A Primer on Q Methodology

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Abstract: This primer serves two functions: (1) It is a simplified introduction to Q methodology, covering the topics of concourse, Q samples, Q sorting, correlation, factor analysis, theoretical rotation, factor scores, and factor interpretation. (2) It also illustrates different conceptions of Q methodology by taking the concept of "Q methodology" as the subject matter of the study. The factor results show how current understandings about Q are traceable to debates among Stephenson, Burt, and others in the 1930s, '40s, and '50s.

Introduction

Several years ago, on one of the many electronic conferences available on the Internet, a contributor asked about Q methodology and its connection to qualitative research methods. Specifically, the contributor, who will be referred to as Professor Follet (a pseudonym), was responding to an inquiry

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This article is a revised compilation of a series of postings to QUALRS-L and Q-METHOD, which are Internet electronic conferences on qualitative research methods and Q methodology, respectively.

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concerning the use of correlation in discourse analysis. Another contributor, who will be referred to as Professor Martin, then added to the growing discussion by recommending Q to those interested in combining qualitative and quantitative methods. And then another contributor chimed in and asked if there was any step-by-step information about Q technique, to which Martin then responded with a list of references and with brief mention of the use of SPSS for data analysis. The discussion was then joined by Professors Kendig, Hoffer, and myself, and in some instances theoretical and conceptual disagreements about the nature of Q methodology were apparent. Eventually, one of the participants wrote:

> ... maybe for the rest of us someone could explain, in simple terms, exactly what Q methods are good for -- in other words, what are they going to tell me about a phenomenon that I cannot learn some other way?

This invitation was accepted, and what follows is a slight revision of the eight short essays on various aspects of Q methodology that were addressed to the electronic conference during a two-month period. It is a simplified introduction, as those familiar with Q will immediately recognize (and as "Primer" in the title is intended to convey), and therefore takes its place as the bottom rung of a ladder that leads to McKeown and Thomas's *Q Methodology* (1988) and Brown's *Political Subjectivity* (1980) as preparatory to understanding Stephenson's *The Study of Behavior* (1953). The intent of this *Primer* is to provide a relatively statistics-free and user-friendly response to the query about what Q might "tell me about a phenomenon that I cannot learn some other way."

Background

What is currently referred to as *Q methodology* was introduced by psychologist/physicist William Stephenson (1902-1989) in a letter to *Nature* in 1935, and spelled out in more detail in "Correlating Persons Instead of Tests" (1935), "Foundations of Psychometry: Four Factor Systems" (1936), and in a celebrated paper with Sir Cyril Burt ("Alternative Views on Correlations Between Persons," 1939) in which the two laid out their contrasting views. His major statement is *The Study of Behavior: Q-technique and Its Methodology* (1953).

In large measure, the differences of opinion about Q which appeared on the electronic conference noted above can be traced to the theoretical and conceptual divergences of the 1930s. Burt's viewpoint, bolstered by such notable factor analysts as R.B. Cattell, Hans Eysenck, and L.L. Thurstone, has generally carried the day and has been ensconced in research methods texts in a variety of fields, not to mention users' manuals for SPSS and other statistical packages, which helps explain why Stephenson's views often sound so out of step despite the fact that Q methodology was his innovation.

Recently, however, Stephenson's ideas have gained in prominence outside psychology. Spurred initially by his own *The Play Theory of Mass Communication* (1967/1988), a number of other books and articles have appeared which have served to clarify Q's presuppositions and to demonstrate its applicability in virtually every corner of human endeavor. In 1977, publication began of *Operant Subjectivity: the Q Methodology Newsletter*, which in 1989 was adopted as the official journal of the newly created International Society for the Scientific Study of Subjectivity. The Society has met annually since 1985 and has generally pursued the implications and applicability of Stephenson's ideas in psychology, communication, political science, health, environmental, and related areas. On-going exchanges are also to be found on Q-Method, an electronic conference accessible at the Internet address Listserv@kentvm.kent.edu.

Fundamentally, Q methodology provides a foundation for the systematic study of subjectivity, and from this innocent beginning flows a number of surprising consequences, as will be seen. Most typically in Q, a person is presented with a set of statements about some topic, and is asked to rank-order them (usually from "agree" to "disagree"), an operation referred to as *Q sorting*. The statements are matters of opinion only (not fact), and the fact that the Q sorter is ranking the

statements from his or her own point of view is what brings subjectivity into the picture. There is obviously no right or wrong way to provide "my point of view" about anything -- health care, the Clarence Thomas Supreme Court nomination, the reasons why people commit suicide, why Cleveland can't seem to win the pennant, or anything else. Yet the rankings are subject to factor analysis, and the resulting factors, inasmuch as they have arisen from individual subjectivities, indicate segments of subjectivity which exist. And since the interest of Q methodology is in the nature of the segments and the extent to which they are similar or dissimilar, the issue of large numbers, so fundamental to most social research, is rendered relatively unimportant. In principle as well as practice, single cases can be the focus of significant research.

In short, the focus is on quality rather than quantity, and yet some of the most powerful statistical mechanics are in the background, but sufficiently so as to go relatively unnoticed by those users of Q who are disinterested in its mathematical substructure. What this might mean for the student of human behavior, including (and perhaps especially) those wedded to *qualitative* methods, is illustrated in the study which follows.

Concourse Theory

As noted previously, Q methodology is comprised of procedures and a conceptual framework that provide the basis for a science of subjectivity, and its phenomena consist of the ordinary conversation, commentary, and discourse of everyday life -- of the kind that proliferates, for example, when discussion turns to such things as the Gulf War, the care of geraniums, whether we can really trust the Russians, pornography, popular impressions about a controversial film, psychotherapeutic strategy, the meaning of life, what to do about the budget deficit, and so forth.

In Q, the flow of communicability surrounding any topic is referred to as a *concourse* (from the Latin *concursus,* meaning "a running together," as when ideas run together in thought), and it is from this concourse that a sample of statements is subsequently drawn for administration in a Q sort. The best references on concourse theory are Stephenson's "Concourse Theory of Communication" (1978), "Consciring: A General Theory for Subjective Communicability" (1980), and "Protoconcursus: The Concourse Theory of Communication" (1986).

Concourse is the very stuff of life, from the playful banter of lovers or chums to the heady discussions of philosophers and scientists to the private thoughts found in dreams and diaries. From concourse, new meanings arise, bright ideas are hatched, and discoveries are made: it is the wellspring of creativity and identity formation in individuals, groups, organizations, and nations, and it is Q methodology's task to reveal the inherent structure of a concourse -- the vectors of thought that sustain it and which, in turn, are sustained by it.

By the same token, concourses are not restricted to words, but might include collections of paintings, pieces of art, photographs, and even musical selections. Grosswiler (1992), for instance, incorporated into a Q sample such diverse materials as newspaper clippings, audio- and videotapes, visual art, and snippets from literature; Kinsey (1991) incorporated as Q "statements" a selection of Gary Larson cartoons; and Wacholtz (1992) used audiocassettes of country music. The idea of concourse incorporates virtually all manifestations of human life, as expressed in the lingua franca of shared culture.

A concourse can be gotten in a number of ways. The most typical is by interviewing people and jotting down or recording what they say, but commentaries from newspapers, talk shows, and essays have also been used. The level of discourse dictates the sophistication of the concourse: hence, factors which should be taken into account in decisions about who should receive a liver transplant at a particular hospital would likely involve the medical personnel, the potential recipients (and perhaps the donor), and possibly even a philosopher specializing in medical ethics (or sociologist with expertise in medical sociology) who might be called in as a consultant. A study of public opinion, on the other hand, would necessitate interviewing representatives of those seg-

ments of the society apt to have something to say about the issue in question.

An illustration is useful for giving substance to the above generalities, and for convenience we can take the commentary that was generated in the course of the abovementioned discussion about the nature of Q methodology itself -- i.e., in terms of the different views about Q that were expressed in the electronic conference during a four or five week period. Persons unfamiliar with Q methodology will not be surprised to find that much of the commentary to follow is of a specialized nature, hence comprehendable in detail by a relatively small audience; the same could be said, however, of a similar analysis of clients in therapy or members of a delinquent gang: a subculture has specific issues which are central to it, and often a specialized language evolves for expressing ideas that may appear obscure to the outsider (who nevertheless may see things more clearly by virtue of being outside). What follows are just a few of the elements from the small concourse which was generated. The pseudonyms of authors of the comments are in parentheses so that the nature of each person's viewpoint can be seen. The verbatim comments are in the order in which they appeared during the course of discussion:

> It allows us to sort patterns of speech among speakers. (Follet)
>
> It uses an ipsative technique of sorting a representative set of subjective statements drawn from a concourse of possible feelings or reactions about a subjective condition. (Martin)
>
> In Q-factor techniques, a case by case matrix of some sort of similarity measure (usually an ipsatized correlation) is analyzed. (Kendig)
>
> Q factor analysis is a simple variation of factor analysis, actually component analysis. (Hoffer)
>
> Q methodology is a set of procedures, theory, and philosophy supporting the study of the same kind of subjectivity that is the focal point of much qualitative research. (Brown)

The original commentary from which the above were abstracted was naturally more detailed. The complete concourse is in the Appendix.

As is apparent, the statements in the concourse are subjective as opposed, say, to the statement "2 + 2 = 4," which is uncontroversial and ostensibly true. Concourses such as the above comprise the raw material of a human science in its subjective respects, and it is frequently at this point that so-called qualitative analyses often break down. Once "texts" (in the widest sense) have been gathered -- from interviews, diaries, participant observation, etc. -- the task becomes one of organization, analysis, and presentation, and in most instances the observer is forced to fall back (as in content analysis) on categories which are superimposed on the data. As will be seen below, Q methodology likewise involves the artificial categorizing of statements, but ultimately this artificiality is replaced by categories that are *operant*, i.e., that represent functional as opposed to merely logical distinctions.

Q Samples

Concourse comprises the raw materials for Q methodology, and for the human sciences generally insofar as they are concerned with life as it is lived, i.e., from the vantagepoint of the person involved. The illustration provided above consisted of the brief commentary that had accrued concerning the nature and scope of Q methodology itself. Diversity in viewpoint was abundant, from the technicalities of factor analysis to the abstractions of quantum theory, from the simplicity of Q sorting to more complex philosophical considerations about subjectivity. The concourse is far from complete and could, if desired, be supplemented with comment and controversy dating from the mid-1930s, when Q was born. Still, what has been presented so far is sufficiently comprehensive to demonstrate a range of opinion, and to introduce the problem of what to do with all the assertions that have been entered into the discursive arena.

For experimental purposes, a subset of statements, called a *Q sample,* is drawn from the larger concourse, and it is this set of statements which is eventually presented to participants in the form of a Q sort. The statements selected for this particular study are as follows:

(1) It permits the a priori structuring of hypotheses in the design of the Q set to be sorted.

(2) Q methodology is a set of procedures, theory, and philosophy supporting the study of the same kind of subjectivity that is the focal point of much qualitative research.

(3) The method can be coupled with analysis of variance to test hypotheses.

(4) The interpretation of factors is more difficult if the Q sorts are internally inconsistent than when they are based on structured Q sets representing testable scientific hypotheses.

(5) Centroid factor analysis is recommended since its indeterminacy is compatible with quantum theory and, at the rotational stage, with interbehavioral principles.

(6) "Ipsative" generally applies to patterns of objective scores for persons, and has little to do with the subjectivity intrinsic to Q methodology.

(7) Cluster analysis may bear some statistical similarity to Q factor analysis, but in most respects it is quite different from the version of factor analysis used in Q methodology.

(8) The history of Q methodology attests to the largely arbitrary division between qualitative and quantitative.

(9) Cluster analysis is really something quite different and has no commitment to that subjectivity which is central to Q methodology.

(10) Variance designs are only used to represent theory. Testing is in terms of dependency factor analysis.

(11) The idea is to come up with a set of traits that characterize individuals, then compare individuals for the distribution of these sets.

(12) Q can give some fascinating insight into underlying philosophic structures which comprise subjective phenomena.

(13) It is intended to get at patterning within individuals (casewise) rather than simply across individuals (factor-wise sorting).

(14) It allows for the interpretive study of subjective behaviors without imposing the usual biases of structured survey questionnaires.

(15) Q-factor is an early form of cluster analysis.

(16) Factor scores can be tough to come by because the correlations are of reduced rank.

(17) There is more to the method than just the technique of Q sorting.

(18) Q has never involved the correlation and factor analysis by rows of the same matrix of data that is analyzed by columns in R methodology.

(19) The frequencies in the piles must be restricted to the frequencies that would be expected if you had a normal curve, with each pile corresponding to an area of a normal curve.

(20) It uses an ipsative technique of sorting a representative set of subjective statements drawn from a concourse of possible feelings or reactions about a subjective condition.

As with sampling persons in survey research, the main goal in selecting a Q sample is to provide a miniature which, in major respects, contains the comprehensiveness of the larger process being modeled. The problem, of course, is how to select from the concourse so as to provide representativeness in the Q sample, and the main device relied upon to achieve this is Fisher's experimental design principles (Brown, 1970).

In this particular case, the simplest of designs was employed. While perusing the concourse, it was noted that some of the statements were of a technical nature, viz.:

> The method can be coupled with analysis of variance to test hypotheses.

On the other hand, there were comments of a more abstract and methodological nature (methodological, that is, in its wider and more philosophical sense):

> Q can give some fascinating insight into underlying philosophic structures which comprise subjective phenomena.

As a preliminary matter, therefore, all statements in the concourse were categorized as either (a) methodological or (b) technical, depending on their main thrust, all the time recog-

nizing that few statements are ever one or the other exclusively.

It is often the case that more than one dimension (e.g., methodological/technical) is at issue, and so at this point we could have subdivided the (a) and (b) statements above -- e.g., into (c) Stephenson, (d) Burt, and (e) Neither, to take into account the intellectual heritage of the points of view at issue. This would have provided the design in Table 1, with $2 \times 3 = 6$ cells. Equal numbers of statements would then be selected from each of the cells (e.g., 8 of type ac statements, 8 of type ad, etc.) for a Q-sample size of $N = (6)(8) = 48$ statements for Q sorting by respondents.

Table 1
Q-Sample Structure

	(a) methodological	(b) technical
(c) Stephenson	(ac)	(bc)
(d) Burt	(ad)	(bd)
(e) Neither	(ae)	(be)

To keep matters simple, only $N = 20$ statements were chosen for this illustration, 10 from category (a) methodological and 10 from (b) technical. The statements in each category are as follows (numbers are associated with the above statements):

Methodological:	2	5	6	8	9	12	14	17	18	20
Technical:	1	3	4	7	10	11	13	15	16	19

As can be seen, the statements are numbered randomly. They are then typed one to a card, the result being a pack of cards (numbering 20) ready for Q sorting.

Before proceeding, it is important to note that, unlike scaling theory, no assumption is made that these 20 statements in any sense measure a "methodological" or "technical" position or stance or understanding per se. In *The Study of Behavior* (1953, chap. 2), Stephenson distinguishes among

general, singular, and induced propositions, and the a priori placing of statements into this or that category is exemplary of the former: a statement can be considered primarily methodological or technical on an ad hoc and mainly logical basis ("all things being equal," as we say), as if it has generalized meaning. But in concrete (singular) situations, words and phrases can mean wholly different things to different people.

This matter is raised at this point since one of the most influential chapters on Q methodology, in Kerlinger's *The Foundations of Behavioral Research* (1985), places great importance on the proper categorization of Q statements -- as if, as in scaling, they could have only one meaning -- and also because one of the participants (Martin) to the electronic conference from which this Q sample was drawn cited Kerlinger's work approvingly. Kerlinger's work is indeed important, but he attached too much weight to variance designs and their analysis, and overlooked Stephenson's admonition (in *The Study of Behavior*) that "it is a mistake to regard a sample as a standardized set or *test* of statements, any more than one can hope to regard a particular set of children as a standard sample..." (p. 77). There are many features to this subtle matter, but the bottom line is that meanings are not to be found solely in the categorical cogitations of the observer, but as well (and even more importantly) in the reflections of the individual as he or she sorts the statements in the context of a singular situation.

Q Sorting

To this point, a Q sample of $N = 20$ statements has been selected from the concourse, and it is this Q sample which is administered to participants in the form of a Q sort. The statements are administered in the form of a pack of randomly numbered cards (one statement to a card) with which the person is instructed to operate according to some rule (called a *condition of instruction*). Typically we are interested in the person's own point of view, and so we would instruct the Q sorter to rank the statements along a continuum from *most*

agree at one end to *most disagree* at the other. To assist in the Q sorting task, the person is provided with a scale and a suggested distribution. More detailed descriptions of Q sorting are to be found in Brown's *Political Subjectivity* (1980) and in McKeown and Thomas's *Q Methodology* (1988).

Table 2
Q Sort

Brown's Position						
-3	-2	-1	0	1	2	3
16	3	1	7	6	5	2
19	13	4	8	17	9	12
	15	11	10	18	14	
			20			

An example may help clarify what is involved, and for this purpose is shown (in Table 2) the Q sort which I performed in rendering my own point of view using the statements displayed above. Generally, the person is given the Q sample and instructed to read through all of the statements first so as to get an impression of the range of opinion at issue and to permit the mind to settle into the situation. At the same time, the person is also instructed to begin the sorting process by initially dividing the statements into three piles: those statements experienced as agreeable in one pile, those disagreeable in a second pile, and the remainder in a third pile. The rating scale is spread across the top of a flat area (like a kitchen table), and may range from +3 to -3, or +4 to -4, or +5 to -5, depending on the number of statements. The distribution is symmetrical about the middle, but usually flatter than a normal distribution. Both the range and the distribution shape are arbitrary and have no effect on the subsequent statistical analysis, and can therefore be altered for the convenience of the Q sorter; there are, however, good reasons for encouraging the person to adhere to whatever distribution shape is adopted for the study.

The Q sort above shows that strongest agreement is with statements 2 and 12, which read as follows:

> (2) Q methodology is a set of procedures, theory, and philosophy supporting the study of the same kind of subjectivity that is the focal point of much qualitative research.
>
> (12) Q can give some fascinating insight into underlying philosophic structures which comprise subjective phenomena.

It is clear, therefore, that my primary concern while peforming the Q sort was with the issue of subjectivity, and this is reinforced at +2 by statements 9 and 14:

> (9) Cluster analysis is really something quite different and has no commitment to that subjectivity which is central to Q methodology.
>
> (14) It allows for the interpretive study of subjective behaviors without imposing the usual biases of structured survey questionnaires.

One of the continuing frustrations that Q methodology has had to face for the almost 60 years of its existence has been the restriction of its theoretical and methodological thrust through the partial incorporation of its technical procedures -- as if all physics had to offer were its cyclotrons and behavior analysis its Skinner boxes. Hence academic psychology quite easily adopted Q sorting as a data-gathering technique, and even incorporated certain aspects of Q factor analysis, but ignored the idea of a natural science of subjectivity, and it is this protest that dominates the positive end of the above Q sort performed by one of Stephenson's students. Statement 17 punctuates the protest, like a parting remark:

> (17) There is more to the method than just the technique of Q sorting. (+1)

A significant characteristic of each and every Q sort on any and all topics is its schematic nature, or what Stephenson, in his "Consciring" paper (1980), referred to as Peirce's Law

(*in re* Charles Peirce's "Law of Mind"). There is therefore a consistency in sentiment throughout the Q sort. Under -3, for example, we see a denial of the antithesis of what is found under +3:

> (16) Factor scores can be tough to come by because the correlations are of reduced rank.
>
> (19) The frequencies in the piles must be restricted to the frequencies that would be expected if you had a normal curve, with each pile corresponding to an area of a normal curve.

Individuals unfamiliar with Q methodology are reminded that the concourse of communicability surrounding it can be highly specialized; even so, it should be easily recognized that what characterizes the positive end of the above Q sort distribution has to do with subjectivity, whereas the above statements, both scored -3, concern themselves with technicalities. This is not to say that statements 16 and 19 were found unacceptable *because* they dealt with technicalities: there are good technical reasons for rejecting them, but the technicalities are rooted in an appreciation of the subjectivity enbraced under +3 and +2.

Most Q technique studies involve administration of the Q sort to several respondents, but to far fewer than is the case, say, in survey research: even in studies of public opinion, samples of persons (P sets) rarely exceed 50 for reasons which will be discussed subsequently. In this particular study, we would naturally be interested in including the views of those individuals who originally contributed to the concourse -- i.e., Professors Follet, Martin, Kendig, et al. For purposes of demonstration, however, simulations of these individuals' views were created (by myself), based on their contributions to the electronic conference. "Professor Follet's View," for example, is shown in Table 3.

Without going into great detail at this point, simply note that the Follet Q sort asserts that "The idea is to come up with a set of traits that characterize individuals, then compare individuals for the distribution of these sets" (no. 11, +3), and

Table 3
Simulated Q Sort

Follet's Position						
-3	-2	-1	0	1	2	3
7	5	6	2	1	3	11
18	9	8	10	4	15	13
	14	12	17	20	16	
			19			

that "It is intended to get at patterning within individuals (case-wise) rather than simply across individuals (factor-wise sorting)" (no. 13, +3). Both of these were points of view which Follet espoused in his contributions to the electronic conference, and his primary concern with technical and statistical features characterizes his Q sort at the negative end as well where it is denied that cluster analysis and Q factor analysis are fundamentally different (no. 7, -3), and that "Q has never involved the correlation and factor analysis by rows of the same matrix of data that is analyzed by columns in R methodology" (no. 18, -3).

At different times over the space of three or four days, Q sorts were constructed as well to represent the views of other contributors to the discussion: Professors Martin, Kendig, and Hoffer. For obvious reasons, a Q sort representing William Stephenson's viewpoint was also constructed for purposes of comparison with other views; and a Q sort for Kerlinger, whose work on Q had been mentioned (Kerlinger, 1986); and also one representing a composite of the views of Sir Cyril Burt and R.B. Cattell, prominent exponents of factor analysis (R method) in its formative days. Also for theoretical purposes, a Q sort was constructed to represent the kind of conventional view about Q technique that one might read in a typical textbook on research methods. And finally, for reasons to which we will return, a Q sort rendition was given of what a *quantum theoretical* viewpoint about Q might be. There were therefore 10 Q sorts in all -- my own plus nine hypothetical standpoints.

As noted previously, it is unnecessary to claim that any of the above Q sorts is in any sense a "true" reflection of Follet's or Martin's or Burt's or anyone else's view, although we might be somewhat surprised to learn that the mark had been missed entirely. These Q sorts are formal models of my understanding of the points of view at issue, rendered ostensible through technique. Next, it will be shown how these perspectives can be systematically compared.

Before moving on, however, it is important to note that a completed Q sort should be followed where possible with an interview so that the Q sorter can elaborate his or her point of view. The Q sort provides focus to the interview by indicating which of various topics in the Q sample are most worth talking about: obviously those statements scored +3 and -3 should be addressed first since they are demonstrably the most salient, but those scored 0 can be revelatory by virtue of their lack of salience.

It is useful at this point to take brief stock of what has been achieved. (1) The Q sample is comprised solely of things which people have said, and it is therefore indigenous to their understandings and forms of life. (2) The Q sorting operation is wholly subjective in the sense that it represents "my point of view" (whether the "me" at issue is Brown, Follet, Martin, or someone else): issues of validity consequently fade since there is no external criterion by which to appraise a person's own perspective. (3) As a corollary, the factors which subsequently emerge -- factors, that is, in the factor-analytic sense -- must represent functional categories of the subjectivities at issue, i.e., categories of *operant subjectivity*. All of this applies to any Q sort on any topic administered to any person in any land under any condition of instruction at any time. Subjectivity is ubiquitous, and Q methodology provides for its systematic measure.

Correlation

In their book on *Basics of Qualitative Research* (1990), Anselm Strauss and Juliet Corbin are quite explicit in distinguishing

qualitative from quantitative research: "By the term *qualitative research* we mean any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (p. 17). One of the advantages of qualitative research, of course, is that it permits the systematic gathering of data which are not always amenable to quantification, but to appraise data on the basis of whether or not they have been subjected to statistical analysis is surely a case of misplaced emphasis. It is important to be able to assay the subjectivity at issue in a situation, which Q does: the fact that the resulting data are also amenable to numerical treatment opens the door to the possibility of clarity in understanding through the detection of connections which unaided perception might pass over. In Q, the role of mathematics is quite subdued and serves primarily to prepare the data to reveal their structure.

The Q sorts above representing my own view and that of Professor Follet (simulated) were pictured, and so it is convenient to draw on these two again to demonstrate the simplicity and subsumptive power of correlation. In tabular form, the two sets of scores are as shown in Table 4, where D is the difference between Follet's and Brown's scores, and D^2 is the difference squared.

We note, in column D, the discrepancy between the score for each item in the Follet Q sort compared to that in the Brown Q sort, and for statistical reasons that number is squared (column D^2). Hence, for example, Follet gives statement no. 1 a score of +1 whereas Brown scores it -1, a difference of D = 2, the square of which is of course 4. The squared differences are then summed, which, as Table 4 shows, produces Sum = 220. Note that if the two Q sorts had been identical, each D would have been 0, each D^2 would have been 0, and Sum would have been 0: when this occurs, the correlation is perfect (an extremely rare event) and is registered as $r = +1.00$, r being the symbol for correlation.

The specific calculation in this case is achieved first by squaring all of the scores in the Follet and Brown Q sorts and summing those squared numbers, which produces a sum of 66

Table 4
Calculation of r

item	Follet	Brown	D	D^2
1	1	-1	2	4
2	0	3	-3	9
3	2	-2	4	16
4	1	-1	2	4
5	-2	2	-4	16
6	-1	1	-2	4
7	-3	0	-3	9
8	-1	0	-1	1
9	-2	2	-4	16
10	0	0	0	0
11	3	-1	4	16
12	-1	3	-4	16
13	3	-2	5	25
14	-2	2	-4	16
15	2	-2	4	16
16	2	-3	5	25
17	0	1	-1	1
18	-3	1	-4	16
19	0	-3	3	9
20	1	0	1	1
Sum	0	0	0	220

for each, or 132 for the two combined. The correlation is calculated by forming the ratio of the sum of squares for Follet and Brown combined to the sum of the squared differences, and then subtracting this from 1.00. Or, in this case:

$$\begin{aligned} r &= 1 - (\text{Sum } D^2/132) \\ &= 1 - (220/132) \\ &= -0.67 \end{aligned}$$

Just as a perfect positive correlation is registered as +1.00, a perfect negative correlation is -1.00, and so the correlation between Follet and Brown of r = -0.67 indicates a quite high level of disagreement, the statements which the one embraces tending to be the ones which the other rejects, and vice versa.

Table 5
Correlation Matrix

Sort	1	2	3	4	5	6	7	8	9	10	
1	--	17	79	76	-70	86	48	85	-71	-67	Follet
2	17	--	14	-05	06	12	74	20	-08	24	Martin
3	79	14	--	73	-70	70	27	82	-53	-57	Kendig
4	76	-05	73	--	-85	80	23	82	-77	-81	Hoffer
5	-70	06	-70	-85	--	-82	-17	-76	73	76	Stephenson
6	86	12	70	80	-82	--	39	82	-65	-66	Burt-Cattell
7	48	74	27	23	-17	39	--	44	-48	-28	Kerlinger
8	85	20	82	82	-76	82	44	--	-74	-67	textbook
9	-71	-08	-53	-77	73	-65	-48	-74	--	85	quantum
10	-67	24	-56	-82	76	-65	-27	-67	85	--	Brown

Decimals to two places omitted.

Follet's and Brown's are but 2 of the 10 Q sorts at issue, and when each of the 10 is compared with the others, the result is a 10×10 correlation matrix, as shown in Table 5. As indicated, Brown (no. 10) correlates with Follet (no. 1) in the amount -0.67, and a quick perusal down column 10 shows that Brown correlates substantially and positively only with Q sort no. 5 (Stephenson, his mentor) and no. 9 (quantum theory); otherwise, he correlates negatively with virtually everyone else save for Martin, although the positive correlation in that case (r = 0.24) is insubstantial. Follet on the other hand correlates quite highly with Kendig and Hoffer.

To determine how large a correlation must be before it is considered substantial, we calculate the standard error (SE), a rough and ready estimate of which is given by the expression $SE = 1/\sqrt{N}$, where N is the number of statements (N = 20 in this case): the value is therefore $1/\sqrt{20}$ = 1/4.47 = 0.22. As a rule of thumb, correlations are generally considered to be statistically significant if they are approximately 2 to 2.5 times the standard error -- i.e., somewhere between 2(0.22) = 0.44 and 2.5(0.22) = 0.56 (irrespective of sign). Hence in the above correlation matrix, Brown's positive correlation with Stephenson is substantial (i.e., in excess of 0.56) as is his negative correlation with Follet (i.e., in excess of -0.56), whereas his

correlation with Kerlinger is insignificant (i.e., is less than ±0.44).

But it is rarely the case that the correlation matrix is of much interest since attention is usually on the factors to which the correlations lead: the correlation matrix is simply a necessary way station and a condition through which the data must pass on the way to revealing their factor structure. What this involves is the subject of the next section.

Before moving on, however, it is worth stressing that the statistics associated with Q are not intended as a substitute for the obvious fact that the correlation matrix above is suffused with subjectivity, each Q sort being a transformation of a person's own vantagepoint, and with the coefficients merely registering the degree of similarity or dissimilarity in perspective. Moreover, although Q emerged from psychometric discussions in the 1930s, it is less and less the case that users of Q technique have need for much more than a minimal grasp of statistics. Software packages for personal computers, such as Stricklin's (1990) PCQ or Atkinson's (1992) QMethod mainframe program convert into ease what before was drudgery, and thereby redirect attention back to the phenomenon and away from the means of its measurement.

Factor Analysis

Few statistical procedures can be more daunting than factor analysis, but in Q methodology there is little more reason to understand the mathematics involved than there is to understand mechanics in order to drive a car. A certain minimal knowledge is required, of course -- such as when (but not necessarily why) to change the oil -- but available and forthcoming software packages are lessening the need to understand factor analysis in detail, thereby freeing intellectual sojourners to remain focused on the road ahead while taking for granted the mathematics purring under the hood. Those interested in further details, presented with as much simplicity as the subject matter allows, are referred to Adcock's (1954) out-of-print classic *Factorial Analysis for Non-Mathematicians*, Brown's (1980) *Political Subjectivity* (pp. 208-224), Stephenson's (1980) "Factor Analysis," and Rust and Golombok's (1989) *Modern Psychometrics* (pp. 114-130).

Fundamentally, factor analysis examines a correlation matrix such as that reported in Table 5, and, in the case of Q methodology, determines how many basically different Q sorts are in evidence: Q sorts which are highly correlated with one another may be considered to have a family resemblance, those belonging to one family being highly correlated with one another but uncorrelated with members of other families. Factor analysis tells us how many different families (factors) there are. The number of factors is therefore purely empirical and wholly dependent on how the Q sorters actually performed. In this example, the factors will indicate different conceptions about Q methodology, with those persons sharing a common conception defining the same factor.

Table 6
Unrotated Factors

		Factor Loadings						
	Q Sorts	A	B	C	D	E	F	G
1	Follet	92	08	07	05	11	-06	-13
2	Martin	15	78	-14	34	-10	13	12
3	Kendig	78	04	31	20	01	-24	07
4	Hoffer	87	-31	05	11	-19	-06	08
5	Stephenson	-82	35	-10	-14	26	-13	02
6	Burt-Cattell	89	-02	16	13	-01	11	-25
7	Kerlinger	50	47	-66	46	20	17	07
8	textbook	94	07	09	03	-01	-08	10
9	quantum	-84	17	40	01	29	19	15
10	Brown	-75	46	13	-03	03	17	05

Decimals to two places omitted.

Table 6 contains the initial set of *factor loadings* (as they are referred to) for each of the 10 Q sorts in our illustration. The table was created by QMethod (Atkinson, 1992), which automatically extracts seven centroid factors. The loadings express the extent to which each Q sort is associated with each factor: hence the Follet Q sort is correlated with factor A to

the extent of 0.92, whereas Brown's is correlated -0.75; on factor B, their respective loadings are 0.08 and 0.46. As indicated above (in the section on "Correlation"), factor loadings in excess of ±0.50 can be considered significant; therefore, only the first two or three factors contain significant loadings.

However, the original set of factors is usually of little immediate interest and only provides the raw materials for probing these subjective relationships from vantagepoints that might interest us. One point of interest, it will be recalled, was that Martin cited Kerlinger's work with approval (see section on "Q Samples," above); for another, it was striking how different Follet's, Hoffer's, and Kendig's views were from Stephenson's. Factor rotation enables us to take advantage of these impressions and any other bits of information at our disposal, as well as any guesses, hunches, and notions that might come to mind. It is at this point -- during factor rotation -- that Peirce's theory of abduction enters Q most saliently, a matter to which we will return.

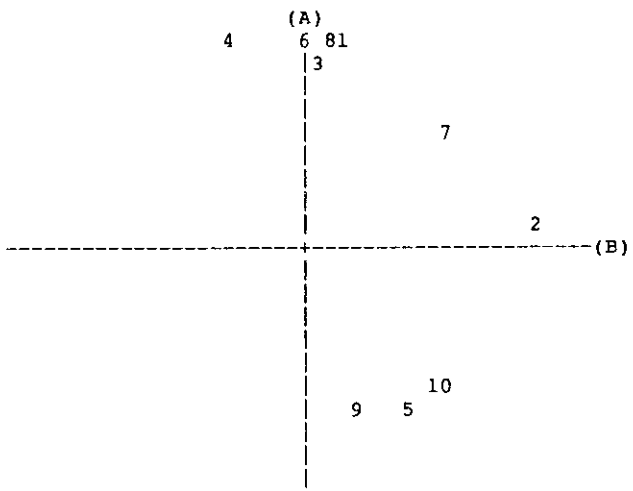

Figure 1

With the above impressions in mind, we note, in examining Table 6, that any Martin-Kerlinger connection that might

exist is not "in focus": Martin is significantly associated with factor B (in the amount 0.78) but not A (0.15); Kerlinger, on the other hand, is significant on A (0.50) and almost so on B (0.47). All of the relationships encompassed by factors A and B can be represented visually, as shown in Figure 1. In this instance, the numbers in the figure are associated with the Q sorts in the previous table (e.g., Martin is no. 2, Kerlinger no. 7), and their spatial locations are a function of the factor loadings: hence Martin is at 0.15 on A and 0.78 on B, and the same for all the other Q sorts, with spatial proximity being indicative of the degree of conceptual similarity: The factors can be repositioned so as to highlight the connection between the views of Martin and Kerlinger by rotating the factors such that one of them extends through the center of gravity between Q sorts 2 and 7. This is accomplished, in this case, by rotating the factors approximately 70° clockwise. (In earlier days, this task was accomplished with graph paper, a T-square, and a protractor, but QMethod reduces to one or two seconds what before would have required several minutes.) The rotation produces the result shown in Figure 2.

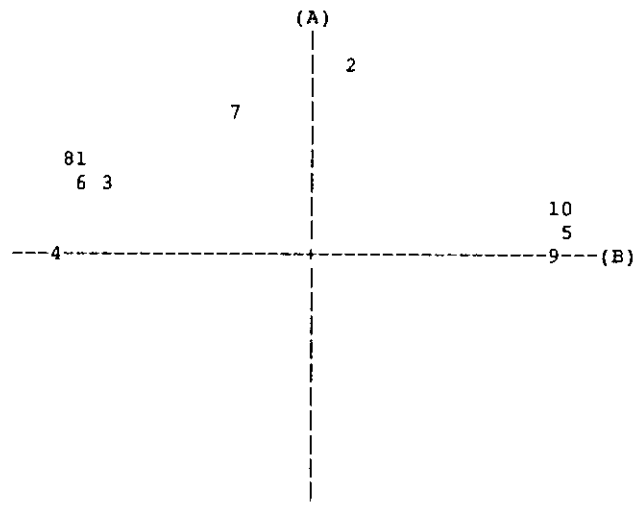

Figure 2

The consequence of this rotation serves not only to focus Martin and Kerlinger on factor A, but also Stephenson (no. 5) and Brown (no. 10) on factor B (and Hoffer, no. 4, at the opposite pole of the same factor). This rotation changes the factor A and B loadings for all the Q sorts, and these are registered in Table 7. Note, in comparing this with the prior table, that the loadings for factors C through G remain the same; only the loadings for factors A and B (now relabeled A2 and B2) have been altered to take into account the rotation above.

Table 7
Rotated Loadings, Factors A and B

	Q Sorts	A2	B2	C	D	E	F	G
1	Follet	39	-83*	07	05	11	-06	-13
2	Martin	79*	13	-14	34	-10	13	12
3	Kendig	30	-72*	31	20	01	-24	07
4	Hoffer	01	-92*	05	11	-19	-06	08
5	Stephenson	05	89*	-10	-14	26	-13	02
6	Burt-Cattell	29	-84*	16	13	-01	11	-25
7	Kerlinger	62*	-31	-66	46	20	17	07
8	textbook	39	-86*	09	03	-01	-08	10
9	quantum	-13	85*	40	01	29	19	15
10	Brown	18	86*	13	-03	03	17	05

*Significant loadings.

As noted previously, the Q factors in this case represent different perspectives or conceptualizations concerning the nature of Q methodology itself, and although we only have one rotation behind us at this point, already the main outlines of what is at issue are beginning to emerge: factor B is the manifestation of a strong bipolarity between Stephenson and Brown on the one hand and Follet, Kendig, Hoffer, and Burt and Cattell on the other; whereas factor A represents that understanding about Q methodology held by Kerlinger and Martin.

Even so, another look at Table 7 indicates that factor A2 can be strengthened somewhat by rotating it as before against those factors which contain some variability (albeit statistically insignificant) held in common by Martin and Kerlinger. On factor D, for example, Martin is saturated 0.34 and Kerlinger 0.46, and on C they have loadings of -0.14 and -0.66, respectively. When A2 is graphed against D, for example, the configuration in Figure 3 results, and a 35° clockwise rotation adds to factor A (which now becomes A3) that portion of variability for Q sorts 2 and 7 that was formerly associated with factor D (now D2).

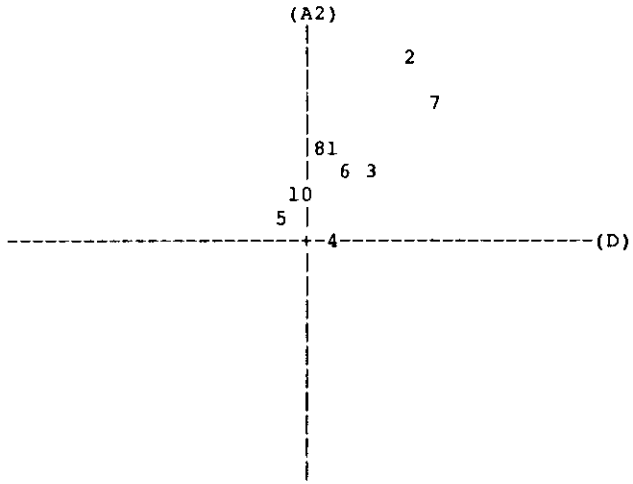

Figure 3

What has been presented to this point is little more than a sketch, but enough has perhaps been said to provide a basic grasp of what is involved in factor analysis and rotation. The initial factor loadings can now be gotten at the press of a button at a computer terminal, hence require no knowledge of statistics. What is important is to know what to do with the factors once they have been obtained. In most conventional factor analyses, rotation proceeds according to statistical principles of one kind or another (e.g., varimax rotation, which remains an option in the QMethod package), but in Q methodology rotation may be guided by the abductory princi-

ples of the investigator (Stephenson, 1961): it is at this point that the researcher utilizes factor analysis, not as a passive finder of Nature's truths, but as a probe into Nature's possibilities. There is an infinite number of ways in which the factors can be rotated (the varimax solution is but one of these), and the investigator probes this space in terms of preconceived ideas, vague notions, and prior knowledge about the subject matter, but with due regard also for any obvious contours in the data themselves. As it turns out in this instance, a more conventional factor analysis (e.g., principal axis extraction and varimax rotation of factors with eigenvalues greater than 1.00) would have produced essentially the same solution, but theoretical rotation often leads to results which are quite at variance with those produced by conventional means.

Table 8
Rotated Loadings

	Q Sorts	Factors I	Factors II
1	Follet	(82)	32
2	Martin	-14	(86)
3	Kendig	(72)	26
4	Hoffer	(93)	05
5	Stephenson	(-90)	-04
6	Burt-Cattell	(83)	29
7	Kerlinger	31	(89)
8	textbook	(84)	30
9	quantum	(-83)	-14
10	Brown	(-87)	13

Significant loadings in parentheses.

The final result of the original factoring and all of the subsequent rotations described above is the table of rotated loadings (Table 8). As can be seen, the factor analysis indicates two broad classes of Q sorts, factors I and II. The first is bipolar, however, and this indicates three different understandings about Q methodology: factor Ia (the positive pole of the first factor) contains the views of Follet, Kendig, Hoffer,

Burt and Cattell, and also that version of Q found in conventional research methods textbooks. In contrast to this, factor Ib (the negative pole of the same factor) contains the views of Stephenson and Brown, and also a quantum-theoretical perspective (to be discussed below). Factor II represents yet a third vantagepoint, as found in Martin and Kerlinger. The *contents* of these viewpoints -- their similarities and differences -- will be the topic of the next section.

Before turning to factor interpretation, it is worth pressing the point again that Q methodology is fundamentally about subjectivity -- its meaning and measure, which, as quantum theory has shown, are inextricable. One can imagine Professors Brown, Follet, Hoffer, Kendig and Martin seated in a faculty lounge somewhere and arguing with one another about Q methodology. In the background is intellectual heritage -- of Cyril Burt, William Stephenson, and Fred Kerlinger, and including textbooks describing "the proper way to conduct a Q study." In the rapid give and take of discussion, the casual observer and even the participants themselves may be unaware of the intellectual vectors at issue, which are nevertheless rendered ostensible through the application of suitable measuring procedures. The result is "factors as operant subjectivity" (Stephenson, 1977), the x-ray plates of subjective communicability, i.e., as expressed from "my point of view," yet as objective as a physiological response or a pigeon pecking a key. It is a remarkable achievement.

Factor Interpretation

The interpretation of factors in Q methodology proceeds primarily in terms of factor scores rather than (as is typical in R methodology) in terms of factor loadings. A factor score is the score for a statement as a kind of average of the scores given that statement by all of the Q sorts associated with the factor. As an illustration, consider those Q sorts which defined factor Ia (as shown in Table 9). The Q sorts representing the views of Follet, Kendig, and others were all interrelated (to the extent of the factor loadings shown), and what we seek

is a kind of composite Q sort for this group. We could simply merge the separate Q sorts by taking the average score for each statement, but for the sake of precision the Q sorts are weighted to take into account that some are closer approximations of the factor than others.

Table 9
Factor Weights

	Factor Ia Q Sorts	f	w
1	Follet	.82	2.50
3	Kendig	.72	1.50
4	Hoffer	.93	6.88
6	Burt-Cattell	.83	2.67
8	textbook	.84	2.85

f = factor loadings
w = weights = $f/(1 - f^2)$

As indicated in the table, the weights are gotten by dividing each factor loading (f) by the expression 1 minus the square of the factor loading: the weight for the Follet Q sort, for instance, is $w = 0.82/(1 - 0.82^2) = 2.50$. Hoffer's Q sort has the highest loading (0.93), hence is given the most weight (6.88). The weighting procedure can be illustrated in terms of the following three statements which received the scores indicated in the respective Q sorts (e.g., Follet gave a +3 score to statement no. 11, Kendig scored the same statement +2, etc.):

Statement 11: +3 +2 +2 +3 +3
2.50(3) + 1.50(2) + 6.88(2) + 2.67(3) + 2.85(3) = 40.83

Statement 10: 0 0 0 -1 0
2.50(0) + 1.50(0) + 6.88(0) + 2.67(-1) + 2.85(0) = - 2.67

Statement 5: -2 -2 -2 -3 -2
2.50(-2) + 1.50(-2) + 6.88(-2) + 2.67(-3) + 2.85(-2) = -35.47

Follet's score for statement 11 is weighted 2.50, Kendig's 1.50, and so forth, the total being 40.83; and the respective totals for

statements 10 and 5 are -2.67 and -35.47: statement no. 11 therefore has high positive salience for factor Ia, no. 5 high negative salience, and no. 10 somewhere in the middle. Weighted composites are calculated for all 20 statements.

For convenience, the statements are returned to the original Q sort format, the two statements with the highest weighted composites being assigned +3, the three next highest being scored +2, and so forth, as shown in the Table 10. The same procedure is also undertaken for factors Ib and II. The numbers in Table 10 are associated with the statements shown in the section on "Q Samples": hence, Q sorts comprising factor Ia collectively demonstrate the highest agreement (+3) with statements 11 and 13, and disagree most with nos. 5 and 18.

Table 10
Factor Scores

Factor Ia

-3	-2	-1	0	1	2	3
5	2	6	4	1	16	11
18	7	8	10	3	19	13
	9	12	14	15	20	
			17			

Factor Ib

-3	-2	-1	0	1	2	3
16	3	4	1	8	2	5
19	13	11	6	14	9	18
	15	20	7	17	12	
			10			

Factor II

-3	-2	-1	0	1	2	3
5	6	7	2	11	4	1
10	16	9	8	13	12	3
	19	14	15	17	20	
			18			

Note: Ib is merely the negative pole of Ia, but in this case the Q sorts defining that pole of the factor were separately merged and are reported as a separate group: as might be expected, Ia and Ib are highly negatively correlated, r = -0.88.

Before turning to factor interpretation, it is again useful to pause and take stock of what has been achieved to this point. Ten separate perspectives on Q methodology have been rendered, based on statements drawn from a naturally occurring

discourse, yet these 10 have been shown to condense around three operant types (factors Ia, Ib, and II), the intellectual structures of which are shown in Table 10. There has been minimal intrusion by the observer: the words belong to the participants, and the factors have emerged from them as genuine operational definitions of their subjective points of view. (That the Q sorts in this example are mainly theoretical in no way obviates the principles involved.) The factors are qualitative categories of thought in the sense that additional participants would have virtually no impact on the factor scores: Quality is operationally distinct from quantity. Consequently, although we do not know the proportions of factor Ia, Ib, or II types which exist in the general population (a matter of nose-counting best left to surveys); and although we lack evidence of any other points of view that might also exist, we can nevertheless proceed to compare and contrast the three distinctive ways of thinking which we have located with full confidence that they really do exist (demonstrably so) in a form similar to that shown above.

Quick access into what is distinctive about the three perspectives can be gotten by examining statements which distinguish them. (Differences of 2 between factor scores can be considered significant.) For illustrative purposes, consider the following three statements (scores are for factors Ia, Ib, and II, respectively, and are taken from Table 10):

3 -2 1 (13) It is intended to get at patterning within individuals (case-wise) rather than simply across individuals (factor-wise sorting).

Factor Ia, as we know, is comprised of the views of Follet, Kendig, Hoffer, and Burt and Cattell, and is also the view most often encountered in research design and psychometrics texts. Statement 13, originally expressed by Follet, gains the greatest support in factor Ia (+3), is strongly disfavored in Ib (-2) and is relatively unimportant in II (+1). Implicit in the case-wise-vs.-factorwise view expressed in this statement is the idea of ipsative vs. normative measurement, and also the "reciprocity principle" which Stephenson dismissed but which Burt clung to until his dying day (Burt, 1972). The term "patterning" in item 13 is reminiscent of profile analysis: based on intraindividual (ipsative) patterns, profiles bear only superficial resemblance to Q and are otherwise lacking in implications for subjectivity (Stephenson, 1953, p. 164); Stephenson therefore associated them with R methodology, which helps account for statement 13's -2 score in factor Ib.

-3 3 -3 (5) Centroid factor analysis is recommended since its indeterminacy is compatible with quantum theory and, at the rotational stage, with interbehavioral principles.

Statement 5 is highly differentiating for factor Ib, which represents Stephenson, Brown, and a quantum theoretical standpoint. The similarities between factor analysis and quantum mathematics have been known since the mid-1930s; moreover, centroid factor analysis has an additional feature in common with quantum mechanics by virtue of its indeterminacy, which is why most statisticians prefer principal components and other more determinant forms of analysis. And theoretical rotation provides the opportunity for the observer to play an active role in the analysis, which is in line with the interbehavioral psychology of J.R. Kantor. Much of this is spelled out in Stephenson's "Q-methodology, Interbehavioral Psychology, and Quantum Theory" (1982) and in his five-part series on "William James, Niels Bohr, and Complementarity" (1986-1988).

1 0 3 (1) It permits the a priori structuring of hypotheses in the design of the Q set to be sorted.

Factor II embraces the views of Kerlinger and Martin, and statement no. 1, originally issued by Martin, succinctly expresses one of the main points highlighted by Kerlinger (1986). The idea of structuring statements in some hypothetical way is certainly included in Q (see section on "Q Sam-

ples," above), but not for hypothesis testing in the way Kerlinger proposes. For Stephenson, much more importance was to be attached to the meanings of the Q sorter (which were contained in the factor analysis) than to the a priori meanings of the investigator as structured into the Q sample.

It is doubtful that the topic of structured Q samples is one about which factor Ia is concerned, but it is a salient matter for Ib, and in this regard some inkling of what is at issue between Ib and II can be gotten by examining factor II in more detail. Consider the following statements, which further distinguish this factor (scores for Ia, Ib, and II):

1 -2 3 (3) The method can be coupled with analysis of variance to test hypotheses.

0 -1 2 (4) The interpretation of factors is more difficult if the Q sorts are internally inconsistent than when they are based on structured Q sets representing testable scientific hypotheses.

0 0 -3 (10) Variance designs are only used to represent theory. Testing is in terms of dependency factor analysis.

Statements 3 and 4 were expressed by Martin, and, combined with no. 1 (*supra*), advance the idea that samples of Q statements should be structured so as to be internally consistent and to permit hypothesis testing via variance analysis. An alternative view, expressed in statement 10 and found in Stephenson (1953, chap. 2) -- that "testing" should be carried out in terms of the operantcy of factor analysis rather than the categories of variance designs -- is rejected by factor II. The scores associated with these statements, as well as those presented previously, reveal a consistent point of view.

Ironically, the consistency of factor II's point of view might have been overlooked had we followed factor II's own advice. Recall that the 20-statement Q sample was structured ("Q Samples," above), half of the statements dealing with

Table 11
ANOVA of Factor Scores

Source of Variance	df	F-ratios Factor Ia	Factor Ib	Factor II
Meth/Tech	1	10.42*	26.33*	0.22
Error	18			
Total	19			
Cell Means (n = 10)				
Methodological		-1.10	1.40	-0.20
Technical		1.10	-1.40	0.20

*p < .01

technical matters, half with broader methodological issues. Table 11 records the outcomes when variance analysis was applied to the three sets of factor scores reported previously. As the results indicate, factors Ia and Ib diverged in a statistically significant way in their reactions to the statements -- Ia favoring the technical items, Ib the methodological ones -- but factor II made no such differentiation. Had we been restricted to the results of variance analysis, therefore, we might have been puzzled as to the meaning of factor II, which, however, stands revealed in terms of factor analysis.

I once heard a statistician characterize factor analysis as that branch of multivariate analysis in which the researcher grasps the data by the throat and screams "Speak to me!" and in Q methodology this is not all that far-fetched. Just as each Q sort portrays a version of the world "as I see it," so does each factor represent a version of the world that is commonly held and which speaks to us through the unison of the factor scores, and factor interpretations (at the risk of a tautology) cannot stray far from the factors of which they are interpretations if they aspire to descriptive accuracy.

Thorough descriptions of Q factors go into far greater detail than is possible here, and often involve the interlacing of factor results and depth interviews; the interested reader is therefore referred to illustrations in the literature. Perhaps the best source on interpretation in Q methodology is Ste-

phenson's (1983) "Against Interpretation" (cf. Brown, 1980, pp. 247-258). A worked example is Brown and Mathieson's (1990) study of poetic interpretation. A running bibliography on applications appears in *Operant Subjectivity*.

In addition to being a psychologist, William Stephenson also held a doctorate in physics; it is therefore not surprising that he saw parallels between Q methodology and quantum theory, and also relativity theory. In this connection, it is instructive to conclude this section by noting how Q renders explicit the location of the observer relative to the field of observation: in this case, the observer is obviously situated in factor Ib, and it is from this perspective that interpretations of Ia and II have been rendered. It should also be obvious that observers from other coordinate systems could (if they were so inclined) render their own perspectives on the same matters via the same procedures, and that connections between and among the relative vantagepoints and interpretations could be rendered ostensible for purposes of inspection. The importance of Q methodology is that it brings any and all such subjective communicability into the same observational field.

Conclusion

> ... maybe for the rest of us someone could explain, in simple terms, exactly what Q methods are good for -- in other words, what are they going to tell me about a phenomenon that I cannot learn some other way?

It was this comment at the outset from a contributor to the electronic conference that prompted this summary of Q methodology, and I leave to each reader whether what has been said is in simple terms. As to whether Q reveals what cannot be learned in other ways: that is a demanding challenge that cannot be successfully risen to in each and every study, but it does occur often enough. Even in single-case studies such as this one -- e.g., studies in which all Q sorts have emanated from the same person -- it is quite often the case that the results are surprising to the person or persons who did the Q sorting. In reference to the above illustration, for instance,

I was of course aware prior to measurement that there were differences (in my own mind at least) between my views and what I understood to be the views of others -- but two factors? three? bipolar? orthogonal? I really had no idea what form the segmentation and its structure would take, or precisely which issues would distinguish the factors; the results nonetheless made perfect sense *in retrospect*.

In part, it is this indeterminate aspect of subjectivity that parallels the indeterminacy of quantum theory, for we know in advance neither how many factors there will be nor what structure they will reveal. Moreover, at the level of the single case in particular, the factors display complementarity: my own point of view in this study was in factor Ib, but on occasions I have expressed views compatible with factors Ia and II, and in a sense Q incorporates all of these. It does measure patterns within individuals (factor Ia) and it also permits the a priori structuring of hypotheses (factor II), but it is also something more -- a comprehensive approach to the study of subjectivity (factor Ib). To say that Q is all three of these is not equivocation or inconsistency or contradiction, but a matter of probabilism, paradox, and the fluidity of meaning and salience within concrete fields of activity.

The illustration presented above adds one more entry in a 2000-item Q bibliography which was one-third this size only 25 years ago (Brown, 1968). A running bibliography is carried in *Operant Subjectivity*. A sampling of recent literature on Q methodology (since 1985) would include the following:

- The history of Q is tied closely to the career of its inventor, William Stephenson (1902-1989), and particulars of his life are contained in sketches by Barchak (1991) and Brown (1991), and in the memorial issue of *Operant Subjectivity* (January 1990). Logan (1991) provides an overview of Stephenson's major ideas.

- Short introductions to Q are often valuable to persons requiring quick exposure to the main ideas. In this regard, a chapter-length introduction to Q is provided by Brown (1986). Stephen (1985) provides an introduction

for the communication field; Dennis (1986) does likewise for nursing.

- A significant feature of Q methodology is its capacity to deal in a systematic way with single cases, and further examples are Stephenson's (1992) self study from within Goffman's frame analysis, as well as his study of himself from the standpoint of Lasch's theory of narcissism (Stephenson, 1990a), which can be compared with Goldman's (1991) single-case analysis from the same theoretical vantagepoint. In this connection, the use of Q in psychoanalytic case studies has been discussed by Edelson (1989). Taylor, Delprato, and Knapp (1994) provide eight single-case studies of four- and five-year-olds from the standpoint of phenomenology. Chusid and Cochran (1989) give a social-psychological rendering of career choice.

- Mention was made of the tie between Q methodology and Kantor's interbehavioral psychology. Further remarks are to be found in Stephenson (1987) and Lichtenstein (1988). More recent observations have been rendered by Smith (1993) and have appeared in a special issue of *The Interbehaviorist* on "Psychological Subjectivity" (Brown, 1994; Delprato & Knapp, 1994; Smith, 1994).

- Reference was also earlier made to Stephenson's (1986-1988) five-part series on "William James, Niels Bohr, and Complementarity," which spells out the connection between Q and quantum theory. Stephenson (1988) provided a summary statement which appeared in *Integrative Psychiatry,* accompanied by observations by four commentators. A two-part paper on "exclusionary psychometrics" (Stephenson, 1990b) criticizes the Newtonian bias of the journal *Psychometrika,* including its exclusion of Q. The distinction between substantive and transitive thought, introduced by William James and critical to quantum theory, is explored in companion papers comparing Joyce's *Ulysses* and *Finnegans Wake* (Stephenson, 1991).

- Deconstruction, social construction, feminism, identity theory, and narrative and discourse analysis are important contemporary approaches which Q methodology has subserved. Kitzinger's (1986, 1987) studies on lesbianism are illustrative, as is Marshall's (1991) study of women lawyers. Stainton Rogers (1991) takes an explicitly social constructivist stance relative to health issues; Stainton Rogers and Stainton Rogers (1989, 1990) have used Q to deconstruct the child abuse controversy and alcoholism. Several others, writing under the pseudonym Beryl C. Curt (1994), have incorporated Q into a critique of social-psychological science. The previous authors are all British, and much of the initiative for this postmodern slant carries a British flavor, which has spilled over into the Commonwealth. Canadians Goldman and Emke (1991), for example, examine Canadian identity, and Gallivan (1994) claims Q as a feminist methodology. Australian John Dryzek (1994), previously of the U.S. (but originally British), ties Q to discourse analysis (cf. Dryzek, 1990; Dryzek & Berejikian, 1993; Dryzek, Clark & McKenzie, 1989). Peritore (1993), on the other hand, finds India resistant to these Western influences. In the U.S., McKeown (1990) has discussed Q in terms of textual interpretation more generally, and Hunter and Davis (1992) have shown how gender is socially constructed while Thomas, McCoy, and McBride (1993) have provided a deconstruction of the Clarence Thomas/Anita Hill spectacle. Knight and Doan (1994) have outlined an approach to narrative analysis in psychology that incorporates Q technique as intrinsic to it, and Felkins and Goldman (1993) have examined the narrative features of political myth; additional attention has been devoted to using Q to reveal emerging global identities (Pignone, 1992) and as supplementary to oral history (Sharpless, 1986; Sanders & Morris, 1990).

- Q has been applied to a wide variety of substantive matters. In the health sciences, for example, attention has been given to hospital environments and patient control (Dennis, 1990, 1991; Bartels, 1990), to practical knowledge among nursing home care-givers (Nelson, 1991), as well as to entering pharmacy students and pharmaceutical decisionmaking (Seoka, 1992; Wigger & Mrtek, 1994). In other decisionmaking settings, Q has been applied to budgetary considerations, strategic planning, and to the "mobilization of prudence" more generally (Cooper & Dantico, 1990; Dick & Edelman, 1993; Gargan & Brown, 1993), and Hill (1992) has shown the role that the public plays in decisionmaking. Other illustrative applications would include Cottle et al.'s (1989) and Senn's (1993) studies of pornography, Gopoian and Brown's (1989) on political campaign strategy, Hooker's (1992) on environmental values, Sykora's (1991) on the integration and enculturation of refugees, Peritore's (1990) series of studies on religion and politics in Brazil, Poole and Steuernagel's (1989) examination of an aspect of Rawls' theory of justice, Whillock's (1994) study of American civil religion and Braswell's (1994) on how Pentecostal beliefs are passed from one generation to the next, Sun's (1992) appraisal of Taiwanese public administration, and Dolan, McKeown, and Carlson's (1988) query into ethics and corruption. Thomas and Baas (1993) have dissected the U.S. public's love/hate relationship with Ronald Reagan, Gillespie (1973) has demonstrated value and attitudinal distinctions among third-party leaders, Casey (1988-1989) has documented public division in reaction to political scandal, and Koch et al. (1992) have revealed the emergent attitudes toward authority in the former East Germany. Lipgar (1992) has taken the lead in applying Q to the study of groups and organizations. Initiatives of a more purely methodological character include "the Minnesota Group's" efforts to combine Q with survey research (Theiss-Morse et al., 1991; Sullivan et al., 1992), Brown and Feist's (1992) calibration of Q samples used cross-culturally, Kinsey and Kelly's (1989) coordination of Q with nominal group technique, and Rhoads and Sun's (1994) use of Q to illuminate heretofore overlooked distinctions among authoritarian personalities. On issues of validity, reliability, and generalizability, see Brouwer (1992-1993), Dennis (1988), and Thomas and Baas (1992-1993). Q methodology has been applied widely in communication, and in this regard mention should be made of Nimmo's (1990) study of information processing, Lindlof and Shatzer's (1989) on family videos, and Lipschultz's (1991) on lawyer's and reporters. Outside the U.S., Murchison (1990) has traced public reaction to media coverage of an Australian corruption case, Chung (1991) has examined Korean attitudes toward advertising, Barchak (1990) has shown how Finnish media elite view America, and Fairweather et al. (1994) have probed land use preferences (using a Q sample of photographs) in the Mackenzie/Waitaki Basin of New Zealand.

The above listing bears witness to the fruitfulness of an interesting methodological idea that was put forth almost 60 years ago, and which has since shown itself to be applicable in a most general way: Around any topic whatever there bushes-out a concourse of subjective communicability, a sampling of which can be subjected to experimental treatment to determine its structure. All else flows from this simple beginning.

Much of "qualitative" research, along with other initiatives falling under the rubric of postmodernism, have arisen from a disappointment with the capacity of so-called objective methods to capture significant features of human experience. The revolution has provided a necessary corrective, but the enthusiasm that has been generated in the process has often led to an overshooting of the mark and to excesses in the opposite direction. An extreme reaction has been to reject any

procedure bearing the slightest aroma of number, but the consequence has been to deprive the student of behavior of devices which can extend perception beyond unassisted limits, and which can secure those fresh and intellectually nutritious observations which a growth in knowledge requires. Q methodology is a useful addition to the qualitative researcher's arsenal: it is simple to the point of elegance, well fortified with mathematics (which needn't be understood in detail), increasingly supported by computer software programs, and grounded in modern philosophical and scientific principles. And it has a wealth of exemplary applications to help show the way. The student of human behavior would be hard pressed to find a more adequate methodological ally.

Appendix: Concourse on Q Methodology

In parentheses following each element of the concourse is contained the author of the statement; the statements are presented in the order in which they were posted to the electronic conference so as to preserve the progression of discussion.

It allows us to sort patterns of speech among speakers. (Follet)

It is intended to get at patterning within individuals (casewise) rather than simply across individuals (factor-wise sorting). (Follet)

It is a survey technique. (Follet)

The idea is to come up with a set of traits that characterize individuals, then compare individuals for the distribution of these sets. (Follet)

The history of Q methodology attests to the largely arbitrary division between qualitative and quantitative. (Brown)

Cluster analysis is really something quite different and has no commitment to that subjectivity which is central to Q methodology. (Brown)

Q can give some fascinating insight into underlying philosophic structures which comprise subjective phenomena. (Martin)

It uses an ipsative technique of sorting a representative set of subjective statements drawn from a concourse of possible feelings or reactions about a subjective condition. (Martin)

A Q analysis concludes with patterns of behavioral styles based on logical interpretations of the factor types by examining factor scores. (Martin)

The method allows for the determination of internal consistency within a person's attitudes. (Martin)

It permits the a priori structuring of hypotheses in the design of the Q set to be sorted. (Martin)

It allows for the interpretive study of subjective behaviors without imposing the usual biases of structured survey questionnaires. (Martin)

There is more to the method than just the technique of Q sorting. (Martin)

The method can be coupled with analysis of variance to test hypotheses. (Martin)

Intraclass correlation can be used to validate the consistency of the responder's individual Q sort. (Martin)

The interpretation of factors is more difficult if the Q sorts are internally inconsistent than when they are based on structured Q sets representing testable scientific hypotheses. (Martin)

In Q-factor techniques, a case by case matrix of some sort of similarity measure (usually an ipsatized correlation) is analyzed. (Kendig)

Q-factor is an early form of cluster analysis. (Kendig)

Some form of multidimensional scaling can be used to study the "average" similarity space *and* individual differences in the use of the dimensions of that space. (Kendig)

Some of the most quantitatively sophisticated techniques of mathematical psychology are used to get at subjective phenomena. (Kendig)

The frequencies in the piles must be restricted to the frequencies that would be expected if you had a normal curve, with each pile corresponding to an area of a normal curve. (Hoffer)

Q factor analysis is a simple variation of factor analysis, actually component analysis. (Hoffer)

To do a Q factor analysis of the exact same data, one must correlate the n respondents rather than the k variables. (Hoffer)

Factor scores can be tough to come by because the correlations are of reduced rank. (Hoffer)

Row standardization is implicit in computer correlations between row vectors. Data are examined relative to the individual's mean. (Kendig)

Q has never involved the correlation and factor analysis by rows of the same matrix of data that is analyzed by columns in R methodology. (Brown)

SPSS (with its Flip routine) and SAS are generally inappropriate since they assume reciprocity. (Brown)

"Ipsative" generally applies to patterns of objective scores for persons, and has little to do with the subjectivity intrinsic to Q methodology. (Brown)

Cluster analysis may bear some statistical similarity to Q factor analysis, but in most respects it is quite different from the version of factor analysis used in Q methodology. (Brown)

Centroid factor analysis is recommended since its indeterminacy is compatible with quantum theory and, at the rotational stage, with interbehavioral principles. (Brown)

Variance designs are only used to represent theory. Testing is in terms of dependency factor analysis. (Brown)

Q methodology is a set of procedures, theory, and philosophy supporting the study of the same kind of subjectivity that is the focal point of much qualitative research. (Brown)

Because of its mathematical substructure, Q has frequently been drawn into debates which are largely extrinsic to its intended use. (Brown)

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