Qualitative Thought Processes In Clinical Interviews

David   Tall

Warwick University, England.

The clinical interview is a method of investigation where the investigator varies his questions according to the responses of the person being interviewed. Such techniques have been used with great success by Piaget and his school and are now used in a wider context which include various investigations into the nature of mathematical thinking.

Two major areas of contention arise in the clinical interview: the first is the interpretation of the interviews in a manner which is not purely anecdotal; the second is the nature of the interjections by the interviewer and their effect on the course of the interview. What is required is not just a study of the specific factors in each interview but a general set of principles which apply to a broad class of interviews.

Such principles could be based on a mathematical analysis of the ideas involved, but this tends to superimpose a logical framework which is at variance with the observed manner in which thinking actually proceeds. An alternative is to consider the qualitative nature of the thinking processes: the continuous stretches of thought, the mental leaps, conflicts, blockages, and so on.

Here we consider such an analysis which proved amenable to describing a number of clinical interviews which arose when I was privileged to join in with a working group on problem solving at Concordia University, Montreal. It is based on an underlying resonance model of brain activity and is proposed here as a basis for discussion. Should it prove fruitful, refinements would be welcome, both in terms of the nature of the analysis itself and the names used for the various phenomena (which are still in need of reorganization and clarification).

First we begin with some observed phenomena:

1. *Initial resonances*: immediate responses to stimuli which occur without time for reflection.

If consonant, such a resonance may provoke an *ongoing schema* but if dissonant elements are present to a sufficient degree there may be a *conflict* leading to an alternative schema or a *mental blockage*.

2. *Ongoing schemas*: Connected chains of thought without major crises or changes in direction.

In clinical interviews the extent of such schemas are often difficult to determine because of the interjections of the interviewer. We may wish to distinguish certain types of schema e.g. a *resonance schema*: carried on by the intense

power of the thought process itself. Such a schema is not disturbed significantly by external comments. It may end up with the subject losing track of the original problem because the goal of solving the problem has been temporarily lost by the internal compulsion of following through the schema itself. *superposed schema*: where the initial resonance involves two disparate schemas which produce a novel train of thought superimposing two (or more) resonances. The subject may feel that such a superposition will lead to a solution & does not (yet) sense a definite conflict. *conflict schema*: the subject realises that a conflict is present, but has not, as yet, resolved it. He may flash from one idea to another. *explanatory schema*: an explanation of thought processes which have already taken place. At this time questions from the interviewer will probably be more welcome than in, say, a resonance schema. other types of schema? e.g. an open search schema?

Schemas are, broadly speaking, continuities in thought (though they may involve small discontinuities not noticed by the observer).

3.   Qualitatively different are observable *discontinuities*:

a)   *conflict*: causing disruption of thought,

b)   *mental blocks*: stoppages in thought, often preceded by conflict,

c)   *insights*: sudden leaps in thought,

d)   *finish*: end of schematic action.

These discontinuities (particularly the first three) are of extreme interest in clinical interviews. We need as much information as possible to interpret them (tape, audio-visual aids etc.)

The flow of thought is often affected by an interjection from the interviewer, indeed, this is part of the special function of a clinical interview. Interjections occur in two different ways:

(i)   as a response to a question from the person being interviewed,

(ii)   as an unsolicited interjection.

A comment of type (i) is a natural part of the flow of thought, for the person being interviewed is seeking a reaction from the interviewer. The response may be of many kinds, it may be clinically neutral, it may support the student's chosen path of attack, or disagree and turn it along different lines. At the other extreme it may be a 'torpedo' (a slang term meaning a provocative and startling challenge). However this is often unsolicited and should probably always be reclassified under type (ii).

The comments of the second type are fundamentally different; they may occur at a time when the student does not wish to be disturbed and they may even disrupt the thinking process. For instance a question in the middle of a resonance schema may upset the train of thought and a response to such a question may not evoke a true explanation of the thinking process, the latter

may not be a verbal process anyway. Interjections on the part of the interviewer can have strong effects at critical points in the thinking process. Even a murmur of approval or a non-verbal piece of communication can affect the outcome. (Hence the inadequacy of written protocols in clinical interviews.)

It is essential to take ideas such as these into account in deciding general modes of behaviour on the part of the interviewer on a broad class of interviews. (These modes may change, provided that their nature is made explicit; for instance, in one class of interviews it may be decided not to interrupt resonance schemas, but, in another, resonance schemas might be purposely interrupted to study the effect of such an action. Or a tape of the interview might be played back to the subject, seeking information about what might have been happening internally at a certain time, though one suspects that this will only lead to a post-rationalization of thought rather than a description of the thought itself.)

Some General Thoughts for Discussion

1. Initial resonances are often overlooked as meaningless remarks before thinking is settled down, on the contrary, perhaps they give essential clues as to the nature of the thinking process, e.g. they may involve over-extrapolation from the evidence leading to later conflict.

2. From observation ideas expressed in one resonance schema may conflict with those expressed in a subsequent resonance schema but this conflict is not observed as such by the subject provided the ideas are locally coherent. Perhaps conflicts are *local*, not global, mental phenomena.

3. Local errors (stumblings, immediately corrected) may not have significant effects on the overall flow, in general, (a case of "structural stability") yet could have extreme effects at critical points in brain activity.

4. Diagrams drawn by the subject are more permanent than verbal comments (which may be forgotten), in particular, verbal comments made in one schema may not be remembered during the course of a later one.

5. Does the memory of something earlier depend on the level of energy involved in the earlier mental activity in some way? (mental activity involves electrical brain activity. Potential differences in different parts of the brain which lead to the passage of electrical current yield a potential function. Structurally stable brain activity may involve local minima of the potential function. The changes of equilibria in time may yield continuous schema and discontinuous leaps. Memory may depend in some way on the level of energy in the earlier activity.)

6. Conflict in problem solving protocols may be different from conflict in Piagetian tests. In problems the conflicts may be caused on occasion by transient electrical phenomena which when questioned cannot be recalled. In Piagetian transition there are usually two fairly stable (chemical) mental

configurations causing the conflict; the subject is able to talk about each one separately in a suitable context.

7. Words like "carelessness", "mistake" etc. are a vocabulary from a logically based paradigm of interpretation. A 'mental resonance' concept may be more suitable for description of thinking processes.

8 It is known from electroencephalograph readings that brain activity becomes progressively more complex with maturation. Some young children do not always seem to notice conflicting results in their mathematics. With more complex brain configurations mature students can experience very subtle conflicts. Are there genuine qualitative differences in brain activity at different ages?

9. Mature mathematicians are able to carry through subtle proofs and understand each step yet feel uneasy about the final result. Does this unease signal subconscious cognitive conflict? Are "subjective emotions" sometimes a *better* guide to the coherence, or otherwise, of brain activity than "observable ability to carry out mathematical processes"?

The brain is a complex mechanism and in the presence of competing resonances, it may well happen that mathematical process may be carried out coherently in one resonance system and it is only the emotional unease which signals the underlying conflict.

Whatever the pitfalls surely clinical interviews have much to offer that cannot be found by psychometric methods.