Quantum Psychology & the Metalogic of Second Order Change

by

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Introduction

The 1950's was a time of radical reformulation within psychology regarding the definitions and nature of psychological problems and interventions. Within a representationalist context (Oshins, 1987a), Eriksonian approaches to hypnosis (Haley, 1972, 1973) attracted attention to subtle and often puzzling strategies of therapeutic intervention. The systems approach toward communication and feedback (Ruesch and Bateson, 1968; Watzlawick, et.al., 1967; Bateson, 1972) focused interest on the various contexts of individuals in interaction within entire systems, including the observer or therapist.

No longer could the therapist justifiably claim to be out there, just looking in, while enlightening their patients with insights in order to help these patients resolve their personal limitations toward accepting a presumed fixed, external reality. Instead, the therapist was conceived as part of a dynamic system which was continually changing and transforming within a pragmatic image of experience. In some sense, the new therapeutic role was to help the patients develop more effective participations in their ongoing life, often through the strategic redefinition of the situation or system (Haley, 1961, 1972, 1973; Ruesch & Bateson, 1968; Watzlawick, et.al., 1974; Weakland, et.al., 1974).

The double-bind theory of schizophrenia (Bateson, et.al., 1956) both pioneered and exemplified this new approach to therapy and to more general psychological systems. It also focused attention on the metalogical structure of communications. In contrast to the prevalent view of schizophrenia as a disease, or impairment in functioning, of an individual's mind, double bind theory proposed that schizophrenia was an understandable, systemic reaction to a certain type of absurd, inviable, and self-reifying, communicational context. In particular (Ibid.; Oshins, 1988; 1989 and references therein; 1994), the six "necessary ingredients for a double bind situation," as specified by the authors, underscores that the circumstances involved are not merely "conflictual," but include disconfirmation ("negative injunction") on at least two logical levels, in a manner such that any selection from among the entire perceived range of possible reactions will perpetuate the untenable circumstances.

In so doing, the authors based their problem conceptualization upon the Whitehead-Russell theory of logical types, which in part sought to avoid certain so-called "self-referential paradoxes," such as Russell's antinomy ("Does the class whose members are precisely those classes which are not members of themselves contain itself?" It would contain itself if and only if it did not.) or the well-known variant of Epimenides' "liar's paradox" ("Is 'This statement is false.' true or false?" If it is true, then it is false; if it is false, it is true; etc..). From this perspective, double binds involve metacommunications (at a higher level), any response to which reinforces and sustains the untenable situation. The proposed remedy for avoiding corresponding predicaments was to adopt such a rule as: whatever involves all of a collection/class must not be a

member of this collection/class. This recognition of the importance of maintaining proper logical levels in communications and of the consequent pathologies which can develop from mixing logical levels was a major contribution to psychology and to philosophy.

As is often the case with epistemic reformation, the initial, pioneering ideas spawn new questions, the answers to which provide new information and new conceptualizations, which can be tested and which in turn generate new questions. "Propositional thinking" such as this provides a bedrock enabling psychology to grow as a science (Cromwell, 1984; Kelly, 1968; Oshins, 1988). As is the case with good such reinvigorization, as it grows it increases our understanding and our ability to anticipate and influence, and thereby to chose how we participate within our personal and mutual experience.

Regarding my own work, I believe it appropriate to acknowledge the creative inspiration that I received from insights of the "MRI school." Although my specific conceptions are somewhat variant to the ones developed by people at the Mental Research Institute, particularly as regards formal representations — anticipatable, since my training is in foundations of theoretical physics —, I find it extraordinary how close some are. In cases where they differ, my own representations have often been an extension or rigorization of concepts which I came to recognize first through reading MRI publications, or through insights and understandings from numerous discussions over the years with John Weakland, Lynn Segal, and other members of MRI. As such, their conceptualizations provided fertile ground for me to plant my own roots and to develop my own model of experience which I refer to as "quantum psychology". This paper represents a gesture of appreciation on the thirtieth anniversary of the Mental Research Institute.

The structure of the paper follows: First, I will present the background of my involvement with MRI and what I mean by quantum psychology. Then I will discuss some examples of metalogic structure and focus on the structure of the metalogic involved in second order change, as described in Change: Principles of Problem Formulation and Problem Resolution (Watzlawick, et.al., 1974). I will next show how simple polarizers can be used to model the logic and metalogic of experience. They will be used to describe the difference between classical logic and quantum logic. Some examples from psychology will be given to illustrate the usage of a "filter logic" approach. I will also discuss what appears to be common parallel structures between the brief/strategic therapy approach and a quantum psychology model. In particular, I will show how the violation of the distributive law of classical logic allows for a complementary metalogic to the filters which I will identify with the logical structure of second order change. In an appendix, the Stern-Gerlach experiment will be discussed as an example of the fracture of classical logic in physics.

At certain points, I will use specific technical language. For readers familiar with some of these terms, I hope that this usage will add clarity and depth of understanding to my overview. After all, the economy of expression of mathematics, when correctly applied, seems peerless. Nevertheless, the paper is not meant to convince the reader that quantum psychology is true nor right, only to indicate that it might be possible. Thus, I recommend that others just skim the technicalness. Rather, try to focus on the limited number of basically simple principles involved, try to play a bit with the examples given, and try to come up with some of your own. Enjoying is often an easier and better, complementary road to understanding than is trying to understand!

Background

My own direct involvement with the Mental Research Institute (MRI) began in 1976. I had been interested in various controversies in the psychological literature concerning the nature of schizophrenia as a logical phenomenon (Oshins & McGoveran, 1980; Oshins, 1989, 1991 ft.nt. 2; Hilgard, 1989). In particular, I was interested in the formal arguments (Oshins, Ibid.) between Arieti (1974) and Bateson, et.al. (1956), concerning what are referred to as von Domarus' principle of "identification by predicates" and "double bind theory." According to von Domarus' principle, subjects are identified on the basis of having a common predicate, called the "identifying link." This is believed to govern certain unconscious, associative, "primary process" reasoning. The prototype is the paleological syllogism (Arieti, op.cit), "I am a virgin. The Virgin Mary was a virgin. I am the Virgin Mary."

My impression was that the arguments were mostly interpretive and representational, and were not in essential empirical contradiction. I felt that the disagreements were due largely to an insufficient symbolic representation for defining and comparing the differing points of view. As I understood that these issues were considered important in psychiatry, I thought that I would try to construct a more adequate symbolic language for representing the logical structures concerned. My purpose was to produce an intellectual tool for clarifying the matter as I understood it, in order to accommodate both sides of the controversy within a single, unified framework.

During the spring and summer of 1976, while "playing" with "fuzzy logic" (Oshins, et.al., 1984; Oshins, et.al., 1989) and "the laws of form" — generalized classical logics being developed by computer scientists in an attempt to model thought — I came up with the idea to construct matrix representations for them, similar to what Heisenberg had done in quantum physics. I had been thinking about the suggestion by Watzlawick, Weakland and Fisch (1974) in Change: Principles of Problem Formulation and Problem Resolution to apply the mathematics of group theory to linguistic interaction because of their misdefinition (Ibid., pp. 4, 7) of mathematical "groups" as being "commutative" (order independent), since all quantum interactions take place through the property of not being commutative. I had come to MRI from New York to discuss this issue with Paul Watzlawick.

Paul directed me to Bateson to whom I proposed my formal ideas about double binds that summer. Bateson said that although he thought they were interesting, he no longer believed that schizophrenia was about double binds, but instead about something called von Domarus' principle — thus, independently, proposing von Domarus' principle to me. We went on talking about my ideas on the possible relation between the two, among other things.

I believed that if I could properly integrate some of my reinterpretations of notions from the computer logics—such as measure, orthogonality (negation) and transformation—then I could possibly "quantize" the structure. Using an approach akin to "recombinant psychology," I had started to examine the psychological issues concerning schizophrenia. By attempting to develop matrix representations of the variant logics while simultaneously constraining my formalism by requiring empirical validity, I hoped to induce a physical logic of psychological processes that could clarify the psychological disputes, embody features from the computer logics, and at the same time be identifiable with actual physical events (Oshins, 1984, 1987b, 1989, 1991, 1994; Oshins, et.al., 1980, 1984, 1992).

At this point, although I had previously heard the term "quantum logic", I was not aware of the almost 50 years of rich mathematical structures given birth to by von Neumann (Birkhoff & von Neumann, 1936) and expanded by Birkhoff, Gleason, Mackey, Piron, Mittelstaedt, Finkelstein, etc.; nor was I familiar with the more interpretive structures, extending the Bohr/Heisenberg physical perspectives, by von Weizscker, Steckelberg, Finkelstein, Jauch, Watanabe, etc.. I was also not then informed about some of the more immediate psychophilosophical precursors of the quantum epistemology such as can be found within Wm. James, Kierkegaard, Hoffding, etc. (Holton, 1973). My interest was focused more upon examining and contrasting intrapsychic processes and "artificial intelligence".

As an illustration of my "perspective" I retranslated Arieti's above example as "I + Virgin Mary (modulo virginity)." As such, "I" becomes equivalent to and nondistinguishable from "Virgin Mary". This intertwining of constructs, based upon the common predicate or attribute "virginity," in principle, would be a more primitive type of association (Vigotsky, 1934, pp. 1064-5; von Domarus, 1944; Arieti, 1974; Oshins, 1989 and references therein) — possibly due to functional, brain impairment; to stress induced, hormonal elevation, etc., which could change neuronal firing patterns or thresholds, or could degrade such functions as lateral inhibition.

In a quantum formalism, one considers a type of encoding of patterns and of regularities in physical experience which is at fundamental variance with classical, parallel process modeling, such as either the generic, McCulloch-Pitts-type neural nets; or Pribram's classical "hologram hypothesis" (Oshins 1984a,c, 1989 and references therein, 1991; Oshins, et.al., 1992, p. 43; Hilgard, 1989). Quantum parallel processing occurs when two empirical processes are possible but there is no empirical procedure that is capable of distin-

guishing which one has actually occurred. It is then empirically meaningless to speak about there being individual events (in the classical sense of having a fully defined and fixed sample space). The reader is referred to the discussion of the empirical logic of the Stern-Gerlach experiment in the appendix.

In quantum theory, this type of fundamental, "operational ambiguity" (Oshins, op.cit.; Oshins, et.al., 1992, p. 54) is effected in terms of symmetries on irreducible equivalence classes of alternative, competing possibilities, realized as a (nondistributive, orthomodular, atomic) lattice (Oshins, et.al., 1984; 1992). The quantum process is described as a "non-discriminating measurement" (Schwinger, 1970) of "interfering alternatives" (Feynman & Hibbs, 1965) realized by an irreducible or "coherent" (Jauch, 1968) lattice of propositions. This equivocation process provides a type of irreducible, representational ambiguity which does not exist in classical representations, such as in computers. Rather than trying to avoid ambiguity, I elevated this specific type of ambiguity into a fundamental principle which I believe to govern primary processes, describable according to von Domarus' principle.(Oshins, 1989; 1991; Hilgard, 1989; Oshins, et.al., 1992, p. 54-55).

Operationally, quantum physics has shown (Schwinger, op.cit., esp. pp. 27-28; Oshins, 1984a , 1991; Oshins, et.al., 1992, p. 54-55) that there is an empirical difference in coding between: (1) forming a class (virtual ensemble) of possible states (subensembles) which are distinguished by some specific attribute (eg. subensembles having either predicate-A or incompatible/complementary predicate-B) and (2) forming a class (virtual ensemble) of possible states (subensembles) which are not empirically distinguishable according to such a predicate — ie., there is no empirical procedure that discriminates between the alternative, possibly incompatible/complementary predicates. This is true even if no member of the class is distinguished or separated out, as long as, operationally, one could be.

A psychological example which I thought might carry the same type of representational alternatives is the difference between saying a person (= a "male or female", if distinguished) came into the room and saying that a "male" or a "female" came into the room (distinguishing gender as opposed to a different, competing context). Of course, the existence of such complementary, competing construct attributes is an empirical issue. Other possible examples of complementary alternatives might involve a metachoice between, say, the good/bad-attribute-dicotomy and the love/hate-attribute-dicotomy. [See also, Bohr (1987a/1954, p. 81) regarding "justice and charity", Heisenberg (1958, p. 179) regarding "enjoying music and analyzing its structure", Orlov (1982), and Oshins (1987b, 1988)] That there are empirically discriminable consequences to these two operational ways to code "nonselecting measurements" became a foundation for my "quantum psychology" approach.

A related type of equivocation exists in children. Using an example pointed out to me by Gordon Bower, a young child might identify dogs, cats, and horses as if the same (eg. a "bow-wow") because they all have the common characteristic of 4-leggedness. I have applied formal theorems from the mathematics of "lattice theory" to show how classical logic would result from the development of a capacity for serialization such as is claimed by Piaget to take place in operational stages of child development (Oshins, 1987a, 1989).

Similarly (Ibid.; Oshins, 1984a,c), I have proposed possible experiments using a "superconducting quantum interference device" (S.Q.U.I.D) to try to determine neurophysiological prerequisites for the developmental and evolutionary capacity to form negation in terms of signal synchronization. Along with Freud, I have suggested the capacity to form negation to be a precondition for consciousness. Thus, the beginning of my project.

I should try to be clear in this regard about my use of the term "quantum psychology," so as not to confuse the reader into thinking that I am applying quantum physics to psychology. As I have tried to sketch above, this would invert the actual development of the model. To the contrary, I believe that I have found quantum physics in psychology. Still, as described above, there is no basis here, as yet, for asserting this work to be quantum. Although I have indicated reasons for claiming to find mathematics in psychology in common with that in quantum physics, mathematics by itself is still not physics.

In order to claim a physical model, I am obliged to provide a "semantically consistent," physical interpretation having empirical validation. In addition, in order to claim a quantum representation, I am obliged to provide a role for Planck's constant (quantum of action). I shall not do this here. I merely stress that my

current interest is in posing "separating alternatives" which can distinguish in principle between competing theories and in determining the answers which Nature provides. Where Planck's constant comes from in my formalism has been discussed in Oshins (1984c, ft.nt. 9 1989, ft.nt. 3; 1991, ft.nt. 16; and references therein). The role that I envision for Planck's constant in quantum psychology is as a "contraction parameter" allowing for the classicalization of psychological experience, as it does for physical experience. That quantum physics does indeed violate classical logic will be discussed in the appendix on the Stern-Gerlach experiment.

Metalogic, Schizophrenia, and 2nd Order Change

This section uses examples to illustrate the metalogic structure involved in double binds and in second order change. The difference between 1st order and 2nd order change is delineated.

Schizophrenia as Metalogical Communications(Oshins, 1984, 1987b, pp. 15, 22-25, 1989 and references therein):

The "double-bind theory of schizophrenia" (Bateson, et.al., 1956) describes errors in logical typing that develop in individuals raised in environments: (1) which negate in a "paradoxical way" at both level and metalevel; (2) which forbid commenting upon this; and (3) in which one's "choice" is experienced as being survival related. Let us consider an example suggested by Paul Watzlawick during my 1978 talk at Stanford's psychology department (Laing, 1965/76, p.205):

> Mother: "I don't blame you for talking that way. I know you don't really mean it."
>
> Daughter: "But I do mean it."
>
> Mother: "Now, dear, I know you don't . You can't help yourself."
>
> Daughter: "I can help myself."
>
> Mother: "No, dear, I know you can't because you're ill. If I thought for a moment you weren't ill, I would be furious with you."

Metalogic representation: The mother is not telling the daughter that she [mom] disagrees with what the daughter is saying, eg. she [mom] does not say "I disagree with what you [daughter] say (or mean)". Instead, she [mom] effectively says "You [daughter] do not mean what you [daughter] say (or think) you [daughter] mean." The mother is not commenting on what is being said by the daughter but making a metacomment on the truth value of what the daughter is saying — ie., the mother essentially decrees that the construct frame which the daughter is asserting is wrong (not-true), not that whichever answer may be chosen within a particular construct frame is wrong (not-true).

The daughter is being forced to label her behavior as "'bad' or 'mad"'. Thereby, the mother invalidates the daughter's framing mechanisms. Alternative evaluations, such as perhaps due to inquisitiveness or hunger, are excluded. The daughter can neither avoid the "choice", nor comment on it, and must "chose" or distinguish one. (The element of power involved being obvious, and significant.)

Boundary formation (Orlov, 1982; Oshins 1984c, 1987a,b, 1988, 1991 ft.nt. 6): From his imprisonment in the Soviet gulag, Yuri Orlov independently described a type of intrinsic ambiguity to information which is similar to my quantum psychology approach. He invisioned a type of "doubt state," similar to my concept of operational ambiguity, when there is "inadequate resolution to resolve" a situation. An example given by Orlov (1982, p.43) is Hamlet's "To be or not to be?". He provides (Orlov, op.cit., pp. 46-47; Oshins. 1987b, pp. 19-23, 1988) a list of "the necessary ingredients for a doubt state" which is remarkably similar to the Bateson, et.al. (1956, pp. 253-254) list of "the necessary ingredients for a double bind situation". I have suggested that the difference may lie in the locus of control of the decision (Rotter, 1966; Oshins, Ibid.).

In this regard, Kubie's comments (1951, p. 77) about the difference between boundary forming processes in neurosis and in psychosis is interesting:

> "The conflict, however, is not the illness. Psychopathological illness begins as the conflict engenders a repressive-dissociative process which obscures the links between symbolic constructs and the percepts and conceptualizations which represent the body and its needs and conflicts: ie., the 'I' pole of reference. This is the primary point of rupture in any psychopathological process. [Emphasis in the original.] Alone, however, this produces only the neurosis. In the psychotic process there is an additional specific distortion in the relationship between the symbol and its pole of reference to the outer world: ie., to the 'Non-I."'

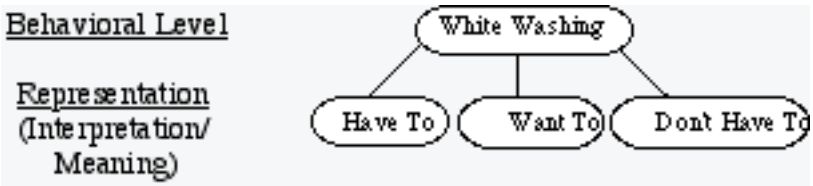
This boundary forming distinction is particularly interesting because of the arbitrariness and yet the necessity of drawing a boundary in the act of knowledge/measurement. Consider Bohr's example (1961/1929, p. 99) of the changeableness of boundaries:

> "... when attempting to orient himself in a dark room by feeling with a stick. When the stick is held loosely, it appears to the sense of touch to be an object. When, however, it is held firmly, we lose the sensation that it is a foreign body, and the impression of touch becomes immediately localized at the point where the stick is touching the body under investigation."

This is particularly provocative in light of De Witt's depiction (1971, p. 220) of an inadequate coupling between an observed system and a physical measuring apparatus as "a kind of schizophrenic state in which it is unable to decide what value it has found. ..."

The Metalogic of Problem Framing.

A prototype of MRI's technique of "problem reframing" is Tom Sawyer's restructuring of his chore to whitewash a huge fence, not as a burden, but as a desirable opportunity worth paying for (Watzlawick, et.al., pp.90-91): "Like it? Well, I don't see why I oughtn't to like it. Does a boy get a chance to whitewash a fence every day?" This resulted in his friends paying him for the "privilege" of painting the fence. We can depict this metalevel reframing, thus:



To affirm on the lower level, by necessity, affirms on the higher level.

Similarly, from hypnosis we might consider: "Do you want to go into a trance, now, while sitting there, or later, when you get up?" To affirm any of "now," "while sitting there," "later," or "when getting up" is to affirm the trance induction. Or, from new wave therapies: "Do you want to sign up for the training now or mail in a check?"

Or, consider the example of a "hostile" women's "frigidity" towards her husband. Successful intervention consisted in supporting the wife's "overprotectiveness" towards her husband, framed as: clearly "he would not know how to cope with the impact of her uninhibited sexuality (Ibid., pp.102-103)." This redefinition of the same circumstances led to her sexual acting out her hostility, thereby "defeating" the "problem".

First Order and Second Order Change. (Watzlawick, et.al., 1974; Weakland, et.al., 1974; Oshins, 1989)

In their book Change: Principles of Problem Formulation and Problem Resolution, Watzlawick, et.al. (1974, pp. 10-11) distinguish two types of change: "one that occurs within a given system which itself remains unchanged, and one whose occurrence changes the system itself." They use the example of a nightmare to differentiate between the two:

"... a person having a nightmare can do many things in his dream — run, hide, fight, scream, jump off a cliff, etc. — but no change from any one of these behaviors to another would ever terminate the nightmare. We shall henceforth refer to this kind of change as first-order change. The one way out of a dream involves a change from dreaming to waking. Waking, obviously, is no longer a part of the dream, but a change to an altogether different state. This kind of change will from now on be referred to as second-order change. ... Second-order change is thus change of change."

Regarding 2nd order change, I draw particular attention to the following formal features of such "metachange": (1) metalogic, (2) reframing, and (3) second order change. (See table "Metacomments on the Principles of Second Order Change from the Perspective of Quantum Psychology" below).

In the next section, I shall use an analogy with polarizing filters to explain how quantum psychology provides a structure which accommodates the metalogic of incompatible frames. In particular, we shall formulate a notion of complementarity which accommodates the metalogic of second order change.

Filter Logic

This section describes some commonality between formal features of second order change and those of quantum psychology. Polarizing filters are used to characterize certain rules of the logic of experience. These "representational tools" are then used to explain a fundamental difference between classical and quantum representations of experience — whether or not the distributive law of logic is universally valid, respectively. [Although we shall be using the polarization of light in order to exhibit certain aspects of interference, the reader is cautioned that the type of wave interference that is relevant to a quantum context has nothing to do with the interference of physical fields such as light (eg. as in holograms) (Oshins, 1989, 1991).] A corresponding metalogic of complementary constructs, as is found in quantum logic, is proposed as the proper formal structure of MRI's second order change (Oshins, 1987a,b , 1989; Oshins and McGoveran, 1980). Quantum psychology's metalogic basis for double binds and for second order change is discussed.

Formal Features of Second Order Change and of Quantum Psychology

As is the case with MRI's strategic therapy approach, quantum psychology presents a model of "entire systems" in interaction. out, as long as, operationally, one could be. The classical image of an external, objective reality, independent of the observing system, is rejected. In asserting an operational meaning to knowledge about experience (Oshins, 1989), quantum psychology maintains that the existence of complementary constructs — ie. that are mutually exclusive, but equally necessary in a different context to give an entire description of the phenomena — gives rise to a metalogic. These common formal features are compared in the following table:

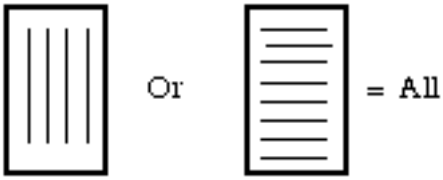
Formal Features in Common between Second Order Change and Quantum Psychology	
Features of Second Order Change	**Features of Quantum Psychology**
(1) Interactive Whole Systems: "...problems that people bring to psychotherapists ...[usually are] situational difficulties between people — problems of interaction" (Weakland, et.al., 1974, p.147); thus, they shifted " from the observation of the individual to the observation of a system and to...the needs of a system rather than the needs of a person " (Haley, 1961/76, p.78);	"...the fundamental difference with respect to the analysis of phenomena in classical and in quantum physics is that in the former the interaction between the objects and the measuring instruments may be neglected or compensated for, while in the latter this interaction forms an integral part of the phenomena. The essential wholeness of a proper quantum phenomenon finds indeed logical expression in the circumstance that any attempt at its well-defined subdivision would require a change in the experimental arrangement incompatible with the appearance of the phenomenon itself....it is indeed more appropriate to use the word phenomenon to refer only to observations obtained under circumstances whose description includes an account of the whole experimental arrangement." (Bohr, 1987a/1954, pp. 72-3) "...the unavoidable interaction between the objects and the measuring instruments sets an absolute limit to the possibility of speaking of a behavior of atomic objects which is independent of the means of observation." (Bohr, 1987a/1938, p. 25)
(2) Metalevel Problem Reframing: " ...there are two different types of change: ...[first-order change] occurs within a given system and...itself remains unchanged, and...[second order change] whose occurrence changes the system itself...thus change of change" (Watzlawick, et.al., 1974, pp. 10-11); and	Complementarity — the basis for metachange Quantum theory " forces us to adopt a new mode of description designated complementary in the sense that any given application of as classical concepts precludes the simultaneous use of other classical concepts which in a different connection are equally necessary for the elucidation of the phenomena " (Bohr, 1961/1929a, p.10). As noted by Bohr: " the nature of our consciousness brings about a complementary relationship, in all domains of knowledge, between the analysis of a concept and its immediate application " (Bohr, 1961/1929a, p.20).

(3) Pragmatism and Avoidance of Insight about Causes: Problem conceptions and interventions are based upon " what is going on in the systems of human interaction... Correspondingly, we avoid the question 'Why?' ... [since it] tends to promote an individualistic, voluntaristic, and rationalistic conception of human behavior, rather than one focused on systems of interaction and influence" (Weakland, et.al., 1974, pp.150-151, 155; Also, Watzlawick, et.al., 1974, pp.83, 86) in the present.	To Bohr, perhaps the most fundamental of all instances of complementarity involved " the space-time co-ordination and the claim of causality " (Bohr, 1961/1927, p.54). Oshins has likened this complementarity between the locational or situational degrees of freedom and the causal degrees of freedom to a complementarity between a " What?" and a " Why?". He has suggested this underlies the distinction between the MRI approach and the traditional psychoanalytic search for " the cause." This reflects the modal structure of quantum logic. There is only a virtual future with no facts, only possibilities. Facts are attributes of the past and are fixed through the thermodynamically irreversible act of obtaining knowledge. Because of its modal structure, quantum physics rejects the notion of determinism from classical physics and, likewise, from classical logic. Although there is still a causal structure to the precedence-antecedence relation of events, instead of a deterministic meaning, such as event-A caused event-B, one has a quantal causal relation — event-A can cause or influence event-B. (This can be true iff if B lies " within the future light cone " of A, which places a bound on the speed by which material information can travel).

The Logic of Propositions and the Logic of Filter:

As in a game such as bridge, chess, etc., logic also has elements, actions, and rules. The elements usually represent propositions about various predicates. These actions include ways to order (such as a "containment" relation), ways to aggregate (the adjunction "or"), ways to disaggregate (the conjunction "and"), etc.. The rules tell us what happens when we make a logical action with the various elements.

We shall illustrate three rules using the logic of propositions as filters. The first two rules (law of the excluded middle and law of contradiction) are usually assumed to be true both classically and quantally. Although, classically, the distributive law for elementary, unit propositions is universally valid; quantally, it is strongly violated for unit propositions about complementary properties.

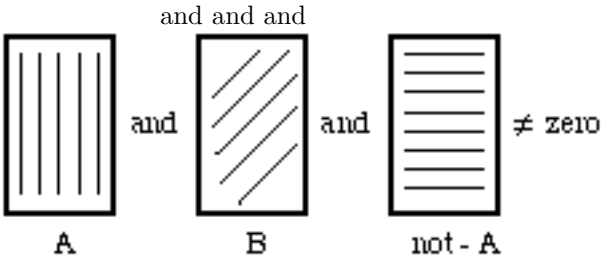
Law of the Excluded Middle For propositions A and not-A and for vertical and horizontal filters.	
Logic of Propositions	**Logic of Filters**
A or not-A = True	

The filter logic correspondent to the law of the excluded middle is that all light will go through either the vertical filter or the horizontal filter, as parallel alternatives.

Law of Contradiction For propositions A and not-A and for vertical and horizontal filters	
Logic of Propositions	**Logic of Filters**
A and not-A = False	

The filter logic correspondent to the law of contradiction is that no light will go through both the vertical filter and the horizontal filter (as serial alternatives).

Violation of Distributive Law For propositions A, not-A and B, & for vertical, horizontal and diagonal filters	
Logic of Propositions (A or not-A) and B = True $\neq\Rightarrow$ (A and B) or (not-A and B) = True	**Logic of Filters** There exists a complementary B/not-B filter system such that:

Alternatively, A or not-A = True $\neq\Rightarrow$ (A = True) or (not-A = True), ie. There exists a complementary B/not-B system	

The filter logic correspondent to the violation of the distributive law is that although no light will go through both the vertical filter and the horizontal filter (as serial alternatives), there exists an intermediary diagonal filter B which can effect such a transition.

I point out that if B $\prod$ A, then light going through not-A would not go through B. Likewise, if B $\prod$ not-A, then light going through A would not go through B. As such, even though all light that goes through A or not-A will go through B, B is a "thing in itself" with its own irreducible integrity. As an example, consider that a mulatto does not have a black arm and white leg but its own coherent integrity, which is not part black and part white.

Classical Logic and the Quantum Logic of Complementarity

Classical logic asserts that there is a unique, fixed set of compatible filters, or compatible propositions (ie. simultaneously can be made either to line up or to be orthogonal to each other). This is known as the Frege principle.

Quantum logic asserts that there is not a unique set of compatible constructs but that there exists complementary constructs "in the sense that any given application of classical concepts precludes the simultaneous use of other classical concepts which in a different connection [sic. context] are equally necessary for the elucidation of the phenomena." [N. Bohr, 1961/1929a, p. 10]. As such, complementary constructs provide competing, alternative frames of reference.

From this point of view, the double bind is seen as fragmenting the integrity of the individual's representation. (Oshins. 1987b, pp. 19-23, 1988; Kubie,1951, p. 77; Rotter, 1966) Due to the "tertiary negative injunction prohibiting the victim from escaping from the field" (Bateson, et.al., 1956), the individual cannot comment upon the circumstances. Consider the example (Oshins & McGoveran, 1980) of my friend Jane who asks me "Do you love me?" Although I might be able to "chose" "yes" or "no" to label any example, if I were forced to do so, the true integrity of my experience is that "I like you [Jane]." In such context, "love" and "like" are being considered as complementary and competing for my experience. Although to my friend Jane, I might be able to express: "Your construct is incompatible with my experience. They don't line up with mine.", often one, such as a double-bound child, can not assert their construct frame. The following table delineates quantum psychology's representations of three formal features of second order change:

Metacomments on the Principles of Second Order Change from the Perspective of Quantum Psychology	
Principles of Second Order Change	**Metacomments from the Perspective of Quantum Psychology**
(1) metalogic: " . . . to express or explain something requires a shift to one logical level above what is to be expressed or explained. No explaining can be accomplished on the same level, a metalanguage has to be used" (Watzlawick, et.al., p.79);	• The metalogic question is not "Is it a1 or is it a2 from the A frame of reference?" but "Is it a1 from the A frame or is it b2 from the B frame?" It is not "Is it up or down from the vertical/horizontal frame of reference?" but "Is it up/down from the vertical/horizontal frame or is it diagonal (upward/right) from the diagonal right/diagonal left frames of reference?" • Likewise, it is not "Is the person black or white?" from the racial frame of reference, but "Is the person black or female?" thereby defining a racial or a gender metaframe of specification. • Or, "Do you think I am innocent or guilty?" "No, I love you."
(2) reframing: " Reframing means changing the emphasis from one class membership. . . to another, equally valid class membership, or, especially, introducing. . . a new class membership into the conceptualization of all concerned" (Ibid., p.98); and	• As is the case with polarizing filters, operational ambiguity allows one to reframe the "A/not-A" system into a "B/not-B" system and then reframe this intermediate "B/not-B" system back into the "A/not-A" system in a manner that induces a transition from "A" into "not-A". • The popular lingo goes: to get/knock someone "off of it". A more spontaneous example is when "surprise" induces a transition from being "angry" into "disappointment". Or, when "like" takes one from "not-love" to "love".

(3) second order change: "As long as the solution is sought within this dichotomy of a and not-a, the seeker is caught in an illusion of alternatives... The formula of second order change... is 'not a but also not not-a' " (Ibid., pp.90-91). I add that although it is, say, "b", it still is "a or not-a."	• Instead of asserting an objective reality, quantum psychology is interested in operational reality. It replaces the distributive law of classical logic (not the laws of contradiction nor of the excluded middle) with a Principle of Operational Ambiguity: • If one can not (operationally) distinguish between two unit predicates A & B, there will always exist a third possible contrary (unit) predicate C such that (A or B) = (B or C) = (C or A)," ie. they are equivalent perspectives —— there is no operational way to distinguish between A, B, & C. • In the earlier cases, we considered "B" to be "not-A" and "C" to be either "B" or "not-B". The principle then reads that the metalogic of quantum psychology will apply if when there is no (operational) way to distinguish whether "A or not-A" is the case then there will be an equivalently valid "B/not-B" system which could be the case.

Appendix: the Stern-Gerlach Experiment and the Fracture of Classical Logic (Oshins, 1991, appendix III; Oshins and McGoveran, 1980, appendix)

In the early part of the century, an experiment was performed by Stern and Gerlach in which a beam of silver atoms carrying the spin of a single electron is passed through an inhomogeneous magnetic field with gradient. (See Figure A.) This experiment is sufficient to derive the transformation properties of 1/2-integral spin matter, such as electrons and nucleons. The beam is split into precisely two separate beams which are either in the direction of the gradient of the magnetic field or opposed to it. (This is not a statistical effect and can be done one atom at a time.)

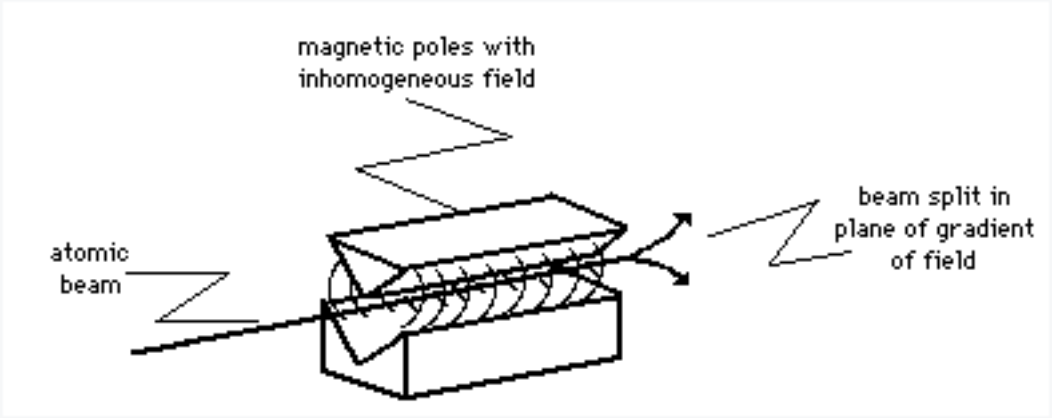


Figure A: Stern-Gerlach magnet separating the beam into two beams.

If the initial magnetic field's gradient was alined, say, vertically we could call the emerging beams Up and Down. This is a dicotomic event. As discussed in Oshins & McGoveran (1980), we can define an

operational logic for the Stern-Gerlach experiment. What we mean by empirical truth is quite specific [originally footnote 10]: (1) we agree upon a collection of questions; (2) we agree upon criteria by which observations pass the test of the questions; and (3) we ask the questions of the observation set. Empirical truth is distinguished by whether or not the answers satisfy the agreed upon criteria. In this sense, empirical truth is identified with the occurrence of an event having the properties under consideration — the event has been determined by some measuring apparatus, possibly a human).

The operational meaning to the logic is: (1) that if the single electron atom is "prepared" such that its magnetic moment is pointing Up, as is depicted in Figure B, then it will pass any attempt to "determine" whether it is indeed pointing Up ; (2) that it is true that the single electron atom is determined to have gone Up means that it is always false that it had been "prepared" Down; but (3) that it is false that the single electron atom went Up does not mean that it is true that it was originally Down. It may have been "prepared" with its magnetic moment pointing Right , which means that it would be false that it could be determined Left !

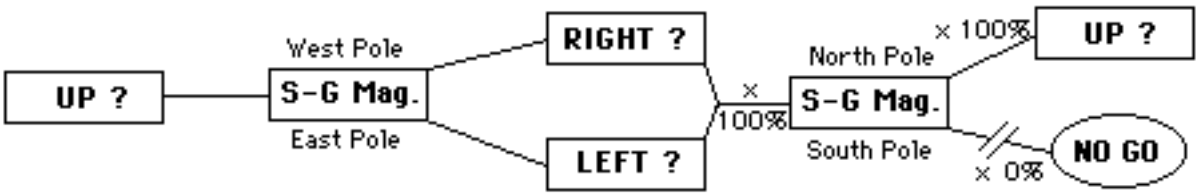


Figure B: Up is true, and Up is true. This means that if a single electron, silver atom is "prepared" such that its "state" has orientation Up, and it is tested to "determine" what its orientation is, one will always determine that the single electron atom is oriented Up. The empirical logic can be represented as (Up and Up) = Up.

If we should select out Up and subject this known beam to a second Stern-Gerlach apparatus which has its gradient alined horizontally, thereby allowing only a Right or Left determination, it is empirical truth (always the observed case) that if there is no empirical procedure which could operationally determine whether it was Right or was Left, then it is as if no measurement had taken place, as is depicted in Figure C:

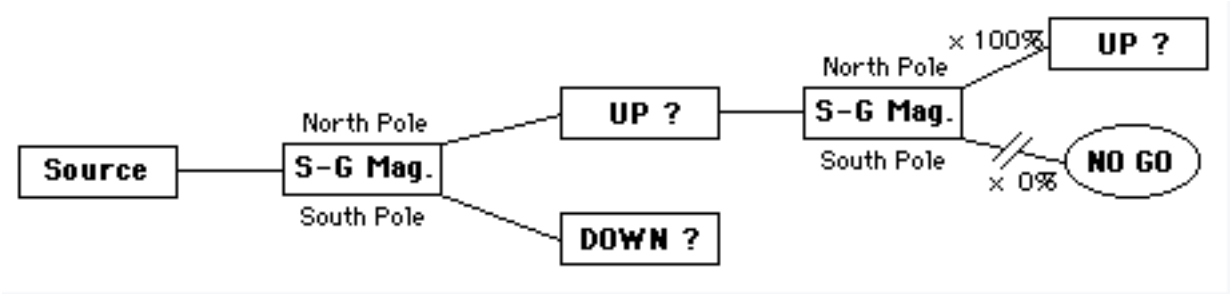


Figure C: Up is true, and (Right or Left) is true. That (Right or Left) is true means that all preparations will either go Right or will go Left if determined by a horizontal (ie. right/left) apparatus. That there does not exist an operational procedure which could determine if Right had occured or if Left had occured is the same as no empirical distinction having taken place. Eg. "I need a person.", not "I need a 'boy or girl'."

It is empirically false that:

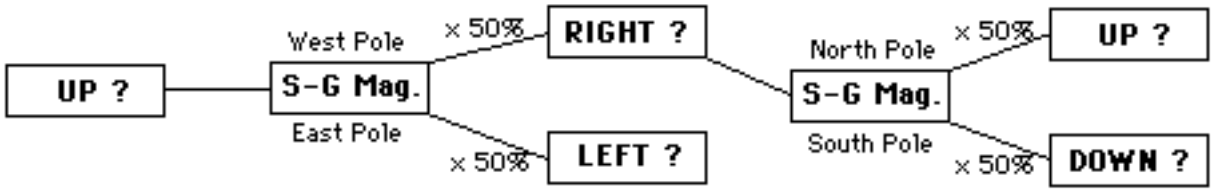


Figure D: Up is true and Right is true. This is so because if Right were true, then Left would be false. The analogy here is that I might be looking for a "boy or a girl", ie. a person, yet the context is not one of gender but of race. Specifically, a "black" is a "boy or a girl" but a black (as an abstractia) is neither a boy nor a girl (cf. also, Oshins, 1989, footnote #8), since if a black were a boy then a black could not be a girl. Thereby, it is claimed that introducing the context of race (eg. "black") would presumably allow for transitions between boy-labeling and girl-labeling which would not take place given a strictly gender context. This might occur for our example with a contextual issue dealing with empathy and discrimination.

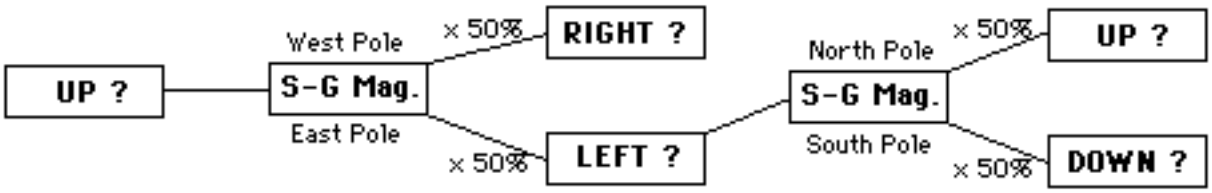


Figure E: Up is true and Left is true. Likewise, if Left were true, then Right would have to be false.

The distributive law of classical logic asserts that it is always true that: [A and (B or C)] = [(A and B) or (A and C)]. Upon substituting the empirical data we find (with obvious abbreviations)

$$\text{U and (R or L)} =?= \text{(U and R) or (U and L)}$$

$$\text{T and T} =?= \text{F or F}$$

$$\text{True} \neq \text{False}$$

$$\text{False}$$

We are forced to conclude from this "non-classical two-valuedness" that the distributive law of classical logic is empirically violated. It is replaced by the principle of complementarity: If two constructs are not-discriminated, there will always be a third within the span (or plane generated by the two) such that non-distinguished aggregates of any pair will be equal to the span.

Postscript

The present paper is based upon my March 21, 1989 talk of the same name at the MRI, and in turn is based upon my earlier unpublished paper (Oshins, 1988). Joyce Emamjomeh suggested not only the talk but also that I write it up as a paper for this volume. Her friendship and encouragement over many years have helped to make this work possible. The present paper is an edited revision of my original paper. An extended version, having substantial technical elaboration, will be presented at the February 1994 meeting of the Alternative Natural Philosophy Association and published in their proceedings (Oshins, 1994, to appear).

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