Chapter 2 — The Logical Reasoning: The Spacecraft and Missile Objection

1. From the Conceptual Proposition to Logical Examination

The preceding chapter presented the conceptual postulate that lies at the starting point of my approach and the idea submitted to the Templeton World Charity Foundation.

One passage from that submission explicitly announced the next step:

> "It remains, therefore, to apply this perspective to space and motion. Within this framework, the 'spacecraft and missile objection' constitutes an unavoidable point of passage, insofar as it confronts the current principles of physics concerning spacetime with a concrete physical situation in which causal coherence cannot be evaded."

We must now examine this "unavoidable point of passage."

To do so, the question of the Driving Principle should temporarily be set aside. The reasoning that follows must be capable of being examined independently of any adherence to the metaphysical postulate presented above.

The question is much more narrowly defined: what becomes of the relativity of simultaneity if physical significance is attributed to planes of simultaneity and if the effective existence of the bodies and events to which they refer is taken into account?

I reproduce below the logical analysis of the spacecraft and missile objection.

2. Logical Analysis of the Spacecraft and Missile Objection

Guiding Idea

The text presents the objection as a proof by contradiction directed at the physical invariance of the speed of light over a one-way path.

2.1. Preliminary Distinction

- Meaning 1 — one-way: light physically has the same speed c, between two distinct points, for all inertial observers.
- Meaning 2 — round-trip: the average speed of light is c over a closed path.

The objection concerns only physical invariance in Meaning 1. It does not directly challenge round-trip measurements.

This distinction is fundamental. The reasoning therefore does not claim directly to call into question experimental results obtained from closed light paths. It concerns the physical meaning attributed to the invariance of c over a one-way path.

2.2. Logical Chain of the Objection

Physically measuring a one-way speed requires determining the departure time and the arrival time at two distinct locations.

This requires distant clocks to be synchronized.

Synchronization defines lines — or hyperplanes — of simultaneity.

If the one-way invariance of c is a physical property and not merely a convention, the lines of simultaneity must themselves be given physical significance.

They must then indicate which bodies or events exist “now” for the frame of reference under consideration.

In the thought experiment, the spacecraft initially has a certain state of motion. According to its first plane of simultaneity, the event associated with the missile — for example, its launch — has already occurred: the missile therefore already exists.

The spacecraft then changes velocity. According to the relativity of simultaneity, its new plane of simultaneity tilts.

The same event concerning the missile may then lie in the future of the spacecraft's new simultaneity: its launch "has not yet occurred," and the missile therefore does not yet exist.

If these planes genuinely represent the present existence of bodies, the same missile must thus be regarded first as already existing and then as not yet existing.

The change in the spacecraft's motion would thus make the present existence of a distant body depend on the spacecraft's own state of motion.

The text regards this as a violation of the principle of non-contradiction or, more precisely, of the irreversible continuity of becoming: a missile that already exists cannot become again a missile that does not yet exist; likewise, an event that has occurred cannot become again an event that has not yet occurred.

3. Condensed Logical Form

Let:

P: the speed of light is physically invariant one-way for all inertial frames.

P → S: this invariance requires relative simultaneity endowed with physical significance.

S → B: when the spacecraft changes its state of motion, its physical plane of simultaneity tilts.

B → C: the same missile must be regarded as already existing and then as not yet existing; correspondingly, its launch event must be regarded as having already occurred and then as not yet having occurred.

¬C: such a contradiction is rejected.

Therefore:

¬P: the universal one-way invariance of c cannot be a physical property.

In symbolic form:

$(P \rightarrow S) \wedge (S \rightarrow B) \wedge (B \rightarrow C) \wedge \neg C \Rightarrow \neg P$

The reasoning is therefore an indirect proof: if premise P necessarily leads to a contradictory consequence C, and if C must be rejected, then P cannot be maintained in the form in which it was stated.

4. Conclusion Drawn from the Reasoning

The immediate conclusion is not that relativistic measurements are false, but that the hypothesis of a universal physical invariance of the one-way speed of light, valid for all inertial observers, cannot be maintained.

The reasoning therefore preserves the possibility of:

- measured round-trip invariance;
- universal simultaneity;
- local variations in clock rates;
- a relational explanation of light propagation.

This conclusion must be understood precisely.

It does not amount to a wholesale rejection of the experimental results associated with relativity. It leads instead to distinguishing those results from the physical interpretation given to the invariance of the speed of light over a one-way path.

5. The Decisive Premise

The entire demonstration depends on this pivotal premise:

if the one-way invariance of c is physically real, relativistic planes of simultaneity must physically determine what presently exists.

This implication is where the real debate is concentrated.

A standard relativist may accept the transformations of simultaneity while denying that each hyperplane represents a present that is ontologically created or abolished by the observer's motion. In that case, the contradiction does not follow.

The objection replies that this solution would make one-way invariance conventional or formal rather than fully physical.

The reasoning therefore forms a dilemma:

- either the planes of simultaneity have physical significance, and their tilting produces the alleged contradiction;
- or they have only a conventional function, and one-way invariance should not be presented as a physical property independent of synchronization.

It is this dilemma — more than the simple scene involving the spacecraft and the missile — that constitutes the logical core of the objection.

6. Scope of the Reasoning

It is important to delimit precisely what is being asserted here.

The reasoning does not simply consist in opposing a personal philosophical conception to special relativity. It seeks to examine the consequences of a precise assertion: that the one-way speed of light is physically invariant for all inertial frames.

If this invariance has physical significance, the simultaneity associated with it cannot be entirely devoid of physical significance.

But if planes of simultaneity have such significance, their modification during a change of motion raises the question of what happens to the distant events to which they correspond.

The missile example gives this difficulty a particularly concrete form.

A missile whose launch has actually occurred and which, consequently, exists cannot, solely because of a change in the spacecraft's motion, become again a missile whose launch has not yet occurred and which, consequently, does not yet exist.

The problem therefore concerns more than the value of a time coordinate. It appears when one seeks to give that coordinate a meaning concerning the effective existence of the body under consideration and the effective occurrence of the corresponding event.

It is here that the question of causality, announced in the idea submission, directly meets that of space and motion.

7. Historical Note

An earlier formulation of this reasoning, also including its consequence concerning the existence of a present instant for the Universe, appeared in an appendix to the book Paradoxe sur l'invariance de la vitesse de la lumière.

Its logical form was then characterized by Gilles Plante, Doctor of Philosophy, as a conditional syllogism of the tollendo-tollens form.

After reading the present version, he confirmed that it does indeed conform to this mode of reasoning.

This historical clarification obviously does not by itself establish the truth of the premises of the reasoning. It does, however, make it possible to identify its logical structure.

The essential question therefore remains that of the pivotal premise: does a physical invariance of the one-way speed of light imply that the relativity of simultaneity itself possesses the physical significance attributed to it by the reasoning?

It is around this question that the objections must be examined.

8. From the Reasoning to the Objections

We now have a clearly identifiable logical chain:

physical one-way invariance of c → physical relativity of simultaneity → tilting of the planes of simultaneity → contradiction concerning the existence of a distant body and the occurrence of the corresponding event → rejection of the universal physical one-way invariance of c.

The strength or weakness of the reasoning therefore cannot be assessed by discussing relativity as a whole indiscriminately.

It is necessary to determine precisely which implication would be false.

Is it the passage from the physical invariance of c to a physically meaningful relative simultaneity?

Is it the meaning attributed to the tilting of the planes of simultaneity?

Is it the passage from that tilting to a contradiction concerning the existence of the missile?

Or should it be considered that no contradiction exists because planes of simultaneity were never intended to determine what physically exists “now”?

These different possibilities must be examined one by one.

The following chapter will therefore be devoted to the objections raised against the spacecraft and missile reasoning and to the responses that can be given to them.