
Editorial by Rosemary Ellis, RN, PhD

Knowledge can be acquired in many ways. The type of knowledge correctly labeled *science* is that which is generated and validated through processes that are communicable to others and subject to review and critique in light of accepted expectations and norms of peer scientists. The processes for development of knowledge of a scientific nature are those of theory construction and research in dynamic interaction.

As nurses have come to increasingly value research, seek a validated body of knowledge for nursing purposes, and engage in the scholarly pursuits for which universities exist, research and research methods have gained attention with emphasis, it seems, on methods or "how to do it" to the neglect of sufficient delineation of the important knowledge questions to be addressed by whatever methods are appropriate to the questions and the phenomena to be studied.

It is my premise that the nature of the question and the phenomena to be studied mandate the method for study as opposed to the method being the determinant. It is also my thesis that the generation of knowledge involves both discovery and validation and that the processes are related but distinguishable phases that differ considerably. Few would argue this, but it is common among those who functionally seem to equate research and science to focus only on the testing and validation processes. This is natural because discovery as a process is not reducible to one ordered set of procedures to be followed or some algorithm. Discovery is individualistic; it can be serendipitous; it is a function of mind set, interest, opportunity, personality, happenstance, and creativity. Stories of great discoveries or insights recounted by their originators describe the uneven, ideosyncratic processes in discovery and the beginnings of, if science is produced, a long process of hypothesizing, formal formulation and testing, reformulation and retesting. Total development from wonder to insight to testable question to scientific

knowledge moves from one mind to increasingly impersonal, public, objectifiable, systematized validated knowledge of a distinctive type called science.

Undue or premature emphasis on particular formal research methods may neglect the early discoveries antecedent to formal theory construction. Such discoveries are essential, individualistic, and creative. Preoccupation with formal methods seems to occur in nursing at the expense of discourse on the nature of the important questions to be addressed in a nursing knowledge system. Dominant nursing perspectives today, extant nursing models, or metaparadigms vary, but all include *humans* as a critical element along with other highly abstract complexities. To produce science, the deep chasm between mind-made abstractions or general ideas, and sense data, perceivable through some direct or indirect observations, must be recognized and overcome in some way. The ability to share, to review, to communicate in a common language, and to argue the correspondence between ideas and data are necessary to produce science. Theoretical structures of science must have some link or potential to be tied to observables, to be subject to research processes, to be claimed as scientific.

If one accepts that all models that portray the idea *nursing* require the concept *humans*, then one must consider what information about humans is required in a nursing knowledge system and what observable realities of humans could provide the data for the scientific portion of that knowledge system. If human responses, perceptions, experiences, and capacities for both alteration and constancy characterize something of the nature of knowledge that might be essential nursing knowledge, then what are the methods to discover and validate such knowledge? Certainly scientist-nurses must know the general methods of science and be able to learn and utilize the specific methods of the different sciences as appropriate to the phenomena, goals, theo-

retical structures, and questions focal to a particular field if the scientist nurse's question is of that sort. But a nursing perspective often is not identical with that of another science, and an adequate nursing knowledge system will not be generated solely from knowledge bits and pieces from other sciences, nor will such sciences formulate nursing questions.

In other words scientific knowledge is publicly verifiable; it is generated by communicable processes and consists of facts and interpretations of facts organized in some mind-made conceptual structures that link observables to produce meanings and frames for operations and understandings. If the knowledge sought is the understanding of human actions and responses in health or illness, then what are appropriate instruments for systematically studying human actions, responses, and meanings of the class or categories necessary for nursing knowledge? Certainly, humans can be such instruments. Who but another human can experience and report what a particular human behavior evokes or is apt to evoke in other humans, or hypothesize about the function of a particular behavior? Who but humans can recognize, try to understand, and communicate the appearances and feelings labeled *sadness*? Who but humans can experience human sensations, attempt to describe them verbally, by analogy, or in some innocuous way as a possibly helpful source for mitigation of aversive reactions to unavoidable, unpleasant, frightening, or not yet experienced stimuli?

Kaplan's¹ exposition of *act meaning* and *action meaning* is a useful discussion for consideration of study of human behaviors with a goal of scientific knowledge. The kind of understanding of humans that comes from within by means of empathy, intuition, or imagination could be one source in the discovery phase of knowledge generation. Simultaneously knowledge that grows from systematic careful observation can provide important discovery. Field work and naturalistic observa-

tions are examples of strategies in which the human investigator is the most effective tool. Such strategies rely on initial insights, and the dynamic interplays of wondering, formulating, checking, and reformulating that typically precede formal postulating and subsequent rigorous testing, replication, and acceptance.

Science as product comes from processes that are known and reproducible, with necessary controls. The product is integrated in or produces reformulation of some conceptual structure. Science as process contains some phases in which the investigator as human is a particularly effective instrument. Piaget's ability to study and ponder the discrepancies between an infant's schema and adult concepts and thinking produced his heuristic description of how the sensorimotor phase of infants' and young children's learning eventuates in the separation of self and world object and awareness of the permanence of objects. His formulations could then be tested, critiqued, or studied by others. The initial observations and insights were not dictated by research methods, and undue concern with particular methods could be restrictive or counterproductive to the creativity of the heuristic scientist in development of theory to be tested.

Premature preoccupation with formal process may be handicapping to the development of a nursing knowledge system if indeed knowledge of some particular class of human perceptions and misperceptions, human feelings, human sensations, and human responses are among the realities that nurses observe and attempt to understand in a nursing context. Impersonality is essential in the testing of theory or hypothesis; it may inhibit effective use of one's self in the initial insights essential to systematic development of adequate knowledge of the human phenomena of interest to nurses as nurses.

REFERENCE

1. Kaplan, A: *The Conduct of Inquiry*. New York, Chandler Publishing Co, 1964.