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**Operant Subjectivity**
*The International Journal of Q Methodology*

# Q-Methodology: Basis of Quantized Subjective Science[1]

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## Introduction

*The Study of Behavior: Q-technique and Its Methodology* (Stephenson, 1953) was one of three volumes written between 1950 and 1954 in Chicago, the others, *Intimations of Self* (1952) and *Psychoanalysis and Q-Methodology* (1954), remaining unpublished. They had their beginnings in a meeting at the Royal Society of London in March 1938, in which the present author took part, concerning "A Discussion on the Application of Quantitative Methods to Certain Problems in Psychology" (Royal Society of London, 1938). At this meeting Cyril Burt proposed that psychology should venture outside its own field for new methodologies, and called attention to R. A. Fisher's (1942) small-sample doctrine and variance analysis as well as to the new mathematics already in use in quantum physics, equivalent to factor theory in psychology. Burt favored variance analysis for psychology, not factor theory. At the same meeting I reversed the preference. However, for the rest of his life Professor Burt was identified with factor theory, his *The Factors of the Mind* (1940) setting the stage for his proposed science of *individual differences*, about which his biographer, L. S. Hearnshaw (1972) had the following to say:

> His work can be regarded as a working out of the programme, first envisaged by Francis Galton, for a psychology of talent and character, rooted in evolutionary

[1] I am indebted to Steven Brown for making available this unpublished manuscript. Professor Brown also prepared the initial draft of this version for publication. Although we have edited this final version in the journal's house style, we have left the substance of the text essentially as Stephenson completed it. Some typos have been corrected and we have supplied any missing bibliographic details. The manuscript is a fine example of a number of short overviews of Q methodology that Stephenson penned in the late 1980s. It features a major preoccupation of his post-retirement years — to set out the quantum foundations of Q methodology and to make clear that this was a long-standing project, dating from his earliest writings on Q methodology. We have been unable to determine exactly when, or for what occasion, the piece was written but from the citations we suspect that it was completed in late 1988 or early 1989. (Stephenson gave an Invited Address on "The Profundity of Subjectivity" at a Workshop on *Q Methodology and the Interpretational Disciplines*, held in April 1989 in Reading, UK. An unpublished 1989 paper on the topic of profundity is referenced in this manuscript.) It represents a late, possibly the final, summary by Stephenson of the principles and challenges of Q methodology. We believe it to be an important and inspiring statement of his aspirations for Q, as relevant and timely today as it was when he wrote it some 30 years ago. [*Ed.*]

> biology and genetics, and recognizing the importance of individual differences, and quantitatively based. Towards the establishment and application of such a psychology Burt worked with undeviating consistency. There is a single thread of purpose uniting his first publication in 1909 and his last posthumous papers published in 1972. (Hearnshaw, 1972, p. 19)

One of these last papers was in my honor (Burt, 1972). It persisted in the belief that R and Q methodologies were merely two sides of the same coin, and that measurement of *individual differences* is the basis for a scientific psychology. Actually, R-methodology remains fallow, while Q-methodology has evolved into a post-Einsteinian, quantum-theoretical approach to everything subjective.

The present paper proposes to outline what this means. It is well known that several decades had to pass before quantum theory became acceptable in physics — and indeed Einstein never really believed it. Q-methodology, its counterpart in psychology, has suffered the same fate, and only now, after five decades, is becoming more widely considered.

## Q-Technique

Q-technique is probably known by name to most psychologists, but its precise definition is perhaps known to very few. It measures *opinion* by way of a "forced-choice" scale which is the same for everyone, for all measurements, for every problem, in any language or culture, such as the following:

| | Unpleasure | | | | Neutral | | Pleasure | | |
|---|---|---|---|---|---|---|---|---|---|
| Score | –4 | –3 | –2 | –1 | 0 | +1 | +2 | +3 | +4 |
| Frequency (n = 49) | 3 | 4 | 6 | 7 | 9 | 7 | 6 | 4 | 3 |

> *This replaces the tens of thousands of scales currently in use to measure so-called mental processes (intelligence, personality, capabilities, attitudes, aptitudes and the rest). Every measurement in Q-technique gives exactly the same average score to everyone, namely average score zero (m = 0) for pleasure-unpleasure. It was a very daring proposal. But Max Born (1927) had to perform the same radical step for quantum physics.*

It has to be recalled that, in Spearman's *Psychology Down the Ages* (1937), with which I was educated, the principle of *pleasure-unpleasure* (not psychological hedonism) was all that Spearman left intact as substantial, down the ages. My letter to *Nature* in 1935, introducing Q-technique, had this fundamentally at issue (Stephenson, 1935).

Q-technique was clearly difficult for psychology to accept, and much needless effort was devoted by its critics to deny value to the "forced-choice" procedure. It is still not taken seriously even by some of the psychologists who make use of it. But it was quite serious, and meant to be revolutionary. Its creator knew, in 1938, that when several different Q-technique measurements are made by a person about different aspects of a psychological event, the individual "takes over," projecting in his/her self-descriptions different aspects of the psychological event (PE), thus constituting the "ghost-field" of quantum theory. What the individual describes as Q-sorts is quite out of control of the scientist.

It was obviously not an easy direction to follow, as a reminder from physics can indicate. For a number of years (1921-27), Werner Heisenberg and his peers in quantum theory were in a state of continuous and excited discussion, always getting nowhere because of contradictions and difficulties. These couldn't be resolved by rational means — one could argue about *matter* as *waves* or *particles*. Niels Bohr and Einstein were heavily embroiled: Einstein argued for particles as light quanta, and Bohr retorted that, with the discovery of radio waves, Einstein hadn't a leg to stand on. So despair again. Then, Heisenberg remarks . . .

> We saw that mathematics could do things we couldn't do ourselves. That, of course, is a very strange experience. (Heisenberg, 1975, p. 568)

The mathematics was matrix algebra, which *worked*. He continued:

> but we did not know the kind of language to use, or how to talk about it. Out of this state of despair finally came a change of mind. All of a sudden we said, well, we simply have to remember that our usual language does not work anymore, and we are in a realm of physics where our words don't mean much. (p. 568)

Niels Bohr was doubtful whether such a mathematics would be found. He felt that nature "might be so irrational that we could never get any kind of good mathematical description." He was agreeably surprised to find himself wrong, and that there was no doubt whatever that a correct system had been found, "even if we didn't know how to talk about it." So conviction supported creativity.

The situation in psychology in the late 1930s was very much like that of physics. At the meeting in 1938 of the Royal Society of London the protagonists in this connection were Cyril Burt and the present author. Burt took a stand with categorical generalized normative attributes, for intelligence, personality, attitudes, etc., as if he were measuring the momentum of a single electron (the R-methodology of *individual differences*). I went the opposite way: as a physicist by early training in the new nuclear theory, I knew that what had to be measured were *states-of-feeling* (like states-of-energy), the quanta of Einstein. Q-technique served this purpose with its "crazy" scale.

## The Methodology

Q-methodology began by rejecting traditional introspectionism and Pearsonian instrumentalism alike: there is reference to this on page 10 of *The Study of Behavior*. The concern, instead, was to be with *communicability*, such as "verbal report."

Systematically, a beginning was made by defining *behavioral segments* (Stephenson, 1953). This was more radical than B.F. Skinner's approach to behaviorism, in that, while agreeing with Skinner that "consciousness" is a non-ens, by way of Q-technique we were able to put operational descriptions to work for a person's self-referential behavior, mainly in the form of "verbal report," as everyday communicability. Thus, when Skinner defends his reflexological position by way of the etymology of some 80 words commonly in use in general psychology (Skinner, 1989) he attends only to the "objective" end of sentences, such as the following:

> "It occurred to me to go for a walk."

For Skinner "to go for a walk" is what behaviorism is all about. Q-technique puts quantum-theory to work at the subjective end of the sentence, "It occurred to me." Indeed we can now join both ends, and apply quantum-theory to the whole sentence.

Anyone who cares to read *The Study of Behavior: Q-technique and Its Methodology* will find that the first hundred pages are devoted not to Spearman's psychology, but to the *interbehaviorism* of J. R. Kantor, whose work had impressed me in 1933 (Kantor, 1933). It is not surprising, therefore, to find that I adopted Kantor's formulation for a *psychological event* (PE) as of primary significance for Q-methodology: the expression is as follows . . .

$$PE = C\ (k, sf, rf, hi, st, md) \ldots . \qquad (1)$$

(Kantor, 1959, p. 16)

k symbolizes the uniqueness of interbehavioral fields and C that the field consists of the entire system of functions in interaction. Thus, PE could be an occasion when I visited Professor Burt in his study at Hampstead. The *stimulus function* (sf) could have been my remark about the comfort of his chair. The *historical* (hi) could have been Burt's reminiscences about it — how it was originally Sir Francis Galton's. The *setting function* (st) consists of the immediate circumstances influencing the sf–rf occurrence — in this case the fact that we were to discuss methodological problems. The *medium of contact* (md) is the medium of interbehavior — in this case, the sunny day that suffused the room, giving a semblance of geniality to us both. The *response function* (rf) would be our mutual pleasure at the thought of the chair as something very special.

> *The functions sf, rf, hi, md, st, are with respect to what we assume about the real world in which we live — that something began it (sf), and it resulted in such-and-such (rf), under this-and-that conditions (hi, md, st).*

Each function can be represented by verbal report, i.e., by the subject's own utterances about the event, *in the form of "statements" with self-reference*. A collection of these for a particular PE was defined as a *concourse* in "Concourse Theory of Communication" (Stephenson, 1978). Self-reference is the only categorical construct, in addition to state-of-feeling, at the roots of Q-methodology. Statistical theory applies in concourse theory, and any concourse is basically the "quantum stuff" of Q-methodology. Cyril Burt had shown that factor theory in psychology and quantum mechanics in physics had the same mathematical foundations, and on this basis Q-methodology proceeded, except that factor theory was adapted to fit the requirements of *states of feelings*, not individual psychological attributes of intelligence, capabilities, talent, and character, etc. of Burt's *individual difference* system. Thus "single case" use of factor theory was introduced, the so-called "inverted factor" approach.

Concourse, therefore, has become the "quantum stuff" of Q-methodology. The "statements" are usually verbal but may be pictorial, etc. about which the individual can be self-referent.

The self-reference of Q-sorting solved the profound problem of *descriptions* for a subjective science. With a sample from a concourse of "statements," Q-sorts can be performed to represent the several functions of Kantor's formulation:

$$PE = C\ (k, \text{Q-sort } 1, 2, \ldots n) \ldots . \qquad (2)$$

The ($n \times n$) correlation matrix is factored (Q), resulting in operant factor structure, viz:

$$PE = C\ (k, f_1, f_2, f_3, \ldots) \ldots . \qquad (3)$$

Where, as for Kantor's expression, C symbolizes factors in interactions in a unique situation k. We now know that the factors f, $f_1$, $f_2$, $f_3$ . . . are subject to Bohr's principles of complementarity and intentionality (Stephenson, 1986a).

## A Matter of Feeling-State

I was Burt's assistant in the 1930s, and quantum theory, as it would apply to psychology, has been "on my mind" since then. But several fundamental problems had to be solved before quantum theory could be given due place as substantive psychological science. Gestalt psychological principles were first used to try to distinguish Q-methodology from R, as in the joint paper by Burt and myself in 1939 (Burt and Stephenson, 1939).

Anyone familiar with *The Study of Behavior: Q-technique and Its Methodology* (1953) will recognize that Professor Burt's advice to go outside the field of psychology for methodology had taken roots in that volume: but what was indicated, and ignored by almost everyone, was the abnegation of self-reference in Fisherian doctrine (variance analysis and in R-methodology) and its centrality in Q-factor theory (factor-analysis for the "single case").

I had also been Spearman's assistant, and was left with two profound problems — what is *noesis*? And what would a psychology be like based upon the sole principle Spearman could vouch for, "down the ages," that of pleasure-unpleasure — a matter of *feeling*? The second was solved by Q-technique. The first led to intensive study of Spearman's g-factor (e.g., in Brown and Stephenson, 1933) as promise of a Copernican Revolution (as it was called) in general psychology. In this direction, Spearman's *Psychology Down the Ages* (volume I) was a dramatic denial of substance to psychology, the principles in which had been discovered — forgotten — and rediscovered in the centuries "down the ages," leaving only one intact and valid — that of states of feeling of pleasure and unpleasure. In volume II, unfortunately, Spearman applied R-methodology for the Copernican revolution: it consisted of the Newtonian concepts of determinate *energy* (g), *inertia* (p), and *oscillation* (o), with *will* (w), the latter "persistence of motives," and thus related to *inertia* (p). It was antediluvian alongside the burgeoning new physics of indeterminism, relativity, and radium of Einstein, Bohr, Heisenberg, Born, etc. of the same early decades of this century.

For myself, first educated in the physics of Rutherford and J. J. Thompson, the outlook was bleak. With respect to *noesis* I formed the judgment that Spearman had taken much from the metaphysics of Sir William Hamilton's *Lectures in Metaphysics* (1875). I had Spearman's own copy of Hamilton's lectures, annotated and marginated by Spearman. I replaced the "introspectionism" and "consciousness" of Spearman's *The Nature of "Intelligence" and the Principles of Cognition* (1923) by "verbal report" and "communicability," finally transforming the latter to quantized behavior: Q-factor solutions could be provided for all Spearman's experiments, on *normal* versus *sensational* aspects of perception and the like, all in terms of "verbal report."

What made good sense, in due course, was J. R. Kantor's interbehaviorism, and aspects of Susanne K. Langer's *Mind: An Essay on Human Feeling* (1967). She could write . . .

> . . . the entire psychological field — including human conception, responsible action, rationality, knowledge — is a vast and branching development of feeling. (Langer, 1967, p. 23)

Langer proceeded to think of "mind" as reality, distinct from matter, linked to the brain. To develop this theme, she said, was the purpose of her two volumes.

Q-methodology took a very different course. I accepted feelings as basic, and began at the beginning: when you say you have feeling, something is felt (and Langer agrees, p. 21). But the human being articulates, and statements about the psychological event involving the feeling can be collected ("My! How it hurts!" "Whow! What a delight!" and a thousand other self-referential "statements" are available, the self-reference of which Langer failed to notice). On this basis, with observable utterances, Q-methodology made its beginnings. Matter was distinguished, not from mind, but from subjectivity, a person's communicability with others or within oneself (Stephenson, 1980a).

For Langer, psychology had to forgo concepts of sensation and association, to be replaced by "symbols and meaning, expression and interpretation, perception of form and import" (Langer, 1967, p. 108). For Q, the problem was one of *description*, and its solution was Q-technique (Stephenson, 1935). The problem in Q was to free measurement from the stranglehold of the philosophers and psychologists who gave *normative* value to every word we utter (as in Wittgenstein's philosophy), and to develop a *theory of knowledge* on a non-normative basis. It was important to recognize, however, that when a feeling is felt, it is not a simple or elemental expression of feeling, but an active human being who is involved, alive in every aspect of life. Langer's *Essay* is a reminder of this, and Q-technique, seemingly simple, and unbelievable, can embrace all of the psychological content of Langer's Volume II, in particular of her chapters 15 to 18. Q-methodology can probe all that Langer was prepared to call "mind."

## The Achievement

Q-technique has been used in many different ways, in hundreds of studies across the whole spectrum of knowledge, and it will no doubt find its use in the future along many such lines of personal satisfactions. What is at issue fundamentally, however, is a revolutionary bid for a science of subjectivity, based on the *discovery* that Q-sorts representing reality in J. R. Kantor's formulation for a psychological experience (PE), can be transformed into quantized factors *which bear no direct relation to the reality formulation*. We psychologists may *propose*; but the experiencing person makes his or her own reckoning, and operant factors are *sui generis*, unbeknown to the person or to the experimentalist.

The consequences are astonishing. All Q-sort measurements can be made in terms of the Q-sorter's own "verbal report" anent his/her personal experience. Nothing of current psychological principles enters the data, except Q-technique for measurement of pleasure-unpleasure, and the personal self-referent descriptions of different aspects of the experience.

Thus, in the example of the distraught widow who yells "Save my dog!" as she watches her house aflame, the dog clearly dead and the house completely destroyed (Stephenson, 1987a), the application of Q is to *her* verbal report as she stands in shock and describes it to her neighbors standing in awe with her. The Q-sample is *her* language, all self-referential ("What would my poor dead husband have said to me?"); the Q-sorts she

performs are also *her* own descriptions ("My feelings as I watched the house aflame"; "What I felt my husband would have said," etc.). Everything from beginning to end is *her* feelings, represented in *her* own everyday language (common of course to her neighbors and all around her).

But the same is true of every Q-study, properly conducted with clear-cut definition of the *concourse* at issue, for every culture, subculture, or counterculture anywhere on earth.

## Concourse Theory

A *concourse* is a collection of self-referable "statements" (sentences, pictures, objects, etc.) pertaining to a particular psychological event (PE of the Kantor formulation) (Stephenson, 1978).

There are three ultimate frontiers in science, the very small of subatomic physics, the very large of the universe, and the *complex* (Davies, 1989, p. 4). Concourse theory is placed in the latter frontier. It has evolved from the probability theory of J. M. Keynes (1921), who postulated that there is fundamental order in nature, and on this account factor-analysis could be justified. Two principles were proposed for this, of *atomic uniformity*, and of *limited independent variety*. Mathematicians could demonstrate that the universe and its processes, whether the very small or very large, could be treated as consisting of quasi-atomic elements, such that "a change of total state may be compounded of a large number of small separate and independent changes" (p. 249). Philosopher C. D. Broad called these independent changes "blobs"' and regarded factor analysis as a method for locating "blobs" in nature. The second principle asserted that there is not an unlimited number of such "blobs" and indeed that one might assume them to cohere in groups.

All such was metaphysical, as Burt fully recognized in his brilliant chapter on the metaphysical status of factors, in *The Factors of the Mind*.

True science began, in this matter, however, when it was discovered that Q-factors are subject to quantum-theory, to Niels Bohr's *principle of complementarity* (Stephenson, 1986a, b), and to *intentionality* (Stephenson, 1987d [1993]). For now there is direct experimental evidence that something very like "blobs" appears in the factor-structures provided by Q-technique when applied to psychological events (the PE of J. R. Kantor's formulation). It was William James (1891) who first called attention to complementarity, in chapter VIII "On the Relation of Minds to Other Minds." Chapter IX, "the Stream of Consciousness" brought into focus another remarkable observation, the complementarity of *transitive* and *substantive* thought. *What he overlooked was that the former is characterisedly self-referential, whereas self is abnegated in substantive thought*. So it was in Newtonian science, the success of which depended profoundly upon keeping the "wishes and whims" of scientist at bay, so that nature may be allowed to tell its own story. It is the lesson of Karl Popper's *The Logic of Scientific Discovery* (1959).

Now, with quantum theory, there are doubts about the role of self-reference in Einstein's relativity and Bohr's phenomena of complementarity. Meanwhile, the story of "blobs" continues. Paul Davies opens his *The New Physics* (1989) with what looks familiar in J. M. Keynes's *Treatise on Probability* (1921): to quote Davies …

> It is one of the universal miracles of nature that huge assemblages of particles, subject only to the blind forces of nature, are nevertheless capable of organizing themselves into patterns of cooperative activity. (Davies, 1989, p. 4)

Actually, there is nothing blind about nature: in experiments aimed at a deterministic approach to turbulence, as described in *Order Within Chaos* (Bergé, Pomeau and Vidal, 1984) one can see how "blobs" appear in the sheer complexity of rolling cylinders placed in an air flow (the Bénard-von Kármán effect). "Blobs," or something very like them, can be physically demonstrated, forming out of chaos and turbulence.

All of this, then, lies behind *concourse theory* in Q-methodology. The *concourse* is conceived as an utterly *complex* "soup" of self-referential possibilities, each element itself immanently multiforming. When a person performs a Q-sort the psychologist may suppose that the person is reasoning, judging, reflecting, making comparisons, relying on memory, etc. — *none* measurable in the given unique context of the PE — yet what is actually measured is *pleasure–unpleasure* of Spearman's draconic conclusion, that this alone was what was left assured after two millennia of philosophy and psychology. And it is measured only to throw it away, as the *average* of the person's feeling-state for a particular Q-sort, scoring *zero* for everyone, for every Q-sort, for every self-description, in any culture, subculture or counterculture, in any language, for any form of communicability.

## The Outcome

In agreement with the conclusion of Spearman's *Psychology Down the Ages*, that the sole valid concept was states-of-feeling, we were prepared by 1935 to dispense altogether with all current psychology, and to depend upon "verbal report" only, as primary data.

This is not the same as Professor B. F. Skinner's well-known treatment of "verbal report," nor is it the same as his "The Origins of Cognitive Thought" (Skinner, 1989), about which I have written in "A Sentence from B. F. Skinner" (Stephenson, 1989a [2005]). Skinner has made no reference to quantum theory, and remains essentially in Newtonian mode of thought as suggested by Edwin Bixenstein (1964). In our case, of Q, everything, of memory, reasoning, intelligence, noesis, anoesis, will, mind, consciousness, unconsciousness, perceptual theory, cognitive theory, etc. is replaced by naïve spoken words (mainly) about an event. We were not first to be so revolutionary. At the turn of the century, there was Edmund Husserl, introducing phenomenology and discounting 19th century science; also Spearman inventing factor theory and dispensing with all psychology down the ages; and James Joyce calling a halt to the superficiality of Western literature, breaking open, with *Ulysses* and *Finnegan's Wake*, a new era for the humanities; and of course Einstein, bringing modern physics into being. All of this was in the early 1900s.

In the Spearman case, the belief that something important is at issue, comparable to that engaging us about g-factor, was the guiding abduction — that in the direction, by sweeping the slate clean of all existing psychology except for a principle of *pleasure-unpleasure*, advances would ensure in *factor* terms. The outcome has indeed been astonishing, because the conclusion in the quantum theory form of Q is that creative thought takes place at a point where past, present, and future self-reflections exist together, at time t = 0 in the Schrödinger wave function, corresponding to the "specious present" in the psychology of James Ward (1933) (Stephenson,1988a).

By the 1970s the psychological pieces were in place for acceptance of quantum theory as the foundation of subjective science. "Cyril Burt, Quantum theory, and Q" (Stephenson, 1981) gives due credit to Burt. An article by D. Zimmerman, "Quantum Theory and Interbehavioral Psychology" (1979), made it possible to continue our thesis in the context of interbehaviorism, in which, indeed, it had its beginnings.

## The Interbehavioral Connection

My "Q-methodology, Interbehavioral Psychology, and Quantum Theory" (Stephenson, 1982a) was in response to Zimmerman's paper of 1979.

Zimmerman reminded us that Heisenberg's positivism in the 1920s was different from that of Mach, Wittgenstein and the Vienna Circle positivists because Heisenberg restricted theoretical constructs to immediately observable, experimentally determined conditions, eliminating "non-essential" concepts, and having little to say about matters of language, meaning, and verification. This was very much the position in our development of Q-methodology: behavioral segments were axiomatic in Q, and, as in the rejection of introspection and instrumentism, "non-essential" concepts were eliminated altogether by Q-technique.

Although Kantor anticipated the interbehavior of scientist and the systems examined (Zimmerman, 1979, p. 480), it was complicated, I added, . . .

> . . . by the necessity to operationalize science so as to control self-reference, which is far more than to keep science free from the whims and wishes of the scientist, and more than the interbehavioral effects to which Zimmerman makes reference. (Stephenson, 1982a, p. 246)

In a subsequent paper on "The Universe: An Unscientific Concept," Zimmerman writes:

> The quantum mechanics treatment of causality and probability, the status of the uncertainty principle, and the inseparability of object and measuring instrument . . . are harmonious with J. R. Kantor's ideas on interbehavior early in this century. (Zimmerman, 1982, p. 235)

All of which found ready support in Q-methodology: indeed, the first half of my *The Study of Behavior* (1953) had Kantor's *A Survey of the Science of Psychology* (1933) at its roots: he was the first psychologist to make sense to me. The interbehavior of scientist and systems examined remains a much-debated problem in quantum physics: as developed by Rae (1986) the scientist has only an ancillary role in "reduction," and this is true of Q. It is not a consciously-exercised Q-sorter who provides a "reduction."

## Quantum Theory and Q-Methodology

In a second paper, "Quantum Theory and Q-Methodology: Fictionalistic and Probabilistic Theories Conjoined" (Stephenson, 1983), many parallels of quantum and factor theories were developed, helped by Zimmerman's (1982) paper, and L. V. Tarasov's *Basic Concepts of Quantum Mechanics* (1980). It is impossible to summarize these parallels, except to say that, amongst them, the problem of self-reference was given primary attention by me. The *fictionalistic* methodology, historically, corresponds to the hypothetico-deductive methodology in fashion since the time of Newton. It is *without* self-reference. The *probabilistic* is the scholarly work of philosophers, theologians, and psychologists prior to the time of Newton, when the effort was to "establish new foundations for exact and compelling knowledge and belief" (Nelson, 1975). The search was for conditions conjoining *certainty* (of proof) and *certitude* (of belief). That is, objective and subjective had to be in one piece.

Self-reference was therefore an issue in both certainty and certitude: and this is precisely what has happened with the advent of quantum theory. The modern physicist

has had to come to grips with self-reference: there are physicists today who place *self* high as an essential observer in quantum phenomena.

The true force of Q-methodology, however, was evident in this 1983 paper. In hundreds of experiments, designed on the basis of Kantor's formulation for a psychological event (PE), it had never been found that the resulting factors (expressions [2] [3] above) were in direct or unique relation to the reality functions (sf, rf, hi, st, md). Since *reality* is represented in Kantor's formulation, this conclusion has astonishing implications. One was reminded that Einstein, upon learning of Bohr's quantum theory, is said to have remarked . . .

> Then the frequency of light does not depend at all on the frequency of the electron . . . *This is an enormous achievement!*

Of all advances made by Q, this is perhaps the most significant. Psychology, down the ages, had been couched in Kantor's reality functions: it had produced nothing but "continually accumulated and diversified observation of detail" (Spearman, 1937, p. 453), and had come to no generally acceptable principles . . .

> None even attained to the negative success of being formally rejected. Instead the psychology remained in what seemed to be an endless and hopeless turmoil.

Spearman was critical of both the fictionalistic and probabilistic approaches: everyone down the ages had transgressed from what common sense could have proposed! Spearman wanted fundamental principles:

> Casting a net from Plato and Aristotle to Augustine and Aquinas, and on down the ages to Malebranche, Occam, Locke, Kant, and on to James, Brentano, and everyone else in Western scholarship, Spearman's incisive questioning of basic concepts led to a conclusion that scientific efforts had ventured "far beyond the bounds of common sense," in most cases coming to no generally acceptable principles. (Stephenson, 1983, pp. 224-225)

This was an abstraction of extraordinary force, and Spearman proposed that a new start could be made, using factor theory. On the final page of Volume I of *Psychology Down the Age*s he wrote: "*The examination of its laws and functions had still to come*" (Spearman's italics).

Unhappily, in volume II of *Psychology Down the Ages* Spearman fashioned his laws and functions on Newtonian lines — with the law of inertia (ch. xxx), control (ch. xxxi), constant output (ch. xxxii), fatigue (ch. xxxiii), etc., and a concept of mental energy with constancy of output, fatiguability, oscillation and inertia, discovered as factors in R-methodology. It was oblivious of the revolution in science going on all around him. For Spearman, science meant prediction, precision, and concern with uniformities in nature — "to predict the future, and describe the past." There was not even a remote connection with his own conclusion of Volume I concerning "knowing-feeling-doing."

## The Way Ahead

The formal statement of quantum-theoretical Q-methodology followed in a series of five papers under the rubric "William James, Niels Bohr and Complementarity" (Stephenson, 1986a, b, 1987a, 1988a, b).

Skimming through these pages will afford a grasp of the comprehensive character of Q-methodology. The first (I — Concepts) describes William James's (1891) *transitory* and *substantive* parts of thought, the two complementary to each other, as well as Niels Bohr's principle of complementarity, introduced independently in 1927. The second (II — Pragmatics of a Thought) uses James's "Columbus discovered America in 1492" to exemplify the quantum theoretical approach to the statement, and provides data supporting the thesis that not only is thought itself subject to the principle of complementarity (transitive-substantive), but that operant factor structure is itself subject to the same principle. This is a discovery of first importance. The third (III — Schrödinger's Cat) solves the problem posed by Einstein and Schrödinger about quantum phenomena, by reminding them that quantum theory initially applies to transitory thought, not to the substantive thought in which they had posed their problem. The fourth (IV — The Significance of Time) finds that its significance is its *insignificance*. It introduces the concept of "specious time" (from James Ward, 1933) as crucial in creative thought: it corresponds to time set at t = 0 for the Schrödinger wave equation, so that thought can proceed without reference to time. The fifth (V — Phenomenology of Subjectivity) is to the effect that Edmund Husserl's postulates for phenomenology correspond to those in Q-methodology, and that, therefore, all forms of phenomenology are subject to Q.

These developments will ultimately speak for themselves: they are guidelines for a subjective science for which Q-technique opened the door 50 years ago. It is important to add that mere contradictions are not necessarily evidence of complementarity: *Observation* in quantum theory doesn't mean what we say when we observe flowers in a field: it refers to the *indeterminateness* of measuring the *simultaneous* values of various quantities. A particle in nuclear physics can have position and velocity, but not *both* simultaneously. The more we try to measure the one, the more the other is "deeply hidden." In Q-technique, of the two influences at work *simultaneously*, one, pleasure-unpleasure, is rendered static at a mean of *zero* for every Q-sort; this leaves the other, for self-description, free for measurement by factor analysis.

## Intentionality

These papers also attended to the central problem of *intentionality*. Operant factors in Q are not only subject to Niels Bohr's principle of complementarity but also the quantum-theoretical principle of *intentionality*. Q-factors are not predictive; they are indicative of possibilities, of likelihoods, not certainties. "Intentionality: How to Buy a Loaf of Bread" (Stephenson, 1987d [1993]) begins by assuming *complexity* as such: buying a loaf of bread is an enormously complex matter, involving every manner of psychological and neurophysiological thought and method as studied by traditional psychology, such as by Wundt, Freud, McDougall and all leading psychologists of this century, as was made evident in Margaret Boden's "The Structure of Intentions" (1973). If we concern ourselves with the *complexity* as such in the form of *concourse*, it is a simple matter to explain what is involved in buying a loaf of bread (and anything else in subjectivity) by way of Q-factor and its quantum methodology, *without reference at all to any of the massive facts gathered in traditional psychology*.

Similarly, attention was given to James Joyce: in *Ulysses* (1912) and *Finnegans Wake* (1936) Joyce had found out for himself the distinction between *substantive* and *transitive* thought. *Ulysses* is an epic about substantive thought — represented by the traditional scientific culture of Europe up to 1900 A.D. *Finnegans Wake* is another epic for transitory thought, encompassing all history since the Homeric myth and legends. Joyce, like Spearman and Husserl, saw that traditional knowledge was seriously "flawed and chimerical." Through his character-hero Stephen Dedalus, he gave us a formula (comparable in importance to that of Einstein's $e = mc^2$), that all subjective knowledge is based upon . . .

> . . . *the void. Upon incertitude, upon unlikelihood*. (*Ulysses*, 1912)

It sounds quantum-theoretical, and it is. The position represented by James Joyce is the subject of my "Ulysses and Finnegans Wake: A Q-Methodological Look at Profundity: Part I — Ulysses," and "Part II — Finnegans Wake" (Stephenson, 1987b, c [1991]). For *profundity*, as distinct from *profound*, there is my paper "Profundity: a Basis for Subjective Science" (Stephenson, 1989b).

Husserl's phenomenology is also quantum-theoretical, as expressed in his *The Crisis of European Sciences and Transcendental Phenomenology* (1938 [1970]). There was nothing transcendental, but plenty of crisis in the European sciences. Husserl's phenomenology led to Gestalt Psychology, of the senses in particular, but left "paradoxes" and "incomprehensibilities" unaccounted for, that Joyce was fingering, and that Q has resolved.

Note, as an incidental observation, the phenomenologist Roger Poole's trenchant account of Professor H. J. Eysenck's work (and by the same argument, of all R-methodology) . . .

> Eysenck's leading idea of "personality" as extraverted/introverted, neurotic/balanced, etc., has not in fact advanced beyond the stages of the poetic medieval metaphor of the "four humors" and the attempt to mathematize *that* is the modern equivalent of alchemy. (Poole, 1972, p. 54)

## Conclusion

One has to conclude as one began: the quantum-theoretical approach to psychology could not have been developed except in factor-theoretical terms, beginning with Charles Spearman's abductory factorization, that is, governed by a deep interest in *noesis*. Its creative end is found in operant Q factor-structure, subject to quantum theory, in Niels Bohr's principle of complementarity, and *intentionality*.

We now have to confront only two fundamental branches of science: one is physics, the other subjective psychology. Both are based on natural quantum phenomena, with appropriate quantum theory to probe them. They differ in one fundamental respect, that one is *without* self-reference, the other *with* self-reference as central to it. They correspond to objective and subjective sciences respectively. Nature is quantized, and the same quantum-theory applies to both sciences alike.

If we can talk of "quantumstuff," it is the subatomic world of the atom in physics; it is transitory thought (really transitory communicability) in psychology, as represented by *concourse* theory.

The concern in Q is with the boundless communicability of consciring (Stephenson, 1980a), i.e., with what is called consciousness, but which is essentially the sharing of opinion between people or within oneself. Instead of a fragmented psychology, sociology, psychiatry, cultural anthropology, etc., there could now be one subjective science, with its foundations in a fundamental quantum theory of feeling and self-reference. One wrote:

> It is because instruments were never designed in Q to measure anything categorically, and because options were left free for measurement of subjectivity as a state of . . . not mind, but feeling . . . that Q has found its way into the truth-value of great poets (Stephenson, 1972a, 1980a), of religious belief (Kraay, 1977), of implicit communication (Gottesman, 1980), of values in science (Nesterenko,1979; Stephenson, 1972b), of self through autobiography (Stephenson, 1982b), of psychoanalysis (Stephenson, 1954, 1982c), of educational psychology (Stephenson, 1980b), and in many other works of this widely-ranging kind. (Stephenson, 1982a, pp. 246-247)

There is now the possibility of a new epistemology based upon Niels Bohr's principle of complementarity such as Bohr foresaw (1950), and there are reasons to give priority to subjective psychology over physics as of primary human and social significance, as Bohr also believed.

Charles Spearman and Cyril Burt both missed this understanding of quantum theory for subjectivity, in Burt's case in spite of expert knowledge of quantum mechanics. For upwards of fifty years not a single psychologist or psychometrist realized that Q-technique could replace purely categorical mental tests, in the hundreds and thousands, meant to measure intelligence, personality, character, aptitudes, etc. That something of the kind is happening is indicated, interestingly enough, in Herriot's "Selection at a Crossroads" (Herriot, 1988), in which Spearman's g-factor returns (Vico-like) as all that is worthwhile in the business world of personnel selection. Sixty years ago I had to come to grips with *noesis*, for that same g-factor, but with the outcome of a new science, for all that is subjective.

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