

# Experimental Morphisms under Boundary Consistency

## 边界一致性下的实验态射

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*Bilingual formal note under the B\_U framework*

**定义句** 实验不是本体论分裂的证据；实验是单一边界上一类可结算态射。

**Mechanism** An experiment is treated here as an admissible morphism that transforms one boundary-consistent state into another under the same fixed set  $B_0$ .

**Hard line** No experimental readout is allowed to create a second ontological domain. Under  $B_U$ , experimental novelty is a readout of one universe, not evidence for many.

### 1. 任务与边界 / Task and Boundary

#### 中文

定义句：本文件只处理一件事——在  $B_U$  框架下，把实验正式改写为边界一致性下的可结算态射。

机制句：这里不引入额外宇宙、不引入观察者特权、不引入分支本体。凡是实验，只能在同一存在域  $U$  内，在唯一不动边界集  $B_0$  上完成读出与结算。

裁决句：实验的地位，不是制造第二宇宙；实验的地位，是在单一宇宙内暴露同一边界的不同局部读出。

#### English

Definition: This note addresses one task only: under the  $B_U$  framework, experiments are recoded as admissible morphisms under boundary consistency.

Mechanism: No extra universe, no observer privilege, and no branching ontology is introduced here. Every experiment must unfold within one total domain  $U$  and settle on the same invariant boundary set  $B_0$ .

Judgment: The role of experiment is not to manufacture a second universe. Its role is to expose different local readouts of one and the same boundary.

$U$  is the total domain in which admissible physical standing is defined.  
 $B_0$  is the unique fixed boundary set that remains invariant across  $U$ .  
 $B_U$  is global boundary consistency, i.e.  
 $B_U = \text{def } \exists! B_0 \forall x \in U, B(x) = B_0$ .

$S = B_U, B_U := \text{exists! } B_0 \text{ such that forall } x \text{ in } U, B(x) = B_0$

### 2. 核心定义 / Core Definitions

#### 中文

定义句：实验态射记作  $\mu_e: \Phi \rightarrow \Phi'$ ，表示在给定实验布置  $e$  下，由一个边界一致态到另一个边界一致态的可结算变换。

机制句：若  $\mu_e$  的生成结果仍可被投影到  $B_0$  的像中，则该实验保有 standing；若结果要求独立子域、边界漂移或多值结算，则实验 standing 失效。

#### English

Definition: An experimental morphism is written as  $\mu_e: \Phi \rightarrow \Phi'$ , denoting a settleable transformation from one boundary-consistent state to another under an experimental arrangement  $e$ .

Mechanism: If the generated outcome of  $\mu_e$  remains projectable into the image of  $B_0$ , the experiment preserves standing. If it requires an independent subdomain, boundary drift, or multi-valued settlement, experimental standing fails.

裁决句：实验 standing 的充分必要判据，不是叙事解释，而是边界失配量是否归零。

Judgment: The necessary and sufficient criterion for experimental standing is not narrative explanation, but whether boundary mismatch is driven to zero.

$$\Phi_{\text{gen}}'(e) = \mu_e(\Phi)$$
$$\Delta_{B^e}(\Phi) := \| \mu_e(\Phi) - \Pi_{\{B_0\}}(\mu_e(\Phi)) \|$$

### 3. 动态匹配律 / Dynamic Matching Law

中文

定义句：实验先生成局部读出，再在生成瞬间接受边界匹配。

机制句：任何实验生成态  $\Phi_{\text{gen}}'(e)$  都先暴露失配项  $E_{B^e}$ ，再由  $\Pi_{\{B_0\}}$  完成场态匹配。这里的匹配不是事后修补，而是实验可成立性的原生条件。

硬句：先匹配，后 standing；不能匹配，就不是实验事实，只是失格生成。

English

Definition: Every experiment first generates a local readout and then undergoes boundary matching at the moment of generation.

Mechanism: Any generated experimental state  $\Phi_{\text{gen}}'(e)$  first exposes a mismatch term  $E_{B^e}$  and is then matched by  $\Pi_{\{B_0\}}$ . Matching is not an after-the-fact repair; it is the native condition of experimental admissibility.

Hard line: Matching comes before standing. If a readout cannot be matched, it does not count as an experimental fact; it counts as disqualified generation.

$$E_{B^e}(\Phi) := \mu_e(\Phi) - \Pi_{\{B_0\}}(\mu_e(\Phi))$$
$$\Phi' = \Pi_{\{B_0\}}(\mu_e(\Phi))$$
$$\Delta_{B^e}(\Phi) = 0 \iff \mu_e(\Phi) \text{ belongs to } \text{Im}(\Pi_{\{B_0\}})$$

### 4. 强化公理 / Reinforced Axioms

中文

公理 A1：一切可成立实验只能作用于同一存在域 U。

公理 A2：一切可成立实验只能在同一不动边界集  $B_0$  上完成结算。

公理 A3：实验结果若要求多值本体结算，则该结果不具单一宇宙 standing。

公理 A4：实验异常、相关性或延迟读出，均不得被解释为第二本体域的生成。

English

Axiom A1: Every admissible experiment acts within one and the same total domain U.

Axiom A2: Every admissible experiment must settle on one and the same invariant boundary set  $B_0$ .

Axiom A3: If an experimental result requires multi-valued ontological settlement, it lacks single-universe standing.

Axiom A4: Experimental anomaly, correlation, or delayed readout may not be interpreted as the generation of a second ontological domain.

### 5. 三条定理 / Three Theorems

中文

定理 1（实验可成立定理）：  $B_U$  成立时，任何

English

Theorem 1 (Experimental Admissibility): When

合法实验都只能表现为边界一致态射。机制句：实验不是把对象推出 U，而是把局部自由度重新绑定到同一 B\_0。

定理 2（单值结算定理）：B\_U 与  $\Delta_B^e(\Phi)=0$  联立时，实验读出只能获得单值结算 standing。

裁决句：多结果并行本体不具有实验 standing。

定理 3（非分支定理）：任何可重复实验都不得生成独立本体子域。硬句：相关性允许，第二宇宙不允许。

B\_U holds, every legitimate experiment can appear only as a boundary-consistent morphism.

Mechanism: experiment does not push an object out of U; it rebinds local degrees of freedom to the same B\_0.

Theorem 2 (Single-Settlement): Under B\_U together with  $\Delta_B^e(\Phi)=0$ , an experimental readout can obtain only single-valued settlement standing.

Judgment: parallel ontological outcomes do not possess experimental standing.

Theorem 3 (Non-Branching): No repeatable experiment is allowed to generate an independent ontological subdomain. Hard line: correlation is allowed; a second universe is not.

$$\begin{aligned} B_U \Rightarrow & \text{forall } e, \mu_e : \text{Im}(\Pi_{\{B_0\}}) \rightarrow \text{Im}(\Pi_{\{B_0\}}) \\ & (B_U \text{ and } \Delta_B^e(\Phi)=0) \Rightarrow R_{\text{single}}(e) \\ R_{\text{single}}(e) \Rightarrow & \text{not exists } U_i \text{ subset } U \text{ such that settlement}(e) \text{ occurs outside } B_0 \end{aligned}$$

6. 实验态射裁决表 / Experimental Morphism Judgment Matrix

实验族 / Family	表面谜题 / Apparent puzzle	B_U 重写 / B_U recoding	裁决 / Judgment
干涉 / Interference	条纹重现或消失似乎要求“路径二重本体”	相位读出在同一 B_0 上重组，不生成第二路径宇宙	被收编 / Re-coded
纠缠 / Correlation	超距相关似乎要求独立本体并行	相关性是同一边界上的全局约束读出	被收编 / Re-coded
延迟选择 / Delayed choice	过去似乎被未来改写	被改写的是局部可读性次序，不是 B_0 本身	被收编 / Re-coded
量子擦除 / Erasure	已知路径信息似乎可被“撤销”	被撤销的是局部判定 standing，不是单一结算面	被收编 / Re-coded
零接触测量 / Null-contact	无接触却得信息似乎违背局部机制	全局边界敏感性允许局部零接触读出	被收编 / Re-coded

7. 否定链 / Negative Chain

中文

定义句：若实验要求边界漂移、子域逃逸或多值本体结算，则实验 standing 直接失效。

机制句：这不是“解释分歧”，而是 standing 失

English

Definition: If an experiment requires boundary drift, escape into a subdomain, or multi-valued ontological settlement, experimental standing fails immediately.

败。实验一旦要求第二本体域，B\_U 即被撤销；B\_U 一撤销，实验本身的可重复资格也随之崩解。

硬句：否定 B\_U，不是打开更多实验可能；是否定实验作为物理事实的统一成立面。

Mechanism: This is not a mere difference of interpretation; it is a standing failure. Once an experiment requires a second ontological domain, B\_U is withdrawn; once B\_U is withdrawn, the repeatable standing of the experiment collapses with it.

Hard line: To negate B\_U is not to open more experimental possibilities. It is to negate the unified standing of experiment as physical fact.

$\Delta_B^e(\Phi) \neq 0 \Rightarrow$  failure of experimental standing  
 $\text{not } B_U \Rightarrow \text{not } R\_single(e) \text{ or loss of repeatable admissibility}$

## 8. 结论 / Conclusion

### 中文

定义句：实验态射文件的核心结论只有一条——凡实验，皆须在同一边界上成立。

机制句：边界一致性把实验从“制造新宇宙的叙事”压回“同一宇宙的局部读出”。

裁决句：实验现象可以复杂，实验本体不可以分裂。

### English

Definition: The file ends on one claim only: every admissible experiment must stand on one and the same boundary.

Mechanism: Boundary consistency compresses experiment from a narrative of new universes back into a local readout of one universe.

Judgment: Experimental phenomena may be complex; experimental ontology may not split.

$B_U \Rightarrow$  experimental standing,  $\text{not } B_U \Rightarrow$  ontological fragmentation

### 硬句 / Hard line

实验揭示边界；实验不创造边界。

**Experiment reveals boundary; it does not create boundary.**

*Formal file in the B\_U series*