

The Observer in Two Interpretations

Modal Logic of Measurement in Copenhagen and MWI

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Zusammenfassung

In *Die Zeitlosigkeit der Steine 2*.md, the observer plays a central role — but only in the DeLillo perspective. That is the Copenhagen side: Without observer no measurement, without measurement no collapse, without collapse no reality. The observer is constitutive. In the Van Dornael perspective (MWI), there is no distinguished observer. All worlds exist independently of whether they are observed. The present treatise introduces two observer operators B_D and B_V and proves: In $S5+SP+B_D$, the Trinity is necessary. In $S5+SP+B_V$, the Trinity is also necessary, but for different reasons. The metaphysical consequence: The necessity of the Trinity is not bound to a particular observer conception. Both perspectives lead to the same structure.

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Past and future are horizons of knowledge.

The present is the locus of reality.

Nothing that was, is lost.

Preface: The Role of the Observer

In `DieZeitlosigkeitDerSteine2.md`, the observer plays a central role — but only in the **DeLillo perspective**. That is the **Copenhagen side** of quantum mechanics: Without observer no measurement, without measurement no collapse, without collapse no reality. The observer is **constitutive**.

In the **Van Dormael perspective** (Many-Worlds Interpretation, MWI), there is **no distinguished observer**. All worlds exist independently of whether they are observed. The observer is himself part of the branching.

In `modal9.md` it was shown: The two perspectives are **not compatible**, but **simultaneously true**. In `modal13.md` we apply this distinction to the **observer**.

The central claim of this treatise is:

The necessity of the Trinity is not bound to a particular observer conception. In $S5+SP+B_D$, the Trinity is necessary for constitutive reasons. In $S5+SP+B_V$, it is necessary for structural reasons. Both perspectives lead to the same structure.

The investigation remains faithful to the self-understanding of `modal5.md`: It shows **dependencies**, not truths. It shows that the observer is **not a foundation**, but a **perspective**.

Two Observer Operators

The Basic Idea

Classical modal logic has **one** necessity operator $\Box$. **Observer modal logic** has **two** operators — one for each observer conception.

Intuition: The observer is not a single mode, but a **family of modes**.

The Language

We extend the language of S5+SP by **two** observer operators:

- $\mathcal{B}_D p$: “p holds under the DeLillo observer (constitutive).”
- $\mathcal{B}_V p$: “p holds under the Van Dormael observer (non-constitutive).”

Important: These operators are **modal** — they describe the role of the observer in the structure of reality.

The Semantics

The two operators have **different** semantics:

$$\begin{aligned}\mathcal{B}_D p @ w &\iff \text{the observer in } w \text{ constitutes } p \\ \mathcal{B}_V p @ w &\iff p \text{ holds structurally in } w, \text{ independent of the observer}\end{aligned}$$

Explanation:

- $\mathcal{B}_D p$: p holds **because** the observer constitutes it.
- $\mathcal{B}_V p$: p holds **structurally**, even without observer.

The Two Observer Conceptions

DeLillo observer ($\mathcal{B}_D$): The observer is **constitutive**. Without him there is no reality. He is necessary for the collapse of the wave function. He is a **singular event**.

Van Dormael observer ($\mathcal{B}_V$): The observer is **non-constitutive**. He is himself part of the branching. Every world has its own observer. He is **multiple**.

The Axioms B1–B4

B1: Constitutivity Implies Reality

$$\boxed{B1 := \Box(\mathcal{B}_D p \rightarrow p)}$$

Reading: If the DeLillo observer constitutes p, then p holds.

Metaphysical meaning: The constitutive observer **generates** reality. What he constitutes is real.

B2: Structure Implies Reality

$$B2 := \Box(\mathcal{B}_V p \rightarrow p)$$

Reading: If p holds structurally, then p holds.

Metaphysical meaning: Structural reality is **independent** of the observer. It holds even when no one observes it.

B3: Observer Relativity

$$B3 := \Box(\mathcal{B}_D p \leftrightarrow \mathcal{B}_V p)$$

Reading: The two observer conceptions are **equivalent** — they lead to the same statements.

Metaphysical meaning: Although the two conceptions are different, they lead to **the same** statements. Reality is **observer-conception-invariant**.

B4: Trinity under Both Observers

$$B4 := \Box(\mathcal{B}_D(U \wedge T \wedge S) \wedge \mathcal{B}_V(U \wedge T \wedge S))$$

Reading: The Trinity holds under both observer conceptions.

Metaphysical meaning: The Trinity is **not bound to a particular observer conception**.

Proof: Both Observer Conceptions Lead to the Trinity

The Main Theorem

Theorem B-A: In $S5+SP+B1-B4$:

$$\Box(U \wedge T \wedge S)$$

The Proof

Step 1: From `modal5.md`: In $S5+SP$, $\Box(U \wedge T \wedge S)$.

Step 2: From B4: $\mathcal{B}_D(U \wedge T \wedge S) \wedge \mathcal{B}_V(U \wedge T \wedge S)$.

Step 3: From B1: $\mathcal{B}_D(U \wedge T \wedge S) \rightarrow U \wedge T \wedge S$.

Step 4: From B2: $\mathcal{B}_V(U \wedge T \wedge S) \rightarrow U \wedge T \wedge S$.

Step 5: From B3: $\mathcal{B}_D(U \wedge T \wedge S) \leftrightarrow \mathcal{B}_V(U \wedge T \wedge S)$.

Step 6: From Step 2 and Step 5: Both observer conceptions lead to the Trinity.

Step 7: Since the Trinity holds in all worlds (from `modal5.md`), it also holds under both observer conceptions. Hence: $\Box(U \wedge T \wedge S)$.

q.e.d.

What the Proof Shows

The proof shows:

1. The Trinity follows **both** from the constitutive **and** from the structural observer conception.
2. The two conceptions are **equivalent** (B3).
3. The Trinity is **observer-conception-invariant**.

What the Proof Does Not Show

The proof does **not** show:

1. That the two conceptions are **identical**.
2. That one of the two conceptions is **false**.
3. That the choice of conception is **irrelevant**.

The proof only shows: Both conceptions lead to the same structure.

Comparison with Everett, Bohr, Rovelli

Everett (MWI)

Everett (1957) formulated the Many-Worlds Interpretation. In this interpretation:

- The wave function does **not** collapse.
- All possibilities are **real**.
- The observer is **himself part** of the branching.

Comparison with our $\mathcal{B}_V$: The Van Dormael observer corresponds to the Everettian observer. He is non-constitutive, but **structural**.

Bohr (Copenhagen)

Bohr (1928) formulated the Copenhagen interpretation. In this interpretation:

- The wave function **collapses** upon measurement.
- The observer is **constitutive** for the measurement.
- The classical world is **necessary** for the description.

Comparison with our $\mathcal{B}_D$: The DeLillo observer corresponds to the Bohrian observer. He is constitutive for reality.

Rovelli (Relational QM)

Rovelli (1996) formulated relational quantum mechanics. In this interpretation:

- States are **relative** to an observer.
- There is no **absolute** state.
- The observer is **relationally** defined.

Comparison with our $\mathcal{B}_D$ and $\mathcal{B}_V$: Rovelli's observer is **neither** purely constitutive **nor** purely structural. He is **relational**. This is a **third** position that **neither** subsumes **nor** excludes our two operators.

The Point

Our two operators $\mathcal{B}_D$ and $\mathcal{B}_V$ capture the two **classical** positions (Bohr and Everett). They do **not** capture the relational position (Rovelli). That is an open question.

What Follows? The Trinity Is Observer-Conception-Invariant

The Central Insight

The necessity of the Trinity is **not bound to a particular observer conception**. In $S5+SP+\mathcal{B}_D$, it is necessary for constitutive reasons. In $S5+SP+\mathcal{B}_V$, it is necessary for structural reasons. Both perspectives lead to the **same** structure.

Formal version:

$$\boxed{\square(\mathcal{B}_D(U \wedge T \wedge S) \wedge \mathcal{B}_V(U \wedge T \wedge S))}$$

The Consequences

Consequence 1: The Trinity is **observer-conception-invariant**. It follows from both conceptions.

Consequence 2: The choice of observer conception is **not** determined by the structure of reality. It is a **metaphysical** or **physical** question.

Consequence 3: The Trinity is **no artifact** of a particular observer conception. It is a **structural** property.

The Relation to Tradition

Classical metaphysics often seeks **one** foundation. The present treatise shows: There are **two** observer conceptions that **simultaneously** lead to the Trinity. This is **not a defect**, but an **insight**: The Trinity is **robust** with respect to the choice of observer conception.

Open Questions: Is There an Observer-Independent Core?

The Question

We have shown: Both observer conceptions lead to the Trinity. **Question:** Is there an **observer-independent core** that underlies **both** conceptions?

Possible Answers

Answer 1: Yes. The observer-independent core is the **structural unity** of the Trinity. It holds independently of whether it is constituted by an observer or grasped structurally.

Answer 2: No. There is no observer-independent core. The Trinity is **always** observer-relative — either constitutive or structural.

Answer 3: The question is **open**. There are arguments for both positions.

What We Have Shown

We have **not** shown that there is an observer-independent core. We have only shown that **both** observer conceptions lead to the Trinity.

The question of the observer-independent core remains **open**. It is the subject of **Modal 14** (Unity of Perspectives).

A Second Open Question

Question: Is there a **third** observer conception?

Possible candidates:

- The **relational** conception (Rovelli).
- The **epistemic** conception (QBism).
- The **process-philosophical** conception (Whitehead).

A Third Open Question

Question: Are the two observer operators $\mathcal{B}_D$ and $\mathcal{B}_V$ **equivalent** or **different**?

Answer: According to B3, they are equivalent. But B3 is itself an axiom. The question of whether B3 **necessarily** holds remains open.

Conclusion: What Has Been Shown?

The present investigation has shown:

1. **The observer plays a constitutive role in the DeLillo perspective (Copenhagen), a non-constitutive role in the Van Dornael perspective (MWI).**
2. **This distinction can be formalized in two observer operators: $\mathcal{B}_D$ (constitutive) and $\mathcal{B}_V$ (non-constitutive).**
3. **Both observer conceptions lead to the Trinity.** In $S5+SP+\mathcal{B}_D$ for constitutive reasons, in $S5+SP+\mathcal{B}_V$ for structural reasons.
4. **The Trinity is observer-conception-invariant.** It follows from both conceptions.

The central claim of this treatise is:

The necessity of the Trinity is not bound to a particular observer conception. Both perspectives lead to the same structure. The Trinity is observer-conception-invariant.

The question of an observer-independent core remains open. It is the subject of **Modal 14** (Unity of Perspectives).

Appendix A: The Axioms in an Overview

Observer Axioms

$$\begin{aligned}
B1 &:= \Box(\mathcal{B}_D p \rightarrow p) \\
B2 &:= \Box(\mathcal{B}_V p \rightarrow p) \\
B3 &:= \Box(\mathcal{B}_D p \leftrightarrow \mathcal{B}_V p) \\
B4 &:= \Box(\mathcal{B}_D(U \wedge T \wedge S) \wedge \mathcal{B}_V(U \wedge T \wedge S))
\end{aligned}$$

Semantics

$$\begin{aligned}
\mathcal{B}_D p @ w &\iff \text{the observer in } w \text{ constitutes } p \\
\mathcal{B}_V p @ w &\iff p \text{ holds structurally in } w
\end{aligned}$$

The Main Theorem

$$\boxed{S5 + SP + B1 + B2 + B3 + B4 \vdash \Box(U \wedge T \wedge S)}$$

Appendix B: Comparison with Everett, Bohr, Rovelli

Interpreter	Observer	Role	Comparison
Bohr	Constitutive	Generates reality	$\mathcal{B}_D$
Everett	Non-constitutive	Part of branching	$\mathcal{B}_V$
Rovelli	Relational	States relative to observer	Neither $\mathcal{B}_D$ nor $\mathcal{B}_V$

Appendix C: The Three Observer Conceptions in an Overview

Conception	Operator	Role	Consequence
Constitutive	$\mathcal{B}_D$	Generates reality	Trinity necessary
Structural	$\mathcal{B}_V$	Grasps reality	Trinity necessary
Relational	—	States relative	Open

Afterword

You have read this treatise. Perhaps the idea surprised you that there are **two** observer conceptions. Perhaps the consequence impressed you that both lead to the Trinity. Both are fine.

The investigation has shown: The observer is **not a foundation**, but a **perspective**. The Trinity is **robust** with respect to the choice of observer conception. It follows from both.

What remains is the insight that the Trinity is **observer-conception-invariant**. It is not an artifact of a particular observer conception. It is a **structural** property.

One final question:

Do we dare the leap into openness to the limit — even though there are two observer conceptions that are not identical?

This treatise was written in the spirit of rigorous modal logic, yet in the language of philosophy – for truth requires both: the precision of the formula and the breadth of the concept.