INTERVIEWS II: THEORIES AND TECHNIQUES

5. CLINICAL APPROACH TO INTERVIEWING – PART 1

5.1 Clinical Interviews: Background Information

The clinical interview is a technique pioneered by Jean Piaget, in 1975, to study the form of knowledge structures and reasoning processes. In the last twenty-five years, it has evolved into a variety of methods, including open ended interviews and think aloud problem solving protocols. These techniques have played key roles in seminal studies in science and mathematics education as well as developmental psychology. Their strengths, in comparison to nonclinical, data gathering techniques, include the ability to collect and analyze data on mental processes at the level of a subject's authentic ideas and meanings, and to expose hidden structures and processes in the subject's thinking that could not be detected by less open ended techniques. These abilities are especially important because of Piaget's discovery that people have many interesting knowledge structures and reasoning processes that are not the same as academic ones. They have alternative conceptions and use non formal reasoning and learning processes. Mapping this hidden world of indigenous thinking is crucial for the success of instructional design. Students cannot help but use their own prior conceptions and reasoning processes during instruction, and they have strong effects on the course of instruction. Since tests are almost always written from the point of view of the academic and are designed to detect standard forms of academic knowledge, they can fail to detect key elements in students' thinking.

Clinical interviews, on the other hand, can be designed to elicit and document naturalistic forms of thinking. In some exploratory varieties of clinical interviewing, the investigator can also react responsively to data as they are collected by asking new questions in order to clarify and extend the investigation. Even where the detection of academic knowledge is sought, clinical interviews can give more information on depth of conceptual understanding, since oral and graphical explanations can be collected, and clarifications can be sought where appropriate. However, the analysis of interviews can be difficult and time consuming, always involving a degree of interpretation on the part of the researcher. One purpose of this research section is to discuss the scientific foundations that provide a basis for sound analysis.

Partly because of their open-endedness and qualitative and interpretive nature, some individuals have implied that clinical interview studies may be unscientific. In fact some view research methodology as being divided into two camps: humanistic (including interviewing for clinical research) and scientific analysis (including quantitative methods.) Furthermore, some argue that carefully done clinical interview studies are an essential and irreplaceable part of the scientific enterprise of investigating a student's mental processes and that, in the context of the history of science, such simplistic associations between the scientific and the quantitative are grossly misplaced.

5.2. Maintaining The Distinction Between Observation And Theory

In all of the above, however, there is an effort to maintain the distinction between observation and theory. Although these two processes interact, they still can be seen as separate, semiautonomous processes rather than a single process. When they conflict, it is seen as essential to assign greater, but not overwhelming, weight, in the long run, to documented, publicly agreed upon observations over prior theoretical commitments and newly invented theories. It is also desirable, where possible, to describe explicitly relations of support between observations and theory. Although intermediate examples can be raised that suggest viewing the theory observation distinction as more of a continuum, the effort can be made still to progress toward separating these two modes of thinking for doing science so that they constrain and stimulate each other. The important goal is to progress toward observation processes that may not be fully objective, but that are still independent enough from one's theories to yield surprises and anomalies that can motivate revisions in, or even eventual rejections of, the theories.

5.3. Purposes of Clinical Interview Studies

Generative purposes usually lead to an interpretive analysis. Such a study can deal with behaviors that are quite unfamiliar, for which there is very little in the way of existing theory. It attempts to generate new elements of a theoretical model in the form of descriptions of mental structures or processes that can explain the data. This method can deal with larger and richer sections of interview data involving more complex processing. It entails higher levels of inference on the part of the researcher. Convergent purposes usually lead to a coded analysis of interviews that attempts to provide reliable, comparable, empirical findings that can be used to determine frequencies, sample means, and sometimes experimental comparisons for testing a hypothesis.

An interpretive analysis in a generative study tends to present a relatively large section of a transcript, followed by the author's inferences concerning the thought processes of the subject. In contrast to a coded analysis, observation categories are not fixed ahead of time. Analysis can generate new observation categories and models of mental processes giving plausible explanations for the observed behavior. For example, all of the models of reasoning modes that produce reversal errors were generated during intensive interpretive analysis of individual case studies done for generative purposes.

There are a number of reasons for the importance of generative studies:

- They are a primary source of grounded theoretical models for learning processes.
- They are a primary source of key observation concepts.
- They are not restricted to collecting immediately codeable observations that fit into existing categories of description; they allow investigators to develop new categories for description.
- They provide a foundation for the design of convergent studies.

5.4. Viability Versus Validity

Generally, in this chapter, the issue of the viability of a model speaks to our interest in attaining models that are useful to us, that have support in the data, that fit or interact productively with our larger theoretical framework, and that give us a sense of understanding by providing satisfying explanations about hidden processes underlying the phenomena in an area. The literature on validity is tangled with multiple meanings and interpretations for the term. Validity of what? Widely differing referents occur including the validity of an observation, of a theoretical model, or of the relation between an observation and a model. For the sake of avoiding confusion with these past uses, the best strategy, to be used here, is to put aside the term validity altogether in this context and to define a new methodological term, viability of a model based on the relation between models and observation in science as described by modern historians of science.

Because the job of generating a framework at this level is such a basic one, it makes sense to use a broad definition of viability, the view that the viability of a model should be no less than an estimate of its usefulness or strength as a scientific theory compared to other theories. The bad news here is that strength is a complex thing to measure, and the criteria for it involve human estimates and judgments. The good news is that modern work in the history and philosophy of science has shown that this is a problem common to all of the developing sciences and has made considerable progress on describing these criteria in more realistic terms.

In regards to the determinants of viability, the explanatory power and usefulness of a model correspond roughly to what we mean by the viability of a model. Given a set of observations, the major factors that affect the viability of a theory or a model that explains them are its plausibility, empirical support, rational (non-empirical) support (such as its coherence with previously established models), and external viability (or "tests over time"), such as its extendibility to new contexts. These factors are discussed separately below;

1. Plausibility: Explanatory Adequacy and Internal Coherence - The most basic requirement for a model of a person's cognitive structures and processes is that it give a plausible explanation for the observed behavior. We cannot provide merely an informal mixed metaphor as the model. It must be a description of a thought process that we can easily imagine taking place in the subjects, that explains their behavior, and that is internally coherent. This last criterion refers to whether the model is internally consistent, both logically and pragmatically, in terms of the story it tells about a mental mechanism (e.g., it does not speak of conscious processing on unconscious material).

2. Empirical Support: Interviews are subject to what can be called the porpoise effect where we only see a part of the porpoise a part of the time, and we only derive partial and indirect information on intermittent parts of mental processes by viewing the data in interview transcripts or tapes. Mental processes are by nature hidden processes. Thus, our concluding hypotheses about models of processes in a report will be stronger or weaker depending partly on how much support they derive from empirical observations, and that depends on how prevalent and how pertinent the data are. The strength of empirical support depends primarily on the three factors listed below:

a . Explanatory adequacy and scope by means of triangulation and number of supporting observations. The empirical support that a model has rises with the number of supporting observations that it has; in other words, the number of connections to data. When a model gives a plausible explanation for an observation it, in turn, receives a degree of empirical support from the observation. When a model provides an explanation for more than one observation or aspect of a transcript and derives support from all of them, we say that we can triangulate from the observations to the model. In this way, model construction is responsive to the multiple constraints provided by the transcript. Inferring new models from evidence in protocols is an inherently difficult and creative construction process. When one can triangulate by explaining multiple observations with the same hypothesized model, that gives one a stronger degree of support for the model.

For example, in the case of the static comparison approach as an origin of reversal errors discussed earlier, a central assumption of this model was that the students comprehended and heeded the relative sizes of the two groups (implying they thought that they were symbolizing that relationship). This assumption distinguishes the static comparison approach from a purely syntactic one of word-order matching. Thus, we can triangulate from these statements to the hypothesized model that a correct, relative size idea is a part of subject's comprehension of the problem.

(Note: Here, support usually means corroborates rather than strongly implicates. On its own, each observation may not provide substantial evidence. Furthermore, a single observation can have explanations other than the one proposed for it. But when one hypothesis fits more observations than any of the other hypotheses, this can support the hypothesis as the most plausible explanation. Thus the relation between observations and hypothesized models used here is not one of unique implication but, rather, of collective abduction and support.

b. The strength of each connection of support between an observation and a hypothesis. That is, the directness and quality of each supporting observation (e.g., if a subject solving a mathematics problem mentions the name of each step of a standard algorithm as it is used, that observation has a strong connection of support to the hypothesis that he or she is using an algorithm).

c. Absence of conflicting evidence or anomalies that are inconsistent with the model. In any study of rich behavior, there will be some observations that are not explained by the current theoretical model, and perhaps some that are in conflict with it. The latter are called anomalies with respect to that model. If there are too many anomalies, a model may lose its viability in comparison to another competing model.

Together, factors a, b, and c determine the strength of the empirical support for a hypothesized model and are one component of its viability. Wide triangulation from multiple instances is desirable when available, but it is not the only criterion, especially in initial studies of an area where existence proofs are needed.