome of fundamental disturbances in consciousness. Recently, there has been an upsurge of interest in the etiological search of SCZ as a disorder of consciousness (Gierch and Mishara, 2017; Sas and Parnas, 2003; Anscombe, 1987; Jose, 2003). The present author submits that SCZ that presents Schneider's first-rank symptoms and has a chronic, remitting and relapsing course may be essentially a biological disorder, but symptoms of SCZ may have a neuro-quantological origin. The anomalous unconscious processing may be the source of SCZ symptoms. Thus, a subset of SCZ may even be an autoimmune disorder and the SCZ symptoms may be an epiphenomenon of the underlying autoimmune process, but schizophreniform disorders may be disorders of consciousness with biological correlates. In an upward causation hypothesis of SCZ, quantum linked distortions of consciousness may be the correlates of an underlying but unknown biological disorder.

SCZ patients have observed that their hallucinatory voices are extremely knowledgeable about their past and present, indicating a memory link. The quantum mind is sometimes considered a store house of memories additional to cortical imprints

(Mindell, 2000). The attribution by highly insightful patients of a non-pathological reality to auditory verbal hallucinations (AVHs) also points towards a quantum connection, meaning that they may receive a contribution from some form of quantum reality constituting consciousness. J. Smythies' postulation (Smythies, 2009) that perceptual images are stored in phenomenological space as quantum objects has validity in assisting our understanding of three-dimensional visual hallucinations as well as AVHs. It is logical to postulate parallel-processing memory-recording systems in the ordinary and the quantum brain, resulting in our having multiple copies of memories. The ordinary brain would then contain representations of the quantum brain and vice versa. This, SCZ symptoms are aberrations of quantum consciousness and will be discussed in the succeeding paragraphs.

### *Impairment of metacognition*

In SCZ, metacognition is compromised, and such a situation has bearing in the development of delusional beliefs. Metacognition is thinking about thinking or it is simply awareness of what we know. It is like "supervising the supervisor," and is indicative of consciousness upon consciousness. Self-appraisal involve metacognition. Metacognition is all about higher order thinking skills and has two components, knowledge about cognition and cognition regulation. This may be analogous to the store keeper's knowledge of the articles in his store so that he can access them on demand. In SCZ this knowledge is in jeopardy and the patient struggles to trace the operational knowledge. Metacognition is supposed to happen in collaboration with the neural and quantum components of consciousness. Busemeyer and Trueblood have demonstrated that quantum probability theory offers a better grasp of cognition and decision making, where classical probability theory framework remains stuck (Busemeyer and Trueblood, 2011).

Impairments of metacognitive capability is thought to play a role in delusion formation. Patients who experience delusions may misattribute the meaning of events and interactions and believe random happenings have personal significance because abnormalities in metacognition prevent them from putting such occurrences in their appropriate perspective. The judgment processes during source monitoring are disordered in chronic and first-episode delusions in SCZ sufferers (Bell *et*



al., 2006). Many studies have revealed that one's own mindreading in SCZ has been impaired. This inability may be due to damage of metacognition and is a key factor in not able to recognise one's own disorder or lack of insight (Wiffen and David, 2009). Deficits in synthetic metacognition are likely linked to the integration of information during specific processes of neural binding and those in turn may be related to a range of mental activities including reasoning style, learning potential and insight (Bob *et al.*, 2016). Austin *et al* assume that elevations in metacognitive beliefs were associated with the severity and duration of psychotic symptoms and metacognition was a better predictor of course of illness than anxiety and depression suggesting that if these associations are shown to be causal, clinical interventions that modify metacognitive beliefs may also impact on positive symptoms and course of illness within SCZ (Austin *et al.*, 2015).

The classical probability theory adopts the assumption that during judgment process, the person has a definite value at each moment on a followed trajectory. The trajectory represents a definite state at each time point and is the only probabilistic component. This can be conceived as a particle which has a well-defined position and momentum on its path. The quantum probability theory proposes the reverse in the sense that the person has an indefinite value at each moment on a followed trajectory. This indefinite state corresponds to a wave function covering all probability amplitudes. Thus, Classical and quantum probability theories have distinctive approaches (Busemeyer and Trueblood, 2011). In the world of quantum cognition, the abstract field of probabilities rules the judgment process (Kaleağasıoğlu and Onur, 2013). Co-occurrence of potentiality, superimposition of probability amplitudes and intrinsic indeterminism are the basic fundamentals of quantum mechanics.

Metacognition mediates human information processing by evaluation of unconscious and conscious factors. Throughout information processing, neural events and judgments are ruled by the abstract field of probabilities. The quantum system evolves from a reversible to an irreversible state by means of measurement of quantum variable. In this context, metacognition is processed by mental wave functions (Kaleağasıoğlu and Onur, 2013). Freda Kaleağasıoğlu and Rüştü Onur have opined, "By gaining insight into the quantum mechanical interpretation of metacognition, we are at a stage of

leaving our traditional views behind and entering a new scope of understanding about reality, where information, cognition and principle of existence are intrinsically structured ab initio."

### *Quantum logic of schizophrenia*

If classical logic involves both practical and theoretical logic, quantum logic is theoretical logic only, but followers of mystical traditions also argue in favour of another form of theoretical logic- spiritual logic which is a quantum-like logic. Owen *et al* argues that there is an enhancement of theoretical rationality in schizophrenia (Owen *et al.*, 2007). Human beings are doers and thinkers and accordingly there is a supposed dichotomy between intellectual professions and skilled workers. Exercises of theoretical knowledge involve active reflection, engagement with the propositions or rules of the theory in question that guides the subsequent exercise of the knowledge. On the other hand, practical knowledge is exercised automatically and without reflection. The chronic SCZ sufferers lose their practical logic and knowledge or misapply them and use a diverse theoretical logic for their thinking which is different from the healthy. Normal people use a common-sense logic or classical logic which is acquired through experience and the construction of contexts, whereas SCZ sufferers seem to lack this ability and use instead a logic intrinsic to the brain; this logic is linear or quantum-like. Brains are linear vector processing devices.

SCZ sufferers have more uniform logic in different cultures, whereas the classical logics are variable in different circumstances (Salesnick and Owen, 2012). SCZ sufferers outperform healthy people who are using classical logic at certain tasks and anomalously outstrip them in certain logic tests (Salesnick and Owen, 2012). SCZ patients are distracted due to their psychopathology or have not acquired classical logic because of the long-term illness process, so that they are reliant on an intrinsic logic that human beings have all attained through the chances of evolution. S.A. Selesnick and G.S. Owen identify this logic as a quantum or quantum-like logic intrinsic to the brain (Salesnick and Owen, 2012).

Without introducing any novel concepts of mind, a better appreciation of the unconscious mind from quantum perspectives may be helpful in accommodating the symptoms of SCZ in psychiatry. Paola Zizzi and Massimo Pregolato argued that the logic of the normal unconscious may be coextensive with the logic of SCZ (Zizzi and Pregolato, 2012).



They submit that healthy minds employ both the classical logic of consciousness and the quantum primary process logic of the unconscious, but the minds of SCZ sufferers use primary process thinking not only in their unconscious psychodynamics but also as their dominant conscious operating mode. SCZ symptoms are subjective and hard to assess. Sigmund Freud's unconscious mind could be better appreciated if examined with a quantum spectacle. While Bleuler coined the term "loosening of association" to describe the formal thought disorder and the cognitive psychopathology of SCZ, Freud applied the phenomenology of the primary process thinking to explain the deranged thinking process of SCZ sufferers, using the language of the unconscious, the primary process thinking in their conscious mind. The primary process thinking applies quantum logic.

The unconscious operates in a much faster manner than conscious thought does (Zizzi and Pregolato, 2012). Such ultra-fast processing entailing the hidden intermediate step is consistent with quantum computation. The logic of the normal unconscious mind and of the consciousness of SCZ may then be the logic of quantum information (Kennedy and Bugajska, 2010). For a healthy mind, the passage from the unconscious state to the conscious state is marked, according to the Orch-Or model, by a decoherence of tubulin qubits (Eckenhoff, 2013).

Zizzi and Pregolato use the analogy of the existence of very fast switches operating at the interface of the quantum logic of the unconscious to the classical logic of consciousness. In SCZ, these switches are not fast enough, and therefore the schizophrenic mind remains trapped in the unconscious logical mode for too long (Zizzi, 2010). In this context, 'the doors of perception' proposed by Aldous Huxley would make sense and the switches may be situated on those metaphorical doors. Such an assertion tallies with the suggestion that in SCZ, there is disconnection between the automatic unconscious thinking process and conscious mind (Giersch and Mishara, 2017).

The unconscious is computational and always uses quantum logic. Zizzi and Pregolato states, "If for some reason the reversibility of these quantum logic gates becomes blocked so that it is no longer possible to perform the inverse operations of decoherence and disentanglement, the mind remains trapped in the quantum-computational unconscious."

They also add that these quantum logic gates are material structures, formed by atoms, ions, etc and the psychotropic drugs used are able somehow to reset at least partially and temporarily the damaged quantum logic gates in the brain (Zizzi, 2010). G. Cocchi and associates propose that both quantum-logical and quantum-physical lines of thinking about the BMC complex have the potential to generate openings for a better understanding of neuro-physics in psychopathology (Cocchi *et al.*, 2017). They also submit that explanatory and even psychotherapeutic opportunities may arise from consideration of superpositional logic and mis-attunement in the primary process thinking of SCZ.

### *Clinical examples*

Clinicians frequently come across the use of quantum unconscious logic among their clients. I shall present a few such examples. "I can play the piano, President George Bush (Bush senior) can also play the piano. I was born under the zodiac sign of Taurus, Bush was also born under the zodiac sign of Taurus. I should be a president." An example of syllogism from a SCZ sufferer is illustrative of the theoretical logic of SCZ. A woman who thought that she has been dead many years ago and currently living in the "astral world" would readily recognize her daughter who visits her regularly, but would ask her daughter much to her embarrassment, "How long have you been dead?" If the daughter could visit the "deceased mother" in her astral world, this SCZ sufferer believed that her daughter should also be dead.

When the transformative drug clozapine was introduced to long-term SCZ sufferers, many patients began to recount lost years. Some of them were fortunate to regain their original consciousness that remained in cognit for years. Sometimes the newly gained insight made them depressed. One such patient held the belief that he was Rip Van Winkle himself. Rip Van Winkle is a fictional character who woke up after many years of sleep. In Washington Irving's story, Rip Van Winkle fell asleep and woke up twenty years later, having missed the American Revolution, the death of his wife, the marriage of his daughter and the birth of his grandson. Obviously, this patient was describing metaphorically his years of trapped quantum state. The patient in question could not recognise new buildings and roads that were constructed about the time he was ill and the new arrivals in his family.



### *Splitting in schizophrenia*

According to classical neuro-physics, which is founded on Newtonian physics, the brain is a nonlinear dynamic system (Stein and Ludik, 1998). The “splitting” that typifies schizophrenia means dissociation between thinking and emotions and it is difficult to explain this psychopathology in the classical neuro-physics context of nonlinear brain dynamics. To reconcile this clinical psychiatric phenomena and quantum brain theory, Gordon Globus has sought assistance from the framework of thermofield brain dynamics (Globus, 2011). According to this theory, the brain is a self-tuning dynamical system and the neural networks are self-organising and capable of spontaneous self-organisation towards a consensus state. Certain symptoms of SCZ become intelligible in the framework of thermofield brain dynamics and is able to generate common diagnoses in a methodical way as disorders of “self-tuning” (autotonoesis). There is a foremost partition between disintegrated self-tuning (schizophrenia) and mistuned self-tuning (e.g. mood disorders).

In spite of the “splitting” associated with it, in SCZ the unity of consciousness is maintained, a conundrum yet to be resolved. Gordon Globus had opined that schizophrenia is the outcome of a disintegration of self-tuning; hallucinations and the insertion of thought become comprehensible in the framework of thermo-field brain dynamics (Globus, 2010). Normally all neuronal systems participating in the supersystem of BMC complex are attuned together and in SCZ incoherent tunings co-occur and it is tuning that splits (Globus, 1995). Globus argues that the tuning of affective, cognitive and behavioural systems splits, and such a failure of tuning may be neurochemically mediated.

### *First rank symptoms*

Even though the diagnostic validity of the first rank symptoms of SCZ is questioned, they are still in the background of main stream psychiatry (Nordgaard, 2008). The brain changes and the symptoms – including many of the Schneider’s first-rank symptoms may be the outcome of an underlying biological disorder, but the mechanism of symptom production may be quantum linked. Among the first-rank symptoms of SCZ (Hamilton, 1985), those that may have quantum standpoints include: thought insertion, commanding and commenting hallucinations, delusional perception. It is quite possible that a few other first-rank symptoms as well

may have a quantum contribution and need further analysis from a quantum perspective. The positive symptoms may have more quantum aspects while negative symptoms may be neurological in origin. There may be a continuum between all the first rank symptoms of SCZ and have biological underpinning.

### *Thought insertion*

Thought insertion is co-thinking, not an insinuation of thought in the brain. The word ‘insertion’ may be inappropriate as the so-called inserted thoughts may be the outcome of some form of core and parallel thinking originating in the quantum brain. Thought insertion and AVHs may be two manifestations of the same thing: co-thinking taking on a perceptual dimension and presenting in the form of AVHs. Neuro-quantologists suggest parallel thought processing (quantum thinking) may be taking place at the quantum level alongside verbal thinking. Globus argues that the SCZ symptoms of thought insertion and AVHs are a continuum reflecting such a parallel brain process (Globus, 2010).

Gordon Globus argues that when inserted thoughts begin to take on a perceptual quality, they become voices in the head and with more perceptual quality there are whisperings, finally, full-fledged hallucinations (Globus, 2010). In such a situation there would be a single consciousness with two agents: one alien and threatening, and the second recognisable. He posits that thought insertion would feel as if someone else were thinking in the mind of the patient, co-inhabiting the patient’s mind, whereas in thought control the thinker is controlling their thinking from the exterior. Inserted thoughts derive from the co-thinking process; when co-thinking becomes solidly conscious, it is experienced as thought insertion. Thought insertion may commence in the latent phase of SCZ and persist even after AVH has subsided, as though it is reverting to thought insertion when it loses its perceptual quality, an observation that supports the co-thinking hypothesis.

### *Hallucinations*

The common forms of hallucinatory experience in SCZ auditory in nature. There might be distinctive phenomenological forms of auditory verbal hallucinations (AVHs); it is hard to categorise them. One form might be considered as a co-thinking glitch because of unusual auto-tuning (auto-tonoesis) that consequences from SCZ psychopathology. Co-thinking might be an oversimplified type of quantum



thinking. There may even be different levels of intrinsic reasoning, inner speech, co-thinking and different forms at the quantum level, maybe including the larval phase of innovative reasoning and instincts. Such reasoning might be more representative, dense and important however significantly faster than the classical thinking. Individual AVHs may have commitments from various reasoning modalities, and co-thinking may initiate and supplement inner speech.

There might be a continuum between co-thinking, automatic thoughts and inner speech; like AVHs, co-thinking and programmed thoughts are automatic, though inward speech is wilful. The relationship between inner speech and co-thinking needs inspection. Supporters of the inner speech theory of AVH cannot clarify the component of its exteriorisation bringing about life-like AVHs. Quantum mechanics may add to this; however, the inward speech theory will keep on being discussed. Sigmund Freud's oblivious, unconscious cerebration might be closely resembling the proposed parallel reasoning and be quantum connected, despite the fact that Freud did not perceive that.

AVHs might be emblematic, similar to dreams and contain dream fragments. They might be acoustic variants of dreams that are altered by the unconscious. Dreams happen in an individual quantum-dream space where the envisioning and waking spaces are combined. Dreams reflect non-direct reasoning and are seemingly the 'royal road' to the quantum mind. Their anomalous nature is closely resembling the bizarre conduct of quantum particles (Rhawn, 2011). To begin with, AVHs might be electrochemical procedures inside the cerebrum. These procedures empower consciousness to get to another piece of the 'truth' of the self that is denied through typical tangible information sources; quantum thinking, the nonlinear and parallel reasoning begins to sneak in. Speculatively, SCZ pathology also and a few types of substance abuse may open a window in particular regions of the brain (again, we may look at Huxley's doors of perception), and the person might encounter a flashing understanding into other perceptual realities. Antipsychotics may be seals to those openings.

Patients who hallucinate are estranged from perceptual reality, while patients who are deluded only are in contact with perceptual reality, yet caught in the quantum rationale of the oblivious

unconscious. AVHs are a standout amongst the most waiting manifestations of SCZ but then all the present speculations about the system of AVH have evident insufficiencies. AVH may emerge due to the collaboration between organic predisposition, perceptual, subjective and quantum factors. The inner speech theory is as of now prominent among the followers of the intellectual model of AVH creation. One phenomenological kind of AVH might be an acoustic multi-dimensional image of co-thinking (quantum thinking) as opposed to an internal dialogue. The investigation of hallucinations can be another route to consciousness exploration.

### *Non-clinical auditory hallucinations*

The quantum vibrational resonances are apparently hindered amid anaesthesia and upgraded by psychoactive substances. Clinicians tend to disregard the way that non-clinical voice hearing does exist, and they medicalise all types of hallucinations (Choong, 2007). Very seldom, case reports of conceivable non-clinical AVHs show up in restorative diaries and one such special case was rendered by Azuonye Obialo Ikechukwu (Azuonye, 1997).

Third-person auditory hallucinatory experiences are a first-rank Schneider schizophrenia symptom and most manifestations involve variable verbal utterances. Auditory hallucinations feature in 75% of schizophrenia patients, 20–50% of bipolar ones, 10% of major psychotic, depressed patients and 40% of post-traumatic stress disorder subjects. Studies show 10–40% of non-psychiatric population experience auditory verbal hallucinations (Louise *et al.*, 2014). People experiencing non-clinical auditory hallucinations report positive content, less frequency, greater control over voices and less interference with their lives. Psychotic auditory hallucinations cause extreme distress and severe cognitive restrictions for the sufferer. The characteristic features of clinical verbal hallucinations are listed in Table 2 and are useful in distinguishing them from the non-clinical ones (Table 3).

The predominance of non-clinical AVH is proof of the presence of asymptomatic continuum between the clinical and non-clinical ones (Louise *et al.*, 2014). Particle physicists keen on consciousness studies are enticed to have a say on the aetiology of AVH. They hold the view that psychopathology opens a window to the quantum consciousness and that the hallucinatory encounters have a quantum segment. They additionally acknowledge that



Table 2. Clinical auditory verbal hallucinations

1. Greater Linguistic Complexity with limited vocabulary
2. Greater Emotional Response
3. Location of voice outside head
4. Higher frequency of hallucinatory experiences
5. Patients believe that their experiences are shared
6. Interference with activities and mental functions
7. Delusion formation correlated with AVH
8. More negative than positive content.
9. Long duration
10. Urge to respond audibly to the voices

Table 3. Non-Clinical auditory verbal hallucinations

1. Higher incidence of positive content
2. Less frequency
3. Higher control over the voices
4. Less interference with their activities and mental functions
5. Short duration
6. Sometimes Voices demonstrate superior vocabulary than that of the hearer.
7. Voices try to offer new information to the hearer as proof of their reliability

AVHs have a neurological substratum. Such a view could clarify why a few patients see their acoustic experiences as more genuine than that of the real world (Pandarakalam, 2015).

### Theories of hallucinations

The system of AVH stays uncertain and two lines of research are as of now mainstream. Investigating neuroanatomical systems utilizing procedures, for example, positron emission tomography and functional MRI is one line of research and the other is centred around cognitive, and psychological processes and events involved with AVH. Customarily, Broca's expressive and Wernicke's receptive speech areas are related with the articulation and comprehension of the verbal idea, and they are additionally connected with the genesis of AVHs. Complex types of AVHs occur due to temporal lobe inclusion (Malh *et al.*, 1964; Horowitz *et al.*, 1968) and that hippocampus and amygdala are likewise viewed as capable operators. Similar locales are additionally, considered in charge of AVHs because of LSD organization or direct electrode application (Gloor, 1997). Both these regions are a supply from which different emotions and feelings, images, words and thoughts are drawn and fused into the grid of dreamlike activity. Alongside, the cyclic decrease in serotonin is likewise ensnared in the generation of dreams and AVHs. In any case, these hypotheses have not been definitive.

There are no persuading neuropsychological tests correlating AVHs with brain deficits (David, 1994). Obviously, there are some missing links. To

compensate for these lacunae, a neuroquantological approach to deal with the investigation of AVHs is likewise developing without barring the biological correlates. SCZ pathology might be infiltrating the microtubules and tampering with the generators of consciousness; the quantum vibrational resonances of microtubules most probably become unstable. Clinical AVHs might be a disturbed quantum vibrational reverberation at the neurological level.

Quantum computation in the MTs of brain is altered in patients with SCZ. MTs have been suggested to act as automata and/or Quantum Hopfield networks. The depolymerization of MTs may lead to altered Quantum Hopfield network and/or MT automata which may result in distortions of consciousness (Grover, 2012). Monendra Grover explains that the output of these automata/networks will possibly be changed in patients with SCZ because of destabilization of MTs and this in turn may lead to the altered brain frequency in patients with SCZ. The brain frequency of the SCZ patients may possibly resonate with the frequency of a parallel universe in contrast to the normal persons, which leads to the hallucinations.

AVHs have been distinguished as a manifestation of the morbid objectification of inner dialogue exchange (thinking in words), and in like manner verbalized, thoughts are the raw material for AVHs (Stanghellini, 2004). Verbal thinking contrasts from external speech in numerous regards and has a few particular highlights. (Table 2) From the patient's perspective, AVHs is a subjective-objective phenomenon. Patients react to the voices they experience by using internal discourse. A few perceptions with comparing highlights debilitate the inward discourse theory. David and Lucas have shown in a solitary contextual analysis that transient upkeep of phonological portrayal (inward exchange) may coincide with AVHs they are not synonymous encounters (David and Lucas, 1993).

The inner-speech hypothesis is not an adequate explanation of the various phenomenological aspects of AVHs. AVHs are not self-generated experiences and are most commonly located in external space. Most AVHs manifest as voices of another person and are experienced as alien to the self. This is not congruent with what is habitually associated with thinking in words (Nayani and David, 1996). Moreover, the negative and derogatory nature of comments and commands typical of AVHs also seems to differentiate



from an inner monologue. In a single study comparing the inner speech of hallucinating SCZ sufferers and that of a control group, no difference between the two was identified (Landgdon *et al*, 2009). Similarly, a neuroimaging study failed to show any difference between the brain activity of hallucinating patients and that of healthy control groups during inner speech (McGuire *et al*, 1996).

Closer scrutiny of AVHs indicates that a group of them may differ substantially from clinical hallucinations (Pandarakalam, 2014), perhaps comprising another phenomenological category (Table 3). Most investigators have focused only on overt AVHs. Disturbances in the stream of consciousness may herald AVH symptoms. Thought pressure, interference and/or block; obsessive perseveration; and failure to discriminate between thought and perception are precursors of AVH and they all built up gradually. Spontaneous cases of AVHs and non-clinical AVHs provide new information that also undermines the inner-dialogue hypothesis. Mental health professionals are not perceptive of non-clinical AVHs.

Inner speech is a normal and essential feature of everyday experience, and an intrusion of it might be exceedingly befuddling for the person. Yet, some of those who experience multiple voices are able to cope with them without the impedance of daily living. The enigma of hearing different voices without the interference of daily functioning is inadequately accounted for by the inner-speech hypothesis, that model may be satisfactory for a few types, but it does not accommodate all. There may be different phenomenological variants of AVHs that need categorisation. Inner speech has its own features (table 4), and to postulate that all AVHs are a fabrication of inner speech is an inadequate assertion (Azuonye, 1997) (Table 5).

Table 4. Features of inner speech

1.Lacks pitch and loudness
2.Lacks extension
3.Recognizably configured
4.Can feel the presence
5. Disclosedness.
6. Disconnected and incomplete when compared to external speech.
7.Inner speech echoes in the mind while external speech attempted
8.Emotional neutrality
9. Sub-rosa movements of vocalising musculature.
10. Under voluntary control.
11.Based on linear thinking

Table 5. Inadequacies of Inner speech hypothesis

1. Dialogical exchange with voices through inner speech
2. Co-existence of voices and inner speech.
3. Unlike auditory hallucinations, inner speech is under self-control.
4. Inner speech is not experienced as alien.
5.Multiplicity of voices
6.Non-clinical voices occurring with new information in normal population
7.Mechanism of objectification of inner speech is unexplained
8. Hypnopompic hallucinations are unrelated to inner speech
9. Inner speech reflects linear thinking and AVHs reflect non-linear thinking.

### Delusions

Delusional ideas may have their origin in the quantum unconscious. Unlike the neuronal network of the conscious mind, the quantum field of the unconscious is highly flexible, as demonstrated by the properties of quantum particles. As indicated elsewhere, it is the flexibility of the quantum unconscious that permits cognitive distortions which are the precursors of delusions that may eventually become systematised. Dopamine overactivity in collaboration with the neuronal networks contributes to and cements the larval forms of delusion emanating from the quantum unconscious. The apophanous state of SCZ may be a twilight stage of the emerging unconscious quantum mode and quantum trap. Automatic thoughts may contain a mixture of quantum and classical logic. Classical logic may be the autonomous logic in healthy individuals but takes advantage of the quantum logic; normally it may filter and control the quantum logic. In SCZ, there is interaction between the quantum automatic unconscious processes and the conscious mind, but the former dominates the latter.

One proposal is that there is altered brain frequency due to changed quantum computation in the destabilised MTs of psychotic patients. These altered brain frequencies may resonate with the frequency of a world which has a frequency quite different from the decohered world resulting in psychotic symptoms (Grover *et al*, 2013). Andrew Sims has commented that creative and psychotic individuals are subjectively indistinguishable, but that does not imply both experiences are identical. He also adds that delusions arrive in the same way ideas drop in the minds of creative people (Simms, 1988). Grover *et al* postulates that sudden flashes of creative insight may happen when the brain of the creative individual resonates with a parallel world that has slightly different frequency from that of the decohered world. They also argue that there may be a hypothetical continuum between creativity, delusional formation and hallucinatory experiences.



Creativity among the psychiatric population is an exception rather than the norm. Psychopathology may be a facilitator of creativity, but not the producer.

### *Déjà vu*

Déjà vu is the name given to the unsettling feeling we get in which we feel we have been in exactly the same situation before-it is a sensation that this has happened before. It is the disrupting feeling we get in which we believe we have been in the very same circumstance previously. For a couple of moments, we are persuaded that we have experienced the moment beforehand, at times to the degree that it nearly feels as though we can anticipate what will occur straightaway. At that point, just as fast as the unusual inclination comes, it goes, and we are back in our typical reality. Déjà vu may not be a regular exhibiting indication of SCZ, but rather it might be a neuro-quantological sign that offers new understanding of the SCZ thinking process (Bosnjak, 2018). It additionally, happens in individuals who do not have SCZ and its aetiology still cannot seem to be affirmed by neuroscience.

### *Abnormalities of self and time perception*

All the foundational texts on SCZ mention disorders of the self, but these were less discussed with the disappearance of the concept of consciousness from the cognitive sciences in the second half of the 20th century. What we have done in the past becomes a part of our 'self,' and the ability to reflect on this influences our behaviour in the here and now. The self is often used to refer to those attributes a person attaches to himself or herself most firmly. Auto-noetic consciousness is significant in our creation of the distinctive self. 'Self' can mean different things to different people. 'Me' and 'I' have different undertones; the former refers to one's physical body, and the latter refers to the personhood that may even reflect a higher self (quantum-like consciousness) downloaded into the quantum consciousness. 'Self' is an essential requirement for life experiences to happen. Consciousness is the state of being aware of one's own surroundings and individual existence (Northoff, 2013; Tuzzynaski, 2006).

The concept of self can be addressed at different levels of reality and abstraction. Self may have different compartments. There is a biological self and a non-biological or larger self. The most elementary component or the basic level of self is referred to as the minimal self. Gallagher defines the minimal self as

"a consciousness of oneself as an immediate subject of experience' and as 'the pre-reflexive point of origin for action, experience and thought" (Gallagher, 2000). The minimal self can be explained separately from more elaborate aspects of the self (Parnas *et al.*, 2003; Nelson *et al.*, 2013). Explicit awareness of an 'I' may be the reflexive self, and the experience of the self as having special characteristics like a personality and a personal history that we tell about ourselves is the narrative self (Haug *et al.*, 2012). Thus, the minimal self refers to the implicit and pre-reflexive selfhood (Parnas, 2011). A reflection of a larger self may be embedded within the minimal self, giving it a unique individuality. The minimal self is tacit and non-verbal and refers to the sense of bodily presence.

In the ordinary phenomenological notion of the self, we live our conscious lives from the first-person perspective, as a self-present, single, temporally persistent, embodied, and bounded entity who is the subject of his or her experiences (Martin, 2014). Impaired minimal self-experience may be defined as a distortion of one's first-person experiential perspective that subtly influences the sense of the experienced self. In such an altered sense of delineation, patients experience difficulty discriminating self from not-self and lose self-boundaries (Parnas *et al.*, 2005). Patients get the feeling that their lives have become an open book that others can read. Those with SCZ have similar trouble discriminating the self from the non-self. SCZ researchers point out anomalies in critical facets of consciousness relating to self-awareness and time perception without conclusive evidence (Venkatasubramanian, 2015). These basic structural aspects of self-hood may become altered or even shattered in SCZ- an orchestra without a conductor (Venkatasubramanian, 2015). Conscious experience is organized in time (Wassenhove, 2009; Wittmann, 2011). The progression of occasions and the connections built between occasions additionally add to the feeling of time's congruity. This is observed to be impaired in patients with SCZ (Fuchs, 2007; 2013).

Our experience of reality is essentially one of virtual reality generated by our brains. Husserl submitted a tripartite conception of consciousness, dividing human cognition into three different temporal domains comprising retention, presentation, and protention and the past, the present, and the future (Husserl, 1928). These correspond to the working memory, interference control, and preparatory set proposed by Fuster (Fuster, 2003). Both concepts



refer to the present as an extended duration that integrates information from the recent past and the future (Husserl, 1991). Vogeley K and Kupke C propose that the integration of phenomenological and neuroscientific approaches can stimulate the development of enriched pathophysiological concepts of mental disorders (Vogeley and Kupke, 2007). According to the proponents of this view, SCZ could be deciphered as a structural disturbance of time consciousness. Consciousness is a structure in its own right and not vaporous or breezy and hazy, as prevalently misjudged because of its intangibility quality.

The anomalies of self and time recognition confirm that symptoms of SCZ are aberrations of quantum-based consciousness. Subjective perception of time is a natural character of consciousness and is weakened in SCZ. Timing debilitations are believed to be identified with self-disorders (Martin *et al.*, 2018). Irregularities of time recognition include time condensation and time prolongation and are experienced in SCZ. Scattered time observation could form into an anomalous high occurrence of faulty associations between events and agency attributes. They are linked with positive and negative indications.

#### *A future direction*

Autoantibodies in an autoimmune disorder affecting nervous system may tamper with MTs and destabilize them, leading to aberrations of consciousness at a lower level. Though, it may be currently only a hypothetical possibility, the way forward would be the use of “anti-autoantibodies” as a treatment measure to control the underlying autoimmune process. Lijuan Luan *et al.* claimed to have developed a strategy for the production of antiserum against the autoantibodies of Type 1 Diabetes Mellitus which is an autoimmune disorder characterized by an autoimmune-mediated loss of insulin secreting  $\beta$ -cells (Lijuan Luan *et al.*, 2016). They produced antisera by immunizing Balb/c mice with affinity-purified IgG from NOD or BALB/c mice along with the immune adjuvant. Their results showed the practicability of producing antiserum against autoantibodies to prevent and treat autoimmune-induced Type 1 Diabetes Mellitus. If a subset of SCZ is an autoimmune disorder, such experiments could be extended to SCZ research. Obviously, these possibilities require further evaluation.

## **Discussion**

The dopamine hypothesis of SCZ has long dominated the research field. The view that SCZ is essentially a neurotransmitter disease is comparable to a faulty assumption that British telecom determines foreign policy. Keshavan *et al.* liken the knowledge gathered so far about SCZ to the differing conclusions by the fabled six blind Indian men after feeling different parts of an elephant. Many attempts have been made to reduce the elephant to a mouse, and the quantum approach is one among them. The idea that SCZ does not allow for any degree of understanding goes back to Jaspers, the founder of psychopathology. We must liberate ourselves from the shackles of conventional views of SCZ to make progress in the study of those affected who coexist with us but refuse to share our world. “The conceptual trappings of the elephant-like unitary constructs may be rescued by the mouse and like models.” (Keshavan *et al.*, 2011).

Like SCZ remains an unknown quantity, consciousness is also mysterious and practically impossible to piece together. Students of consciousness are also in a comparable position to those of the proverbial blind men, but as the obscurities of mind are unravelled, the elephant is transforming into a giant size dinosaur; consciousness is becoming more mysterious as studies progress. Colin McGinn has opined that human intelligence is wrongly designed for grasping consciousness: that there are natural ceilings to our understanding of consciousness (McGinn, 1999). He contends that we have a cognitive and intellectual disability in our make-up when it comes to searching this mystery and that our buried potentials will always remain an obliviousness. In that case, we may never be able to fully comprehend the mechanism of SCZ symptoms. The pathogenesis of SCZ may affect only the quantum mechanical part of the BMC complex, but the larger self remains intact. Such a novel approach may also be helpful in placing the clinician’s mind in the place of those with SCZ by understanding their metalanguage.

Auditory hallucinations, one of the commonest symptom of SCZ may arise because of interactions among biological predisposition, perceptual, cognitive, and quantum factors. One phenomenological type of AVH may be an acoustic hologram of co-thinking rather than an inner dialogue. The pathology of SCZ may lead to a mild disturbance in the unity of the brain–mind–consciousness



complex at the neurological level and result in hearing multiple voices that appear to emanate from different entities. Hallucinogenic drugs, anti-hallucination medications, neuroimaging, and quantum studies may all promote a better understanding of AVHs. Quantum views help to elucidate symptoms of SCZ, but the illness may be essentially due to a highly complex underlying biological disorder. With its neurological link, the orchestrated objective reduction (Orch-OR) of Penrose and Hameroff is relevant to psychopathology. If destabilisation of MTs is one of the underlying causes of SCZ symptoms, the black box of the aetiology of SCZ may be hidden inside the neurones. MT based research may lead to more potent anti-psychotic drugs.

The dignity of those with SCZ could be compromised with a mechanistic ultra-reductionist view of consciousness. Medical professionals ought to recognize that patients are integrated physiological and spiritual beings. The realization that the greater self of those with SCZ is intact, and only the outer coverings are affected is of paramount importance to preserve their respect and self-esteem. The quantum model of the symptom pathology of SCZ is expected to work alongside neuroscience and psychiatry to offer a fuller and more complete grasp of the SCZ thought processes. Such insights should facilitate communication between therapist and patient, enhancing the self-esteem and safety of SCZ patients and enabling greater empathy towards them.

More theoretical research into the BMC complex is required to fully comprehend symptoms of SCZ. The psychotic symptoms due to disorders of consciousness observed in SCZ appear to form a spectrum. Zizzi and Pregnolato suggest that further scientific research in this field should perhaps focus on the study of the quantum brain as understanding this model is crucial to both fields of quantum logic and quantum physics in general. Such an endeavour may help to understand more about the unconscious and even regions beyond the quantum mind which in turn could be useful in the interpretation of SCZ symptoms. To use an informal expression of Alan Gauld, we must admit that we know as much about consciousness as the ancient Greeks knew about electricity when they rubbed wool with pieces of amber (Gauld, 1982). SCZ research is going to evoke new interest in consciousness studies.

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