

## CHAPTER 6

### FORM OF THOUGHT

#### Introduction

In the psychiatric examination, two aspects of thought are considered: 1) “content” - abnormal the content of thought (delusions) is described in Chapter 4, and 2) the “form” of thought.

Form means the “arrangement of parts”. When the “arrangement of the parts” of thought are out of order, the logical connections between the ideas are lost – the thought is difficult to follow.

Disorder in the form of thought (or formal thought disorder – FTD) is frequently, for the sake of brevity, referred to as ‘thought disorder’. Theoretically, ‘thought disorder’ could refer to disordered content (delusions), but in practice it is generally used to refer to FTD.

[For the sake of convenience, “flight of ideas” and “poverty of thought”, which strictly speaking are not disorders of connection, but disorders of speed or amount of thought, will also be described in the paragraphs of this chapter.]

FTD is diagnostically significant, and detection is important. While many health and social services workers can give a good account of some aspects of the mental state of a patient, the assessment of FTD requires special training and experience. The general public may comment that the patient’s speech is “odd”, he/she is ‘difficult to follow’, or ‘gets off the track’.

The form of thought is mainly assessed by examining the speech of the patient. It is necessary to take the conventions of conversation into account when examining ‘form’. In everyday conversation we tend to ignore changes of subject and direction; we pay more attention to content and ‘the bottom line’. Thus, the conclusion that FTD is present is only made when there are sufficient examples, and the evidence is clear.

Thought is also reflected in behaviour. A person who writes on his front door that aliens have landed and barricades himself inside with weapons would appear to be suffering a disorder of the content of thought (delusions).

Behaviour gives less clear evidence of FTD, for although poor quality thinking leads to poor planning and ultimately, poor behavioural outcome (such as, failure to pass exams or obtain employment), behaviour also depends on additional factors including personality, motivation and other cognitive processes such as memory and orientation.

Nevertheless, behaviour may reveal FTD, as in the following illustrations.

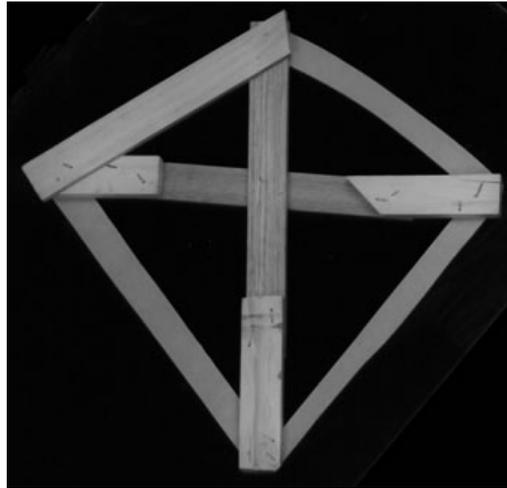
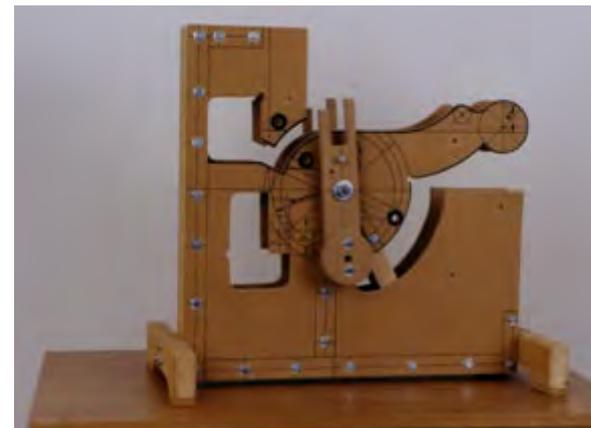
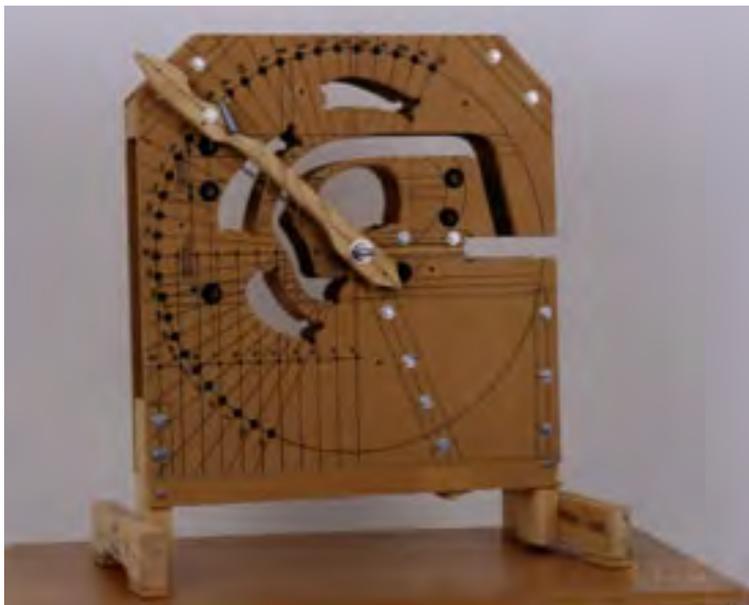


Illustration. This construction was made by a well trained carpenter who was admitted to hospital with FTD and disorganised behaviour as the predominant symptoms. In the Occupational Therapy Department he set about making this “crucifix” to hang on the wall of his home. Rather than fix two pieces of wood together symmetrically and at right angles, he nailed two pieces of wood together such that the left and right arms were different lengths, and the angles they made with the upright were not square. To correct the asymmetry, he roughly nailed additional pieces of wood onto the arms. These increased the weight of the cross-piece and made the central join unstable. To increase stability, he then nailed pieces of wood between the ends of cross bars, thus producing a diamond shaped outer edge with a cross in the middle. His parents were dismayed by the quality of this work, which was much below his usual standard. When the patient recovered he was embarrassed by his creation, and could not explain his poor workmanship. There was no disorder of content (no delusion), the problem was with the ability to think efficiently.



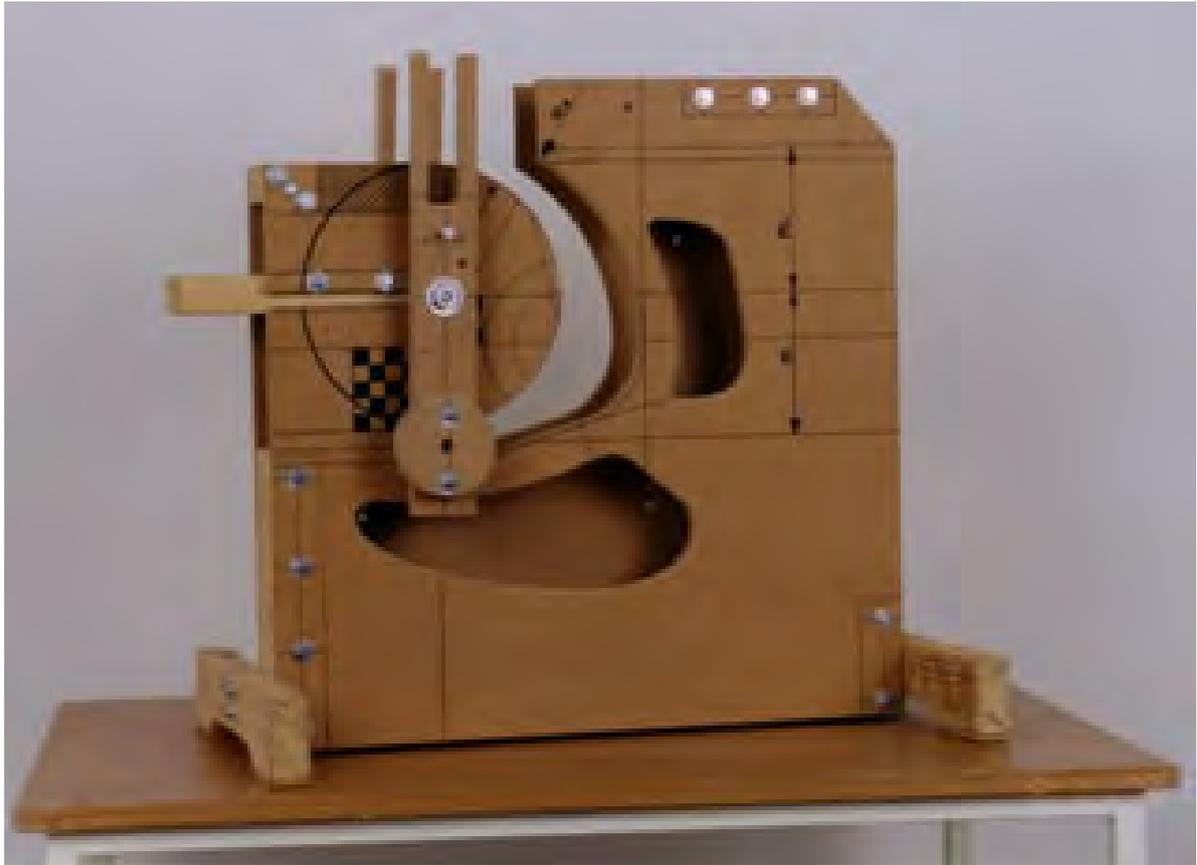


Illustration. These are three examples of more than a dozen ‘unfinished machines’ which were constructed by a man with FTD. In contrast to the poor workmanship of the carpenter in the earlier example, the workmanship of this non-carpenter was excellent. His FTD manifested in his inability to complete the machines, or properly explain their purpose. While attempting to explain their purpose/function, he frequently slipped off track, and within the same conversation, would give more than one justification for a particular shape. A recurrent theme was that these were “perpetual motion” machines. However, on one occasion, while talking about the first machine he stated that one set of curves indicated “the shape of a nigger skull” and that another set indicated “the shape of a number 6 Jewish nose”. He stated that as the arm of the machine passes over different positions, various moral and scientific principles are demonstrated (which seemed unconnected to the primary aim of perpetual motion).

Patients rarely complain of their FTD and generally do not appear to be aware of the problem. However, occasionally a patient will complain about being ‘disorganized’, ‘confused’ or ‘saying wrong things’. When one’s thoughts are not linking together properly, it is presumably difficult to make this observation in the first place, and then difficult to formulate a statement to that effect.

I've been told I'm schizophrenic  
 but I don't think I am  
 the only feelings I have are  
 confusion, plus whether I look normal  
 I feel as if I'm being punished for a crime  
 I didn't commit.  
 Actually I don't know <sup>who</sup> to blame at times  
 My thoughts seem to linger into each other  
 therefore I get completely confused.

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I feel so lost and lonely  
 I once heard a phrase which went "who can  
 you tell if you haven't got a friend?"  
 which I am feeling very strongly <sup>about</sup> so I decide  
 -a, to write it on a paper  
 so someone, anyone! could you listen  
 and give me an explanation.  
 Or even maybe help sort out my confused  
 state of mind.

I don't want to take heaps of tablets  
 I want a truthful explanation of my feelings  
 so that once and for all can  
 understand my mind, and why it is completely  
 confused.

Lisa

Illustration. This statement was written by a young woman who suffered FTD and other symptoms. She died by jumping from a height. She states, "My thoughts seem to linger into each other therefore I get completely confused." Her statement contains suggestions that she is having difficulty with her "feelings" which may be a separate issue, or secondary to her "confusion" (FTD). She also lacked insight and could never accept her diagnosis or any treatment.

FTD is an important clinical symptom/observation. **Derailment** is the most common form - the patient is following a particular train of thought, but suddenly veers off onto a different thought track. If, during a neurological examination, a patient was asked to walk across the room, and half way across he/she suddenly veered off at a 45 degree angle and walked into a wall, the neurologist is very concerned. Which is more important, walking or thinking? This is not a serious question, but posed to emphasise the importance of FTD. Among the most disabling consequences of schizophrenia is the inability to budget, plan and carry out activities. FTD may be an important contributor to these problems.

For clinicians to make decisions about the presence/absence of FTD, they need clear definitions and as small a number of categories as possible from which to choose. (Some earlier categories of FTD, such as "**knight's move thinking**" and "**condensation**" are not longer used and will not be discussed any further.)

## Technique

The form of thought is assessed during the initial and all subsequent interviews. If the interview is a highly structured series of questions and answers, FTD will be less obvious. For example, the answer to, "What is your date of birth" rarely reveals thought disorder. This answer is factual and almost automatic. When FTD is suspected, the examiner may ask open ended questions which require the patient to structure answers and stay on track.

Thought processes are tested by purposefully asking abstract questions. Such questions do not have standard, structured answers and there is a greater chance of loss of logical connections. Religious or philosophical questions are useful, and should be tailored to suit the patient. If a patient has talked about having faith, it is reasonable to ask, "Why do you believe in God?" If a patient has talked about outer space or scientific theories, it is reasonable to ask, "How could time travel contribute to pollution?" or, "Is there a relationship between the space creatures you have been talking about and God?"

Another test of abstract thinking is asking for explanations of the meaning of proverbs, such as, "A stitch in time", "People who live in glass houses" and "Still waters run deep". It is important, of course, to give consideration to the intelligence, education and cultural background of people when assessing their response to abstract questions.

An example of an "abstract" question is given by Solovay et al (1986):

Interviewer, "Why should we pay taxes?"

Patient, "Taxation, we have representation... taxation without representation is treason..."

Here, FTD is clearly present.

(An aside: treason is usually clandestine and dangerous, and is the sort of issue which concerns patients with paranoid delusions. Thus, the mention of treason suggests the patient may have delusional content.)

Finally, it is essential to record verbatim examples of FTD in the patient's file/notes. While dramatic or humorous FTD may be remembered for a few minutes, the more common and less remarkable examples, which carry the same diagnostic power, are very difficult to remember (probably because we store memories in logical sequences). It is recommended the interviewer writes down verbatim examples as the patient speaks, either directly into the file, or on other paper, from which they can be copied into the file later.

## Classification of FTD

The following definitions are taken from authoritative texts, and are widely accepted. At the end of the chapter an idiosyncratic attempt is made to simplify.

## 1. Derailment

Derailment occurs when a train jumps off the track. Andreasen (1979) defines derailment as “A pattern of ..... speech in which the ideas slip off the track onto another one which is clearly but obliquely related, or onto one which is completely unrelated”.

YOUR NOTES SAID, I DID "NOT STICK TO THE ANSWER," BUT DIGRESSED! TRUE, IT IS A NORMAL BAD HABIT OF MINE, OF WHICH I AM FULLY AWARE OF. MY WEIGHT HAS ALWAYS BEEN ABOUT 11 STONE - GIVE OR TAKE 6-7 lbs. ON TUESDAY LAST WEEK DR MIKADO WEIGHED ME AT 71½ KG TAKE 6.75 KG OFF FOR CLOTHES 70.75 THIS EQUAL TO 115.40Z (NORMAL) "DOT" IS WRONG! (Patient's sister)

Illustration. This man suffered derailment. Here he is complaining that his hospital notes state he did not “stick to the answer”. He states that he knows that he digresses when speaking, and that this is “a normal bad habit of mine”. He then (next sentence, same paragraph) slips onto the topic of his weight, and that it has “always been about 11 stone”. Thus, while arguing against having FTD, he demonstrates it.

Tony - To whom it may concern!

I feel that while I'm in PICU my rights (re smoking) are completely and utterly taken away. This is not fair under the Australian national anthem,

Illustration. This patient is complaining about rules which prohibit smoking on a psychiatric intensive care unit. He is about to say that this is unfair, and against the Australian law or constitution. However, he slips from these official rights onto an official institution - “the Australian national anthem”. Yes, this may simply be a slip of the tongue (pen), and nothing should be made of a single slip, but notice that the letter is addressed to Tony (Chief Nurse), but continues, “To whom it may concern...”

The term derailment was introduced to replace the earlier term, “**loosening of associations**” (which had been introduced by Eugene Bleuler in 1911 - who believed that looseness of associations represented the fundamental disturbance in schizophrenia).

It was claimed that “**loosening of associations**” had been used indiscriminately, and had thereby lost meaning, and needed to be replaced. Either term can be used, but derailment is now more common.

Derailment is one of a number of types of FTD. However, it is a basic type and at least some of the other types can be considered as elaborations of derailment.

**Tangentiality** was defined by Andreasen (1979). It applies only to answers - not to spontaneous speech. The term is applied when a question is asked and the patient gives an answer which is “off the track”.

An example:

Interviewer, “How old are you?”

Patient, “I feel young sometimes.”

At first glance it might appear the writer is making a mountain out of a mole hill, as this is the sort of response we all might make, sliding off the question and communicating other important information. After all, in this era of anti-discrimination, people are encouraged to assert that they are “55 (or any number) years young” rather than “55 years old”. However, this answer came early in an interview, at the time when the demographic data of the patient was being collected. That is, in a part of the interview where there is structure - and the conventional response is to provide factual rather than philosophical responses. In this setting, such a response suggests (but does not prove) FTD.

A touch of rebellion – the current writer recommends that, to simplify matters, the academic distinction between derailment and tangentiality be ignored, and the term derailment be used for both.

Derailment is found in the conversation of normal individuals, particularly those with shared experiences. When frequent examples are observed, it is necessary to exclude the dysphasias of vascular, traumatic, degenerative or other origins. Derailment may occur in mania (see later, under flight of ideas) and depression. It is characteristically found in schizophrenia, particularly in subtypes with younger onset. It is also found in schizotypal personality disorder.

## **2. Flight of ideas (includes clanging)**

The central feature of flight of ideas is rapid, continuous verbalisations, which are associated with constant shifting from one idea to another.

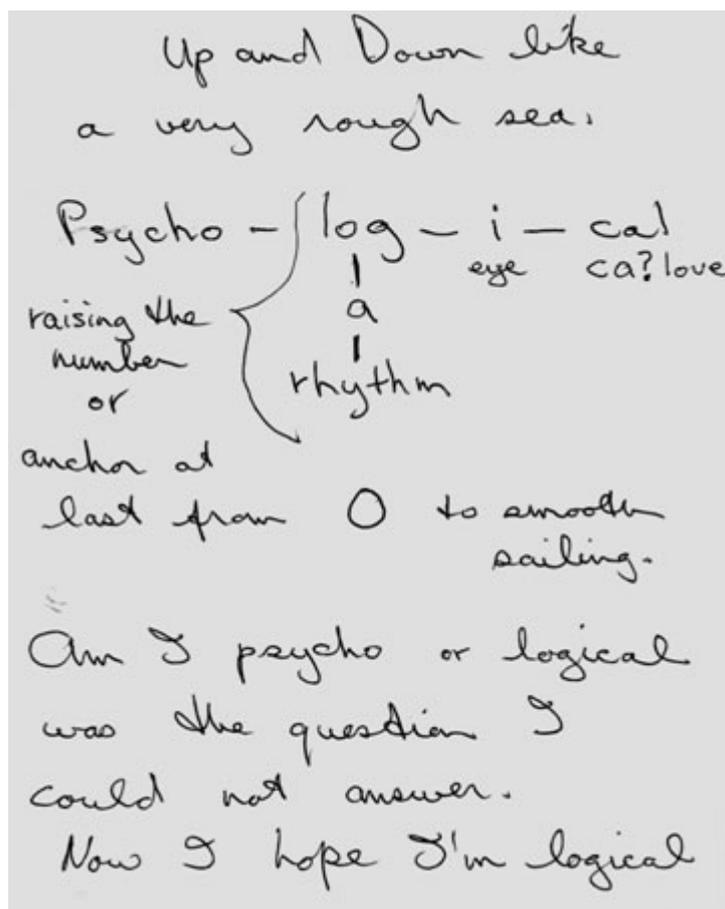


Illustration. This was written by a 25 year old woman with bipolar disorder during her second manic episode. The following analysis is reasonable:

‘Up and Down like a very rough sea’ – the patient may have been referring to the ups and downs of her mood (characteristic of bipolar disorder).

‘Psycho-log-i-cal’ – is split into beats which give the word an up and down rhythm.

‘eye’ – was suggested by the letter ‘i’.

‘log’ – suggested ‘logarithm’, a mathematical concept in which a base must be raised in order to produce a given number. A connection is made between ‘raising the number’ and an ‘anchor’.

‘smooth sailing’ follows the idea of raising the anchor.

‘Am I psycho or logical’ – the patient splits the word psychological a second time to reveal apparent opposites ‘psycho’ colloquially synonymous with psychotic, and ‘logical’ – an opposite state.

‘Now I hope I’m logical’ – the patient ends with humour, which is a frequently observed feature of mania.

Interestingly, the patient did not draw a connection between ‘log’ and “a ship’s log”.

Wing et al (1974) describe three types of flight of ideas: 1) where there is rhyming or **clanging**, eg, “ill, illegitimate, illusion”, 2) where there is an association by meaning, including opposites, eg, “white, black, coffin”, and 3) where there is distraction, eg, a patient talking about his appetite sees another patient walk past the window, assumes that patient is going for ECT and starts talking about ECT. [However, the difference between type 2 and 3 would appear to rest simply on the site of the distraction, that of the former being internal and that of the latter being external, and can be ignored.]

The example of clanging given above, “ill, illegitimate, illusion” is not rhyme, but alliteration. A rhyme is “agreement in the terminal sounds of lines of words”, while alliteration is “the same consonant sound at the commencement of two or more stressed syllables of a word group”. Thus, clanging may include rhyme and alliteration.



Illustration. This 24 year old science graduate suffered bipolar disorder. During a manic phase she wrote extensively on rainbows (a symbol of luck and a happy topic). The statement “The Multi-Colour White/ Throws out Light” does not explain the scientific principles well. However, the clang is clear (sorry about that).

Under the heading of clanging, Andreasen (1979) has drawn attention to **punning**. In an early draft of her Thought Language and Communication Scale she gave the example, “I’m not trying to make noise.....I’m not trying to make sense anymore. I’m trying to make dollars”. Here the sound of the word “sense” (cents) brings in a new topic (money), which is the essence of punning. With mood elevation the punning of flight of ideas can be frequent, amusing and apparently clever.

Debates about the diagnosis in particular cases have sometimes centred on whether utterances were derailment or flight of ideas. The old view was that there is something different in the quality of the connections which justifies the use of separate categories. However, when flight of ideas and derailment are transcribed onto paper, that is, when they are stripped of the manner in which they were vocalized, it is often impossible (unless there is much clanging and punning, which is rare) to tell them apart.

Andreasen (1979) states that the distinction is made on the presence or absence of **pressure of speech**. The characteristics of pressure of speech are 1) increased speed of talk, 2) increased volume, and 3) the patient being difficult to interrupt.

In the presence **pressure of speech**, flight of ideas is the appropriate term. In its absence, the term derailment is appropriate.

It was said above that derailment is like a train slipping off one track onto another. The current author thinks of flight of ideas as being like a person is in a great hurry pushing those people in front of him/her out of the way. That is, the thoughts are coming so fast that one cannot be properly presented, before another comes along and disrupts it.

Flight of ideas most often occurs in mania, however it also occurs in schizophrenia and intoxication with stimulants. The patient suffering infarction of the cerebellum may be loud, disinhibited and verbalize what could pass as flight of ideas.

### 3. Poverty of content of thought (Poverty of content)

Poverty of content is not to be confused with “Poverty of thought” (see below).

In poverty of content there are plenty of thoughts, but because of the severity of FTD, the listener does not get a clear message.

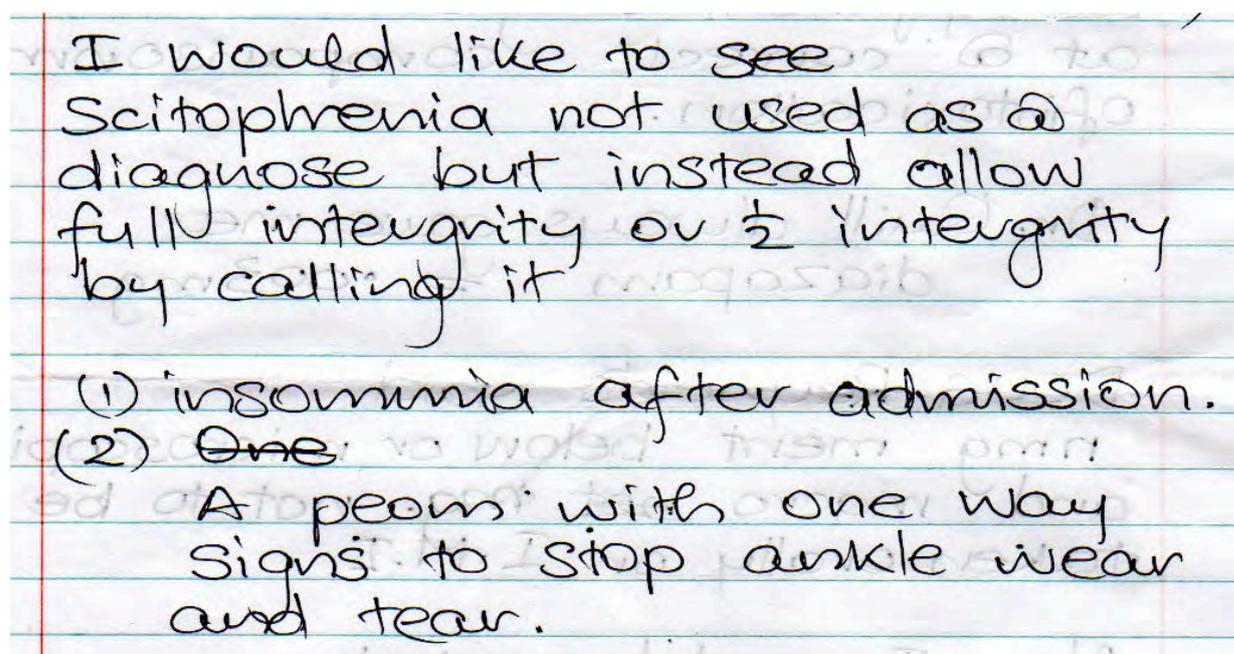


Illustration. Poverty of content is a form of FTD. It can be conceptualized as a midpoint on a spectrum of severity, with derailment (minor) at one end and incoherence (severe) at the other. What is this patient telling us? He starts out with concerns about the diagnosis of schizophrenia, then mentions insomnia, a poem and ankle wear and tear. This is not as severe as incoherence (although this is a matter of opinion), but the message is unclear, and the designation ‘poverty of content’ is justified.

Poverty of content is most often the result of frequent derailment. However, the derailment may be subtle and not easily noticed. The interviewer may continue to listen, expecting the patient to make a significant point at any moment. But that moment does not come. If poverty of content is clearly the result of derailment, the record of the interview should mention both - these are not mutually exclusive terms.

When psychotic patients talk of yoga, spiritualism or quasi-philosophical matters, poverty of content of thought is frequently present. The patient may be attracted to these topics partly because a lack of critical, logical thought is apparently less noticeable in these areas. Also, the patient may find comfort in belonging to these interest groups. When the patient is talking about less concrete topics, FTD may be more difficult to identify.

A test of whether there is poverty of content is to listen to the patient talk on a topic for a period and then attempt to make a summary. The product of normal thought process can be reduced to a pithy summary. Where there is poverty of content, there is almost no systematic information to summarise.

Poverty of content may be difficult to differentiate from the output of the particularly verbose normal individual or the narcissistic individual. It may occur with intoxication of various types. It may be found in schizophrenia, mania and politicians. (That last word was put in as a joke. If you did not smile, you may not have been paying attention.)

#### 4. Incoherence

Incoherent thought is characterized by extreme loss of logical connections, distortion of grammar and idiosyncratic use of words.

When twenty Jacks were actually  
 sixteen jacks four colours of each  
 this went into percentages of  
 provided for peoples being a forgotten  
 four percent then the calculations  
 to be observed were only up to  
 0-2-4-6-8-10-12-14-16-18-20  
 20 being 11 sizes of a weekly wage  
 faeries representations - sizes up to 50  
 Dae reckon

Illustration. From a chronically psychotic, middle aged, itinerant woman. This example is readable, but conveys no sensible message. 'Jacks' probably refers to the game also known as 'knucklebones', in which the pieces may come in different colours. '20 being 11 sizes of a weekly wage faeries representations' is incoherent. This patient was in the habit of writing 'they' as 'dae', so the last two words are 'dae (they) reckon'.

Andreasen (1979) provides the following example:

Interviewer, "What do you think about current political issues like the energy crisis?"

Patient, "They're destroying too many cattle and oil just to make soap. If we need soap when you can jump into a pool of water, and then when you go to buy your gasoline, my folks always thought they should get pop, but the best thing to get is motor oil, and money."

Incoherence appears to result from the same mechanism as derailment, and can be conceptualized as very severe derailment.

Some authors (Kaplan and Saddock, 1991) give separate definitions for incoherence and **word salad**. However, these terms refer to the same phenomenon and it is recommended that only 'incoherence' be used.

Incoherence can sound like dysphasia and a neurological examination is necessary in the event of sudden onset. Intoxication with various agents needs to be excluded.

Incoherence due to psychiatric disorders is not common. It is evidence of severe disorder and occurs in schizophrenia and mania.

[The impression is that incoherence and neologism were more common in schizophrenia in the past. There is speculation that the disease is changing. However, it is clear that the care of people with schizophrenia is more immediate and comprehensive than formerly, which may limit the severity of cases we now observe.]

## 5. Neologism

There are various definition of neologisms (new words).

Rifkin (1991) placed under this heading: invented words, distortion of standard words, and words used in an idiosyncratic manner.

Andreasen (1979) reserved the term neologism for those items, the derivation of which cannot be understood, eg, "a tavor" and "replaper". She suggested a separate category of "**word approximations**" which are new words developed by the conventional rules of word formation, eg, "handshoes" (gloves). Under this heading she also included the idiosyncratic use of words such as when a patient used the word "vessel" in an unusual manner - for him, a watch was a "time vessel", the stomach was a "food vessel" and the television was a "news vessel".

In the opinion of the current writer, neologisms, word approximations and idiosyncratic use of words are extremely rare and most psychiatrists seldom encounter them. There is no benefit from distinguishing between them and it is recommended they be grouped together under the heading of neologism.

From the experience of the writer, only a couple of examples come to mind. One came from a 25 year old man with schizophrenia - in conversation, he frequently used the words "brain smash/s", in a manner suggesting he expected the listener to understand. When asked, "How have you been" (over the last 24 hours), he would

report whether he had experienced few or many “brain smashes”. When asked to define “brain smashes” he appeared (there was considerable derailment and uncertainty still remained) to be talking of episodes of distress.

Neologisms may occur as a feature of a neurological disorder. If a patient presents with apparent frequent neologisms, dysphasia needs to be excluded. Neologisms may present as single, stark, curious specimens in an otherwise less remarkable stream. Neologisms are rare, occurring in a very small percentage of those people suffering schizophrenia or mania. In mania they disappear with resolution of the episode. In schizophrenia they indicate a poor prognosis.

## **6. Blocking (Thought block)**

In thought block there is an interruption in the train of speech/thought, before the message is completed. The patient stops speaking, and after a period of seconds, indicates that he/she is unable to remember what he/she had intended to say.

Blocking is over diagnosed. It occurs to a small degree in healthy individuals. It can occur to a marked degree in mental disorders, but it is rare. It should only be identified if it occurs in mid thought and if the patient volunteers or admits on questioning that the thought was lost.

Blocking may give rise to the delusion that thoughts have been withdrawn from the head (thought withdrawal).

Care should be taken not to identify thought block when patients are simply distracted by their delusions or hallucinations.

Thought block is seen in schizophrenia. In mania there may be loss of a train of thought but patients are unconcerned and simply pass on to the topic which distracted their thinking.

Older people with mild cognitive decline may experience “word finding difficulty” – and pause while they try to “find” it – this can lead to them forgetting what they were talking about – but this is not classed as Thought blocking [I can’t remember what its called].

## **7. Perseveration and echolalia**

Perseveration is the repetition of a particular word, phrase, or concept during the course of speech.

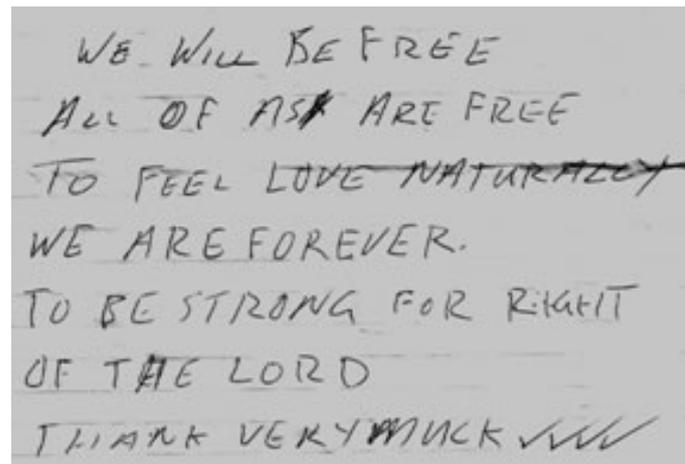


Illustration. This note was written by a man with schizophrenia, who, in conversation, perseverated the phrase, “Thank you very much”. Here he has written a vague, but encouraging message. Somewhat inappropriately he ended the message with, “Thank very muck”. This phrase is followed by four ticks. Each time he read the message, he ticked “Thank very muck” one more time.

The example of perseveration given by both Andreasen (1979) and Rifkin (1991) is, 'I think I'll put on my hat, my hat, my hat, my hat.'

Perseveration of concept/topic is less obvious, and is impossible to distinguish from simply returning to a pressing delusion.

**Echolalia** is the pathological repeating, by the patient, of words or phrases first uttered by another person. This may appear to be delivered in a mocking manner, but, with true echolalia there is no such intention.

In both perseveration and echolalia, the central feature of both is repetition (one's own words, or those of another person).

Perseveration and echolalia occurs in neurological disorders and retardation, and these need to be excluded. Both perseveration and echolalia can occur in schizophrenia and mania, but are very rare.

### **8. Poverty of thought (speech)**

Poverty of thought is generally a ‘negative symptom’ of schizophrenia. The other problems of thought which have been mentioned, when they occur in schizophrenia, are termed, ‘positive’ symptoms.

In poverty of thought, speech is decreased in amount, is not spontaneous and consists mainly of brief responses to questions.

Replies may be monosyllabic, and some questions may be left unanswered altogether. The interviewer may need to keep prompting and asking for elaboration, and keep introducing new topics to maintain the conversation. The interview can be draining.

For example, consider the response to the question, “Do you have children?” If the answer is in the affirmative, the person without psychopathology usually responds immediately, often giving the number and the ages and gender and sometimes even the names of children. Where there is poverty of thought, however, the patient may not make any response when the question is first asked. The interviewer may ask the question a second time and after a pause the patient may answer, “.....Yes.....”, often without any supplementary information. Even the word ‘yes’ may be mumbled or little more than a grunt suggesting an affirmative reply.

In the case of apparent poverty of thought, the two main medical/organic conditions to be considered are hypothyroidism and dementia. Slowness of mentation (and other physiological processes) is a core feature of low thyroid hormone levels; in dementia lack of conversation may involve speech problems and/or apathy.

Depression must be considered. A core feature of depression may be slowness in the production of thoughts (psychomotor retardation). This reverts to normal with resolution of the episode.

Poverty of thought is common in chronic schizophrenia, in which circumstances, it is called a “negative symptom” and is often accompanied by other “negative” symptoms.

## **9. Illogicality [Unnecessary detail]**

Illogicality is present when the thinking involves erroneous conclusions or internal contradictions.

This category is included only as a contribution to the reader’s knowledge base. Illogicality is a difficult category which survives in disputed territory between disorders of thought form and content. The concept of “illogicality” is not essential for good clinical practice.

For illogicality to exist the patient must make a number of statements, and at least one must contradict another. Most often the patient is psychotic and reporting a delusion. It is easy to pick up on the disorder of content, what can be missed is that there may also be flaws in logic which constitute a FTD.

An example: A patient believed there were aliens living on earth. He stated that when they looked at normal human beings, the normal human beings immediately burst into flames and died. He further stated that he knew this because he was a normal human being and he had been looked at by aliens on at least a dozen occasions.

The disorder of content is not difficult to spot. But we are interested here in the failure of logic. The patient stated that he was a normal human being (there would not have been any illogicality if he had claimed to be a God with special powers) - if his belief had been correct, he should have been burnt to death. He was not dead. The logical impossibility, when pointed out, did not concern him; nor was his belief modified to accommodate the illogicality.



## Recent research

### Symptomatology

Strous et al (2009) studied the writing of people with schizophrenia. Using a computer based analysis method, 83.3% of patients could be correctly diagnosed.

Also, there was a difference in the frequency of word use. Details are listed in the following table. People with schizophrenia used more first person pronouns (I, me) and less third person pronouns (he, she). They used the word 'very' more often, and made less use of the definitive object 'the', and the prepositions 'on', 'at' and 'of'. In addition, people with schizophrenia repeated words more often.

These findings are consistent with what we observe when talking with people with FTD.

|   | Non-schizophrenia | Schizophrenia | Significance |
|---|-------------------|---------------|--------------|
| <b>Markers of schizophrenic writing</b>     |                   |               |              |
| First person pronouns                       |                   |               |              |
| <b>I</b>                                    | 94.15             | <b>164.06</b> | p = 0.01     |
| <b>Me</b>                                   | 13.45             | <b>59.56</b>  | p = 0.01     |
| Intensifier                                 |                   |               |              |
| <b>Very</b>                                 | 30.49             | <b>51.69</b>  | p = 0.01     |
| <b>Markers of non-schizophrenic writing</b> |                   |               |              |
| Third person subjective pronouns            |                   |               |              |
| <b>He</b>                                   | <b>130.92</b>     | 111.25        | p = 0.01     |
| <b>She</b>                                  | <b>113.88</b>     | 93.27         | p = 0.01     |
| Definitive object marker                    |                   |               |              |
| <b>The</b>                                  | <b>192.79</b>     | 113.5         | p = 0.01     |
| Prepositions                                |                   |               |              |
| <b>With</b>                                 | <b>57.39</b>      | 44.94         | p = 0.01     |
| <b>On</b>                                   | <b>108.5</b>      | 69.67         | p = 0.05     |
| <b>Of</b>                                   | <b>130.02</b>     | 75.17         | p = 0.05     |

Adapted from Strous et al, 2009.

### C-reactive protein

CRP levels are significantly associated with formal thought disorder (Chang et al, 2019)

### Neuroimaging

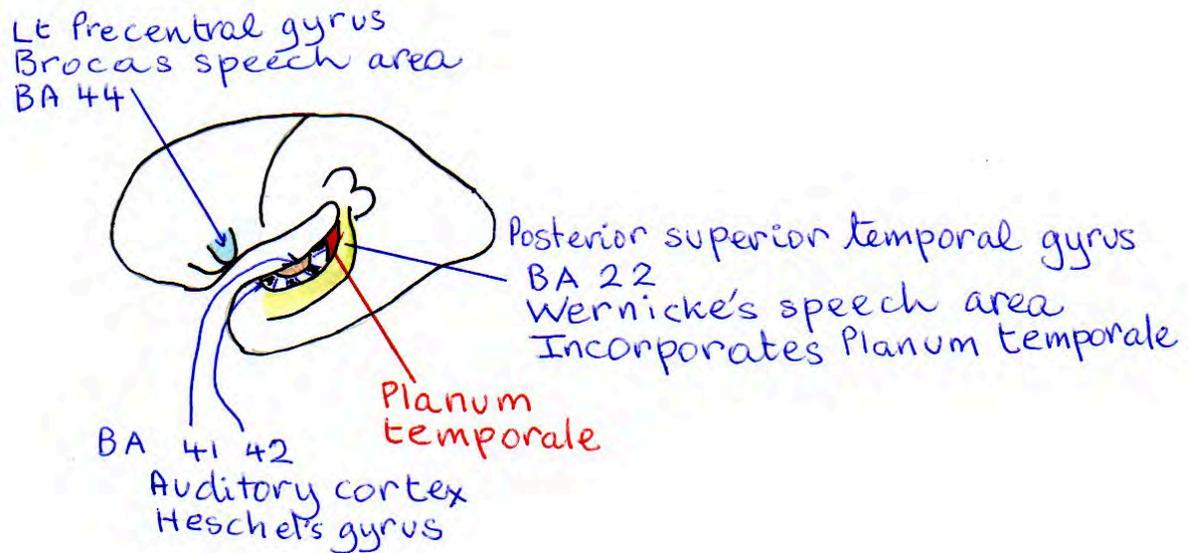


Illustration. The left temporal lobe is pulled down to display those regions usually hidden in the Sylvian fissure.

Horn et al (2009) investigated the grey-matter of the left-sided language network in people with FTD. They found 1) bilateral deficits in grey-matter volume in the temporoparietal areas which correlated with severity of thought disorder, and 2) a positive correlation between perfusion in the left frontal and parietal regions and the severity of FTD. They concluded that specific grey matter deficits of the left-sided language system leads to increased perfusion, and FTD. This was a sensational advance; something which has been suspected for over a century was finally demonstrated.

More recently, Horn et al (2010) reported FTD was negatively correlated with various regions of grey matter loss, including 1) the left superior temporal sulcus and, 2) the left temporal pole (these changes had already been described as associated with FTD).

Some of these areas are of particular interest. The left superior temporal gyrus (extending into the sulcus) is Wernicke's speech area (BA 22) and the left precentral gyrus is Broca's speech area (BA 44). It is perhaps not surprising that these areas are involved in thought disorder (as assessed by speech). Planum temporale is a triangular area at the heart of Wernicke's area, and is particularly involved in FTD.

The Planum temporale is adjacent to the auditory cortex (Heschel's gyrus, BA 41 & 42) which is involved in hallucination generation.

Jung et al (2019) found individuals with first episode psychosis (FEP) had significantly smaller grey matter volumes (than healthy controls) in the **left pars opercularis** (left inferior frontal gyrus, BA44, Broca's speech area, precentral gyrus), **Heschl's gyrus** (auditory cortex; BA41 & 42) and the left **fusiform gyrus** (the temporo-occipital gyrus - spanning across the basal surface of the temporal and occipital lobes). Thus, in early schizophrenia there are grey matter abnormalities associated with various language processing areas

In other exciting work, Sabb et al (2010) studied adolescents at high risk of psychosis, using blood oxygenation level-dependent (BOLD) activity at baseline and follow-up. They found functional differences in the brains of those individuals who became psychotic, compared to those who did not. The differences associated with subsequent FTD were in the left inferior frontal gyrus (Broca's area, called precentral gyrus by Horn et al, above) and the superior temporal gyrus (as well as the caudate).

Moving away from the speech centres, an interesting finding has been reported in the cerebellum. The cerebellum has a well-recognized role in the co-ordination of movement. A similar role has been proposed in the 'co-ordination' of thought. The 'cognitive dysmetria' hypothesis of schizophrenia (Andreasen et al, 1999) assumes the online processing of thoughts is impaired or mistimed, leading to disruption and poorly coordinated sequences of thought. Kuhn et al (2012) used sensitive scanning techniques to examine the cerebellum and demonstrated a correlation of FTD and grey matter deficits in the left Crus I and II (also known as superior and inferior semilunar lobules).

Thus, imaging studies suggest FTD may be underpinned by deficits in the speech areas and the cerebellum (and other regions) – clarification is awaited.

### Genetics

The non-schizophrenic family members of people with schizophrenia have been reported as demonstrating “grammatical oversimplification and deviant verbalizations” (Levy et al, 2010) – suggesting a genetic association between language and schizophrenia.

### **Summary**

|   |   |
|---|---|
| Derailment  | A sudden deviation in the train of thought  |
| More severe derailment  | Poverty of content  |
| Much more severe derailment   | Incoherence   |
| Derailment plus pressure  | Flight of ideas   |
| <ol style="list-style-type: none"> <li>1. fast</li> <li>2. loud</li> <li>3. difficult to interrupt</li> </ol>   | <ol style="list-style-type: none"> <li>1. distraction by sound (clanging, punning)</li> <li>2. distraction by meaning (young/old; white/black)</li> </ol> |
| Poverty of thought  | Negative symptom  |
| Neologisms  | Museum pieces   |
| <ol style="list-style-type: none"> <li>1. distorted words</li> <li>2. word approximations</li> <li>3. idiosyncratic use</li> <li>4. “real” neologisms (“replaper”)</li> </ol> |   |

|                             |  |
|-----------------------------|--|
| Illogicality                |  |
| Thought block               |  |
| Perseveration and Echolalia |  |

### Further examples of FTD

1. Psychiatric Assessment Symptoms and signs, available free:  
<http://eprints.utas.edu.au/12973/>

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