Paper. 1, *of*

What we can do with propositional Quantum Logic and a Functor in a Classical Propositional Calculus

Using Functor Substitutability for the basis of creating an intuitionist interpretation of the results of that subscribe.

Laying the Grounds for Challenging Goedel's Incompleteness Theorems with the Aspects of the Poincare Group.

Proceeding with: Propositional Quantum Logic,

Transitioning "Non-Commensurability" Smoothly

to Functor-Auxiliary Substitutability and Detachment.

by Alex Patterson

3i. Why is it the case that by adding non-commensurability to the classical propositional calculus of truth-functional logic, creates immediate statements of a quantum logic --

"W is a quantum world $\Leftrightarrow$ *def.* $((\forall\ a, b)\ (a \in W \ \&\ b \in W\ ) \rightarrow (aDb \rightarrow bDa)) \rightarrow ((\exists\ a, b)\ (a \in W \ \&\ b \in W \ \&\ \neg\ aCb))$?

Because the divisibility relation D cannot be sustained universally for terms a,b without the existential assertion $(\exists a, b)(a \in W \;\&\; b \in W \;\&\; \neg aCb)$. A kind of negative transitivity.

This is a different way of saying that the existential assertion $((\exists a,b)(a \in W \;\&\; b \in W \;\&\; \neg aCb))$, as the qualification that makes the universal assertion $((\forall a,b)(a \in W \;\&\; b \in W) \rightarrow (aDb \rightarrow bDa))$ meaningful for actual states of affairs, is a factual statement of non-locality.

C. The classical situation. $(Px \vee \neg Px) \Leftrightarrow \neg (Px \wedge \neg Px)$. In generality for all things: $(\forall x) \neg (Px \wedge \neg Px)$. The latter can also be written as: $\neg (\exists x)(Px \wedge \neg Px)$. To express this for any property, we can quantify with the variable P: $((\forall P)(\forall x)(Px \vee \neg Px)) \wedge \neg (\exists x)(Px \wedge \neg Px)$. The latter can also be written as: $\neg (\exists P)(\exists x)(Px \wedge \neg Px)$.

CM. Von Wright's calculus for the modification of the classical situation. The symbols are truth-connectives ($\wedge$, $\vee$, etc.), an unlimited number of T-symbols, and an unlimited number of P-symbols (Property symbols). An atomic expression of a complex of T-Symbols in quotes, standing immediately to the right of a P-Symbol. A molecular expression is a complex formed by one or several atomic expressions by means of truth-connectives. An expression is an atomic or molecular expression.

CM. The axioms are a set of axioms of the propositional calculus (with atomic expressions of the calculus presented instead of propositional variables). The theorems are any expression which may be obtained from an axiom or theorem by

(I) substituting a T-Symbol in the axiom or theorem for another T-Symbol throughout, or for a P-Symbol for another P-Symbol throughout, or (II) detachment (modus ponens).

3.i.3.j.k. **M.** An introduction of the Greek letter ξ does necessitate a modification in the rules as so far stated. The logical space in the calculus is exhausted and the Greek letter benefits from this by the assignment of a new definition to a symbol. The introduction of the Greek letter ξ is a definition of the symbol ξ through the identity of ξ'X' ⇔ ¬ X'X', where X is a P-Symbol. From this definition we can derive from any theorem of the calculus a new theorem by substituting—not necessarily throughout in this case— for parts of ¬ X'X' which occur in the theorem, parts of the form ξ'X', or vice versa.

3.i.3.j.k.k. **M.** The modificational definition from the paragraph does indeed demand a new clause to the definition of a theorem. Because a theorem of our calculus is the expression ¬ A'A' ⇔ ¬ A'A' (or ¬ X'X' ⇔ ¬ X'X'). Where we substitute ξ'A' for one occurrence of ¬ A'A', we obtain the theorem ¬ A'A' ⇔ ξ'A'. But because of substitutability we may in the last theorem substitute ξ for A throughout, thus obtaining the theorem ¬ ξ'ξ' ⇔ ξ'ξ'. ¬ ξ'ξ' ⇔ ξ'ξ is a contradiction. Von Wright simply says that we could call this the Heterological Paradox.

3.i.3.j.3.k. **M.** This substitution was not in any way permitted in the calculus by the rules of C and CM. The rules said that for a P-Symbol in a proven formula, another P-Symbol could be substituted throughout. They did not say that ξ could be handled or even treated as a P-Symbol with regard to substitutability. That this substitution occurs, von Wright says, can be taken as "grounds" for saying that "ξ is not, and must not be regarded as, a P-Symbol of the same kind (type, category) as the P-Symbols" of C and CM.

3.i.3.j.3.k.l. This allows us to write $(\neg\ \xi'\xi' \Leftrightarrow \xi'\xi') \Leftrightarrow (\neg\ A'A' \Leftrightarrow \neg\ A'A')$. This is not equivalence relation between the two complexes $(\neg\ \xi'\xi' \Leftrightarrow \xi'\xi')$ and $(\neg\ A'A' \Leftrightarrow \neg\ A'A')$. It is a mapping between the two. It states that we proxy modulation to a classical state of affairs, by a proxy function to a background theory with supremely evolved rules for theorem derivation that do not defy but order the observed phenomena of non-commutating observables. Tanaka's existential assertion $(\exists\ a,b)\ (a \in W\ \&\ b \in W\ \&\ \neg\ aCb)$ could be changed to $(\exists\ a,b)\ (a \in W\ \&\ b \in W\ \&\ \neg\ aDb)$. As formality, $(\neg\ \xi'\xi' \Leftrightarrow \xi'\xi')\ f :\rightarrow\ (\neg\ A'A' \Leftrightarrow \neg\ A'A')$.

Further work, as indicated in subtitles at beginning of paper, are to follow.