

Cogito Cross Equality

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In this paper I prove that “I think, therefore I am” produces “I think” cross equals “I am” in EP.

In the paper “Existential Propositions”^[1] I argued for using the Excluded Middle for Non-Existence in Type Theoretic Existential Philosophy (EP):

$$\forall x \{ \neg\neg x \vee \neg x \}$$

The motivation is that laws of physics in quantum mechanics is unitary^[2]. When interpreting unitary physical laws as cross equality (see paper^[1]), EP is necessary for transitivity^[3].

EP is the idea that there is no direct proofs that one exists, unlike the Cogito^[4] suggested by Descartes^[5]:

I think, therefore I am

The best one can do is the following:

I don’t non-think, therefore I don’t non-exist

However, this is not the weakest possible assumption, which is:

I think, thefore I don’t non-exist

Proof:

$$\begin{aligned} \because & a \Rightarrow b \\ \therefore & \neg b \Rightarrow \neg a \\ \therefore & \neg\neg a \Rightarrow \neg\neg b \\ \therefore & a \Rightarrow \neg\neg b \end{aligned}$$

This is provable in both IPL and EP.

No previous step is provable from the next step.

This means that the last step is the weakest possible assumption.

Under the assumption that laws of physics are unitary and something causes me to think (which is unobservable), it follows that in order for transitivity to hold, two things must be true:

1. EP
2. “I think” cross equals “I am”

The definition of “cross equals” is the following:

$$a =_x b \quad \Leftrightarrow \quad (a \Rightarrow \neg\neg b) \wedge (b \Rightarrow \neg\neg a)$$

Q.E.D.

References:

- [1] “Existential Propositions”
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https://github.com/advancedresearch/path_semantics/blob/master/papers-wip2/existential-propositions.pdf
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- [3] “Transitive relation”
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- [4] “Cogito, ergo sum”
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