Fifty Years of Exclusionary Psychometrics: II. Developments

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ABSTRACT: Mathematics originated in knowledge of invariance, and factor theory is of this form, a matter of pure numbers in statistical distributions. Q technique was developed in this framework, with full knowledge of its consequences. The quantum-theoretical approach to subjective psychology stemmed from Spearmanian factorization and his Psychology Down the Ages, and from psychophysics, not from quantum mechanics and physics. Many psychological problems had to be solved before quantum theory could be made substantive for psychology, including acceptance of abduction as a basis for inference, the rejection of consciousness as substantive and its replacement by communicability, the operant nature of factors, concourse theory, and the solution for Newton's Fifth Rule. The result is reported in a series of papers under the title "William James, Niels Bohr, and Complementarity." They propose that Bohr was correct to suggest that there are only two fundamental sciences, physics and psychology; both, however, are subserved by the same quantum theory, developed independently, and the psychology is that of Q methodology.

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Introduction

Part I introduced the quantized form of Q technique (Stephenson, 1990), which suffered 50 years of exclusion from official psychometrics such as *Psychometrika* has encouraged for the same half-century. Meanwhile Q methodology has developed a quantum-theoretical basis for subjective psychology.

What was at issue in the early decades of the century was involvement of psychometry in the "psychology of individual differences," about which Cyril Burt and I agreed to differ (Burt & Stephenson, 1939). Group mental testing, for large numbers of individuals, provided statistical distributions of their scores, represented theoretically by the familiar statistical "normal probability" distribution -- the Gaussian curve. Tens of thousands of professionals are engaged almost every day in mental testing on this basis, in every branch of psychology (general, clinical, educational, social, political, military or whatever), where abilities, personality and social influences are reduced to statistical numbers. Burt's biographer, L.S. Hearnshaw (1979) put the matter cogently as follows:

> 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 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, 1979, p. 19)

One of these last papers was in my honor (Burt, 1972), yet it persisted to this end, that the quantitative basis provided by "individual differences" gave scientific sanction to the psychology of "talent and character."

It was a very interesting proposition, worked out with great skill in Burt's most important (and still significant) work, *The Factors of the Mind* (Burt, 1940). What has been universally overlooked, however, is a profound principle at

issue in the "psychology of individual differences," which has implications reaching into the old myth, as Georgia de Santillana put it, of "eternal invariance" (de Santillana & von Dechend, 1969).

Factors as Pure Numbers

De Santillana's "eternal invariance" is brought to our notice by the fact that the statistical distributions provided by group mental tests, by a familiar statistical procedure, are transformed to *pure numbers.* Whatever the particular mental units involved in the mental tests may be (and no one knows what they are), they are rendered nugatory by this transformation to pure number distributions, whose *mean* (in standard statistical terms) is *zero,* and *standard deviation* (dispersion) is 1.00. The concern in Burt's *The Factors of the Mind* is with this remarkable translation (though Burt never mentioned it, and it is widely ignored as of significance by factor theorists). The concern in factor theory, and "factors of the mind," is with a purified region in statistical theory in which pure numbers, and a *theory of form* (factors) which these numbers subserve, are everywhere ubiquitous. The *theory of form* stems from Sir Isaac Newton's Transformation of Form -- as one sees in the leaves of a tree (all leaves alike, yet all different), the convolutions of sea-shells, and the horns of antelopes. All our *factors* were such transformations of statistical distributions, all of pure numbers.

An important principle has to do with what comes first, *form* or *meaning.* It is not a chicken-and-egg quandary: in factor theory, *form* indubitably comes first. Factors, we say, have to be interpreted, i.e., given meaning.

It happens that this is a profound prerogative, the substance of Giorgio de Santillana's "Preface" to *Hamlet's Mill: An Essay on Myth and the Frame of Time* (de Santillana & von Dechend, 1969): he remarked that over many years he had searched for a point where myth and science join, and that he found it in the myth of invariance. The Greeks were on its trail in the 7th century B.C. with the problem of the "One and

Many"; and so was Pythagoras with his axiom that "things are numbers." Down the millenia of history there were humans who must have observed the invariance of the constellations in the heavens, providing the basis for the astrological myths attached to them -- and indeed still attached to them in much of 20th century culture worldwide -- from the nebulae Virgo to Capricornus. The cultural myths were based on invariances of "numbers, motion, measures, overall frames, schemas, on the structure of numbers, on geometry," grasped, as de Santillana reminds us...

> ...Way back in time, before writing was even invented.... It was measures and counting that provided the armature, the frame on which the rich texture of real myth was to grow. (de Santillana & von Dechend, 1969, p. xi)

Mathematics was born in this same knowledge of invariance, and science followed suit. And there remains, at the core of all knowledge this same profound tie with invariance, in de Santillana's words:

> ...still the old myth of eternal invariance, ever more remotely and subtly articulated, and what lies beyond it is a multitude of procedures and technologies, great enough to have changed the face of the world and to have posed terrible questions. But they have not answered a single philosophical question, which is what myth once used to do. (de Santillana & von Dechend, 1969, p. viii)

It must seem preposterous to leap from history in millenia terms to factor theory of the 20th century -- a sort of megalomaniacal conceit! Yet the myth of invariance is so enjoined. We shall leave to posterity the playing out of this theme: but it takes us headlong into the modern science of quantum theory and the theory of relativity, where we find that what applies to subatomic matter applies no less to mind (Stephenson, 1982a). Here, it is enough to say that factor theory fits into the myth: human abilities, intelligence, and character are reduced in factor theory to pure numbers in statistical space, with frames, schemas, and structures, as in the heavens down

the millenia of mankind, in which invariance is involved -- sometimes crudely as the "reification of factors." Basically, however regarded, a subtle articulation is at issue, of the eternal quality of pure number, *sans* meaning, *sans* life. Burt's *The Factors of the Mind,* and all theoretical work based on the methodology of "individual differences," are in essence rooted in the myth of invariance.

There is only difficulty: missing in the methodology, in spite of the elegant procedures and technologies based upon it, is an *absolute origin.*

Many decades ago, E.L. Thorndike (the elder) of Teacher's College, New York, tried to define a zero point for intelligence, with his CAVD tests: his work came to nothing instead of to zero! It was a brave endeavor. The pure distributions in R methodological factor theory float about like hawks in the sky or gulls about a fisherman's boat -- you never know where they are. The numbers, however, are not meant to be arbitrary transformations from phenomena, but to be homologous with them. With respect to "individual differences" for a given defined population of people this is achieved: the person who scores highest on a test gains highest pure number, and who scores lowest gains lowest pure number, with everyone appropriately in between.

But the populations differ. Tests made for 10 year olds are at one level of ability, and those for 16 year olds at another. Their means are very different. Tests in China, France, Britain, Africa, and America are equally disparate with respect to *means* for defined populations. In short, the *zeros* for the different populations do not represent comparable levels of ability. Nor is there an *absolute* level to which all could be aligned, the problem tackled unsuccessfully by Professor Thorndike earlier in this century.

Fundamentally, it was about this that Cyril Burt and I differed. I had in fact solved the problem of an *absolute origin,* but it meant turning everything in Burt's work upside-down: instead of basing psychology on the methodology of "individual differences" and 19th century views on evolution and genetics, it meant moving into the 20th century with theories of

relativity and quantum mechanics. It ought to be possible, I argued, to apply this new thinking to probe into the mind of *one* person -- "the single case" instead of a population of such -- and *any* one person would serve as well as any other.

Thus it was that I introduced Q methodology in *The Study of Behavior: Q-technique and Its Methodology* (Stephenson, 1953a), with the following aphorism:

> We must, to change the Greek epigram a little, *ascend downward* and *descend upward,* if we are to reach truth, or any true persuasion of it.

Psychological Development of Quantum Theory

Q technique, based on measurement of states of pleasure-unpleasure, such that each person scores zero (average), no matter what the dispersion, came from a long history of psychophysics, not from association with physics. It solved the difficulty of an absolute zero for abilities, traits, etc., by reducing all psychological events to subjectivity, where they intrinsically and fundamentally belong, and then calling for the individual to measure himself or herself in such a way as to give *no* feeling (on the average) to any psychological event (PE), by way of the "forced choice" distribution of Q technique.

Three steps were developed for the quantization of a psychological event. First its representation by Kantor's (1959) formulation:

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

Then the expression of this by Q sorts:

$$PE = C\ (Q\ sorts\ 1, 2, 3...n) \qquad [2]$$

Followed by the factoring of the n×n matrix:

$$PE = C\ (factors\ f_1, f_2, f_3...) \qquad [3]$$

Expressions [2] and [3] provide the new probabilistic.

Q technique was possible only because of the psychophysics of Gustav Fechner (1871). Emphasis on pleasure-unpleasure was only possible because of Spearman's *Psychology Down the Ages* (1937) which denied substantiveness to all propositions in psychology except for one, that of pleasure-unpleasure; but also upon J.G. Beebe-Center's *The Psychology of Pleasantness and Unpleasantness* (1932), a veritable Bible for the early days of Q methodology. Three book-length manuscripts -- *Intimations of Self* (1952), *The Study of Behavior: Q-technique and Its Methodology* (1953a), and *Psychoanalysis and Q Methodology* (1954) -- were completed while I was a peripatetic psychologist in the USA without settled employment (1948-56). Only the 1953 volume was published, against the advice of Professor Thurstone, who said "he couldn't understand a word of it." The 1952 volume is still 20 years ahead of today. The 1954 manuscript was offered to psychiatrists in Chicago, who were favorable, but who wanted "more cases."

Quantum theory, as it would apply to psychology, had been on one's mind since 1938, but it was not until much later that the psychological pieces were in place for acceptance of quantum theory as substantive and not merely analogical. Several fundamental problems had to be solved before quantum theory could be given due place as substantive psychological science. Abduction had to be given sanction (Stephenson, 1961, pp. 9-17). Consciousness had to be rejected for compelling reasons and replaced by communicability (Stephenson, 1969). Factors had to be granted as operant (Stephenson, 1970). Concourse theory was formulated (Stephenson, 1978). And to cap all, a solution was found for Newton's aborted *Fifth Rule* (Stephenson, 1979), a basis for inductive inference.

Anyone familiar with *The Study of Behavior: Q-technique and Its Methodology* will recognize that Professor Burt's advice to go outside the field of psychology for methodology had taken roots in that volume. The literature at hand during the 1950-1960 years corresponds to that in Susanne K. Langer's three volumes of *Mind: An Essay on Human Feeling*

(1967-1982), and much in her work finds ready agreement with Q methodology. For Langer:

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

Langer was writing in 1966 what Spearman should have said in 1927 when he announced the "sole principle" of states of pleasure and unpleasure. *States*, however, has a very special meaning for physicists, and Spearman had clearly not used the term quite so specifically. Langer proceeded to think of "mind" in a new way: instead of an ultimate reality, distinct from matter, she described "mind " as a phenomenon of the highest physiological processes, linked to the brain; and to develop this theme, she said, was the purpose of her three volumes. Matter and mind were indistinguishable for Langer.

From the same literature, except for psychophysics which Langer ignored, Q methodology took a very different course. It began at the beginning: when you say you have feeling, something is felt (and Langer agrees, 1967, p. 21). But the human being articulates, and a concourse of statements about the psychological event involving the feeling is readily collected ("My! How it hurts!" "Whow! What a delight!" and a thousand other self-referential statements are available, the self reference of which Langer fails to notice). On this basis, Q, and quantization, is the reasonable way to proceed. One distinguishes matter, not from mind, but from subjectivity, a person's communicability. There is also a profound difference in our logic. It is true that psychology had to undergo a revolution, away from concepts of sensation and association to the present concern with "symbols and meaning, expression and interpretation, perception of form and import" (Langer, 1967, p. 108). The perception of formal aspects of concrete reality, or its rendition in symbolic terms (such as J.R. Kantor's formulation for a psychological event (PE)), makes a *science* possible along our lines, whereas the philosopher Langer has to rely upon *intuition* (p. 114) -- her own. Even so it is important to recognize that when a Q sort is performed, it is not a simple

or elemental expression of feeling, but an active human being, alive in every aspect of life, who is Q sorting in such a context. Q technique, seemingly simple, and unbelievable, thus can embrace all of the psychological content of Langer's Volume 2, in particular of her Chapters 15 to 18. Q methodology can encompass all that Langer is prepared to call "mind."

Quantization

In nuclear physics, to quote from A.I.M. Rae's *Quantum Mechanics* (1986):

> There are some physical measurements whose outcome is not uniquely determined by the state of the system beforehand. (Rae, 1986, p. 210)

The same is the case for psychological measurements using Q technique in the framework of J.R. Kantor's formulation for a psychological event (PE, expression [1] above). The factors emerging from the use of Q are in no way uniquely determined by the reality state [1] of the PE system.

The mechanism of factorization is called a "reduction," and again, quoting Rae (1986):

> When a measurement is made of some property of a quantum mechanical system, the wave function changes from what it was before the measurement was carried out to become an eigenfunction of the operator representing the measurement. (pp. 211-212)

Thus, if the PE is one's visit to Professor Burt vis-a-vis his chair, the Q sorts one performed about it change from the "forced distribution probability" for pleasure-unpleasure, to a "ghost-field" of quantumization, an eigenfunction of the operator, oneself.

When, however, does this "reduction" take place? Quoting Rae again:

> A problem arises when we ask at what point in time this reduction takes place, and what exactly is meant by a measurement in quantum mechanics. (p. 212)

The answer is given:

> The wave function is reduced, and the measurement performed, when the fact is registered in some counter or other recording equipment. (p. 212)

In short, it does not require the presence of a person as observer. The role of the observer is purely ancillary to the quantization.

This applies, precisely, to Q methodology. When several Q sorts are performed by a person about a psychological event (PE), each is a record on paper. The Q sorts may be hours or days, or even years apart. The "reduction" takes place when these records are factored (Q). It is factored by a computer program, not by the "mind." The outcome is operant factor structure; the factors are in a complementarity relationship, as for Niels Bohr's Principle of Complementarity (Bohr, 1950). The factors are also *decision-structures*, pointing to future possibilities. (An example is given in Stephenson (1982b) for Virginia Woolf's autobiographical *Orlando*.)

It clearly suggests that there is something systematic about a person's self reflections about complex psychological events. In the context of Q methodology it suggests that subjectivity is not the aimless randomness of positivism.

The Outcome

Beginning with Spearman's experiment with a matchbox on a chair, we were prepared by 1935 (Stephenson, 1935), to dispense altogether with all current psychology, and to depend upon verbal report only, as primary data. Everything, of memory, reasoning, intelligence, noesis, anoesis, will, mind, consciousness, unconsciousness, perceptual theory, cognitive theory, etc. was to be replaced by naive spoken words (mainly) about an event. But the belief that something important is at

issue, comparable to that engaging us about *g* factor, was still the guiding abduction -- that in that direction, by sweeping the slate clean of all existing psychology except for a principle of *pleasure-unpleasure* (which was not hedonism, but merely self referential), advances would ensue 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 Schrodinger wave function, corresponding to the "specious present" in the psychology of James Ward (1933) (Stephenson, 1988a).

But that came from the developments now briefly to be reviewed. 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 credit to Burt. An article by Donald Zimmerman, "Quantum Theory and Interbehavioral Psychology" (1979), made it possible to continue our thesis in the context of interbehaviorism, in which, indeed, it had some of its beginnings.

The Interbehavioral Connection

"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 for Spearman's matchbox on a chair, "non-essential" concepts were eliminated altogether by Q technique.

One added that although Kantor anticipated the interbehavior of scientist and the systems examined (Zimmerman, 1979, p. 480), this is complicated...

> ...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 (1982) 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. (p. 235)

All of which found ready support in Q methodology. The interbehavior of scientist and systems examined remains a much debated problem in quantum physics: in Q, as developed above (vis-a-vis Rae) 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 paper on "The Universe--An Unscientific Concept" (1982) 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 attention. 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! (cited in Stephenson, 1983, p. 215).

The same can be said of the transformation of reality functions into quantum factors in Q:

> ... Spearman's conclusion, that nothing had resulted from centuries of efforts by philosophers and psychologists to develop valid principles for a science of psychology, is now proved to be completely correct. *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. (Stephenson, 1983, p. 403)

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 *Psychology Down the Ages* 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 (chap. 30), control (chap. 21), constant output (chap. 32) fatigue (chap. 33), 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 follows, in a series of five papers under the rubic "William

James, Niels Bohr and Complementarity" (Stephenson, 1986a, 1986b, 1987a, 1988a, 1988b).

Skimming through these papers will afford a grasp of the comprehensive character of Q methodology. The first (I. Concepts) describes William James' 1891 transitory and substantive parts of thought, the two complementary to each other, as well, of course, as Niels Bohr's Principle of Complementarity, introduced independently in 1927. The second (II. Pragmatics of a Thought) uses James' "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 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. Schrodinger's Cat) solves the problem posed by Einstein and Schrodinger about quantum phenomena, by reminding them that quantum theory 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 Schrodinger 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.

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,* the origin of creative mind. His assistant had to dispense with mind and consciousness for good reasons, but pursued *noesis* to its scientific end in operant Q-factor structure, subject to quantum theory and Niels Bohr's Principle of Complementarity.

We now have to confront only two fundamental branches of science: one is physics, the other subjective psychology. Both are based on quantum phenomenon and the appropriate quantum theory to probe it. 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. Quantum theory and relativity are the foundations of physics: Q factorization and interbehaviorism are the foundations of the new psychology.

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.

This origin in concourse is applicable to transitory thought in whatever form this may appear -- in writings in history, literature, politics, religion, education, philosophy, science, law, industry, in conversations and all forms of print and graphic communicability.

The creator of factor theory, Charles Spearman, could find nothing substantive in *Psychology Down the Ages* except for states of feeling. He proposed a new approach to psychology in terms of factor theory, but failed to develop the concept of *noesis* as the source of creative mind. This we have achieved, as operant factor structure in quantized form. The implications are, surely, enormous. Transitory thought remains largely unmeasured, and this can now be achieved about every psychological event whatsoever, in principle, and usually in fact. The indications are that the study of psychological events in the classical mode of isolating this-or-that purported attribute is no longer acceptable as a scientific approach to any PE.

For 50 years, American factor theory has remained in the R methodological mode of Thurstone, Hotelling, Kelley and their many followers as represented in Harman's *Modern*

Factor Analysis (1960). The consequence is that there has been no adequate critical regard of the massive cult of instrumentation in America -- where every stolen run in baseball is counted, and where students assess their professors, psychologists assess everything that occurs to them, and a whole educational and cultural system seems bent upon expedience and ideology, about trivialities, "the continually accumulated and diversified observation of detail," without regard to sane science and sound policies.

Meanwhile we should repeat that the concern in Q is with the boundless communicability of consciring, 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, there could now be one subjective science, with its foundations in a fundamental quantum theory of feeling and self reference. One writes:

> 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, 1972b, 1980c), of religious belief (Kraay, 1977), of implicit communication (Gottesman, 1980), of values in science (Nesterenko, 1979, Stephenson, 1972a), of self through autobiography (Stephenson, 1982b), of educational psychology (Stephenson, 1980b), and in many other works of this widely-ranging kind. (Stephenson, 1982a, p. 246)

As may often be true, one's first adventure into a new field may be perspicacious. One's own was a study of President Kennedy's *Alliance for Progress* of 1961. Professors Maritano and Obaid had worked for a year in Latin America, publishing their *An Alliance for Progress* in 1963. From this, and a visit to Equador, one Q factored the situation and found that the value system at issue was on neither a purely democratic nor a communistic frame of reference, but was "spiritual," in the mode of Rodo's *Ariel* (1922). The intelligentia of Latin America (on the Spanish side, i.e., excluding Brazil) had been educated in the manner of Rodo's *Ariel.*

> **Ariel represents in the Shakespearian symbolism that noble and winged part of the spirit. Ariel is the rule of reason and sentiment over the base impulses of irrationality. He is the generous zeal, the lofty and unselfish motive in action, the spirituality of civilization, the vivacity and grace of intelligence, the ideal goal to which human selection aspires. (Rodo, 1957, translated by Obaid and Maritano)**

Q methodology, in its quantum form, is likely to bring cognition and "spirituality" together, in the age-long mode of probabilistics, with a new probabilistic, in which even ethics is rendered substantive (Stephenson, 1987b, 1988c). Quantum physics gives us the rule of reason; quantum psychology, the rule of sentiment as well. The reformulation of psychology as a quantitative science, for which Thurstone toiled, is achieved, but in the subjective mode where psychology belongs.

*References**

Beebe-Center, J.G. (1932) *The psychology of pleasantness and unpleasantness.* New York: D. Van Nostrand.

Bohr, N. (1950) On the notions of causality and complementarity. *Science, 111,* 51-54.

Born, M. (1927) Report of British Association for Advancement of Science. *Nature 119,* 354.

Brown, W. & W. Stephenson (1933) A test of the theory of two factors. *British Journal of Psychology,* (General Section), *23,* 352-370.

Burt, C. (1940) *The factors of the mind* London: University of London Press.

Burt, C. (1972) The reciprocity principle. In S.R. Brown & D.J. Brenner (Eds.), *Science, psychology, and communication* (pp. 39-56). New York: Teachers College Press.

Burt, C. & W. Stephenson (1939) Alternative views on correlations between persons. *Psychometrika, 4,* 269-281.

Cronbach, L.J. & G.C. Gleser (1954) Review of *The Study of Behavior,* by W. Stephenson. *Psychometrika, 19,* 327-330.

de Santillana, G. & H. von Dechend (1969) *Hamlet's mill: An essay on myth and the frame of time.* Boston: Gambit.

Fechner, G.T. (1871) Zer Experimentellen Aesthetik. *Abh. d. Math.-Phys.* (Zeipzig), 555-635.

*Combined references for Parts I and II.

Fisher, R.A. (1935) *The design of experiments.* London: Oliver & Boyd.

Gottesman, M.J. (1980) Case studies in implicit communication: A Q-methodological approach. (Doctoral dissertation, University of Iowa, 1980.) *Dissertation Abstracts International, 41,* 1267A.

Harman, H.H. (1960) *Modern factor analysis.* Chicago: University of Chicago Press.

Hearnshaw, L.S. (1979) *Cyril Burt, psychologist.* Ithaca, NY: Cornell University Press.

Holzinger, K.J. & F. Swineford (1937) The bi-factor method. *Psychometrika, 2,* 41-54.

Hotelling, H. (1933) Analysis of a complex of statistical variables into principal components. *Journal of Educational Psychology, 29,* 417-441, 498-520.

Irwin, J.O. (1932) On the uniqueness of the factor *g* for general intelligence. *British Journal of Psychology,* (General Section), *22,* 359-363.

Kantor, J.R. (1933) *A survey of the science of psychology.* Bloomington, IN: Principia Press.

Kantor, J.R. (1959) *Interbehavioral psychology: A sample of scientific system construction.* Bloomington, IN: Principia Press.

Kelley, T.L. (1935) *Essential traits of mental life.* Cambridge, MA: Harvard University Press.

Kraay, R.W. (1977) Symbols in paradox: A theory of communication based on the writing of Mercea Eliade. (Doctoral dissertation, University of Iowa, 1977.) *Dissertation Abstracts International, 38,* 1720A.

Langer, S.K. (1967-1982) *Mind: An essay on human feeling* (3 vols). Baltimore: Johns Hopkins University Press.

Line, W. (1931) *The growth of visual perception in children.* Cambridge, England: Cambridge University Press.

Maritano, N. & A.H. Obaid (1963) *An Alliance for Progress.* Minneapolis: Denison.

Mulaik, S.A. (1986) Factor analysis and *Psychometrika*: Major developments. *Psychometrika, 51,* 23-33.

Nelson, B. (1975) The quest for certitude and the books of scripture, nature, and conscience. In O. Gingerich (Ed.), *The nature of scientific discovery* (pp. 355-372). Washington, DC: Smithsonian Institute Press.

Nesterenko, A. (1979) Values in science: A study in operant subjectivity. (Doctoral dissertation, University of Iowa, 1979.) *Dissertation Abstracts International, 40,* 6054-6055A.

Newbold, E.M. (1926) *A contribution to the study of the human factor in the causation of accidents* (Report of the Industrial Fatigue Research Board, No. 34). London: H.M. Stationery Office.

Pais, A. (1986) *Inward bound: Of matter and forces in the physical world.* Oxford: Clarendon Press.

Piaggio, H.T.H. (1931) The general factor in Spearman's theory of intelligence. *Nature, 127,* 56.

Rae, A.I.M. (1986) *Quantum mechanics* (2nd ed.). Bristol, England: Adam Hilger.

Rodo, J.E. (1922) *Ariel.* Boston: Houghton Mifflin. (1957 trans. by Maritano and Obaid)

Royal Society of London (1938) A discussion on the application of quantitative methods to certain problems in psychology. *Proceedings of the Royal Society of London* (Series B), *125,* 415-434.

Spearman, C.E. (1904) General intelligence objectively determined and measured. *American Journal of Psychology, 15,* 201-293.

Spearman, C.E. (1927) *The nature of "intelligence" and the principles of cognition.* London: Macmillan.

Spearman, C.E. (1937) *Psychology down the ages* (2 vols). London: Macmillan.

Stephenson, W. (1931) Tetrad-differences for verbal subtests relative to non-verbal subtests. *Journal of Educational Psychology, 22,* 334-350.

Stephenson, W. (1935) Technique of factor analysis. *Nature* (London), *136,* 297.

Stephenson, W. (1936) The foundations of psychometry: Four factor systems. *Psychometrika, 1,* 195-209.

Stephenson, W. (1939) The factorial analysis of abilities defined as non-fractional factors. *British Journal of Psychology,* (General Section), *30,* 94-104.

Stephenson, W. (1952) *Intimations of self.* (Unpublished manuscript)

Stephenson, W. (1953a) *The study of behavior: Q-technique and its methodology.* Chicago: University of Chicago Press.

Stephenson, W. (1953b) Postulates of behaviorism. *Philosophy of Science, 20,* 110-120.

Stephenson, W. (1954) *Q-methodology and psychoanalysis.* (Unpublished manuscript)

Stephenson, W. (1961) Scientific creed--1961. *Psychological Record, 11,* 1-25.

Stephenson, W. (1969) Foundations of communication theory. *Psychological Record, 19,* 65-82.

Stephenson, W. (1970) Factors as operant subjectivity. In C.E. Lunneborg (Ed.), *Current problems and techniques in multivariate psychology* (pp. 33-48). Seattle: University of Washington. (Reprinted: *Operant Subjectivity,* 1977, *1,* 3-16.)

Stephenson, W. (1972a) Applications of communication theory: I. The substructure of science. *Psychological Record, 22,* 17-36.

Stephenson, W. (1972b) Applications of communication theory: II. Interpretations of Keats' "Ode on a Grecian Urn." *Psychological Record, 22,* 177-192.

Stephenson, W. (1973). Applications of communication theory: III. Intelligence and multivalued choice. *Psychological Record, 23,* 17-32.

Stephenson, W. (1974) Methodology of single case studies. *Journal of Operational Psychiatry, 5*(2), 3-16.

Stephenson, W. (1978) Concourse theory of communication. *Communication, 3,* 21-40.

Stephenson, W. (1979) Comment: Q methodology and Newton's Fifth Rule. *American Psychologist, 34,* 354-357.

Stephenson, W. (1980a) Consciring: A general theory for subjective communicability. In D. Nimmo (Ed.), *Communication Yearbook 4* (pp. 7-36). New Brunswick, NJ: Transaction Books.

Stephenson, W. (1980b) Newton's Fifth Rule and Q methodology: Application to educational psychology. *American Psychologist, 35,* 882-889.

Stephenson, W. (1980c) Q methodology and the subjectivity of literature. *Operant Subjectivity, 3,* 111-133.

Stephenson, W. (1981) Cyril Burt, quantum theory, and Q: Historical note. *Operant Subjectivity, 4,* 120-134.

Stephenson, W. (1982a) Q-methodology, interbehavioral psychology, and quantum theory. *Psychological Record, 32,* 235-248.

Stephenson, W. (1982b) Newton's Fifth Rule and Q-methodology: Application to self psychology. *Operant Subjectivity, 5,* 37-57.

Stephenson, W. (1983) Quantum theory and Q-methodology: Fictionalistic and probabilistic theories conjoined. *Psychological Record, 33,* 213-230.

Stephenson, W. (1986a) William James, Niels Bohr, and complementarity: I--Concepts. *Psychological Record, 36,* 519-527.

Stephenson, W. (1986b) William James, Niels Bohr, and complementarity: II--Pragmatics of a thought. *Psychological Record, 36,* 529-543.

Stephenson, W. (1987a) William James, Niels Bohr, and complementarity: III--Schrodinger's cat. *Psychological Record, 37* 523-544.

Stephenson, W. (1987b) The science of ethics: I. The single case. *Operant Subjectivity, 11,* 10-31.

Stephenson, W. (1987c) Q methodology: Interbehavioral and quantum theoretical connections in clinical psychology. In D.H. Ruben & D.J. Delprato (Eds.), *New ideas in therapy* (pp. 95-106). Westport, CT: Greenwood Press.

Stephenson, W. (1988a). William James, Niels Bohr, and complementarity: IV--The significance of time. *Psychological Record, 38,* 19-35.

Stephenson, W. (1988b) William James, Niels Bohr, and complementarity: V--Phenomenology of subjectivity. *Psychological Record, 38,* 203-219.

Stephenson, W. (1988c) The science of ethics: II. Ethical judgment. *Operant Subjectivity, 11,* 37-52.

Stephenson, W. (1988d) Quantum theory of subjectivity. *Integrative Psychiatry, 6,* 180-187.
Stephenson, W. (1988/1989) The quantumization of psychological events. *Operant Subjectivity, 12,* 1-23.
Stephenson, W. (1990) Fifty years of exclusionary psychometrics: I. Q technique. *Operant Subjectivity, 13.*
Tarasov, L.V. (1980) *Basic concepts of quantum mechanics.* Moscow: MIR Publishers.
Thompson, D.W. (1942) *Growth and form.* Cambridge, England: Cambridge University Press.
Thurstone, L.L. (1935) *The vectors of mind.* Chicago: University of Chicago Press.
Ward, J. (1933) *Psychological principles.* Cambridge, England: Cambridge University Press.
Wilson, E.B. (1928) Proc. of the National Academy of Sciences XIV, p. 283. ABSTRACT
Zimmerman, D.W. (1979) Quantum theory and interbehavioral psychology. *Psychological Record, 29,* 473-485.
Zimmerman, D.W. (1982) The universe--an unscientific concept. *Psychological Record, 32,* 337-348.

To see what is general in what is particular and what is permanent in what is transitory is the aim of scientific thought. (A.N. Whitehead)