Thought Experiments as Semantic Arguments

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Three questions and three approaches

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Empiricist view (J. Norton) 1. No. 2. No. 3. Reducibility to deductive arguments.
A TE is a proof in disguise.

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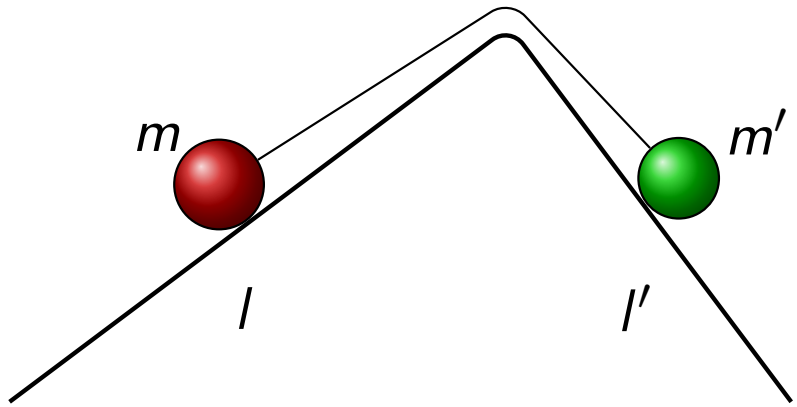
It is all about intuition:

1. Can intuition provide new knowledge?
2. Is intuition indispensable?
3. Are intuitions fallible? What is the criterion of their correctness?

SE: equilibrium on frictionless inclined plane

- Is the complex in equilibrium if $\frac{m}{m'} = \frac{l}{l'}$?



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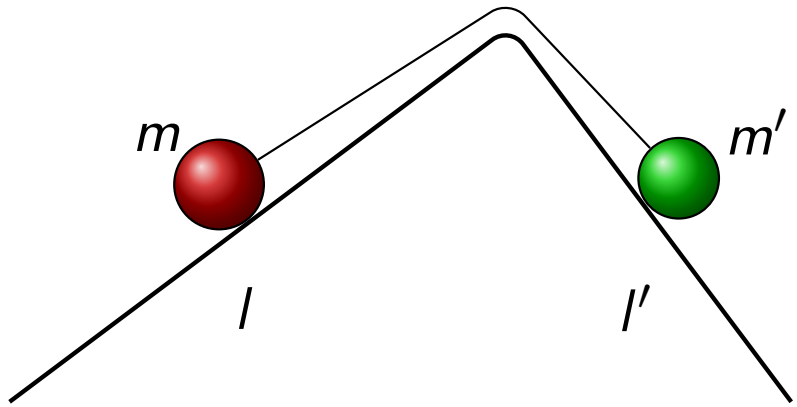

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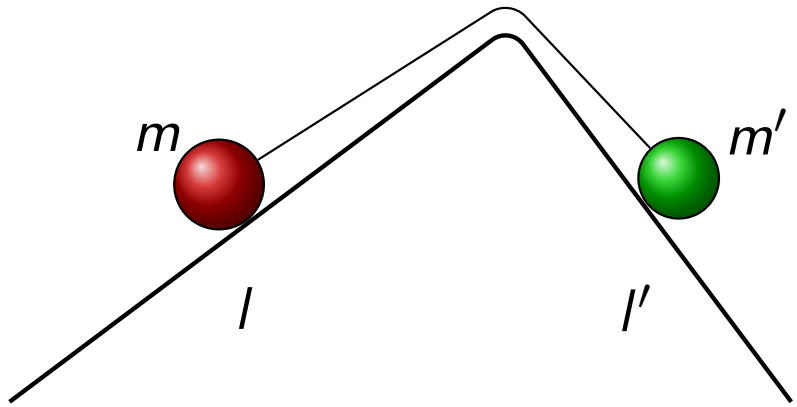

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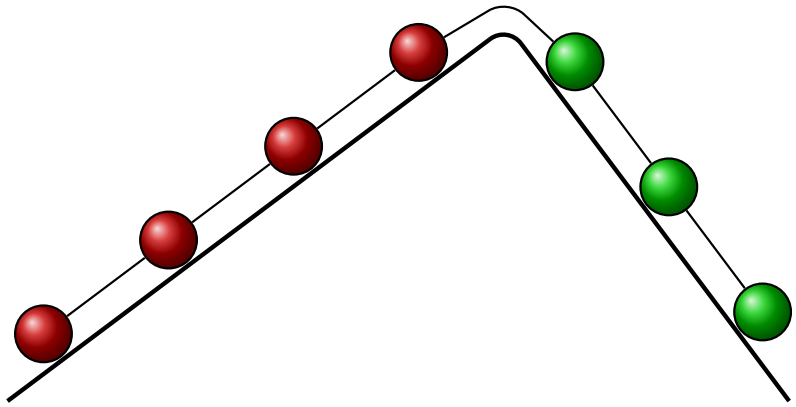

An equivalent arrangement.

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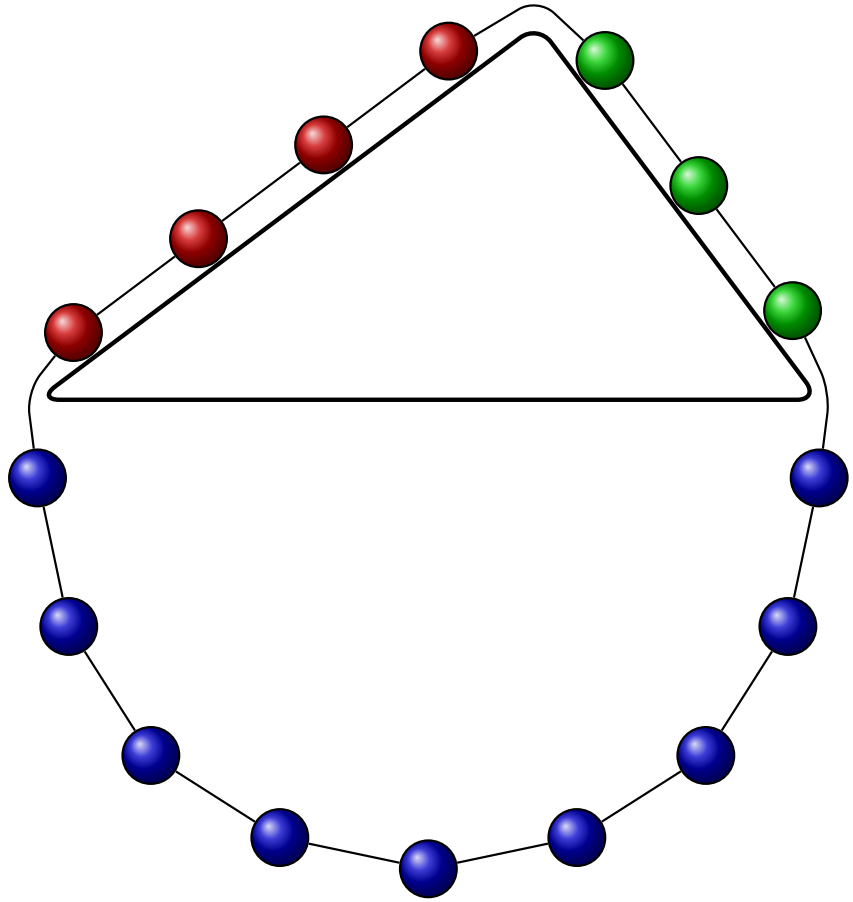

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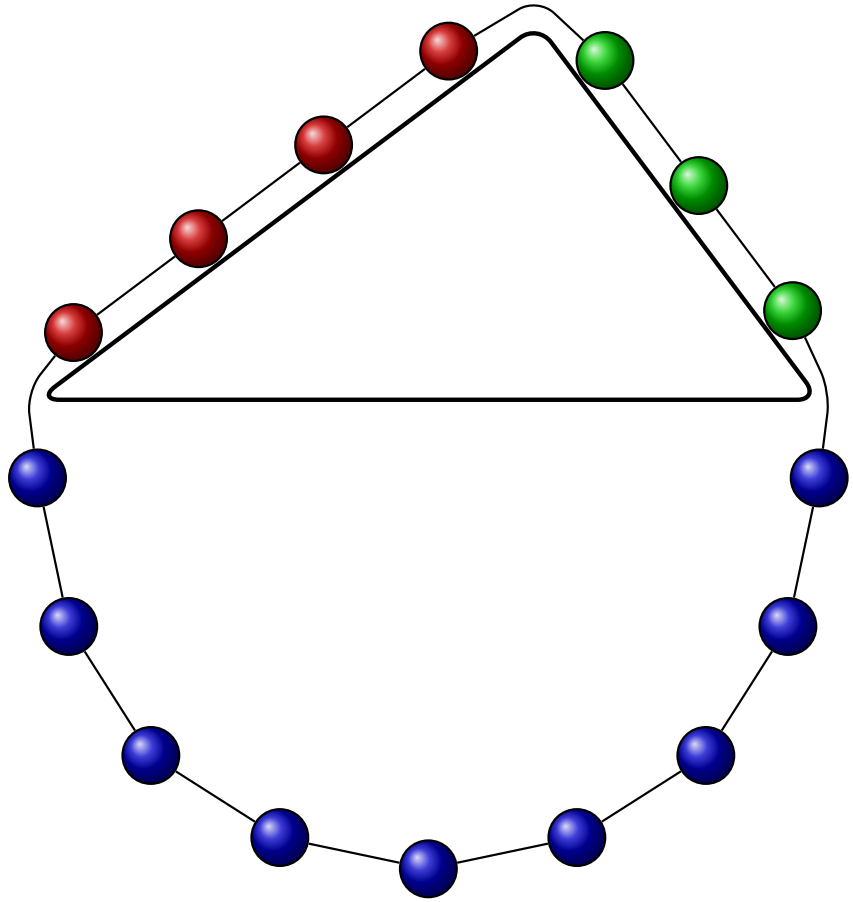

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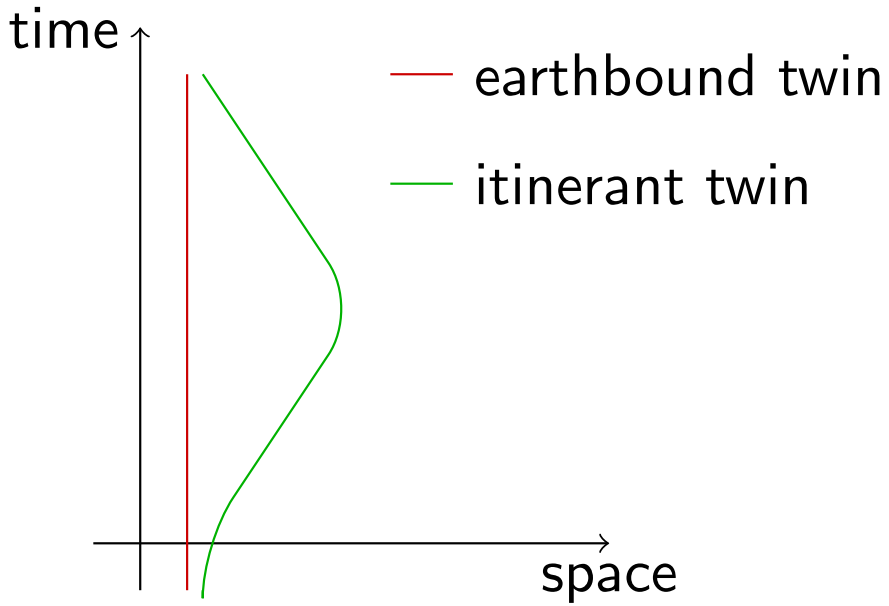
- *I*: They are in equilibrium. Moving would result in infinite acceleration.

TP: the twin paradox of relativity theory

- Are two twins still even-aged after a period of separation, during which one stayed, while the other travelled?



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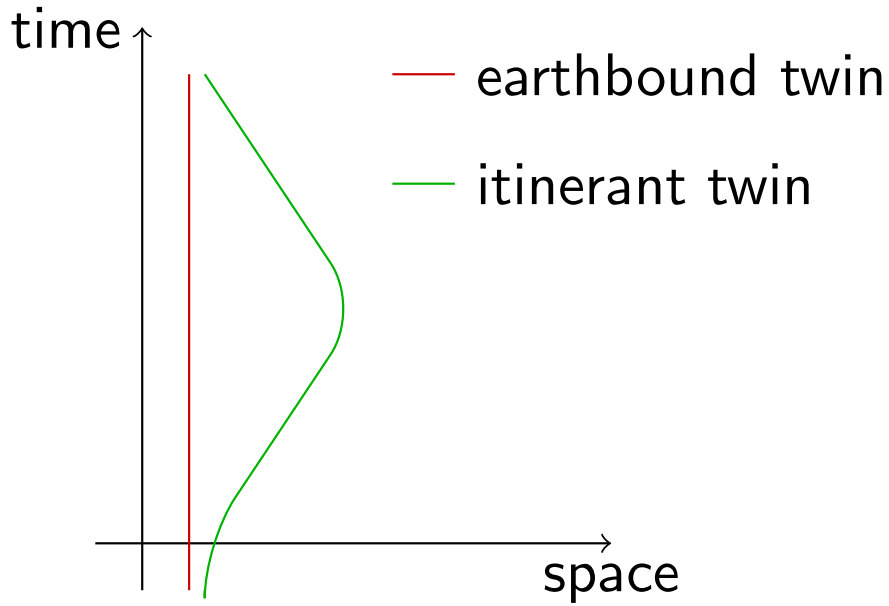

- T: No. Time dilates with speed. The itinerant twin is younger.
- I: Yes. Who stays and who moves is relative. If one would be older, the other one would be older, too.

Evaluation

The arguments follow the same pattern, yet:

SE : The TE succeeds. I refutes T.

TP : The TE fails. T refutes I.

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Problems:

Platonism fails to explain the failure of intuition in TP.

Cognitivism fails to explain why mental modelling worked well in SE, but not in TP.

Empiricism fails to explain how SE is to be understood as an argument within a theory.

Proposed answers

1. A TE is indeed a deductive argument, but not *within* the theory it attempts to refute. It is *about* that theory.

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2. No special mental faculty is involved in the justification of the result of a TE.
3. The extra premises labelled as intuitive arrive from other areas of knowledge.
4. Interpreting the concepts of a theory in fictional scenarios creates a context in which principles of different areas of knowledge can be confronted.

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6. Whether or not a TE is conclusive depends on
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6. Whether or not a TE is conclusive depends on
   - 6.1 the plausibility of the fictional scenario;
   - 6.2 the reliability of the extra knowledge involved.
7. The TE method especially fits theories under construction. External principles may be integrated in the theory.
8. There is a partial analogy with the role model-theoretic arguments play in mathematics. Its limitations are instructive of differences between mathematics and physical sciences:
   - 8.1 a mathematical theory can be freely interpreted, while a physical theory not;
   - 8.2 mathematical models have a standard metatheory, while a physical theories do not.

Question to the Németi team

- Are all the classical thought experiments reducible to deductions in the FOL systems of relativity?

Thank you for your attention.