Q methodology: relevance and application to nursing research

Q methodology is a unique research tradition with an epistemology and technique that is much more than the Q-sort form of instrumentation used to gather data. Developed to explore and understand the richness of human subjectivity, Q methodology, with its emphasis on the individual, is relevant to many substantive areas of scientific inquiry within nursing. This article presents an overview of the technique and delineates special considerations for implementing Q methodological investigations.

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Q METHODOLOGY is a creative and avant-garde approach to scientific investigation that holds great promise for expanding nursing knowledge. Influenced by logical positivism yet departing from its mandates, Q methodology has struggled through 50 years of existence to gain acceptance as a credible scientific enterprise. Developed during an era when the study of nonobservable phenomena was hardly considered legitimate, Q methodology emerged as a unique way of knowing.

Founding Q on the premise that it is possible to study subjectivity in a manner that is objective, orderly, and scientific, Stephenson[1] asserted that all experience is behavior. Since thoughts, feelings, and dreams are just as purposeful as walking, these subjective behaviors should be amenable to precise, reliable, and objective investigation. Just as blood pressure cannot be seen unaided but can be measured through auscultation, subjective experience can be made "operant" and observ-

able with all the objectivity inherent in the Skinnerian use of the term. "All percepts, concepts, reports of events; all dreaming, daydreaming, quarreling; all enjoyment of art, music, literature, and so on can be transformed into operant factors."[2(p883)] Q methodology develops those operant factors.

Although the scientific community now acknowledges the importance of studying nonobservable phenomena, a methodology such as Q that deviates from traditionally accepted conceptualizations of research design and statistics remains suspect. Reverberations from logical positivism continue to be felt. The literature is replete with reports of research and expository articles that fail to appreciate the fact that Q methodology is a totally different research tradition than quantitative or qualitative methodologies as they are widely known. According to Laudan, "A research tradition is a set of general assumptions about the entities and processes in a domain of study, and about the appropriate methods to be used for investigating the problems and constructing the theories in that domain."[3(p81)]

With Q methodology, the domain is subjectivity, the emphasis is on the individual, and the methods are unique. What evolves from the use of Q methodology are answers to questions that seek to develop and understand the dimensions of subjective phenomena from a perspective intrinsic to the individual, to determine what is statistically different about those dimensions, and to identify characteristics of individuals who share common viewpoints.

How Q methodology is being used and how Q methodology was developed to be used are not always the same. Nurse researchers using Q sorts are not alone in their lack of awareness that Q methodology encompasses a great deal more than the Q-sort form of instrumentation that is used to gather data. Q methodology is not a branch of psychometry and has nothing to do with mental testing. Nor is it just a different way to measure attitudes, opinions, and beliefs.[4] When implemented to its fullest potential, Q methodology offers unique insights into the richness of human subjectivity.

Concepts of a subjective nature and the focus on the individual are of interest and concern to nurses who seek to foster the maintenance and promotion of health, the prevention of disease, and the care of illness and injury. The box ("Subjectivity— Examples of Topics for Q Methodological Inquiry in Nursing") presents only a limited number of the substantive research topics in nursing for which Q methodology is not only appropriate but perhaps the method of choice. "Where individuals are involved and can be expected to entertain viewpoints with respect to things going on around them, however subjective these viewpoints may be, Q technique and its methodology can illuminate in broad outline the major effects that are operating."[5(p58)]

CONTRAST OF RESEARCH METHODOLOGIES

Quantitative and Q

The most widely used methodology in research to date is R methodology, well known to all researchers although perhaps not by that name. R methodology charac-

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Subjectivity—Examples of Topics for Q Methodological Inquiry in Nursing

Attitudes, feelings, beliefs, values, perceptions related to these areas, separately or in combination:

Life experiences
  Living with chronic illness
  Coping
  Stress
  Attribution
  Quality of life
  Social support networks

Health beliefs
  Preventive health practices
  Cultural influences on health-seeking behaviors
  Cross-cultural value orientations
  Life style changes (eg, diet and exercise)
  Self-care

Intraindividual concerns
  Self-esteem
  Body image
  Efficacy
  Aging
  Sexuality

Clients and providers
  Clients' needs within patient-provider relationships
  Satisfaction with care
  Quality of care
  Modes of nursing care delivery

Roles
  Family: marital dyad, sibling, parent-child
  Faculty: teaching, practice, research
  Student: role transition, professional socialization
  Nurses: image

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terizes descriptive or correlational studies as well as experimental designs. It is grounded in the study of individual differences and is related to the application of Pearson's r coefficient to the study of trait relationships.[5] In quantitative (R) methodology, phenomena are investigated according to theoretical formulations that investigators deem important. Hypotheses are derived and scales developed to measure the constructs; the scales often become the operational definition of the constructs themselves. Receiving a score on these scales, subjects are viewed as having more or less of each trait being measured. Ultimately each person becomes the sum of his or her parts, which is a composite of scores on scales such as loneliness, anxiety, and tolerance of ambiguity. In the norm-referenced approach to measurement within R methodology, one person differs from the next only in quantitative degree, an outcome antithetical to nursing practice, which values the uniqueness of the individual.

Since each person's world is different from that of all others, the stimuli provided by R-scale items may have entirely different meanings from individual to individual. In classic measurement theory where the observed score is equal to the true score plus error, the idiosyncrasies, uniqueness, and individualities that may seem unrelated to the concept being measured yet that influence each person's responses are relegated to the error term. Likewise in an experimental design, the subjectivity of the individual and the uniqueness which makes him or her different from others in the same treatment group becomes the within-group mean square error term. Ironically, it is those cognitive and behavioral nuances that may be the most intriguing and the most elucidating of the phenomena in question. To improve the possibility of finding the significance they seek, however, investigators attempt to reduce the error terms, thereby suppressing the richness of spontaneous differences among

persons. The ability to understand phenomena from a stance intrinsic to the individual is impeded when external constraints are imposed on internal reality. Brown has noted, "It is to the credit of contemporary science that it has developed to a fine point the science of asking important questions; what is lacking is an equal development of the art of listening to the answers rather than transforming them, through a kind of behavioral alchemy, into something else."[5(p3)]

In contrast to R, Q methodology focuses on the perspective of individuals whose responses are neither right nor wrong, neither more nor less. The responses are simply, yet undeniably, theirs. The unexpected meaning subjects may attach to the items and the individuality influencing the responses given are highlighted in the process of statistical analysis, not deemed undesirable and relegated to an error term. Subjectivity is revealed by the subjects; the challenge lies in understanding what it is and what it means.

Qualitative and Q

Like qualitative methodology, Q methodology identifies the dimensions of subjective phenomena from the viewpoints and experiences of individual human beings. Categories emerge from the data and are named inductively through insights

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Q methodology identifies the dimensions of subjective phenomena from the viewpoints and experiences of individual human beings.

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into tones and feeling states. Unlike qualitative methodology, however, in Q methodology subjects are given specific items to which to respond, the resultant categories are derived statistically, and the categories have statistically significant differences among them.

Q TECHNIQUE

A brief description of Q technique is deceptively simple, yet it provides an organizing framework for understanding the unique procedures that are integral to this method of investigation. In Q technique, a universe of statements is derived, and a sample of these is placed along a continuum of significance, such as "most agree to most disagree" or "most like me to most unlike me." This is the Q sort. Q sorts obtained from several individuals are factor analyzed, with the factors indicating both dimensions of the phenomenon as well as clusters of individuals who sorted the items in a similar way. Explanation of the factors is made on the basis of commonly shared viewpoints.[5]

The Q set

Unlike the large number of persons that constitute the population of interest in traditional quantitative research, a number of statements or pictures are the primary sources of statistical data in Q. The "n" for the study, then, is the number of items (Q set) rather than the number of persons. Items drawn from a universe of statements that reflect the domain of the study may be taken from the literature, modified from extant measures, or, in an approach that is uniquely Q, derived from preliminary inter-

10 views. For example, when studying factors that contribute to clients' choices among health care providers, discussions with a few patients in a clinic will produce verbatim sentences or phrases that can be selected as items in the Q set. This approach yields a natural rather than contrived wording of the items and facilitates an adequate representation of the domain.

Incorporating the study's theoretical framework, the test blueprint is a balanced factorial design. Fig 1 depicts a Q set blueprint used by Hanson and Beech[6] for a study they conducted to determine similarities and differences in the thinking of public health nurses and Spanish-American villagers. The concepts of typical nurse prescriptions (actions related to the patient's health) and validations (substantiating reasons) comprise the major dimensions.

Although more than one item represents each cell, in a process called cell replications, a structured sample contains equal numbers of items in each cell. The overall size of the Q set becomes a multiple of the basic design; most contain 40 to 60 items, but they may number less or more. In the study by Hanson and Beech[6] there were five cell replications in the 3 × 5 factorial blueprint for a total of 75 items. Once the statements are developed, each one is printed on a separate card to form a deck for a Q sort.

The P set

Analogous to structuring the Q set, a factorial table is used as a heuristic guide for structuring and selecting subjects, known as the P (person) set. Unlike the Q set of items, however, the P set does not need to have an equal representation of person-related variables. Although development of the P set is similar to stratification prior to random selection of subjects in quantitative methodologies, persons in Q studies are theoretically sampled as they are in qualitative research. Study participants are deliberately selected with the expectation that they will hold different points of view on the topic being studied. For example, preoperative patients who have had previous surgery may experience different feelings and needs than patients undergoing surgery for the first time. The boxed material ("P Set: Preoperative Anxiety") illustrates an example of a P set

| | **Health prescriptions** | | |
Validations:	**Treatment**	**Diagnosis**	**Prevention**
Health			
Authoritarian			
Organizational			
Social obligation			
Religious			

Health prescriptions = 3 × Validations = 5 × Cell Replications (5) = 75

Fig 1. Q set: communicating health arguments across cultures.

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│        P Set: Preoperative Anxiety        │
│                                           │
│  Sex          a) Male                     │
│               b) Female                   │
│  Age          c) ≥30                      │
│               d) <30                      │
│  Education    e) Bachelor's degree and    │
│                    above                  │
│               f) Less than high school    │
│                    education              │
│  Previous     g) Prior surgery            │
│    surgery    h) No prior surgery         │
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derived from a Q study on preoperative anxiety conducted by Haag and Adamski.[7]

Large-sample theory guides the determination of sample size in traditional quantitative studies, but it is not a consideration in Q where the items rather than the persons comprise the sample and the unit of analysis. Instead, the number of subjects for a Q study reflects the requirement for enough persons to define the factors that emerge from factor analysis of the Q sorts. In Q, concern for the subjects : factors ratio replaces the subjects : variables ratio at issue in R. Brown noted, "What is of interest ultimately are the factors with at least four or five persons defining each; beyond that, additional subjects add very little."[5(p260)] Since no more than seven factors, and usually far fewer, emerge from the data in most Q studies, relatively small numbers of subjects are required. In clinical nursing research, a requirement for limited numbers of subjects is a decided advantage.

Also with items as the unit of analysis, Q methodology is valuable for the study of a single case (n = 1). In this approach, one person performs multiple Q sorts according to different frames of reference. When studying role strain in nursing faculty, for example, one faculty member may be asked to sort items according to how she or he views herself or himself as a teacher, a researcher, a clinician; how she or he believes the dean views her or his roles; and how she or he believes her or his colleagues view her or his roles, and how the students view these roles. To gain further insight into the underlying dynamics, that faculty member's students, colleagues, and dean also may be asked to sort the items. Data analysis will reveal areas of conflict and consensus among the different perceptions and thus will posit guidelines for reducing role strain.

The sorting procedure

Subjects are instructed to sort the cards along a continuum according to a predetermined meaning called a condition of instruction. In a study of parenting, expectant parents and parents with children of different ages might be asked to place the items in piles according to their beliefs about child raising. For theoretical reasons and to help subjects conceptualize the task, piles on the continuum are labeled in deviation form. For example, nine piles would be labeled −4 to +4 and would reflect a "most to most" orientation, such as "most believe to most disbelieve" or "most like me to most unlike me." Phenomenologically this is important because people's negative feelings can be just as strong as their positive ones. The middle pile labeled 0 contains items about which the subject is neutral, so that information is contained in the variance that bulges out or distends from that null position.

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Prior to sorting the cards subjects are told of the shape of the distribution, usually one that is flattened-normal. That is, only a certain number of cards can go in each pile so that a distribution is "forced." In this nine-pile continuum, the numbers in parentheses indicate the number of cards to be placed in each pile (see box, "Card Sorting Procedure").

Because subjects are encouraged to make comparisons among items throughout the sorting process, the cards for each pile are arranged in columns for visualization rather than hidden in a series of single stacks. There are no right or wrong answers, no right or wrong ways to do a Q sort. Subjects use the items to reflect their perspectives on the subject matter of the study, agreeing with one statement more than another. When the sorting is completed, the subject reexamines the entire array and realigns items if desired.

DATA ANALYSIS

Factor analysis is, and always has been, *the* form of data analysis for Q methodological investigations. The factors are the observable or operant form of the thoughts, feelings, or other kinds of subjectivity. Factor loadings in Q, however, are persons rather than items. When people load together significantly on the same factor, it is because their Q sorts are similar

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> *Factor loadings in Q are persons rather than items.*

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and highly correlated. Conceptually, this means that they share common perspectives on the topic of the study and define the categories that emerge as dimensions of the phenomenon.

Techniques of Q factor analysis

Although Stephenson[1] and Brown[3] advocate centroid factor analysis and hand rotation, existing computer software can and does yield significant mathematical and theoretical results. When a computer is used, principle factoring is followed by varimax rotation, since by definition the dimensions (factors) in Q are orthogonal.

Formatting data for the computer is different for Q than for R factor analysis. In the familiar R methodology, persons form the rows and items form the columns, while in Q methodology, items form the rows and persons form the columns. Thus, factor loadings are correlation coefficients representing the degree to which each individual's entire Q sort correlates with the various factors. Because an individual provided each Q sort, factor loadings reflect persons rather than single items. It is imperative to remember, how-

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Card Sorting Procedure

Most disagree								Most agree
−4	−3	−2	−1	0	+1	+2	+3	+4
(2)	(3)	(4)	(4)	(6)	(4)	(4)	(3)	(2)

ever, that Q methodology factor analysis is more than a transpose of R factor analysis, because the epistemology and emphasis on individual subjectivity, the structuring of the Q and P samples, and the nature of the Q sort itself make important contributions to the uniqueness of data analysis and interpretation.

The number of factors to extract is an issue in Q methodology, just as it is in R. Traditional ways of determining the number of factors to retain, such as eigenvalues in excess of 1.00 and factors having at least two significant loadings, are possibilities. Offering general guidance, Brown[5] suggests taking out more factors than one expects to be significant and dropping the insignificant factors after rotation. As a "rule of thumb," seven factors is an arbitrary but realistic starting point.

Factor loadings are considered to be significant at the 0.05 level if they exceed $1.96 (1/\sqrt{N})$ and at the 0.01 level if they exceed $2.58 (1/\sqrt{N})$, where N equals the number of items in the Q set. Using these predetermined criteria, all significant loadings for each factor are identified. Subsequently only the people who load significantly on just one of the factors are used for further analysis and factor definition. People who load significantly on more than one factor do so because they share perspectives with more than one category of the phenomenon. Using persons with multiple loadings obfuscates both the statistical and conceptual clarity of the respective factors. Persons who do not load significantly on any factor hold viewpoints that are diffuse enough to make them load somewhat on the major factors but are not strong enough to identify a factor of their own.

One factor at a time, significant factor loadings are used to weight the items of the Q set, each item receiving a factor score according to its aggregate weight. After the items are arranged in their weighted order, they are placed back into the original Q-sort continuum that the subjects followed in sorting the cards. Consequently, each factor looks like a Q sort and contains all of the items in the Q set. What makes each factor different from the rest is the different order of the items. Each factor array is most like the person's Q sort with the highest loading on that factor and least like the person's Q sort with the lowest loading.

Factor interpretation

Again, one at a time, each factor is interpreted conceptually using both inductive and deductive reasoning. The inductive approach follows a process somewhat similar to the analysis of data obtained through qualitative methodology. The theory underlying the research and the Q-set blueprint are set aside, and an understanding of the factor is allowed to emerge spontaneously. As factor arrays are interpreted, items that fit certain cells of the Q-set blueprint a priori may actually carry different meanings within the context of the various factors. As a matter of interest, the factor also can be examined deductively, although it is important not to be bound by artificial constraints or preconceived ideas. Whether or not the interpretation of the factor bears a resemblance to the investigator's original conceptualization is immaterial; the importance lies in the dimensions of the phenomenon as characterized by the subjects.

14 Since the items comprising each factor array are reassembled in a Q-sort continuum format, the items significantly differentiating the factors, and thus the dimensions of the phenomenon, are identifiable. Although the criteria for significance are a function of the number of items in the Q set and the shape of the forced distribution along the Q-sort continuum, a difference of three spaces along the continuum from factor to factor often is significant. Isolating these items by factor and making a side-by-side comparison enables the investigator to understand more clearly the factors themselves and the significant differences among them.

A condensed example from a study of control in hospitalized patients illustrates the issues of factor arrays and the significant differences among them.[8] In this study, two factors emerged from a condition of instruction related to what was most important and most unimportant to patients for getting well and going home. The scores of the following items on factor two differed by three points from the scores they received on factor one. Thus, these items marked some of the significant differences among the factor arrays. The numbers in the parentheses indicate the score of each item on factors one and two respectively.

(−1, +5) Help to decide whether to have surgery

(−4, +4) Help to decide what treatments I will have

(−1, +4) Contribute to discussions about whether to have certain diagnostic tests

(0, −5) Know when visiting hours are

(−2, −5) Wear my own pajamas or nightgown

Although a presentation of each factor array in entirety goes beyond the scope of this paper, arrays and their significantly differentiating items were used in the conceptual interpretation of each factor. Unlike factor one, as demonstrated above, persons on factor two emphasized an active participation in making decisions related to their care and treatment. Although persons on both factors gave relatively low scores to some of the esthetics of the environment, those on factor two, in the words of one patient, "couldn't have cared less."

Commonalities among persons

Further underscoring the uniqueness of the subjectivity emphasized in Q methodology, subjects load significantly on factors together because they share similar perspectives. In R methodology, investigators frequently analyze data according to externally imposed categories such as age, ethnicity, or gender. Although these preconceived, investigator-imposed categories tend to be developed on the basis of theory and the findings from previous research, they also may reflect statistical artifact. What may be more illuminating is the spontaneous groupings into which subjects have placed themselves. Although there is no guarantee that any of the demographic data will be correlated with the Q factors, relevant variables may naturally emerge among the persons defining each factor. Data from a study of control in hospitalized patients illustrate the inherent dimensions as well as an actual rather

than contrived segmentation of person-related characteristics.[8]

Although investigators had not examined control on the part of patients during the overall hospitalization experience, those who studied the stressfulness of hospitalization reported that patients' reactions differed by age, gender, and educational backgrounds.[9-12] In a Q-methodological study of control during hospitalization, these demographic variables were irrelevant among study participants. Fig 2 shows the widely scattered distribution of these variables among persons on the two factors. Instead, what marked the difference was the medical diagnosis.

Patients with a diagnosis of cancer, who were in the throes of often noxious diagnostic procedures and treatments, figured prominently on the decision-making factor (factor two), which was previously described. Patients on factor one, most of whom had diagnoses other than cancer and were in various stages of recovery from illness, found control through certainty of role enactment, both their own as patients and others as health care providers. They preferred not to be active decision makers. It is important to note that it probably was not the diagnosis per se that was most relevant but the concomitant subjective experiences of the individuals receiving various types of diagnostic and therapeutic interventions.

STRENGTHS AND LIMITATIONS

In addition to its penetrating and unconstrained approach to the study of subjectivity, Q methodology has a number of advantages that are particularly cogent for nursing research. Fewer subjects are required than with most other methods, and Q studies tend to be less costly.

SUBJ	FACTORS		SEX	AGE	ED	DX
	1	2				
_J_						
1	x		F	75	Bacc	M-Ca
3	x		M	24	HS	M-GU
6	x		M	30	>HS	M-GU
8	x		F	51	HS	M-GI
18	x		M	64	>HS	S-GU
20	x		M	64	PG	S-GU
22	x		F	57	>HS	S-Ca
25	x		M	25	Bacc	S-GI
27	x		F	51	—	S-Th
2		x	M	27	—	M-Ca
4		x	M	38	PG	M-Ca
5		x	F	49	HS	M-Ca
9		x	M	41	>HS	M-GI
11		x	M	28	Bacc	M-Ca
12		x	M	64	PG	M-Ca
19		x	M	66	>HS	S-GU
30		x	F	45	HS	S-Ca

Fig 2. Patterns of subjects' characteristics. Education (ED): HS = High school, Bacc = College graduate, PG = Postgraduate; Diagnosis (DX): M = Medical, S = Surgical, Ca = Cancer; GU = Genitourinary, GI = Gastrointestinal, Th = Thyroid.

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Q methodology has a number of advantages that are particularly cogent for nursing research.

Problems with missing data, social desirability, "undecided" responses, or response sets are virtually nonexistent, and the data tend to be highly reliable. Because subjects are their own points of reference, the introduction of bias from the environment surrounding data collection is not an issue, and thus Q methodology is amenable for interorganizational use.[13]

Despite its promise for nursing research, Q methodology has its own set of problems with which the researcher must deal. Group instruction and administration of Q sorts is possible in some studies, but in many nursing investigations patients are approached on an individual basis in hospitals or clinics. The resultant personalized administration of Q sorts requires large investments of time over the course of the study.[14] Instruments in all studies need to be explained to participants, but with Q sorts this process is particularly time consuming. While many persons are familiar with questionnaires and different types of rating scales, few have encountered Q sorts. Therefore, instructions need to be more extensive, and subjects, particularly children and those with limited education, may need to be shown how to proceed. A thorough comprehension of the instructions is essential if subjects are to represent their perspectives accurately and adequately. Validity is at issue if lack of comprehension leads to misrepresentation.[15]

The forced distribution of the Q-sort continuum is a strength of the methodology because it requires subjects to make fine discriminations they otherwise might not make. Its disadvantage lies in the potential for subjects to make mechanical rather than conceptual choices to complete the process. In addition, the selection of items for the Q sample and the selection of the P set are critical, because subjects may resent having to discriminate among items that are irrelevant.[16]

The Q sort is a different form of self-report data collection that offers an alternative to the often overworked paper-and-pencil measures. Although some subjects enjoy sorting the cards, the sorting process can be tiring to patients when energy resources are limited. Although one set of Q cards may be used by many participants, it is important for the researcher to have multiple decks so that subjects may sort the cards at their own pace and convenience, while data collection with other subjects can proceed.[14]

When conducting a Q study, it is very important to acknowledge a priori that the purpose of the methodology is to identify relevant dimensions of the phenomenon and to characterize commonalities among persons having different perspectives on the issue at hand. Q methodology is not intended to, nor is it capable of, discerning what percentages of a larger population subscribe to the various viewpoints. To answer that kind of question, a different methodology is required.

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Q methodology is not a panacea for nursing research. When used to its fullest potential, however, Q methodology pro-

vides an approach to the study of subjectivity that is not found in other research traditions. Nursing, unlike other disciplines, is not known for exclusive adherence to one research methodology. Instead, nurse researchers' methodological repertoires include surveys, experiments, quasi experiments, ethnographic methods, and a variety of descriptive approaches.

Adding Q methodology to that repertoire will enhance the nature and richness of the design alternatives for developing nursing knowledge. Q methodology has great promise for nursing research, but it is important to remember Stephenson's admonition that more than just a technique, it is "a profound way of approaching nature."[1]

REFERENCES

1. Stephenson W: *The Study of Behavior: Q-Technique and Its Methodology.* Chicago, Univ of Chicago Press, 1953.
2. Stephenson W: Newton's fifth rule and Q methodology: Application to educational psychology. *Am Psychol* 1980;35:882-889.
3. Laudan L: *Progress and Its Problems: Towards a Theory of Scientific Growth.* Berkeley, Calif, Univ of California Press, 1977.
4. Stephenson W: The shame of science. *Ethics Sci Med* 1978;5:25-38.
5. Brown SR: *Political Subjectivity: Application of Q Methodology in Political Science.* New Haven, Conn, Yale Univ Press, 1980
6. Hanson RC, Beech MJ: Communicating health arguments across cultures. *Nurs Res* 1963;12:237-241.
7. Haag GP, Adamski JA: Uncovering preoperative anxiety. *AANA J* 1978;46:615-621.
8. Dennis KE: *A Multi-Methodological Approach to the Measurement of Client Control,* doctoral dissertation. University of Maryland, Baltimore, Md, 1985.
9. DeWolfe AS, Barrell RP, Cummings JW: Patient variables in emotional response to hospitalization for physical illness. *J Consult Psychol* 1966;30:68-72.

10. Lucente FE, Fleck S: A study of hospitalization anxiety in 408 medical and surgical patients. *Psychosom Med* 1972;4:191-198.
11. Volicer BJ, Burns MW: Preexisting correlates of hospital stress. *Nurs Res* 1977;26:408-415.
12. Wilson-Barnett J: Patients' emotional reactions to hospitalization: An exploratory study. *J Adv Nurs* 1976;1:351-357.
13. Waltz CF, Stickland OL, Lenz ER: *Measurement in Nursing Research.* Philadelphia, FA Davis Co, 1984.
14. Dennis KE: Q methodology in nursing research: Promise and problems. Read before the Third Annual Research Conference of the Southern Council on Collegiate Education for Nursing, Baltimore, Md, Dec 2, 1983.
15. Dennis KE: Q methodology: New perspectives on estimating reliability and validity. Read before the Measurement of Clinical and Educational Nursing Outcomes Conference, New Orleans, La, June 27, 1985.
16. Whiting JF: Q-sort: A technique for evaluating perceptions of interpersonal relationships. *Nurs Res* 1955;4:70-73.