Title: Formal thought disorder in schizophrenia: a problematic history.

Running title: Formal thought disorder: a problematic history.

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Abstract

Background and Hypothesis: Formal though disorder (FTD), studied even before the inception of the concept of schizophrenia, remains a deeply isolating experience for patients as well as a difficult one for their interlocutors, including clinicians.

Study Design: The views on language, paralinguistic and extralinguistic features exhibited by patients with severe mental ill health are reviewed, including the contributions from 19th century European authors to the last third of the 20th century.

Study Results: Stages in the construction of FTD are described, including its merging with Dementia Praecox, and its subsequently being shaped by notions such as primitive-archaic thinking, paralogical or autistic thinking, concretism, overinclusive thinking, and the return of the efforts to describing it with increased reliability.

Conclusions: It appears that some features of communication in schizophrenia, but not others, have been selected, at different points in time, for clinical and research use, without realising that by carrying out that selection, the phenomenon under study itself is changed. Remarkably, some theories of FTD remained in use, despite being empirically disproved (e.g., word association disorder, concrete thinking,

paralogical thinking) or despite its highly problematic and discriminatory nature. We would suggest that studies of FTD should explicitly consider which and why some of its features are included or excluded when assessing it. Furthermore, we would suggest that the study of FTD should incorporate the complexity of human communication, including the pragmatic, paralinguistic, non-verbal, and cognitive dimensions of the localized and unique situation where it takes place.

Key words: primitive-archaic thinking, autistic thinking, paralogical thinking, concretism, overinclusive thinking, language, communication**.**

Introduction

Formal Thought Disorder (FTD) remains, despite recently summarized decades of research,[1, 2] a deeply isolating and puzzling experience for patients with a diagnosis of schizophrenia and their interlocutors, because it substantially impairs effective communication.[3] It has been claimed that what is now needed is greater integration of structural, functional, and behavioural measures, possibly with a non-unitary view of FTD[2], to develop effective interventions because, despite the above, it has a significant impact on outcomes despite standard treatment.[4] This approach assumes that we already know what FTD is and how to quantify it.[5,6,7] The approach taken here focuses instead on reviewing the history of how FTD has been conceptualised, exploring whether changes in its

definition and boundaries influence the validity of the findings reported by researchers and clinicians.

The history of the clinical phenomena called at the time 'the language of the insane' has gone, since the second half of the 19th century, through three stages. Up to the 1870s, they were included within aphasia. By the 1880s, they started to diverge from aphasia,as in the work of Kussmaul (1884)[8] and Séglas (1892)[9], and, by the turn of the century, FTD and schizophrenia became linked, particularly in the work of Masselon (1902).[10] FTD became epistemologically and ontologically autonomous, i.e. it could be reliably known and identified in terms of certain features, considered as a stable object of knowledge that could be reliably measured and explained in terms of any psychological theory (Table 1).

(Table 1 about here)

The 19th century

Peculiarities of thought and speech were commented upon, even if in passing, by the great alienists of the 19th century. Thus, whilst Jean-Étienne Dominique Esquirol made reference to patients' peculiar verbal expressions and their relation to delusions,[11] it was the German psychiatrist Wilhelm Griesinger who, in 1861, distinguished anomalies of thought affecting its form from those affecting its content, with the former exciting 'morbid ideas' and leading to delusions.[12] 'Thought incoherence' consisted of the evocation of senseless images and thoughts resulting either from emotional turmoil or from the projection of briefer emotions,

a common finding in acute conditions; or from the 'destruction of the mental processes', whose mechanism, whilst 'still very obscure', seemed to involve perceptions being 'called forth, not only according to their similar or contrasting contents, but especially according to external similarity of sound in the words,[12] indicating a transition to the 'incurable forms of dementia'. Anomalies of the form of thought were frequently accompanied by speech anomalies, so whilst some patients were mute, others spoke incessantly, unable to communicate anything proper. Often, the formation of sentences and mode of expression were altered, with speech becoming disconnected or artificial, or patients forming new words, or employing old words with a new meaning.[10] Griesinger pointed out that those feigning insanity imitated these altered modes of expressions 'very clumsily'.

Kussmaul

Adolf Kussmaul, from Heidelberg, a major contributor to the study of language disorders,[8] explored the language disorders due to a mental dysfunction.[8] Since the brain was the organ of mind and language, speech was 'the mirror of the soul' because the mind gave it its individual and affective character. Hence, any disorder of the mind would translate into a disturbance of speech.

According to Kussmaul, the first stage of language production resulted from a cortical mechanism that translated ideas into acoustic symbols and generated words and phrases according to the universal rules of

grammar. Disturbances at this level he called ‘dysphasias.’ In the second stage, known as language articulation, words were transformed into acoustic forms by means of centrifugal motor complexes delivered as units of movement to the sub-cortical organs of phonation. Disturbances at this second stage he called ‘dysarthrias’. He envisaged a third type of disorder, the ‘dyslogias’ or ‘dysphrasias’, a range of singularities and mistakes of language caused by aberrations of feelings or intellect. Some speech symptoms (e.g., voluntary religious mutism or avoidance of certain words) could be exhibited either by non-clinical subjects (e.g., due to bad habits, anxiety or when falling asleep) or by dysphasic patients, demonstrating for him how deeply disturbances of the mind could affect speech. In more detail, the dyslogias encompassed phenomena such as introducing certain expressions in conversation in a pretentious way, utilising some syllables or prolonged vowels in the middle of phrases, and the repetition of the end of the phrase just heard (‘echo’ phenomenon); some words could be repeated or could make thinking to appear distractible and confusing. In addition, changes in the tempo of thinking could disrupt the structure of phrases and, eventually, making speech incomprehensible. A mixture of words by assonance, alliteration, rhyme, or supplanting of words, could also disrupt speech’s structure. Abnormal beliefs could lead to abnormalities of speech too. For example, in the syndrome of ‘thematic paralogia’, speech was strongly influenced by ‘wrong fixed ideas’ of patients who, without any apparent motive, kept returning to them. In what he called ‘vesanic paraphrasia’, the character

of the delusion itself was conveyed in the voice, intonation, attitude, gestures, speech, words, syntax, and neologisms.[8]

Séglas and Masselon

Jules Séglas, from Paris, divided the disturbances of language exhibited by mental health patients according to whether there was a predominant defect of spoken, written or gesture language (Séglas 1892).[9] Insightfully, he considered that language abnormalities resulted from a complex interplay of disturbances of what in contemporary terms would be called phonology, morphology, syntax, semantic, pragmatics, paralinguistic, and non-verbal communication disorders. This is a crucial point, as the full elucidation of what is said in conversation, overwhelmingly the most common type of human interaction, is inextricably dependent upon the rhetoric, gestural (facial, visual, manual, bodily), tone, and volume of speech, as well as the conversational situation's explicit and implicit context. Séglas believed that conversational speech was the best medium for studying language abnormalities, as opposed, for example, to speech delivered describing a visual stimulus. In his view, language abnormalities were to be considered, as 'symptoms' and, on occasions, they might be specifically associated with a given disease, i.e., be pathognomonic (e.g. verbigeration in catatonia, where the patient repeats endlessly, with a sad or histrionic tone, the same phases, or in special para-lexia where patients with general paresis were convinced that their reading was correct despite inserting words related to their delusions). Like Kussmaul,

Séglas believed that disturbances in speech or writing could derive from abnormalities of the 'intellectual faculty' (dyslogias), language proper (dysphasias) or speech and/or writing itself (dyslalias/dysgraphias). Thus, different causes could lead to 'thought disorder' and that, on occasions, different causes could co-exist.[9]

Séglas classified the dyslogias according to the aspect of thought and language most affected (form, speed, content, and syntax as well as 'reflex' and 'emotional' language). For example, formal dyslogias included rhetoric and stylistic effects (such as timbre, pausing, accent or volume of speech, trivial or obscene speech, stilted and pseudo-intellectual terminology, declamatory discourse, singing or speaking true or pseudo-poetry, or prosody conveying fear and hopelessness). In agreement with Kussmaul, Séglas believed that utterances could sound bizarre when conveying delusional, affective, or hallucinatory material ('dyslogias of content') and, insightfully, he observed that the degree of bizarreness of utterances was not related to their aetiology, for example, mild bizarreness, such as begging and groaning, might in fact be organic in origin whilst severe bizarreness might not.[9]

The Frenchman Rene Masselon (1902)[10] played an important role in the process whereby the map of speech disturbances in the mentally ill became restructured, because in his empirical work he linked one of many disturbances exhibited by the patients, namely, thought disorder, to the notion of Dementia Praecox (DP). Pioneering the neuropsychological study of DP by assessing the co-ordination of ideas, attention, association of

words, and response time of 14 patients (mostly with a diagnosis of hebephrenic or catatonic type; mean age: 30.5 years; mean duration of illness: 7.1 years). Agitated patients exhibited incoherent associations, unusual, inexact, or incoherent definitions of words, impaired written grammatical structure, and impaired error detection and correction. Apathetic subjects uttered contradictory contiguous clauses, with incoordination of ideas when summarising a story, as well as echolalia, poverty of ideas, verbal stereotypes, perseveration, and poor arithmetics.[10] All patients exhibited incoordination of ideas, which he saw as the first manifestation of the illness. They also had impaired voluntary attention, with some patients not remembering details of the beginning of the illness or their age or erratic amnesic patches. Masselon envisaged DP as damaging the active faculties of the mind, with apathy, aboulia, and loss of intellectual activity being its characteristic triad at the onset of the illness, which was subsequently followed by imprecision of images and incoordination of ideas. When Kraepelin developed his final version of DP in the eighth and final edition of his textbook (1910/1919, p. 3), he quoted Masselon as one of his sources[14] as Jung had done in 1907.[15] From this point onwards, the view that the abnormal speech of subjects with DP (later to be called schizophrenia by Eugen Bleuler) reflected a deeper or primary thinking pathology became the central theory of FTD.

The Construction of Formal Thought Disorder

FTD began to be conceived of as a homogenous phenomenon that reflected a specific psychological disorder. Thus, Kraepelin, who had modelled his initial formulation of DP in 1893 around Hecker's hebephrenia,[16] in the eight edition of his textbook, conceptualised FTD in terms of Association Psychology and as causing several of DP's 'psychic symptoms', including derailments in speech, fusion and substitution of words, neologisms, akataphasia (ill formed phrases somehow related to the topic at issue), and derailments in the train of thought.[14]
Bleuler[16,17] together with Jung's work[15], on the other hand, gave FTD a central role in schizophrenia, envisaging it as a disorder of associations that interrupts either limited threads or a broad range of the thinking processes. Patient's ideas and feelings appear fragmented, and different levels of functioning compete or coexist, some deteriorated, some preserved.[16] However, although neither the previous theoretical elaboration by Jung (1907)[15] nor word-association studies [18,19] fully supported the view that FTD was 'specific' to DP, it was concluded that it was indeed specific. For example, Kent and Rosanoff (1910)[18] studied the word associations in 1,000 control subjects and 247 patients, reporting a great deal of overlapping between the responses of DP patients, individuals with other psychoses, and control subjects. Murphy (1923),[19] improving the methodology of association studies, found that the same overlap, after comparing 250 control subjects, 48 DP patients, and 51 manic-depressive patients. Finally, to contend with the fact that in addition to 'pure' FTD individuals with DP showed other anomalies of

speech, Bleuler (1911) separated the abnormalities of speech from FTD and reclassified them as his 5th accessory symptoms.[16]

Afterwards, the specificity and centrality of FTD was re-affirmed, albeit on a theoretical basis,[20, ,17,21] and considered as the cause of other symptoms, such as delusions or hallucinations. Hamilton [21,22], believed that all schizophrenia patients showed some degree of it if their illness lasted long enough, and suggested that thought alienation was probably the subjective experience associated with FTD.[21,22] The view that FTD was specific and essential to schizophrenia remained influential despite being challenged by clinical observation. For example, some schizophrenia patients present a 'language' disorder but not a 'thought disorder', i.e., despite severe FTD their behaviour fails to convey any abnormality of thinking or reasoning, as in the case of Chaslin's discordant verbal insanity.[23] Similarly, thinking abnormalities of believed to be pathognomonic of schizophrenia could also be found in non-clinical subjects.[24] As new psychological theories of thinking emerged after the First World War (Gestalt psychology, archaic-primitive thinking, etc.) alternative hypotheses began to redefine FTD.

'Archaic', 'primitive', and 'para-logical' thinking

In first third of the 20th century, the concept of FTD was further elaborated in terms of what could be called 'ethology of thinking', a view with long-lasting influence. Important in this regard was the work of the biologist Haeckel whose hypothesis of recapitulation of phylogenesis

during ontogenesis became popular at the time.[25] Haeckel himself applied these concepts to psychology[26] but his methods and findings have been called into question.[27] Also, degeneration theory was influential at the time in research and clinical psychiatry views, such as those of Kraepelin.[28] Beliefs about the existence of a 'primitive' or 'pre-logical' mentality, as described by the French anthropologist Levy-Brühl were also influential.[29] According to him, primitive peoples would have an 'aversion' to the discursive operations of thinking, precluding abstract thinking; causal relations were unimportant and thinking was governed by the 'law of participation', i.e., one thing becomes another but at the same time both remain different and the law of contradiction would not apply.[29]
FTD became re-conceptualized as a 'regression' to lower levels of mental functioning. Crucial here was the German Alfred Storch, who hypothesised parallels between the peculiarities of the thinking of people with schizophrenia and primitive peoples[30], including: 1. an absence of circumscribed representations of persons, things, and clear-cut concepts; the awareness of objects had lost structure and constancy, sinking to a lower level; 2. the mind had become undifferentiated, containing diffuse expressions and fragments of ideas; sensory images had replaced the abstract elements of normal thought; 3. a single feature possessed in common by different objects was sufficient for connecting them, leading to condensation and distortion; importantly, the individual lacked awareness of these changes. Storch analysed peculiarities of speech in schizophrenia such as neologisms and the insertion of unintended words

as well as metaphor-like verbal constructions. In his view, this primitive thinking could result either from the individual's inability to distinguish between the sign for a part and the whole, or as a way of avoiding certain words connected with magic and taboo. Metaphor-like verbal expressions were not metaphors proper as patients were not making comparisons.[30] Storch commented that, normally, magic-archaic experiences are present as an undercurrent of normal wakeful thought, but only in schizophrenia such undercurrent came into conflict with normal thinking.[30]

The notion of 'regression' to a primitive level of thinking was also used to explain the thinking of children ('paleological' thinking)[31] and 'higher' animal forms,[32] and was described as a form of 'functional decerebration' (sic), a return to using a simpler machinery for handling reality.[15,21] For the Russian psychologist Lev Vygotsky (1934),[33] thinking in schizophrenia 'regressed' to a pre-adolescent 'non-abstract' level of functioning. The 'regression' hypothesis implied that in adults, 'archaic levels' of thinking remained 'latent' and could reappear if 'the levels of [mental] energy' became insufficient, as it might occur in schizophrenia, emotional shock, fatigue, sleep, and delirium.[21] Specific mechanisms of 'regressive' or 'primitive' thinking were also proposed, including Von Domarus's 'paralogical' thinking,[32] where similarities are made from a common predicate. For example, a patient considers 'Jesus', a 'cigar box' and 'sex' as identical, and the missing link was the idea of 'being encircled': the head of Jesus, as the head of a saint encircled by a halo, the package of cigars by the tax band, and a woman by the sex glance of

Paralogical thinking entailed a regression to the egocentric speech of the child, with the laws of language in schizophrenia being like those of primitive peoples or higher animals. With paralogical thinking being subsequently fully empirically refuted,[34,35,36] 'concreteness' of thinking was applied to schizophrenia, after undergoing some adjustments (see below).[37,38]

The Austrian psychiatrist Paul Schilder (1920), influenced by Gestalt psychology, psychoanalysis, and the theories of archaic-primitive thinking, he proposed a theory of normal thinking, by which thoughts developed through preparatory stages before reaching clear conscious status.[39] Intermediate stages of thoughts were less definite, more amenable to affective influence, and activated close associations. The different stages of thought development were "traceable in the thinking of primitives, children, and schizophrenics (sic)…what is already known justifies the assumption that every thought recapitulates the phylogenesis and ontogenesis of thinking" and considered that FTD resulted from abortive formations reaching consciousness when they would normally have only transient existence.[39] Schilder distinguished between abnormalities of the form in which delusions are expressed and the actual semantic content of delusions.[39] For him, some formal disturbances, including condensations of fragments from various spheres of knowledge, precluded the creation of a unitary meaning in the delusion, producing vaguely related phrases, iterations and themes, and clang-associations.

Finally, it is important to note that Bleuler (1912), when describing autistic thinking as a feature of his newly created term ‘schizophrenia’, rejected the notion of archaic thinking for, in his view, “savages (sic) can think as logically as ourselves in all the things they understand”.[40] Instead, he regarded autistic thinking as opposed to logical thinking, divorced from reality, present in non-clinical and clinical individuals, both conscious and unconscious, and having a positive role in problem solving and creativity. It was only when the balance between affectivity and logical thinking was disturbed that autistic thinking could get the upper hand. Such an imbalance could occur, according to Bleuler, in children, who have not enough experience to discriminate logical possibilities; in subjects without sufficient knowledge and logic; in questions of religion or love, where emotions reach high significance; in strong affects, be they pathological or normal; and where the connections of associations were loosened, such as in dreams and schizophrenia. Under these circumstances, autistic thinking, driven by affect, could lead to delusions and hallucinations.[41]

Over-inclusion and concretism

From a different perspective, Cameron (1947) envisaged schizophrenia as disorganisation of the behaviour systems constituting personality, which had been replaced by behaviour determined by fantasy,[42] in absence of tissue pathology. Schizophrenia patients lacked the ability to focus cognitive resources to stick to an aim and tended to ‘over-include’

extraneous stimuli and conditions into tasks at hand,[43] exhibiting thought and language phenomena such as 'asyndetic' thinking, frequent use of metonyms, and inter-penetration of themes. Cameron, upon testing normal children and 'deteriorated senile' (sic) individuals, found that their thinking was dissimilar to that of schizophrenia patients and this he considered as evidence against the hypothesis of 'regression' to primitive thinking in schizophrenia. Theories and tests of behavioural, conceptual and stimulus over-inclusion were proposed.[44] In the United Kingdom, Payne suggested that over-inclusion resulted from a specific defect in discrimination learning[45] and that it was over-inclusion and not concreteness or slow intellectual and motor activity what characterised schizophrenia patients. In a clinically heterogeneous sample, over-inclusion was associated with FTD, delusions, and paranoia.[46] Payne (1973) concluded that over-inclusion was a) an elusive concept, b) a disorder affecting only one third of acute schizophrenia patients, specifically those with clinical FTD, c) it was also exhibited by mania patients, and d) it was not associated with delusional thinking.[47] However, a decade later, it was again claimed that over-inclusion was a robust finding in accordance with clinical observation.[48]

Semantic pathology

FTD became conceived, around the middle of the 20th century and anticipating more recent studies of semantic network dysfunction, as a disorganization of the way in which concepts are represented in the mind,

either as a distortion their internal structure or as a deficit on their interaction. Thus, the Italian psychiatrist Sergio Piro, summarising his work in the 1950s and 60s, pointed out that the language of schizophrenia patients reflected a weakening of links amongst signs, their referent, and their emotional basis,[49] which in turn manifested as a broadening of the semantic halo of concepts as well as a variety of distortions and connotative hypertrophies. For Piro, these changes in the semantic import of words accounted for over-inclusion, if their import broadened, or concretism, if their import was reduced. He criticised the distinction between form and content of thought and stressed the importance of the underlying affective meaning of expressions to understand disorders of communication. Hence, the study of language in schizophrenia would necessarily require both 'empirical' and 'interpretative' methodologies.[49]

With the same focus on the function of patients' conceptual system, in England, during the 1960s, Bannister utilised Kelly's Personal Construct Theory[50] to study the strength of patients' conceptual structure, operationally defined as the statistical association between sorting categories. Bannister found that in schizophrenia patients with FTD, those correlations were less consistent, weaker, and stereotyped compared to non-thought disordered schizophrenia patients and control subjects, which pointed to its specificity.[51,52] Noticeably, interpersonal concepts, as opposed to physical concepts, appeared to be more impaired, a finding redolent of the Frenchman Tulié's earlier views.[53] Bannister suggested

that FTD resulted from the serial invalidation of patients' constructs,[54] taking place in the interpersonal family process of double bind (Bateson et al., 1956)[55], or the disintegrating effects of mystification (Laing and Esterson, 1964)[56], or parental inculcation of confused and distorted meanings (Lidz, 1964)[57], all views current at the time.

The neurological view

This approach, that encompasses the 19th and the 20th centuries, starts with the contribution of Theodor Meynert, the German Austrian clinician and researcher whose views influenced, amongst others, Carl Wernicke, Karl Kleist,[58] and Kurt Goldstein. Meynert envisaged psychological events as epiphenomena of anatomically localised physiological events. In fact, he indicated, anticipating the concept of connectome,[59] that cortico-cortical connections were essential for the associative processes which, in turn, were crucial for human mental activity.[60] For an orderly evolution of a thought from a starting-point towards a goal, links were established according to the level of local cortical activation modulated by subcortical structures which, in turn, were under cortical control. In this context, Wernicke's concepts of psychic reflex arc and sejunction were important.[60,61] The notion of psychic reflex arc expanded the system of primary sensory and motor projections into the so-called centre of ideas, which encompassed psycho-sensory, intra-psychic, and psychomotor paths, with mental elaboration occurring specifically in the intra-psychic stage. Wernicke's sejunction theory meant that in all the psychoses the

continuity of association pathways was disrupted. For example, for Wernicke,[61] mental disorders with aphasic features had a selective and isolated damage to the associative pathways, whereas in classic aphasia the damage affected a gross mass of associative pathways.

Following Wernicke, under whom he studied, Kleist (1930)[62] also conceptualised FTD in neurological terms, as analogous to aphasia and other organic disorders of language. For him, speech in schizophrenia reflected either a dysfunction of thinking, language, or the connections thereof and its subtypes could be related to focal brain lesions (temporal, frontal, or occipital lobes, thalamus, and brain stem). Kleist described three subtypes of confused schizophrenias: confused proper, paralogical, and incoherent.[62,63] Confused schizophrenia, resembling a sensory aphasic disorder, presumably reflected damage to the higher levels of the language system responsible for the construction and derivation of words, formation of sentences, and abstract meaning of speech, i.e., language-based thinking.[63] In paralogical schizophrenia, there would be an impairment of the thinking processes that led to differences mistaken for similarities and merging of concepts. In incoherent schizophrenia, in addition to paraphasic and paralogical disturbances, there would be incoherence of the stream of thought due to a disorder of attention associated with a diencephalic dysfunction.[63] The speech disorders seen in catatonic schizophrenia were analogous to the motor-aphasic syndrome and associated with frontal lobe dysfunction. Kleist stated that speech and

thought disorder occurred to some degree in all patients with schizophrenia.[64]

Whilst the view that FTD in schizophrenia was a disorder of thinking unrelated to aphasia remained mainstream in the 20th century,[65,66] the perspective that FTD could be, at least partially, conceived of as an organic disorder of language retained some ground, notably in the work of Chaika, Benson, and M. A. Taylor.[67,68,69,70,71] Thus, for Chaika, in his article ‘A linguistic looks at the “schizophrenic” language’,[67] phenomena such as gibberish, neologism, inappropriate rhyming and alliterating, word salad, and derailment, had to be analysed in terms of speech and discourse production, not a thought disorder, a view reinforced by the fact that, ultimately, FTD’s meaning was often rather ordinary. An opposing view, argued by Fromkin’s (1975)[68] in her article ‘A linguist looks at “a linguist looks at ‘schizophrenic language’”, was that except for the disruption of the sequencing of ideas in discourse, attributable to cognitive factors, all FTD’s features were prevalent in normal speech. An interesting proposal was that FTD was a kind of episodic and fluent disturbance of language.[72,73,74,75,76,77] Lastly, proposals resembling Kleist’s views have plausibly been elated FTD to an organic thalamus dysfunction, which could account for the episodic and fluctuating nature of FTD, one of the key and rather puzzling clinical features of FTD in schizophrenia, or frontal lobe pathology.[78,79,80,81]

Also having studied under Wernicke, Kurt Goldstein (1944), from a Gestalt psychology perspective, elaborated ‘concretism’ and applied it to

FTD in schizophrenia.[82] In his view, schizophrenia patients' experience of inner and outside world lacked the 'abstract attitude' which included, among other features, what would currently be called 'mental planning', 'working memory' and 'prospective memory', as well as the ability to budget attentional resources. For Goldstein, schizophrenia patients' concrete behaviour was abnormally governed by ongoing stimuli, causing communication disturbances, autistic thinking and behaviour, delusions, as well as rigidity, and distractibility. The bizarreness of patients' language derived from the fact that they wanted to express what they were experiencing but lacked the words for categories or classes. As a result, their words became completely context dependent; hence, if interlocutors were able to discover the situation to which a given word belonged, much of the apparent awkwardness of a patient's language would disappear.[82] Schizophrenia patients could not provide an account of what they were doing or what their inner experiences were like. Goldstein conceded that 'concreteness' in schizophrenia patients was different from that of organic patients, and that not every schizophrenia patient exhibited it.[82] Several tests for measuring concrete thinking were created[50] and the notion of FTD as a 'gross decline and impairment of conceptual thinking' remained influential[22,83] despite the methodological problems affecting the supporting evidence as well as the significant contradictory evidence found. [84,85,86]

Back to the drawing board: focus on reliability

The low reliability of psychiatry assessments and diagnosis became an explicit concern after the publication of the ICD-6 by the WHO, [87,88] where FTD was one of the mental symptoms with the lower reliability.[89,90] Work on reliability led to the development of the Brief Psychiatric Rating Scale (BPRS) [5] which, building on the work of the VA psychologist M. Lorr[91,92]included sixteen symptoms derived from factor analyses of larger sets of items. FTD was operationalized as the single item 'Conceptual Disorganization' which offered 1. an etiological hypothesis, 2. an epistemological approach, and 3. clinical markers as follows: [5] "[it involves] the disruption of normal thought processes and is evidenced in confusion, irrelevance, inconsistency, disconnectedness, disjointedness, blocking, confabulation, autism, and unusual chain of associating", whose assessment should be based upon "the patient's spontaneous verbal products, especially those longer, spontaneous response sequences which are likely to be elicited during the initial, non-directive portion of the interview. Attention to the facial expression of the patient during the verbal response may be helpful in evaluating the degree of confusion or blocking".[5] This description considered pragmatics (e.g., irrelevance and inconsistency) and non-verbal aspects of communication (e.g., facial expression).[93]

In 1974, the 10-year work on the Present State Examination (PSE) was reported.[94] Regarding FTD, it described 15 abnormalities of speech (Table 2), including, for example, slowness and pressure of speech, whilst disorders of content of speech included items such as flight of ideas and

poverty of content of speech.[94] The Schedules for Clinical Assessment in Neuropsychiatry (SCAN/PSE),[95] twenty years later, included 27 abnormalities of speech, with newly added items such as abnormal loudness/quietness of voice, perseveration, and rumination (Table 2), indicating that pragmatics of communication as well as non-verbal and paralinguistic factors were germane to the assessment of FTD.

In New York, in the 1980s, the Positive and Negative Syndrome Scale (PANSS)[6], building on the BPRS, included the subscales of positive, negative, and general psychopathology scales, and required a 30- to 40-minute semi-formalized psychiatric interview. FTD was operationalised, as in the BPRS, as the item Conceptual Disorganization, ranging from mild (circumstantial or tangential thinking) to severe (seriously derailed and internally inconsistent thinking, gross irrelevancies, disruption of thought processes, and failure of communication) (Table 2). Whilst widely used, the PANNS has received criticisms for its misuse and drawbacks, including its limited assessment of hallucinations and delusions.[96] A recent meta-analysis of 45 factor analyses (n = 22,812), found that disturbance of volition, stereotyped thinking, and preoccupation are part of the disorganization dimension (of which FTD is part),[97] which in turn is associated with poorer outcomes, specific cognitive dysfunctions, dorsolateral prefrontal cortex function, and more consistent heritability in comparison with the positive and the negative dimensions of schizophrenia symptoms.[16]

(Table 2 about here)

In Austria, during the 1960s, Peter Berner developed the Vienna Research Criteria (VRC) or endogenomorphic-schizophrenic axial syndrome (ESAS),[98,99] which required that, for a definitive diagnosis of schizophrenia, incoherence or cryptic neologisms must be ascertained in the absence of marked pressure or retardation of thinking or autonomic anxiety (Table 2). Incoherence could take three forms: blocking, derailment, or pathologically 'muddled speech', whilst cryptic neologisms had a purely personal meaning not sensibly explained by the patient. This view is related to the concept of Zerfahrenheit, a phenomenon specific to the active period of psychosis of schizophrenia, [100] where ideas go into new areas, their internal structure is lost, leading to extreme fragmentation and word salad; emotions can intensify the dysfunction but cannot cause it. Recognising Zerfahrenheit requires considering both form and content of thought. For example, in fusion of thinking, two or more ideas that seem to coincide by chance combine into one thought, which is redolent of a dysfunction of the ‘conceptualizer’, part of Pim Levelt’s model of the speech production.[101] The fusion of thoughts leads to subjective experiences which are difficult to understand both for the patient, who feels disturbed, helpless or perplexed, as well for their interlocutor, i.e. Zerfahrenheit must be captured through observation but also through phenomenological empathic understanding. Importantly, focusing on ‘post-acute residual’ FTD, Henning Sass,[100] following the ideas of the Austrian Jozef Berze, identified “Verschrobenheit” or eccentricity, as a type of secondary thinking symptoms (e.g., bizarreness, mannerism,

stereotypes, stilted speech), lived and communicated with certainty by the patient.[100]

Also, in German speaking psychiatry, the Association for Methodology and Documentation in Psychiatry (AMDP) has, since 1971, offered a systematic introduction to psychopathology.[101,102,103] Its latest version includes twelve symptoms either observed in patients' speech (e.g. perseverative thinking) or reported by patients themselves (e.g. inhibited thinking); thought blocking can be either observed or self-reported (Table 2).[104] The French Empirical Diagnostic Criteria for schizophrenia,[105] close to those of the Vienna Research Criteria, also emphasised the importance of persistent FTD for the diagnosis of schizophrenia.[105]

So far, several notions of FTD, from the single item (e.g. BPRS, PANS) to multiple items (e.g. SCAN) have been reviewed. Next, we will discuss the influential Thought, Language, and Communication scale (TLC).[7]

The Scale for the Assessment of Thought, Language, and Communication[7]

Nancy Andreasen, with strong background in the humanities, developed this scale taking a broad approach to reliably assessing FTD by describing a range of thought, language and communication disorders exhibited by patients.[7,106]. Such as approach is redolent of Kussmaul's and Séglas' work in the 19th century. In fact, the piloting of the scale convinced Andreasen that evaluations of language behaviour could only be done well

through a live or videotape interview, because transcripts or audiotapes appeared to make patients seem more disorganized, since the clinician lost visual and auditory cues that might make the patient's statements seem more sensible.[106] The scale, consists of 20 items, each scaled for severity, with its operational definitions informed in part by the classic descriptions. It includes semantic and phonemic paraphasia, to encourage clinicians to include aphasia in their differential diagnosis (Table 2).[7]

The TLC scale should be rated based on information obtained during an interview lasting for at least 45 minutes.[7,106,107] Its items were divided into ‘positive' and ‘negative',[106] the former reflecting abundance and increased flow of thought, intact or excessive affect, good prognosis, and being more frequent in mania and acute schizophrenia. The FTD negative symptoms, on the other hand, would convey a sense of intellectual emptiness and apathy and would be more frequent in chronic schizophrenia. Such a descriptive dichotomy may be helpful if is not assumed as having aetiological implications because, for example, positive FTD was found to be associated with emotional blunting (a negative symptom)[108] whereas poverty of speech, a symptom of negative FTD, was associated with passivity phenomena (a positive symptom).[109] There has also been disagreement regarding which items belonged to the group of positive FTD symptoms[110, 111,112,113,114,115,116] and it is now clear that poverty of content of speech, initially considered a symptom of negative FTD, is a type of positive FTD, all adding to uncertainty as to what are symptoms of a putative dimension of positive FTD. Also, limited

information was provided as to why some symptoms, but not others, were included in the TLC scale. For example, whereas self-reference (patients repeatedly referring the subject under discussion back to themselves) was included, features such as syntax deficits,[117] or peculiar speech styles (e.g., circumlocutions, mysterious allusions) were not.[118] Similarly, it is unclear why some symptoms (word approximations and poverty of speech) are seen as more pathological than others (echolalia or perseveration). Similarly, researchers did not always follow the author's rules for its administration. For example, assessments were based on a full interview, or a sample of patients' discourse,[119,120,121] or averaging out information from up to five days,[122] or using the first 200-words of patient's speech,[123] 10 minutes of free speech[124] or from tapes and transcripts of interviews.[125] This lack of uniformity is important for it biases ratings against infrequent but potentially crucial items. Versions of the TLC scale based on the deletion, modification, and addition of items were also reported,[126,127,128,129] which threatened comparative research, and it might have also explained why the scale did not show a stable factor structure.[130,131]

As mentioned previously, either if described as a single item (as in the BPRS), as a few (as in the PANNS), 12 (AMDP), 18 (TLC), or 27 (SCAN) items, the fact remains that in addition to strictly considering the literal meaning of speech, the proper study of FTD must also take into account linguistic, paralinguistic, non-verbal, and pragmatics aspects of human communication, as Kussmaul and Séglas did.

Conclusions

1. During the 19th century, features of speech, gesture, writing, and artistic expression were described as symptoms. Some of those symptoms were then selected under the influence Association Psychology and theories about 'primitive' thinking, whilst other symptoms were dropped (e.g., syntactic alterations or paralinguistic features such as accent). The selected symptoms were adapted by researchers and clinicians without realising that by including or excluding certain items they were changing the phenomenon under study. This has also been an issue in more recent 20th century research on FTD.

2. Noticeably, some theories of FTD remained in use despite having been empirically disproved at the time (e.g., word association disorder, concrete thinking, paralogical thinking) or despite being highly problematic either by their ethnocentric or discriminatory character.

3. The definitions of FTD have varied along the dimensions of whether it is a single or a variegated phenomenon, whether includes para-linguistic and non-verbal aspects of communication, and whether incorporate the pragmatics, paralinguistic, non-verbal, social, and cultural factors of the localized and unique interactional event where it occurs.[53] Researchers and clinicians may want to consider the location of their working definition of FTD within the conceptual space set by these dimensions because each decision to include or not an item is likely to change the object of study.

Explicitly considering such a complexity might be necessary to conceptualize, operationalise and research FTD.

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