Semantic processing and semantic experience in people with schizophrenia: a bridge between phenomenological psychopathology and neuroscience?

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Summary
I describe and discuss two kinds of language anomalies in people with schizophrenia: impairments of Semantic Processing (SP), the neural activities underpinning the construction of meanings, and Semantic Experience (SE) the way one lives and manages meanings. The first level includes abnormal language lateralisation models and anomalies of Semantic Memory (SM). SM-based models shed light on three main domains: 1) heightened automatic spread of activation within the SM, 2) inability to build-up and to maintain a meaningful, coherent context of reference as a consequence of impairment of working memory and executive function, 3) impairment of the fine balance between SM-based and syntactically-driven combinatorial processing. Anomalies of SE include the tendency (or proneness) to override the extensional limits of semantic fields as imposed by socially shared constraints of meaning (semantic drift). Language loses its public validity and displays an over-reliance to transcendence, the possibility of every meaning to transcend its commonsense value. The ecological validity of SP models, role of neurocognition, segregation of SP and SE in specific psychopathological domains and diagnostic validity are discussed and contradictory findings underscored. In the final section, I speculate on common properties shared by SP and SE findings as two sides of the same coin, such that SP findings reflect a sub-personal (pre-phenomenal or neural) level (i.e. SM impairment), while SE findings reflect a personal (phenomenal or experiential) level (i.e. the hyper-trascendence of meanings).

Key words
Schizophrenia • Language • Semantic processing • Semantic experience • Neurocognition • Phenomenological psychopathology • Neuro-phenomenology

1. Introduction
During evolution humans developed the capacity to represent experience in linguistic constructs and the ability to operate a flexible manipulation of them. Language is traditionally considered the emergent behavioural side of thought, as well as the medium of thinking. Although a “one-to-one” relationship between speech and thought is questionable (consider e.g. visual imagery or logic-mathematical thought), it is nonetheless clear that we use linguistic constructs (inner speech) whatever activity we are engaged in, not only when we are in a reflective stance. Since the early twentieth century, language impairments have been reported in people with schizophrenia by assuming that they reflect an underlying thought disorder. Today, descriptive psychopathology relates language disorders to Formal Thought Disorders (FTD), distinguishing positive FTD (loosing associations, neologism, tangentiality) from negative FTD (poverty of speech). A growing number of studies has been devoted to speech production while speech comprehension has been studied to a lesser extent; a set of standardised assessment tools have been developed to assess patients’ speech production considering the behavioural side of thought disorder; on the contrary, single items of the BSABS (C.1.7) and the SPI-A (C-4) regard the phenomenon of comprehension (Table I).

In language both production and comprehension reside on the same linguistic constructs, both involving the (internal) representation of meaning, that is – broadly defined – semantics. The term semantics “has generally been used as an umbrella” covering different levels of language organization: words, sentences (where the representation of meaning is integrated with syntactical structure) and discourse (where the boundary with pragmatics – the social contextualisation of language as communication device – is vaguely defined). Semantic and syntactic levels are thought to be processed in parallel – not sequential – “streams” provided with closely interacting processes.

In the next two sections, I will discuss the emergent findings from the field of neuroscience (Semantic Processing) and phenomenology (Semantic Experience). Each section includes an introduction aimed to delineate basic concepts concerning the neurobiology of semantic processing and the experience of representation of meaning under normal conditions and emerging findings in the area...
of schizophrenia. In the last section, I will tentatively look for matching constructs bridging phenomenological with neurobiological data. My final remarks will be no more than tentative, due to, on the one hand the paucity of studies, without large-scale investigations (phenomenology); on the other hand, the working-through character of the findings often charged by persistent shadow-zones or contradictory results (neuroscience).

2. Neuroscience: semantic processing

Semantic processing (SP) is the large set of neural activities underpinning the construction of linguistic meanings. In the last decades, an increasing number of studies employing several laboratory paradigms has produced a growing amount of findings that demonstrate, despite some inconsistencies, a substantial up-grading of language models, including their distortions in pathology. Anomalies of SP in people with schizophrenia have been attributed to impairment of Semantic Memory (SM) or, alternatively, to anomalous Lateralization of Language Functions (LLF). The emergent literature may appear, at least partially, obscure to non-experts since it relies on complex experimental laboratory variables and neurophysiological assumptions. In this section, I will discuss the theoretical models concerning the anomalies of SM and the disturbances of LLF; each section will be preceded by a brief summary of the basic concepts concerning the language functions herein considered.

2.1 What is SM?

SM is the large database containing all the knowledge about the world acquired throughout one’s life. Its content is long-term, formally generalised (extracted from the experience that produced it) and declarative since it is expressible in propositional terms. SM is absolutely indispensable to almost all our activities. The neural basis of SM has been investigated in fMRI studies (for a review, see 20).

Neurobiology of SM

The neurological underpinnings of SM include: a) modality specific (motor and sensory) cortical areas (demonstrating that SM is – at least partially – embodied); b) supramodal convergence areas, such as the temporal lobe and the inferior parietal regions (where representations become “more abstract”); SM also involves the inferior, rostral and dorsomedial areas of the frontal cortex (selection, combinatorial and retrieval routines), as well as the posterior cingulate and precuneus cortex (where it may be integrated with episodic memory (hippocampus), providing the latter with temporal organisation).

In SM, each representation constitutes a node or a hub within a network of associative connections with other hubs (related concepts). An incoming (meaningful) input (a word, or a concept) activates the corresponding node as well as the related constructs through associative links (e.g., nurse-hospital-doctor). The activation decreases as a function of reduced relatedness.

SM probably contains the same information in the two hemispheres but with very different arrangements: in the left (dominant) hemisphere, semantic fields are tightly, finely and strictly connected; in the right hemisphere, semantic fields are wide, with remote associations. The two hemispheres display differences in the cytoarchitectonic structure of semantic regions (i.e. in the right – non-dominant – hemisphere the pyramidal neurons display a wider number of dendritic branches and synaptic connections).

How is SM studied?

SM has been extensively investigated in several laboratory paradigms, employing linguistic stimuli as single words, pairs of words (real words vs. meaninglessness strips of letters; related and unrelated pairs of words; conventional vs. novel metaphors, the latter taken from modern poetry), sentences, discourse (with congruous or incongruous arrangement of clauses). Other studies employ pictures or picture–word coupling (related or unrelated). The responses measured in these studies include behaving-
al indexes (recognition accuracy or time reaction), neuro-
physiological markers and neuro-imaging data. Among neuro-
physiological markers, event related poten-
tials (ERP) are perhaps the most studied. An ERP is wide-
spread bio-electrical activity recorded from the scalp in
response to specific stimuli (i.e. related or unrelated word
pairs). In SM studies, the most relevant ERP component is
the N400 (a negative waveform occurring 400 msec after
the stimulus) indicating a perceived semantic incongruity
between the two stimuli (e.g. bread-tiger). Some authors, as
in a study on schizophrenia, prefer to rely on instrumental
results such as ERP components, expression of automatic or “implicit” processes; behav-
ioral responses, such as a semantic task, are considered
to be more sensitive to controlled or “explicit” cognitive
strategies; also, schizophrenia patients tend to be slow
or inaccurate in behavioural tasks. ERPs display good
temporal resolution as they record neural activities on-
line, but have poor spatial resolution, exactly the reverse
pattern of fMRI results.

What is the priming effect?
The priming effect (PE) is the recognition of a target
word (e.g. tiger), which is facilitated if it is preceded by a
related concept (i.e. stripes). PE is very useful to study the
associative networks between diverse (related or unrelated)
semantic fields; a major determinant in these studies is
represented by the time interval, usually termed as SOA
(Stimulus Onset Asymmetry) between the two stimuli. A
short SOA (≤ 400 msec) activates more automatic pro-
cessing, while longer SOAs (> 400 mSec) activate more
strategic, explicit, cognitively charged processing.

2.2 SP in people with schizophrenia: SM-based
models
The three most influential models concerning SM im-
pairment in schizophrenia are: a) heightened automatic
spread of activation within the SM; b) inability to build-
up and to maintain a meaningful, coherent context of ref-
ERENCE; 3) impairment of the fine balance between SM-
based and syntactically-driven combinatorial processing.

Heightened automatic spread of activation within
the SM
A very influential model depicts schizophrenia patients
as suffering from a heightened automatic spread of activ-
vation within the SM. This is an abnormal proliferation
of relationships between semantic fields, which leads to
a sort of hyper-activation of connective links between
weakly related or unrelated words and concepts.
Schizophrenia patients do not display enhanced SM: a
meta-analysis documented impairment in semantic flu-
cy tasks where probands were asked to produce words
belonging to specific categories. Also, patients do not
suffer from a sort of semantic dementia: they were less
accurate than controls in organising words according to
semantic categories and in recalling previously-stored
lists of words, failing to use semantic strategies. The pa-
tients’ performance improved if the time task was pro-
longed or external help was provided. Patients perceive remote or unrelated concepts as seman-
tically related. Their transcripts (with randomly omitted
words) were judged to be more unpredictable than those
produced by normal controls. In semantic fluency
tasks, patients produced bizarre semantic associations.
As documented by a meta-analysis, in semantic decision
tasks (where the proband has to recognise the semantic
relatedness between two words), patients with positive FTD exhibited hypersensitivity to PE. This finding
was significant, with short SOAs indicating an impairment
of automatic processing. Similarly, in ERP studies, pa-
tients with schizophrenia displayed a reduction of N400
component (semantic hyper-priming) when exposed to a
pair of distant words (i.e. moderately or indirectly related
words). This was more evident when short SOAs
were used, activating more automatic associative pro-
cesses; the ERP semantic hyper-priming is reduced with
longer SOAs or when patients are requested to make a
behavioural decision (e.g. matching the semantic relat-
edness between two stimuli).

On the contrary, other studies, employing behavioural re-
sponses (semantic decision tasks) and neuro-physiological
data (N400), displayed reduced or negative PE both at short
SOAs and at longer SOAs suggesting the latter is an im-
pairment of semantic explicit strategies (see next section).
All these findings were related to SM disorganisation with
impairment of normal connections between related se-
matic fields. These results have been regarded as the
cause of loosening associations and positive FTD. Anoma-
lies of semantic ERP were also occasionally described in
patients with severe Positive Symptoms, or Negative
Symptoms (for discussion, see section 4).

Inability to build-up and maintain a meaningful,
coherent context of reference
Anomalies of SP have been attributed to an inability to
build-up and maintain a meaningful, coherent context of ref-
ERENCE between word pairs or sentences. Negative
PE between word pairs has been considered the conse-
quence of such a disturbance. This inability has been referred to as an impairment
in working memory (WM) and executive functioning
(EF). The impairment of WM and EF may operate in
several ways: 1) inability to maintain “on line” the
correct context of reference of meanings, especially in

M. Ballerini
the face of multiple sources of information; 2) inability to inhibit irrelevant words that do not match the context of reference. If these mechanisms do not work, the number of words that should be, and are not, inhibited overrides patients’ reduced capacities.

Impairment of the fine balance between SM-based and syntactically-driven combinatorial processing

An integrative model has been recently purposed by Kuiperberg and coworkers. The ability to correctly represent linguistic meaning within the frame of discourse is related to a fine integration of semantic-syntactic mechanisms necessary to obtain appropriate logical, causal, temporal connections, as well as consistent semantic matches

Conventional models of language processing have established a two step-sequential mechanism: syntactic parsing plus semantic analysis, the latter performed when the syntactical structure has been already determined

It is assumed that simple blocks of semantic-syntactical associations are stored in SM, ready-to-hand in many everyday transactions. When one is faced with complex, ambiguous, or contradictory communication, a more sophisticated level of analysis is required, called the combinatorial integrative parsing of discourse

Consider two examples from laboratory paradigms, both without coherent meaning: “the guests played bridge because the river has many rocks”; “at breakfast the egg would eat …” (for review, see). In the first case, the homograph (a word with two or more meanings) bridge has been used in its subordinate meaning (a card game), while the subsequent word river is connected to its dominant meaning. In the laboratory, when confronted with the term river normal people produced an N400 (perceived semantic incongruity). This is not the case with people with schizophrenia who seem to rely on semantic association between ‘bridge’ and ‘river’ irrespective of the context. In the second case, non-patients do not to produce a N400 (transitory semantic illusion) in response to the term eat, but they produce a late P600, reflecting a supervening need for combinatorial-integrative parsing (semantic-syntactic integration) of the sentence. People with schizophrenia do not produce this effect; they seem to rely on semantic associations between the words ‘breakfast’, ‘egg’ and ‘eat’

An fMRI study demonstrated that patients with schizophrenia have a reversed pattern of cortical activation: when responding to semantic-related stimuli, schizophrenia patients display hyper-activation of infero-frontal and temporal cortices; the inefficacy of lexico-semantic retrieval and selection (infero-frontal cortex) leads to hyperactivation of temporal structure

Similarly, in another fMRI study the same research group indicated that schizophrenia patients experience a disassociation between frontal and temporal lexi-co-semantic integrative processes, which has been confirmed by other studies using a different semantic fMRI paradigm. Another fMRI study, employing semantic indirect priming (two associated words predicting a target word), demonstrated hyperactivation of temporal regions in patients, suggesting enhanced activity in cortical semantic structures

In language comprehension, the two “streams” of processing, that is, the semantic memory-based and the combinatorial-integrative syntax driven, need to be fine-balanced. People with schizophrenia seem to rely excessively on semantic associations. These patients are able to match the incoming linguistic stimuli with the stored constructs, but when confronted with more complex or ambiguous parses of language they are unable to inhibit their over-reliance on semantic associations. The authors concluded that the fine balance between semantic memory-based and syntactically-driven combinatorial processing is disrupted in schizophrenia, and that such a disruption can lead to errors in the build-up of higher-order meaning under some circumstances

2.3 What is the LLF?

Lateralisation of brain functions (and conversely, asymmetries in neuro-anatomy) are widespread in many species. They represent an evolution-driven advantage in performing many tasks. Human language has been considered for many decades strictly lateralised in the left (dominant) hemisphere. Today, the classical nineteenth century model (the Wernicke–Broca model) is considered no more valid. Language processing involves both hemispheres and possibly sub-cortical structures. Nonetheless, the two hemispheres do not need to be considered functionally (and anatomically) equivalent: there is growing evidence for hemispheric specialisation, that is, the segregation of specific language functions in the right or left hemisphere

The Four Quadrants model

In the model proposed by Crow, the brain torque is subdivided by two axes (antero-posterior and latero-lateralis) in four linguistic chambers: left dorso-lateral pre-frontal cortex (speech production), left hetero-modal associative occipito-temporo-parietal cortex (phonemic comprehension), right hetero-modal associative occipito-temporo-parietal cortex (meanings representation) and right dorso-lateral pre-frontal cortex (planning concepts and intentions); while the left – dominant – hemisphere is prevalently dedicated to motor and sensory phonological features of language, the right is devoted to more conceptual features. While the left (dominant) hemisphere contains a set of primary lexi-co-semantic modules neces-
sary to speech production and comprehension, the right hemisphere is considered a “secondary lexicon or lexico-semantic store” where the “separation of a motor from a sensory component gives rise to distinction between meanings on the one hand and thoughts and intentions on the other” 50. In the left (dominant) hemisphere, the connections between linguistic neural representations or “engrams” are restricted to linear or serial forms of processing, while in the right hemisphere they are wider and provided with “in parallel” associative links, consenting more complex or “alternative” elaboration of meanings 51. The four chambers are connected by one-way pathways: the direction is biased toward the right at the posterior level (representation of meanings) and biased toward the left at the anterior level (speech production, where thoughts and intentions – at least partially elaborated in the right hemisphere – become speech) 50. The correct functioning of the entire system requires absolute hemispheric segregation of linguistic routines: if not, the road is open to overt pathology 49-51.

Bilateral activation integration and selection model

Another very influential theory of SP is the BAIS model (Bilateral Activation Integration and Selection) 12. The model has been developed via fMRI and neurophysiological studies. In laboratory paradigms, it is possible to rely on only one hemisphere by addressing semantic stimuli in one visual hemi-field. SP occurs in both hemispheres in parallel streams, distinct but complementary and highly interactive: in the left (dominant) hemisphere, semantic fields are tightly, finely and strictly connected, while in the right hemisphere they are widely connected, with remote associations; the left hemisphere is activated by strong categorical information (dominant meanings, literal associations, contextually-relevant information), effective for quick comprehension and speech production; the right hemisphere seems to be engaged by distant, non-conventional categorisation (subordinate meanings, unusual or distant semantic associations, apparently irrelevant information, abstract concepts), displaying an advantage in detecting context inconsistencies, deriving themes, drawing inferences, repairing grammatical errors, producing figurative language and comprehending novel metaphors and jokes 12. When faced with a semantic stimulus (a word, or discourse), the semantic networks are activated. The diverse semantic fields are then computed and integrated by their overlapping zones. Finally, the best-matching semantic field is chosen, while all others are inhibited. The brain regions involved in these sequential processing are, respectively, the posterior temporal cortex, anterior temporal and frontal infero-lateral cortex 12. SP may be viewed as the product of this “hemispheric negotiation” 52. It is still unclear what regions operate as the selector, able both to address the “stream” in one direction and to switch off processing. The right hemisphere may be activated when left hemisphere processing is inconclusive 12. Some authors have suggested that the left (dominant) hemisphere plays “a gate-keeper role” by preventing unconventional semantic processing from becoming excessive 53.

2.4 SP in people with schizophrenia: lateralization-based models

In a seminal paper 49, Crow argued that schizophrenia is the price Homo Sapiens pays for the acquisition of verbal language. While the model is still under debate, there is still a growing amount of evidence concerning anomalous LLF in people with schizophrenia.

Crow’s model

Crow has proposed that anomalous lateralisation impedes the normal hemispheric segregation of diverse language functions. He suggests that psychotic symptoms are the result of this anomalous lateralisation, as well as a possible reversal in the direction that these pathways typically flow. For example, auditory verbal hallucinations are viewed as products of reversed direction in the posterior pathway 50 51 – inner speech becomes objectified in perceptive-like (auditory) phenomena. In Crow’s model, anomalies of language account for all classic psychotic (first-rank) symptoms 49-51 and possibly for incoherent speech phenomena 50.

Experimental evidence concerning anomalous LLF in schizophrenia

Several studies have demonstrated anomalous LLF in people with schizophrenia, ranging from neuro-anatomical 54 to functional levels, as documented by fMRI investigations 55 56; despite some inconsistencies 57, a correlation between the severity of psychotic symptoms and defec-tive lateralisation has been found 56 58 59. A meta-analysis confirmed a correlation between defective language lateralisation and auditory hallucinations, although with small effect-size 60. Anomalies of language lateralisation have been documented in patients with relevant negative symptoms 61, first episode patients 59, un-medicated patients during acute episode 58 and in relatives 62 63, suggesting that they may represent a vulnerability marker for schizophrenia.

BAIS based evidence

Two studies 52 64 have challenged the BAIS model in people with schizophrenia. In one study 64, schizophrenia patients exhibited a reverse pattern of brain activation during a semantic task (conventional vs. unconventional
metaphors). In another study 52, the ERP magneto-EEG was recorded during a semantic task test (literal related or meaningless word pairs, conventional or unconventional metaphors). Patients were more able than controls to identify novel metaphors, but performed worse on all other tasks. Also, patients did not display the M350 waveform (similar to N400 reflecting perceived semantic incongruity) for either unrelated words pairs or unconventional metaphors. In conclusion, patients with schizophrenia (with positive FTD) seemed to rely on automatic – coarse – (right hemisphere-based) SP independent of the type of semantic stimuli 52 64. Given the small number of patients, the results are preliminary.

3. Phenomenology: semantic experience

From a phenomenological perspective, semantic experience (SE) may be considered the way we live and manage meanings, the building blocks of all knowledge. In other words, SE is the subjective, first-person experience of meaning. In this section, after recalling the notions of ‘meaning’ as developed by social phenomenology, I will briefly summarise the (few) psychopathological studies regarding SE in people with schizophrenia.

3.1 Meanings and language

Man is an animal symbolicum 65 and his core property is the ability to conceptualise reality. Facts, events and objects are typified through meaningful constructs (MC). Every kind of knowledge is grounded on MC, including common sense (CS) – knowledge, taken-for-granted and shared intuitively by all the individuals of a given sociocultural context, as well as the most sophisticated forms of scientific knowledge – whose evolved symbolism is shared only by experts and adepts 65. Language is the principal means through which we typify experiences. It is the way we give sense to our actual experience, the way we retrieve past experiences and build up predictions. In learning our native language, we acquire a large stock of knowledge 66. We use this knowledge to take account of our experiences and to communicate with others 67.

Meanings and the (socially-shared) interpretative procedures

The social world is articulated in the everyday life-world (the world which we all first and foremost inhabit) and in specific districts of meaning (e.g., the world of art, science, work, specific disciplines, or groups of adepts etc.). These are essentially interpretative orders – an incredible database of meanings, categorisations, standards, rules, principles, causalities etc. – that the individuals of a given social context share intuitively and spontaneously 65 66. CS (including the standards of specific disciplines, activities and restricted groups of people) is not only the database of knowledge at everyone’s disposal; it is also the set of interpretative procedures (IP) or account practices 68 that allow us to experience different phenomena in the world as solid realities whose meaning is taken for granted. Garfinkel 68 introduced the term indicality to point out a fundamental property of socially-shared IP: every meaning is contextually grounded but the context (the frame of reference of each meaning) is nothing more than a sum of MC (“accounts”) assembled according their semantic values or properties. In our engagement with the world, we intuitively use already-assembled or ready-to-hand frames of reference (assembled contexts) to represent meaning 68. The socially-shared IP represent a facet of the more complex CS experience; other facets include the system of values, social attunement, self-experience and, finally, lived space 69 70. CS is the grounding element and the condition of possibility of social life. Normally transparent, it is the root of our sense of reality. The boundaries of our perception of reality are traced by the interpretative order provided by CS 71: each deviance brings bewilderment, disapproval, embarrassment, or fear 68.

The ambiguity of meanings

Commenting on the Schutz’s notion of MC (typifications), Natanson 72 observed three main properties that may be extended to the notion of interpretative procedures. These include: (1) abstraction, since each MC is not confined to the experience that produces it; (2) anonymity since each MC is at everyone’s disposal; (3) transcendence, since each MC may go further, may be manipulated, updated, acquiring new meaning 71; every meaning also displays an intrinsic ambiguity – it is an “open horizon” in the fact that it permits the possibility of natural evolution (new significations) or personal manipulation 65 73.

Meanings are never forever: they are signs of time, as they evolve continuously. Man is also a set of solitude and sociality 74: each of us is permeated by an immediate feeling of individuality 73, rooted in his personal life-history and in his unique arrangement of habits, interests, values, cognitive and affective styles. Nonetheless, each personal world is situated within the extensional constraints established by CS 68. The construction of meaning also involves a dialectical tension between the social matrix and the subjective pole of interpretation. Each of us assembles the frames of reference (context) of meanings in a personal way. Every meaning displays a socially-driven central core and a personal peripheral fringe 64; we are anchored to the social matrix of meanings, but we also commonly reside in the peripheral fringe.
As far as possible to penetrate in the peripheral fringe of meanings?

There is a continuum between ordinariness (the center), originality (close to the boundaries) and bizarreness (beyond the boundaries). The socially-shared IP, that is, the cognitive style of everyday life-world also called natural attitude, and the cognitive styles of specific disciplines draw the limits within the sense of reality (objectivity) is preserved. Beyond these limits, meanings are immediately felt as original, strange, uncanny, bizarre. IP circumscribe the semantic fields and act as a constraint. Everything that goes beyond these boundaries is felt as a derailment. Beyond these extensional limits we find only peculiar, odd, uncanny and, at the extreme of this continuum, bizarre assemblages of meanings and semantic attitudes.

3.2 SE in people with schizophrenia

There is a paucity of psychopathological studies regarding SE in people with schizophrenia. Most rely on only a few patient samples or even single cases.

Pioneering contributions

The Italian psychiatrist Sergio Piro was a forerunner in this field, documenting in patients the tendency to endorse the semantic halo of linguistic constructs instead of the usual dominant meanings. Lacan, in a psychoanalytic context, evidenced a subversion of the symbolic register of meanings. Schwartz, Wiggins and Spitzer described in schizophrenia an apparently automatic expansion of the horizon of meanings, where people are absorbed in semantic associations departing from commonly shared categorisation procedures. During the prodromal stage of schizophrenia, words may appear void, meaningless, unfamiliar, lacking their usual references; patients collapse into an abyss of doubt, reality does not match the way is commonly represented. Patients, losing the strength of CS experience, suffer the collapse of their sense of reality.

The semantic drift

In more recent years, Stanghellini and I depicted the anomalies of SE in people with schizophrenia as a semantic drift: patients appear to be detached from the (socially-shared) frame of reference of meanings as a consequence of the impairment of CS experience. Some patients seem to be engaged in the search for a private (idiosyncratic) language and for new meanings. They sometimes look for the right words to conceptualise their ineffable experiences. Other times, patients’ hyper-reflective stance may be reflected in their attitude toward language and words, resulting in obsessive-like ruminations about the semantic potentials of specific words. Sass and Pienkos recalled that de-contextualisation of language may occur within the referential frame of language itself: patients may be captivated by some anomalous salience of certain words, sometimes residing in the phonemic properties. Other times, they may attribute odd, uncanny, strange powers or properties to words, as in the magicians’ world. Patients may be interested in the graphic features of the words (Stanghellini, this issue), often in exotic languages, using diverse typefaces (e.g., Hebrew, Veda). They manipulate words and types transcending their linguistic value but investing in them peculiar properties. Words are decontextualised from their significant reference: words may become semi-independent objects, losing their inter-subjective value.

Finally, in a recent contribution I outlined patients’ narratives (reflective of their semantic attitude), as lacking both internal coherence (i.e. consistency and logical connections), and external coherence, since they overwhelm any pattern of social shared knowledge, symbolism, standards, values, or frames of action.

In schizophrenia patients, the referential frames of meaning tend to vanish; meanings become de-contextualised from the socially shared network of signs and symbols and from their common sense semantic fields. Italian anthropologist and psychopathologist De Martino argued that psychosis is characterised by a dramatic detachment from the inter-subjectively valid cultural background that is shared by all individuals of a given socio-cultural context.

De-contextualisation of meanings is a central value in patients with schizophrenia. They may feel unable to take for granted the objective character of reality. They may deliberately (and sometimes disdainfully) refuse CS assumptions, including the (implicit) rules, standards and causalities, intuitively shared by all the people of a given socio-cultural context. The shared constructs and symbols are felt by patients as threats to their individuality. They may be fascinated or absorbed by the inexplicable complexity of the nature of existence: they may be moved by what is beyond, including the mere appearance (what is taken-for-granted or the natural attitude toward the world), the standards of specific disciplines, the ordinary semantic fields, the frames of reference (assembled contexts) of meaning and any socially-shared interpretative procedures. It is notable that patients seem to be engaged in a sort of continuous, moment-by-moment idiosyncratic re-assembleage of referential contexts, with the effect of producing a peculiar proliferation of meanings devoid of any accomplished arrangement.
Schizophrenia and the hyper-transcendence of meanings

The semantic attitude of people with schizophrenia displays a tendency (or a proneness) to override the extensional limits of semantic fields as imposed by CS constraints of meaning. Patients lose themselves beyond the peripheral fringe of meanings without being able to come back, to limit their enlarged perspective, or to bring back this enlargement to the correct (semantic-syntactic) frames of meaning. Meanings, and conversely language, lose their anonymity, their public validity, that is their intersubjective value. Meanings may appear sententious, philosophical or abstract, but they represent a grotesque distortion of abstraction since they rely dramatically on the (abnormal) experience that produced them. Finally, patients display an over-reliance on the transcendence of meanings: hyper-transcendence involves the assembled contexts, the IP and, consequently, the resulting meanings. Lacking the grounding effect of CS, patients may contribute to an uncontrolled solipsistic polysemy of the world. Abnormal semantic attitude in people with schizophrenia is a consequence of the impairment of CS experience. Patients’ semantic attitude, intertwined with the peculiar arrangement of values, may substantiate the typical feature of bizarre-ness that characterises schizophrenia.

Patients’ statements may appear assumptions of reality when they are concrete, “distorted metaphors” constitutive of a strange, solipsistic private world erected upon new meanings and causalities, completely divergent from social shared symbolism.

4. Concluding critical remarks

In this section, I will discuss some critical issues regarding anomalies of SP and SE in people with schizophrenia.

Do contradictory findings undermine theoretical models?

Contradictory findings can be found in studies regarding both physiology as pathology pathology of brain linguistics functionally, e.g. the right-hemisphere advantage for novel metaphors, the neural localisation of supra-modal areas within the SM and the precise staging of SP, including its anatomy. The significance of the hyper/hypo priming effect, the role of cognitive processes, clinical correlates and the diagnostic validity of the above reported models have also been challenged (see below). Laboratory models are working-through models, which are necessary to structure available findings and to direct future research. Yet we need extensive investigations, large samples of patients (in most laboratory studies the samples are very small) and standardised methodology to obtain comparable results.

Are laboratory findings ecologically valid?

The ecological validity of laboratory findings is obviously questionable, but at the moment technology does not permit on-line (real-world) studies. Laboratory paradigms aim to isolate objective sub-personal variables while available phenomenological studies aim to investigate the experiential first-personal level. Laboratory models need to be integrated with phenomenological data. Also, they may serve as “points of reference” or “constraints” to refine the phenomenological theoretical models.

Are the above-mentioned SP anomalies limited to patients with positive FTD, or do they characterise schizophrenia as a whole?

SM anomalies are well-documented in patients with positive FTD. There are few reports regarding their presence in patients with relevant positive symptoms and negative symptomatology. One study in first-episode patients found correlations between negative symptoms, on one hand, and semantic retrieval disturbances and cortical (parietal) anomalies, on the other. Alternatively, it has been hypothesised that: a) different stages of SP may be altered in patients with diverse symptomatology, i.e. the activation stage in patients with positive FTD and the selection stage in patients with positive symptomatology; b) the impairment may be of a different intensity with a diverse arrangement of symptoms. Anomalous language lateralisation seems to characterise schizophrenia as a whole and particularly patients with prominent positive symptoms.

SM and lateralisation models may not be mutually exclusive, since abnormalities in these functions may contribute independently to overt symptomatology and possibly to diverse psychopathological domains. It is important to recall that BAIS-based models seem to integrate disorders of SM with abnormal lateralisation.

Is SP independent from basic neurocognition?

Anomalies of SP are more evident in patients with positive FTD where neurocognitive impairment is more severe. Impairments in sustained attention, WM and EF have been invoked as major determinants of SP impairment. It is still under debate whether there are components of WM specifically dedicated to SP. It has been debated whether SM impairment involves the storage or the retrieval stage. In every case patients displayed disorganised and not degraded SM.

One study using a semantic paradigm (related, weakly related or unrelated sentences), documented semantic...
ERP anomalies, but no difference with respect to normal controls in response accuracy in patients: the authors hypothesised a late cognitive repairing mechanism. On the contrary, other studies using incongruent sentences as stimuli (see above, section 2.2c) showed biologic (ERP) anomalies associated with poor response accuracy: patients were judged to be unable to maintain meaning coherence within the frame of discourse. Also, studies with explicit semantic tasks, seen in patients with reduced or negative PE suggests impairments of cognitive semantic strategies (for review see 24). In patients with schizophrenia, the relationship between SP and cognition has to be more precisely ascertained.

Do anomalies of SM possess diagnostic validity?

There are some encouraging results concerning the diagnostic specificity of N400 in people with schizophrenia compared with affective disorder patients; nonetheless, a recent study documented N400 disturbances in a sample of psychotic patients without respect to nosographical diagnosis. Anomalies normalise in remitted patients. The relatives of schizophrenia patients do not display these anomalies, hence SM neuro-physiological anomalies may be a biomarker of full-blown illness, but not an endophenotype or a marker of schizophrenia vulnerability.

Is decreased language lateralisation a specific characteristic of schizophrenia?

Crow’s model suggests that anomalous language lateralization may be the root of psychotic symptoms in schizophrenia. Yet psychotic symptoms are not characteristic of schizophrenia. Abnormal language lateralisation has been documented in relatives and high risk population respecting the candidate trait marker and an endophenotype. Nevertheless, diagnostic specificity is lacking: disturbances have been documented in non-schizophrenia psychotic patients, suggesting a psychosis liability marker. Language lateralisation has been assessed with diverse fMRI techniques; in neuroimaging, results are dramatically prone to technical variables. We need to ascertain if different patterns of anomalies are at play in different psychotic diseases.

Do phenomenological results possess diagnostic specificity?

Schizophrenia patients display anomalies of SE, a kind of semantic drift, intertwined with their peculiar arrangement of values and other features of so-called ‘bizarreness’. These anomalies of SE in people with schizophrenia seem to be absolutely divergent from the language anomalies described in bipolar patients, as patients with bipolar disorder are intolerant of semantic ambiguity and over-reliant on commonsense assumptions. Extensive studies assessing SE among comparative populations are lacking.

5. Is it possible to bridge the gap between phenomenology and neuroscience?

The heightened automatic spread of activation within the SM or, alternatively, the dependence on coarse (right hemisphere based) SP in people with schizophrenia could be matched with their peculiar SE, that is, their tendency (or proneness) to override the extensional limits of semantic fields imposed by CS constraints of meaning (i.e., over-reliance on transcendency of meaning). We may hypothesise that SM anomalies and SE disorganisation represent two sides of the same coin, the former reflecting the sub-personal level (pre-phenomenal or neural) and the latter reflecting the personal (phenomenal or experiential) level.

Some authors have speculated on the experiential consequence of SM disorganisation. Patients may be over-reliant on apparently irrelevant environmental stimuli that may be felt as meaningful, opening the door to abnormal salience. Moreover, patients may “jump too quickly to remote conclusions, with limited control over the meanings they form”. Patients are captured by the ambiguity of language; they are hyper-tolerant of the intrinsic ambiguity of meanings. They may perceive remote or unrelated concepts as significantly semantically related. They lose themselves beyond the peripheral fringe of semantic fields unrelated to the socially shared constraints of meaning. As a result, patients appear to display a proneness to override the extensional limits of semantic fields imposed by social shared constraints of meaning. As suggested by one patient, ‘I open too many windows to be able to adequately manage with all of them’. Persons with schizophrenia may be unable to ‘close’ these ‘windows’ once they are open.

Alternatively, we may also hypothesise that abnormal lateralisation impedes the ability to switch off the activation of coarse (right hemisphere-based) SP. Sass and Parnas have suggested that diminished self-affectation (the impairment of basic-self, the pre-reflective fundament of subjectivity) may be the root of thought disorder by depriving patients of the “lived point of orientation” and inducing a “proliferation of meta-perspectives” that patients are unable to manage. As a consequence, thinking looses coherence and pragmatic efficacy. Patient narratives may lack both internal (lexico-syntactic) and external (socio-cultural grounded) coherency. These anomalies may be regarded as the experiential consequences of the imbalance of fine syntactic-semantic integrative processes. Language is no longer able to conceptualise actual experience according to culturally-shared standards, hence it looses its pragmat-
Semantic processing and semantic experience in people with schizophrenia

ic value. Language loses its anonymity and appears to be distorted in a grotesque taint of abstraction. The phenomenon of ‘hyper-transcendence’ may emphasise words as such, transforming them into semi-independent objects. They become decontextualised and de-situated not only with respect to ordinary semantic fields (including the biographical arrangement of memories), but also to the intrinsic character of symbols. They materialise into something real and concrete (Stanghellini, this issue), opening the door of hallucinatory experience. Can this be linked to the abnormal segregation of language functions as described in Crow’s model? This may be another intriguing hypothesis. In all of these cases, language is no longer a means of sharing a world, becoming the basis of a new solipsistic world.

Conflict of interests
None.

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Semantic processing and semantic experience in people with schizophrenia

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