The Term "Experiment" has
No Formal Definition in Logic

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Abstract

The endeavor called *"science"* (in the modern era since Newton) has no definition of the concept *"experiment"* in logical terms. A definition framed as *"what scientists do"* or appeals to *"testing of hypotheses"* is unacceptable as a logical base. Scientists know what they are doing intuitively but not explicitly … as a matter of formal logic. Hence, occasionally, mistakes are made that may persist for more than a century. Here such a definition is proffered, and a long-term mistaken experiment is reexamined in the light of that definition.

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An "*experiment*" may be formally defined as …

… the observation and quantitative measurement of a state "**A**" altered by an interaction "**Q**" producing a state "**B**". Both states **A** and **B** are compared (quantitative measurement) to a standard "**C**" which is <u>not functionally attached</u> to the change of state ($A_{by\ Q} \rightarrow B$). The *quantitative difference* between the measure of $A_{(relative\ to\ C)}$ and $B_{(relative\ to\ C)}$ is named the … "*result of the experiment*" (**R**) … {A_C by Q} $\rightarrow B_C = R$ … or … $A_c/B_c = R$ … and … **R=1** is a null result

Thus, if we have a metal rod of length (A) and conjecture that it will shrink if cooled in a refrigerator, we will measure the rod against a ruler (C) … then … put the rod in the refrigerator (Q) … then … after some time, remove the rod (now B) and measure it once again with the ruler (C). This would be an experiment complying with the definition above.

We assume that the ruler (C) is not affected by any changing temperatures or other factors, for if it changed during the course of the experiment, it could not function as a standard of quantitative measure. <u>Clearly, we would not put the ruler into the refrigerator with the rod</u> ($AC \Rightarrow BC_Q$; $C \neq C_Q$).

Yet this was exactly what was done in the Michelson-Morley 'experiment'.

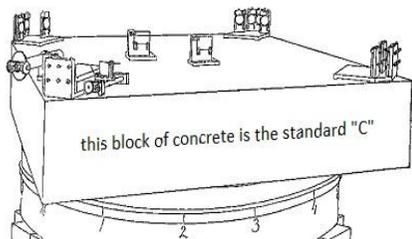this block of concrete is the standard "C"
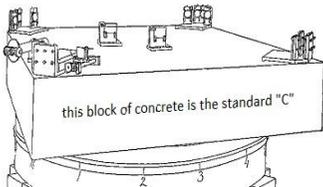
The concrete block (**C**, the standard of measure) was rotated to various orientations to see if the aether wind (**Q**) could be detected. The block is "*in the wind*" with the rest of the experiment (exposed to **Q**). So, it is equivalent to putting the ruler in the refrigerator with the rod as in the previous example.

Four Logic Types Identified

"**0**" **logic** = the null set … without referent … the 'allow' mechanism of existence

"**1**" **logic** = … self-referential … makes the universe "*get up and go*" (by recursion)

"**2**" **logic** = opposite in pair is referent … yields "*subjective*" physics … identity problem

"**3**" **logic** = … states A then B compare to a 'standard' C not functionally involved in the interaction (>) … any scientific experiment is done in this mode

The four logic types are characterized by their referent structure. By "*referent*" is meant that which logically validates or confirms the nature of an object or state, by qualitative or quantitative comparison. A rational experiment can only be done in 3-logic.

It is impossible to do a valid experiment in any other than 3-logic. The Michelson-Morley experiment is an attempted 2-logic experiment and must therefore fail … or … give spurious results, e.g. if the block was affected differently by the "a*ether*" than the air over it, causing a measurable difference in the electromagnetic interaction in either medium. Without a variation in *"aether"* passage through air or concrete a *"null result"* is logically guaranteed. Hence, these so-called experiments are logically invalid.

this block of concrete is the standard "C"

Conclusions

Both Galilean and Special relativity are 2-logic composites. Two observers in uniform motion relative to one another cannot identify an absolute reference frame because either can claim to be *"at rest"*. Any attempt to prove that one reference frame is *"more valid"* than the other is logically doomed to failure by way of a null result. However, both 2-logic and 3-logic are valid interpretations of our universe … which must be structured in a non-contradictory fashion. But experiments themselves can only be done in 3-logic where non-null results are possible.

The foregoing has not been noted by others (to my knowledge). Critiques of the M&M experiment do not attack it on formal logical grounds … but rather accept it as *"rational yet flawed"* for reasons other than being illogical. Consequently, it was bizarrely redone many times with different setups for decades afterwards … all irrationally contrived in the manner of the original.

References

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