

Distinguishing Decision Commitment from Changes in Available Futures in Generative Relational Models

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Abstract

A decision can settle a person's practical stance while the person's modeled opportunities remain unchanged. Conversely, an external disturbance can change available futures without constituting a decision. This paper examines those two possibilities within a generative relational account of social dynamics. It distinguishes perceived alternatives, feasible continuations, permitted continuations, commitments, judgments, and implementation. A typed grounding relation connects descriptions of alternatives to a shared carrier of possible traces. Commitment operations include adoption, reaffirmation, refusal, deferral, revision, and revocation, with explicit scope conditions for their representation. Set-theoretic consequences establish how commitment constraints behave when the feasible and permitted background is fixed. Countermodels establish that a change in an opportunity projection is neither necessary nor sufficient for a separately warranted decision episode. A further result identifies what endpoint-only records lose when deliberate reaffirmation and passive continuation share the same projected state. Analysis through six descriptive categories locates agents, capacities, authority relations, practical states, settlement events, and deliberative processes without undertaking an ontological classification of their ultimate nature. Worked episodes and adversarial cases test the treatment of habit, coercion, collective decisions, changing interpretations, and machine outputs. The resulting framework supports disciplined modeling and evidence-sensitive attribution while leaving a general theory of agency and empirical validation open.

Keywords: decision; practical commitment; generative relational models; alternatives; agency attribution

Research Note

This paper develops a bounded argument through conceptual distinctions, stated assumptions, conditional derivations, worked examples, and objections. Its length follows the requirements of that argument. Formal statements concern the specified models; the application of those models to persons and institutions requires independent interpretation and evidence. Constructed examples are explicitly identified and carry illustrative, rather than observational, status.

The manuscript follows the repository’s paper template for typography, numbered formal statements, section structure, citations, and navigable contents. The associated project files preserve research provenance, source verification, derivation records, unresolved objections, and validation results. Philosophical commitments about the ultimate nature of social facts remain suspended where the descriptive framework is sufficient for the argument.

Authorship and Research Assistance

Wanhong Huang directed the research questions and authorized this paper’s preparation. An AI research assistant helped organize the material, develop explicit formal constructions, check primary sources, and prepare the text. Agent-added arguments and formulations remain subject to the author’s review. Source positions, repository proposals, and model consequences are distinguished throughout the manuscript.

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Contents

1	Introduction	4
2	Planning, Reconsideration, and Intentional Interpretation	4
3	Descriptive Metamodel and Practical Scope	5
4	Perceived, Feasible, and Permitted Alternatives	6
5	Commitment Operations and Episode Histories	8
5.1	Public commitments and changing backgrounds	9
5.2	Commitment conflict and ranked revision	9
6	Opportunity Projections and Decision Attribution	10
7	Judgment, Settlement, and Implementation	11
8	Six Descriptive Categories in a Decision Episode	12
8.1	Entities and the bearer of a practical question	12
8.2	Attributes and practical capacities	12
8.3	Relations and the force of commitment	13
8.4	States and the resolution of description	14
8.5	Events and the occurrence of settlement	14
8.6	Processes and the organization of continuation	14
9	Constructed Episodes and Boundary Cases	15
9.1	Reaffirmation after a challenge	15
9.2	Refusal and supported expression	15
9.3	Collective adoption and individual disagreement	15
9.4	Automatic selection and agency attribution	16
10	Evidence and Attribution Across Roles	16
10.1	Episode evidence and rival reconstructions	16
10.2	Measurement invariance and opportunity comparison	16
10.3	Standing and the use of an attribution	17
10.4	Sensitivity under relevant and irrelevant variation	17
11	Philosophical Objections and Model Revision	18
11.1	Reaffirmation and conceptual stipulation	18
11.2	Complete state descriptions and projection dependence	18
11.3	Habit, coercion, and gradual settlement	18
11.4	Generative interpretation and changing alternatives	19
12	Discussion and Further Formal Obligations	19

1 Introduction

A person can reconsider a course of action and decide to continue it. The available routes, resources, and formal permissions may remain the same. Conversely, a cancelled service or an external prohibition can alter those opportunities while the person has made no new decision. This paper examines the distinction between practical settlement and changes in available futures within a generative relational model. It develops typed representations of alternatives and commitments, derives their limited formal consequences, and tests the account through six descriptive categories and worked episodes.

The motivating difficulty arises when a model defines a decision by a change in the set of possible continuations. Such a definition initially appears attractive. Decisions are consequential, and choosing one course can exclude others. Yet the definition combines several questions. Which continuations are being counted: those physically feasible, institutionally permitted, imagined by the person, or consistent with a commitment? Which time horizon is relevant? Is the change attributed to the person's settlement, its implementation, or an external event?

These questions become especially important in a framework that emphasizes generation and transformation. A rich account of becoming should be able to represent maintenance, reaffirmation, refusal, and delay. Their significance can lie in the history through which a practical stance is sustained. A projection that displays only the current alternatives may conceal that history. The model needs a place for the episode without requiring every episode to change every projection of the person's possibilities.

The central claim is conditional on a defensible conception of practical settlement. When an episode is independently warranted as settling a practical question for an agent, a change in the named opportunity projection is unnecessary for that episode to count as a decision. A change in that projection is also insufficient, because external events can produce it. The algebra establishes these distinctions through countermodels. The conceptual and evidential work of recognizing settlement remains explicit.

The account consequently separates perceived descriptions, feasible traces, permitted traces, commitments, judgments, and implementation. A grounding relation connects an alternative's description to the continuations that would count as realizing it. This relation can be partial and many-to-many. Commitment operations act on a representation of practical constraints and append to an episode history. Reaffirmation may leave the represented constraint set unchanged while adding a distinct episode to that history.

This approach preserves the research program's use of six categories of social facts: entities, attributes, relations, states, events, and processes. The categories support different questions about one episode. They need not constitute an ontological partition. Section 8 examines how each category contributes to the model and where a reduction to another category would lose explanatory content.

The paper proceeds through conceptual analysis and elementary formal derivations. It acknowledges relevant work on intentions, plans, reconsideration, and intentional interpretation. It develops a scoped architecture within the present research program rather than asserting a comprehensive new theory of practical agency. Constructed examples test the architecture's ability to represent ordinary and difficult cases. A prospective evidence program identifies observations that would support, challenge, or leave undetermined an attribution of decision.

The resulting account allows a decision to matter through its relation to reasons, subsequent conduct, and social coordination even where a selected endpoint remains unchanged. It also gives future-changing events their proper description without automatically treating them as decisions. The distinction protects the explanatory specificity of both concepts.

2 Planning, Reconsideration, and Intentional Interpretation

This section establishes three relevant antecedents and identifies the limited use made of each. The comparison helps locate the proposed formal architecture without treating familiar concepts as original discoveries of the present research program.

Bratman's work on intentions and plans gives partial plans a role in organizing activity over time

and coordinating it socially [1]. The inspected publisher description supports that general orientation. It supplies a clear antecedent for treating practical commitments through their temporal and relational roles. Detailed claims about the complete theory require a fuller textual investigation than the bounded comparison used here.

Holton examines weakness of will through the disposition to reconsider intentions too readily, while allowing that changed circumstances can justify reconsideration [3]. This account makes the relation between persistence and renewed deliberation a useful point of comparison. The present paper leaves the general theory of weakness of will open. Its narrower concern is that an intention's persistence alone cannot distinguish passive continuation from a renewed episode of settlement.

Dennett's intentional stance provides an antecedent for interpreting and predicting a system through intentional vocabulary [2]. The inspected publisher account supports this broad point. It does not settle which systems possess practical authority, first-person agency, or a moral status. Those questions should therefore remain separate from the predictive convenience of a model that calls an output a choice.

The three comparisons identify different dimensions. Planning concerns the organization of action through time. Reconsideration concerns the relation between a standing intention and further practical thought. Intentional interpretation concerns the standpoint from which a system's conduct is described and anticipated. A generative relational model can represent all three, but their coexistence in one model supplies no argument that they are equivalent.

The present contribution has a more restricted form. It defines separate carriers for descriptions and continuations, makes the grounding relation explicit, and derives what follows from adding or removing a commitment under a fixed background. It supplies countermodels to identifying decision with opportunity change. It also shows why a record containing only selected endpoints can fail to preserve an episode-level distinction that the account otherwise recognizes.

These results are elementary mathematically. Their usefulness depends on the conceptual errors they prevent. An intersection of perceived descriptions and physical trajectories is ill-typed until a common representation has been supplied. A shrinking feasible set cannot by itself identify an agent's settlement. An unchanged commitment set cannot by itself establish the absence of reconsideration. Each point restricts a tempting simplification in formal modeling.

Several broader literature tasks remain open. A complete account would need deeper engagement with theories of practical reasoning, collective agency, nonverbal action, supported decision-making, and artificial systems. The manuscript treats those areas as pressure tests and research directions. Its assertions about established work remain confined to the sources and passages verified for this draft.

3 Descriptive Metamodel and Practical Scope

This section fixes the descriptive level at which the formal model operates. It introduces states, transformations, histories, and equivalence relations, then explains why these structures alone leave the attribution of a decision unresolved. The distinction prevents a mathematical vocabulary of transition from becoming an unexamined theory of agency.

Let S be a set of represented configurations and M a set of represented transformations. A partial action map

$$\alpha : M \times S \rightharpoonup S \tag{1}$$

records where a transformation is applicable and which represented configuration follows. A chosen equivalence relation $\sim$ on S can express the resolution at which two configurations are treated alike. This four-part structure $(S, M, \alpha, \sim)$ is a descriptive syntax. Its interpretation must say which transformations are actions, disturbances, institutional changes, or other events.

A history can be represented by a finite alternating sequence

$$h = (s_0, m_0, s_1, \dots, m_{t-1}, s_t), \quad \alpha(m_j, s_j) = s_{j+1} \tag{2}$$

where defined. If timing, simultaneity, or uncertainty matters, the representation needs further structure. The finite sequence suffices for the present countermodels. It preserves the possibility that two histories terminate in the same represented state after different episodes.

The equivalence relation is consequential. If $s \sim s'$ means identical feasible travel routes, the two configurations can differ in intention, confidence, commitment, or public record. If equivalence additionally requires identical commitment constraints, they can still differ in the history of reaffirmation. A claim that a decision leaves a state unchanged should consequently name the projection or equivalence under which the claim is made.

Definition 3.1 (Practical settlement). A practical settlement is an episode through which an agent provisionally adopts, maintains after reconsideration, refuses, defers, revises, or withdraws a stance that governs a specified practical question, under a defensible account of the agent’s participation and the stance’s role.

This is a working definition. “Provisionally” allows later revision; “governs” requires a role in practical organization that needs evidence; “specified practical question” fixes the scope. The definition includes reaffirmation when reconsideration carries an actual settling role. It leaves mere passage of time and every instance of behavioral persistence outside that description unless further episode evidence is supplied.

The agent need not verbalize a proposition at a discrete instant. Nonverbal refusal, an extended deliberative process, or an institutionally specified procedure can support a settlement attribution under a suitable account. These possibilities require explicit interpretation. Declaring a label in the model is insufficient evidence for its application. Likewise, a recorded vote or a generated output can have a recognized procedural role while leaving broader questions of agency open.

The paper uses a predicate $D(e)$ for a warranted decision episode e . Its warrant comes from the conceptual account and evidence appropriate to the setting. The formal results then ask whether $D(e)$ can be recovered from changes in a particular projection. This ordering matters. Defining $D(e)$ to mean the very projection change under examination would make the inquiry circular and would exclude the motivating counterexamples by stipulation.

The scope is therefore methodological and philosophical. The model represents distinctions needed to assess a decision claim, while a general necessary-and-sufficient theory of agency remains open. This restriction gives the formal countermodels a defensible target: they challenge the adequacy of a specified observable projection for a separately motivated episode distinction.

4 Perceived, Feasible, and Permitted Alternatives

This section distinguishes three senses of an available alternative and derives a consequence for counting them. The order is deliberate: descriptions and trace domains are fixed first, their grounding relation is introduced next, and comparison becomes meaningful only after that typing work.

Let Γ be a common carrier of possible continuation traces over a specified horizon. A trace may describe a route, a sequence of actions, or another sufficiently explicit continuation. Let

$$\Gamma^f(x) \subseteq \Gamma, \quad \Gamma^n(c) \subseteq \Gamma \tag{3}$$

represent feasibility in environmental state x and permission under normative context c . The choice of horizon and granularity belongs to the model. Distinct minute-by-minute traces may count as one practical alternative under a coarser description.

Let A^p be the descriptions of alternatives available to the person under the account. Examples include taking a train, asking for help, declining a request, and postponing a response. A description is a different kind of object from a realized or possible trace. The person may entertain a description with no feasible realization in the current circumstances. Several descriptions may refer to overlapping realizations, and one description may cover many traces.

Introduce a grounding relation

$$G \subseteq A^p \times \Gamma, \quad G[a] = \{\tau \in \Gamma : (a, \tau) \in G\}. \quad (4)$$

Its feasible part is $G^f[a] = G[a] \cap \Gamma^f(x)$. Restricting G to $A^p \times \Gamma^f(x)$ recovers the simpler convention used when only currently feasible realizations are represented. The broader typing retains imagined but infeasible alternatives explicitly.

Definition 4.1 (Grounded practical menu). For stated x , c , and G , the jointly perceived, feasible, and permitted trace menu is

$$\Gamma^{p,f,n} = \left(\bigcup_{a \in A^p} G[a] \right) \cap \Gamma^f(x) \cap \Gamma^n(c).$$

The intersection now acts on sets with a shared carrier. Writing $A^p \cap \Gamma^f$ before supplying a representation would combine descriptions and traces without a defined relation. More substantively, the grounded menu leaves visible three distinct absences: the person may lack a description of a feasible route, the described route may be infeasible, or a feasible route may be prohibited under the stated context. Each diagnosis suggests a different investigation.

Permission also requires an index. A continuation can be permitted under an organization's rule and contested under a person's moral judgment. An informal expectation can differ from a written policy. The model may therefore retain several sets $\Gamma^{n_j}(c_j)$. Their intersection is appropriate only for a question requiring joint compliance with all those systems. Automatically intersecting every norm would erase the possibility that the practical question concerns which norm to contest.

Cardinality requires comparable meanings. Suppose one menu contains “take the train,” while another contains “take the 08:10 train” and “travel on the morning rail service,” both referring to the same available departure. A larger number of labels can coexist with the same grounded continuations.

Proposition 4.2 (Synonymous refinement). *Let $r : A^{p'} \rightarrow A^p$ be surjective and suppose $G'(a', \tau)$ holds exactly when $G(r(a'), \tau)$ holds. Then*

$$\bigcup_{a' \in A^{p'}} G'[a'] = \bigcup_{a \in A^p} G[a].$$

Consequently, intersection with the same feasible and permitted sets preserves equality of the corresponding grounded menus.

Proof. If τ belongs to the left side, some a' grounds it. The stipulated relation then places τ in $G[r(a')]$, giving membership on the right. Conversely, if $\tau \in G[a]$, surjectivity supplies a' with $r(a') = a$. The same stipulation gives $\tau \in G'[a']$. This proves both inclusions. Intersecting equal sets with the same sets preserves equality. $\square$

The proposition is conditional on genuine synonymy in grounding. A new description can reveal a previously unrecognized possibility, change how a person evaluates it, or organize a new collective response. Those changes violate the equality assumption and deserve their own model. The result challenges raw label counts, while leaving open the productive role of interpretation and language.

Even trace counts can mislead. Splitting a route into more detailed time segments can multiply represented traces without adding a meaningful opportunity. Conversely, one newly available route can matter more than many minor variants because it permits a previously excluded activity. Comparing opportunity therefore requires a declared equivalence, horizon, and evaluative target. The formal apparatus organizes those decisions without supplying a universal measure of freedom or well-being.

5 Commitment Operations and Episode Histories

This section gives commitment a limited formal representation and derives the consequences of adding or removing a constraint. It then examines reaffirmation, refusal, and deferral, where a simple change in constraint content can fail to capture the episode’s practical role.

Let $\mathcal{K}$ be a vocabulary of practically interpreted prescriptions. For each $k \in \mathcal{K}$ and trace $\tau \in \Gamma$, the relation $\tau \models k$ means that τ satisfies the prescription under the declared interpretation. A represented commitment set $K \subseteq \mathcal{K}$ has satisfaction set

$$\text{Sat}(K) = \{\tau \in \Gamma : \forall k \in K, \tau \models k\}. \quad (5)$$

This construction represents the constraint content of commitments. Their force, ownership, provenance, and conditions of revision require further description.

The joint continuation set is

$$\Gamma^{K,f,n} = \text{Sat}(K) \cap \Gamma^f(x) \cap \Gamma^n(c). \quad (6)$$

A perceived version additionally intersects the grounded menu from Section 4. An empty result can arise through inconsistent commitments, physical infeasibility, prohibition, or their interaction. It can also reflect an inadequate model. The emptiness alone supplies none of those diagnoses uniquely.

Proposition 5.1 (Constraint addition and removal). *For any prescription p ,*

$$\text{Sat}(K \cup \{p\}) \subseteq \text{Sat}(K), \quad \text{Sat}(K) \subseteq \text{Sat}(K \setminus \{p\}).$$

Both inclusions continue to hold after intersection with the same feasible and permitted trace sets.

Proof. A trace satisfying every prescription in $K \cup \{p\}$ satisfies each member of K , which gives the first inclusion. A trace satisfying every member of K satisfies every member of its subset $K \setminus \{p\}$, giving the second. If $A \subseteq B$, then every member of $A \cap C$ also belongs to $B \cap C$; apply this fact with the fixed background intersection. $\square$

These are weak inclusions. Adding a prescription already entailed by the represented commitments can preserve the satisfaction set. Removing a redundant prescription can do the same. A change in linguistic content therefore need not change the compatible traces. The reverse implication also fails: two distinct commitment sets can have the same satisfaction set on a limited carrier while differing in reasons, conditions, or application beyond that carrier.

An episode can be represented schematically by

$$e = (i, h, c, A^p, G, \omega, K, K'), \quad K' = U_\omega(K, c), \quad (7)$$

where i identifies the agent under the adopted account, h the relevant preceding history, c the context, and ω the operation. The new history appends the episode: $h' = h \frown e$. This record structure preserves the operation even when its endpoint constraint set equals its input.

Table 1 gives illustrative operations. The formulas are schemas whose interpretation requires the practical setting. A refusal of a request differs from a commitment to the opposite action. Deferral differs from passive delay when it settles when or under what condition a question will be reopened.

Reaffirmation supplies the central case. A person can inspect a new consideration, weigh it against a standing plan, and settle on continuation. Within a constraint-content projection, $U_{\text{affirm}}(K, c) = K$. The historical episode still differs from never encountering the consideration. Its significance might include renewed coordination with another person, a clarified reason, or a deliberate acceptance of a burden.

The model leaves open how much reconsideration is sufficient. An explicit statement can be formulaic, and a silent response can be practically decisive. A satisfactory application needs evidence of the episode’s role, with uncertainty recorded where that evidence is weak. Appending the label “reaffirmation” to a history records an attribution; it provides no independent validation of that attribution.

Table 1: Commitment operations and the scope of their set representation

Operation	Illustrative update	Interpretive requirement
Adopt	$K' = K \cup \{p\}$	Specify the prescription, ownership, and practical force.
Reaffirm	$K' = K$	Preserve evidence that reconsideration settled continuation.
Refuse	Context-dependent	Identify the request and the stance toward it; avoid assuming an opposite commitment.
Defer	Add a review condition	Distinguish an adopted timing rule from unresolved delay.
Revise	$(K \setminus R) \cup A$	Identify withdrawn and adopted content and changed background conditions.
Revoke	$K' = K \setminus \{p\}$	Distinguish withdrawal of a prescription from erasure of its historical occurrence.

The fixed-background assumption also has substantive limits. Publicly adopting a commitment can change what others do, release resources, create permissions, or attract sanctions. In those cases, x and c change alongside K . Proposition 5.1 still describes the isolated constraint operation, but it cannot determine the net change in (6). A dynamic model must derive the environmental and institutional transitions separately.

5.1 Public commitments and changing backgrounds

The fixed-background qualification in Proposition 5.1 can be tested with a finite countermodel. This subsection constructs a case where a commitment adds a constraint while the jointly feasible set expands through coordination. The example prevents the isolated inclusion result from being interpreted as a general law of shrinking opportunity.

Let $\Gamma = \{\tau_a, \tau_b, \tau_c\}$. Initially $K = \emptyset$, all traces are permitted, and $\Gamma^f(x) = \{\tau_a\}$. A public commitment adds prescription p with $\text{Sat}(\{p\}) = \{\tau_a, \tau_c\}$. Suppose its communication also enables another participant to supply a resource, changing feasibility to $\Gamma^f(x') = \{\tau_a, \tau_c\}$. The initial joint set is $\{\tau_a\}$; the later joint set is $\{\tau_a, \tau_c\}$.

The constraint content has narrowed the full carrier from Γ to $\{\tau_a, \tau_c\}$, exactly as Proposition 5.1 requires. The environment has simultaneously made a previously infeasible trace possible. The net expansion follows from the two specified operations. It contradicts only an unqualified claim that commitment must shrink the joint opportunity set.

A conversational interpretation is that participants commit to a common meeting time, making shared transport possible. The example requires evidence that the commitment actually enables the resource response. Its mathematical consistency does not establish that all public commitments have such effects.

Other background responses can narrow the set. A commitment might induce withdrawal of support, create conflicting obligations, or change permission. A complete transition model should therefore specify a joint update $(K, x, c) \mapsto (K', x', c')$. The isolated constraint theorem is one component of that model, with a clear scope and a reusable proof.

5.2 Commitment conflict and ranked revision

The satisfaction construction treats every prescription in K as jointly binding for the represented target. Real practical organization can contain priorities, exceptions, and conditions for reopening a commitment. This subsection identifies the additional structure needed to represent them.

If p requires attendance at a meeting and q requires an incompatible activity over the same interval, then $\text{Sat}(\{p, q\})$ can be empty even while each prescription is individually feasible. The empty set records a conflict under the joint interpretation. It supplies no rule for resolving the conflict.

A priority relation $\succ$ on prescriptions can guide a proposed revision rule. For a finite K , let $\mathcal{C}(K)$ be the subsets of K whose satisfaction sets intersect the fixed feasible and permitted background. A revision procedure can select among these subsets using a declared ranking over retained commitments. The ranking and tie handling carry substantive practical content.

Choosing a maximal-cardinality subset would preserve the largest number of labels, but Proposition 4.2 already shows the danger of label counts. Duplicating synonymous prescriptions could alter the selected subset without changing the underlying reasons or realizations. A defensible rule needs a semantic and evaluative account, not merely an optimization symbol.

Conflicting commitments also help distinguish decision from successful execution. A person can genuinely undertake incompatible commitments through error or misunderstanding. The resulting practical problem concerns coherence, revision, and responsibility. Declaring that the empty joint menu proves the absence of any decision would erase the very episodes that need explanation.

The present paper therefore retains the simple satisfaction model as an explicit baseline and marks ranked revision as a further modeling obligation. Its purpose is to show where richer commitment content belongs, while avoiding an unsupported universal rule for reconciling practical reasons.

6 Opportunity Projections and Decision Attribution

This section proves the two non-implications motivating the paper and derives a corresponding limit on endpoint records. It keeps the decision predicate independent of the opportunity projection so that the countermodels test a substantive proposal.

Let $\mathcal{E}$ be a class of candidate episodes with represented before and after states e^- and e^+ . Let Φ be a declared projection of available futures, such as the feasible travel routes over the next day. Let $D : \mathcal{E} \rightarrow \{0, 1\}$ record whether the episode is warranted as practical settlement under the account.

Assumption 6.1 (Admissible contrast episodes). The episode class includes a warranted reaffirmation for which $\Phi(e^-) = \Phi(e^+)$ and an environmental disturbance, without a settlement episode by the target agent, for which $\Phi(e^-) \neq \Phi(e^+)$.

The assumption names what needs conceptual and empirical support in an application. Constructed examples establish the consistency of such a class. They leave the classification of real episodes answerable to evidence.

Proposition 6.2 (Non-equivalence of settlement and opportunity change). *Under Assumption 6.1, neither of the following implications is valid across $\mathcal{E}$:*

$$D(e) = 1 \implies \Phi(e^-) \neq \Phi(e^+), \quad \Phi(e^-) \neq \Phi(e^+) \implies D(e) = 1.$$

Proof. The warranted reaffirmation has a true antecedent and false consequent for the first implication. The environmental disturbance has a true antecedent and false consequent for the second. Each therefore supplies a counterexample to the corresponding universal implication. $\square$

For a concrete witness, let the feasible route set before and after a person's reconsideration be $\{\tau_{\text{rail}}, \tau_{\text{bus}}\}$. The person reaffirms an earlier rail plan after considering a request to change it. The modeled feasible projection is unchanged. In a separate episode, a rail service cancellation changes the set to $\{\tau_{\text{bus}}\}$ before the person responds. The disturbance changes feasibility while leaving the person's subsequent practical settlement still to occur.

The first example remains compatible with changes in attention, confidence, neural activity, social expectations, or a richer historical record. The proposition concerns the named projection. It would be an error to infer complete physical identity from equality of feasible routes. Equally, requiring some physical change for an event to occur would leave the distinctive concept of decision unexplained, since many nondecisional events also involve physical change.

Now let an endpoint record retain only before and after commitment contents and opportunity projections:

$$\rho(e) = (K^-, K^+, \Phi(e^-), \Phi(e^+)). \quad (8)$$

Let $d(e)$ distinguish warranted reaffirmation from passive continuation. This narrower target isolates an episode distinction that the working definition regards as meaningful.

Proposition 6.3 (Endpoint recovery limit). *If e_1, e_2 have $\rho(e_1) = \rho(e_2)$ and $d(e_1) \neq d(e_2)$, there is no function of $\rho(e)$ alone that recovers $d(e)$ correctly for every episode in the class.*

Proof. Any function takes the same value on the identical input records. Since the two target values differ, that common output fails to equal at least one of them. $\square$

The result explains the role of episode history. Recording an earlier challenge, the person’s response, and the subsequent coordination can preserve evidence that endpoints omit. The quality of those additional records still matters. An observer who writes “deliberate” without a basis has changed the label, not supplied the missing warrant.

Projection choice should consequently follow the research question. A transport model may reasonably retain feasible routes and omit reaffirmation because its purpose is route availability. A theory of practical settlement requires a richer target and record. The paper challenges an inference across those purposes, while preserving the usefulness of the simpler projection within its scope.

7 Judgment, Settlement, and Implementation

This section separates three activities that can occur within one practical episode: assessing a proposition, settling a practical question, and carrying out a course of action. It explains how their temporal relations complicate the attribution of decisions from behavior alone.

A judgment can concern the truth, plausibility, desirability, or comparative merit of a proposition or alternative. A decision settles a practical stance under the working definition. Implementation concerns the processes through which the stance is carried into conduct. These descriptions can overlap. An utterance can express a judgment and enact an institutional commitment; a physical action can complete a practical settlement while beginning its implementation. Their possible coincidence leaves the analytical distinction useful.

Suppose a person judges the train more comfortable than the bus. That evaluation can enter a decision, but the person may remain unsettled because another consideration matters. Conversely, a person may settle on a route under uncertainty about comparative comfort because the task requires a timely commitment. A model that equates the highest evaluated score with decision would need further assumptions about how evaluation governs settlement.

Let J represent an evaluative ordering over interpreted alternatives. Let K' represent commitment content after an episode, and let τ_{act} represent the subsequent realized trace. A complete model requires distinct predicates on these inputs

$$\begin{aligned} \mathcal{R}_{\text{settle}}(J, A^p, G, c, h, K') &\in \{0, 1\}, \\ \mathcal{R}_{\text{exec}}(K', x, c, h', \tau) &\in \{0, 1\}, \quad \tau \in \Gamma. \end{aligned} \quad (9)$$

Each argument ranges over its previously specified kind of object. The predicates permit multiple possible settlements or implementations under the same represented inputs. Their substantive content must be specified in an application.

This relational formulation avoids assuming a deterministic maximizing rule. Such a rule is one possible model if its ordering, constraints, tie handling, and role in the agent’s activity are justified. It is insufficient merely to observe a selected action and construct an ordering that makes it maximal. That procedure can fit the endpoint while leaving the practical episode unexplained.

Implementation can fail after a warranted decision. A person may commit to attend and then encounter an inaccessible route. The failure can provide evidence about feasibility, unforeseen conditions, or practical capacity. It does not by itself erase the earlier settlement. Conversely, conduct can match a commitment-compatible trace through habit, coercion, coincidence, or another agent's intervention. Successful execution alone therefore requires an interpretive bridge before it supports a decision attribution.

The timing of settlement can also be distributed. A person may narrow the question over several conversations and settle it through a final gesture whose meaning depends on that history. An institution may specify an exact point of effectiveness, such as certification of a vote, while the participants' deliberation continues across a longer process. The effective institutional event and the practical formation process should receive their own time indices.

This distinction matters for revision. A person can continue implementing an earlier commitment while reconsidering it. A later revocation can change future conduct without undoing already completed actions. Similarly, an institution can withdraw a policy prospectively while preserving the historical fact of its earlier adoption. A model should state which operation changes present obligations, future feasible conduct, or the interpretation of an earlier episode.

The framework consequently represents success and failure in several dimensions: evaluative adequacy, settlement warrant, implementation, and subsequent consequences. Collapsing these dimensions into a single decision-quality score would require an explicit evaluative argument. Their separation allows criticism to locate the actual problem: an unsupported judgment, an inadequately authorized settlement, a failed implementation, or a harmful consequence can call for different forms of reassessment.

8 Six Descriptive Categories in a Decision Episode

This section examines how entities, attributes, relations, states, events, and processes contribute to a decision model. Each subsection states the category's role, a useful formal representation, and a limit on reduction to that representation. The categories organize questions about one episode while suspending a claim about six ultimate kinds of being. Table 2 provides a compact map.

8.1 Entities and the bearer of a practical question

Entity description identifies the individual, group, or institution whose practical question is under examination. The index i in (7) has this role. Its presence is a bookkeeping requirement, while the claim that the indexed entity can decide requires a substantive account.

Persistence matters because commitments extend through time. A model may use an identity relation $\equiv_i$ across temporal representations to connect an earlier adoption with a later reaffirmation. For a person, the relevant continuity can often be taken for granted in an ordinary episode. For a committee with changing membership, the account must state whether continuity attaches to the institution, its office holders, or a particular coalition. These alternatives affect whose commitment is being maintained.

The category also separates the bearer of a decision from its object. A committee can decide on behalf of a service whose users are affected without those users thereby becoming the deciding body. The model should preserve participation and representation relations separately from the entity label. Treating every affected party as a coauthor would overstate agency; treating an authorized office as the complete source of every member's practical stance would erase internal differences.

An entity-first analysis can become too static if it assumes the agent is fully specified before every relation. The framework permits roles and collective capacities to develop through a history. It requires enough continuity to identify the target episode, while leaving the formation of the entity's practical organization open to analysis.

8.2 Attributes and practical capacities

Attributes represent capacities, dispositions, knowledge, confidence, or other properties attributed to the entity in a context. A profile $a_i(c, t)$ can index a capacity to understand a relevant distinction, maintain

Table 2: Descriptive roles of six categories in practical settlement

Category	Formal role	Main interpretation obligation
Entity	Index i and persistence criteria	Explain whose practical question is being settled and across which history.
Attribute	Profile $a_i(c, t)$	Distinguish a modeled capacity or disposition from a single observed response.
Relation	Typed relation $R_\ell(i, j, c, t)$	Specify authority, dependence, promise, or coordination separately.
State	Tuple of current commitments and conditions	Declare the projection and information omitted by its equivalence classes.
Event	Episode e with occurrence and attribution records	Distinguish a settlement occurrence from its later classification.
Process	Ordered or otherwise structured history	Preserve reconsideration, implementation, and revision where their order matters.

a plan, or communicate a refusal. Such a profile is context-sensitive when the capacity’s manifestation depends on support, language, time, or available means of expression.

One observed response is insufficient to define the entire profile. A person who struggles to explain a choice in an unfamiliar format can have other ways of understanding and expressing it. A person who responds fluently can still be repeating a formula without settling the practical issue. Operational measures should therefore state what task they test and what broader attribution they are intended to support.

Formal sensitivity can be useful when interpreted carefully. A model may ask whether some relevant change in reasons changes a response. Existential sensitivity alone is weak: many non-agentive systems vary under input changes. Universal sensitivity is too strong: synonymous descriptions, irrelevant details, and already considered reasons may appropriately leave a settlement unchanged.

The needed question concerns patterned responsiveness to distinctions that the account independently treats as practically relevant. Testing that pattern requires varied evidence and a theory of relevance. The attribute category therefore exposes an empirical obligation rather than supplying a numerical threshold that automatically certifies agency.

8.3 Relations and the force of commitment

Relations connect a decision episode to other persons, institutions, resources, and expectations. A typed relation $R_\ell(i, j, c, t)$ can represent a promise to another person, an authority to adopt a policy, a dependence on assistance, or a coordination requirement. The subscript ℓ prevents these different relations from being merged into an unqualified edge.

Relational force can explain why the same words have different effects. “We will proceed” uttered by an authorized chair at the conclusion of a specified procedure can settle an institutional question. The same sentence uttered speculatively by an observer can describe an expectation. A transition rule for institutional commitment should therefore include the relevant authority and procedure rather than treating the sentence alone as sufficient.

Relations also affect available alternatives. A person may perceive refusal differently when a relationship makes disagreement costly. Support can make a previously inaccessible means of expression available. These mechanisms belong in the grounding and transition account. The model should distinguish a changed opportunity from the normative evaluation of how that opportunity was structured.

Dependence itself carries no fixed positive or negative valuation in this framework. Some dependencies enable practical participation; others restrict it; one relation can do both in different respects. Describing the mechanism and evaluative standard supplies more content than attaching an automatic judgment to relationality.

8.4 States and the resolution of description

A state summarizes conditions at a represented time. For this paper, a useful state might include (K, x, c, A^p, G) , with additional variables when their role is justified. The summary makes local comparison possible. It also determines which differences disappear under equality of state descriptions.

State equality is consequently model-relative. Reaffirmation can preserve K and $\Gamma^f(x)$ while changing a history record, confidence, or a relationship. An analyst who needs those changes can enrich the state. An analyst interested only in route feasibility can legitimately omit them. The disagreement concerns adequacy for a target rather than an unconditional fact that nothing changed.

A richer state can in principle include the whole past. That representation makes endpoint equality rarer but also changes the meaning of “state.” It does not defeat the projection result: the simpler retained fields still merge episodes that differ on the practical target. The choice between a rich state and an explicit history is a modeling decision whose costs and purposes should be stated.

The state category is thus useful for controlled comparison and dangerous when its omissions become claims about the phenomenon. A decision’s absence from a state projection can reflect the projection’s design. It leaves the question of the episode’s occurrence to the evidence retained elsewhere.

8.5 Events and the occurrence of settlement

Event description concerns what occurred, with temporal boundaries appropriate to the inquiry. A settlement event may be associated with an utterance, gesture, vote, or completed stage of deliberation. Its occurrence differs from the later record through which an observer classifies it.

The episode tuple (7) should therefore carry provenance for the attribution of ω . A contemporaneous statement, another person’s interpretation, and a later recollection can support different claims. The record should preserve which one is being used. An institutional declaration can constitute a procedural event even while its relation to each participant’s personal settlement remains contested.

Event boundaries can also be uncertain. A person may become settled gradually, while an institutional rule assigns an exact effective time. A model can represent an interval for practical formation and a point for procedural effectiveness. Forcing both into one instant can create an apparent contradiction between descriptions that answer different questions.

The event category protects the historical occurrence of a decision from being erased by later revocation or failed execution. It also protects against inferring an event merely because a later state is compatible with one. Occurrence needs evidence connecting the purported episode to the history.

8.6 Processes and the organization of continuation

Process description concerns the ordered development through which practical questions are formed, considered, settled, implemented, and reopened. The sequence in (2) gives a minimal representation. More complex processes can include simultaneous contributions, feedback, and multiple participants.

Order matters even when individual updates are simple. Let one operation add a prescription p and another remove it. Starting from $K = \emptyset$, addition followed by removal yields the empty set, while removal followed by addition yields $\{p\}$. This difference follows directly from the operations’ definitions. It demonstrates order dependence without establishing any broader claim about nonlinear dynamics.

A process account also distinguishes maintenance from inertia. Continuing a commitment through repeated challenges can involve ongoing work, coordination, and repair. A state-only record of unchanged content can omit that work. Conversely, repeated public statements can reproduce a commitment ceremonially without reopening the practical question. The occurrence of repetition alone leaves its process role unresolved.

The six categories consequently support complementary explanations. An entity bears a practical question, attributes help describe capacities, relations supply forms of force and dependence, states summarize conditions, events locate occurrences, and processes connect them through time. A comprehensive analysis uses the categories where they answer a real question, while avoiding six parallel

redescriptions added solely for symmetry.

9 Constructed Episodes and Boundary Cases

This section tests the distinctions against four constructed cases. Each case specifies the practical target and the evidence needed to move from a formal representation to an attribution of decision. The cases illustrate possibilities rather than prevalence.

9.1 Reaffirmation after a challenge

A researcher has arranged to attend a meeting. A colleague offers an alternative activity. The researcher considers the invitation, checks a prior promise, and explicitly confirms attendance at the meeting. Both activities remain feasible and permitted. The commitment-compatible trace set can also remain unchanged if attendance was already the standing prescription.

The candidate reaffirmation has evidence beyond persistence: the challenge, consideration, and confirmation have a practical role in resolving the reopened question. The same final attendance could occur in another history where the invitation was never received. The endpoint equality makes the episode history essential to the distinction.

The evidence still admits scrutiny. A formulaic confirmation could be socially expected and practically empty. A private reconsideration could be inaccessible to the observer. The model should preserve warranted, unwarranted, and unresolved attributions separately rather than declaring every confirmation a decision.

9.2 Refusal and supported expression

A person is offered a course of action through a format they find difficult to use. With a different means of expression, the person indicates refusal consistently and supplies a reason through an accessible channel. The change in communication can reveal a stance, help form a stance, or accomplish both. The timing and target require investigation.

Refusal here should be indexed to the offered proposal. It leaves open what the person affirmatively prefers next. Representing refusal as commitment to a single opposite option would impose content beyond the episode. The grounding relation can represent multiple continuations consistent with declining the proposal.

The example also challenges a requirement of fluent verbal deliberation. Such a requirement would make the selected measurement format part of the definition of agency. A defensible account evaluates the person's participation and the stance's practical role using appropriate evidence, while the broader attribution remains open where evidence is limited.

9.3 Collective adoption and individual disagreement

A committee follows a specified voting procedure and adopts a schedule. The institutional commitment can be represented by a transition whose conditions include membership, authority, and the procedure's completion. Several members continue to oppose the schedule personally.

The institutional decision and individual attitudes have different bearers and targets. An aggregate vote result is insufficient to infer unanimous personal commitment. Conversely, individual disagreement does not automatically nullify the procedural event under the stipulated rule. Whether that rule is legitimate requires a normative inquiry beyond the transition's mathematical consistency.

A later change in membership raises a further question: which entity's commitment persists? The answer depends on the institutional continuity account. The episode record should retain the adopting body, effective rule, dissent, and subsequent revision rather than replacing the history with a single present status.

9.4 Automatic selection and agency attribution

A scheduling system outputs one time slot after receiving constraints. Its feasible-output set can shrink, remain unchanged, or be relabeled across runs. These facts describe the computation. Calling the output a decision can identify its operational role in a workflow, while a claim about practical agency requires further criteria.

The same caution applies to a stone rolling into one of two channels. Its path depends on conditions and narrows its subsequent reachable positions. Those properties alone cannot distinguish it from the opportunity-changing counterexamples already considered. Input sensitivity and branch selection are too general to carry the full attribution.

The comparison leaves machine agency open as a research question. It identifies the missing inferential step: a functionally useful selection description must be connected to a defended account of practical settlement before the broader conclusion follows.

10 Evidence and Attribution Across Roles

This section specifies an evidence program for decision episodes and distinguishes three attribution roles. Its purpose is to prevent the formal distinction from being validated merely by labels that already presuppose it.

An interpretive attribution describes an episode through a model of the agent's practical stance. A functional attribution identifies an output's role in a process, such as selecting the next action. An institutional attribution applies a procedure that recognizes an effective decision. These roles may align in an ordinary personal or organizational episode, but their criteria differ.

Write an attribution schematically as

$$\text{Attr}_{o,c,r}(e, \text{decision}), \quad (10)$$

where o is the observer or authorized assessor, c the context, and r the role of the attribution. The subscripts expose a dependence that ordinary language can leave implicit. They do not imply that every attribution is equally well supported. Evidence and authority remain assessable within and across roles.

10.1 Episode evidence and rival reconstructions

A study of reaffirmation could hold a practical menu fixed while varying whether a standing plan is explicitly challenged. Records would include the challenge, available response channels, the person's account of the reopened question, subsequent conduct, and the timing of any renewed coordination. The target would be the episode's practical role, rather than the fact that the person eventually chose the previously planned option.

Several rival reconstructions deserve attention. The participant may actively reconsider and reaffirm. They may respond formulaically while continuing without reconsideration. They may revise an unstated reason while preserving the same practical content. They may regard the challenge as an instruction and comply. A coding protocol should allow these possibilities to remain unresolved where the evidence cannot distinguish them.

Self-report is relevant because practical questions and reasons have a first-person dimension. It also has timing and context. A later report may reconstruct a gradual process as a sharp decision. Behavioral evidence can supplement the account but requires interpretation: persistent conduct can express habit, settlement, or external constraint. The strongest design combines appropriate sources while preserving their different evidential roles and disagreements.

10.2 Measurement invariance and opportunity comparison

An opportunity comparison needs a fixed or explicitly translated carrier. If a later interview uses more fine-grained descriptions, the apparent number of options may increase without a change in grounded

possibilities. Proposition 4.2 provides a check for pure relabeling. Where descriptions introduce new practical meanings, the researcher should record that interpretive change instead of forcing a synonym mapping.

Feasibility should also be separated from awareness. A route can exist while the person lacks information or support required to use it. Depending on the research question, those conditions may belong within the feasible-set definition or within the grounding account. Either choice can be coherent if declared. Changing the convention midway through a comparison creates a misleading effect.

A prospective validation should report classification agreement, unresolved cases, sensitivity to alternative codings, and the consequences of changing the episode boundary. A model that classifies every case with confidence may merely have hidden its ambiguous inputs. Comparison with a simpler endpoint-only account can test whether the additional episode record improves explanation or later prediction for the declared task.

10.3 Standing and the use of an attribution

Recognizing a functional choice in a system leaves questions of authority and accountability open. Similarly, uncertainty about the fine structure of a person's deliberation need not eliminate their standing to participate in a practical question. The use made of an attribution should therefore be stated separately from the descriptive model.

An institution may require evidence that a specified procedure occurred before treating a policy as adopted. A researcher may seek a more detailed explanation of participants' practical formation. These purposes can use overlapping records while reaching different kinds of conclusions. The framework supports explicit scope rather than a universal test that automatically determines every consequence of the word "decision."

10.4 Sensitivity under relevant and irrelevant variation

An attribution study can test the framework more sharply by separating three kinds of variation: a change in a practically relevant reason, a synonymous change in description, and an external change in feasibility. These manipulations target different parts of the model.

Suppose a standing appointment conflicts with an offer of another activity. In one condition, new information changes the importance of a prior promise. In another, the offer is reworded without changing its grounded meaning. In a third, transport becomes unavailable before the person responds. The records should track perceived descriptions, the person's interpretation of the reason, the feasibility change, and the episode of response separately.

The model predicts no universal response to the first variation. A person may reconsider and reaffirm because another reason remains decisive. What matters is whether the relevant distinction enters the practical organization in the way the proposed account states. The second variation tests invariance only after synonymy has been checked. The third distinguishes an environmental event from a later settlement.

A study can also include matched endpoint pairs: one episode contains a documented challenge and renewed settlement, while another reaches the same commitment and route endpoints through continuation. Observers receiving only endpoints should face the ambiguity demonstrated in Proposition 6.3. Observers receiving richer histories can be assessed for whether they use the additional evidence appropriately and preserve uncertainty where it remains.

The reference classification should be constructed independently of the observer model being tested. Multiple coders, participant accounts, and explicit rival interpretations can help reveal disagreements. Agreement among coders is evidence of reproducibility under the coding rule; it leaves the rule's philosophical adequacy open.

This design offers a concrete failure condition for the framework. If its additional distinctions merely reproduce coding stipulations and add no explanatory or predictive value, the application should be narrowed. If they expose systematic confusion between external constraint and practical settlement, the results would motivate further development with more naturalistic episodes.

11 Philosophical Objections and Model Revision

The objections examine the paper’s working definition, its dependence on projection choice, and its treatment of difficult practical episodes. Each identifies a condition under which the model needs refinement or a narrower claim.

11.1 Reaffirmation and conceptual stipulation

The strongest objection is that counting reaffirmation as a decision builds the desired conclusion into the working definition. The formal proof indeed relies on a model class that admits warranted reaffirmation. Its contribution is conditional: any account accepting such episodes must reject opportunity change as a universal necessary condition.

The conceptual reason for admitting some reaffirmations is their settling role after a practical question has been reopened. A person can owe others an answer to a proposed revision, consider it, and resolve the question by maintaining the standing plan. The continuity of content leaves that practical work intelligible. A theory reserving “decision” for new content can use another name, but it still needs to represent the difference between that episode and passive continuation.

The argument therefore has both a terminological and a substantive part. The preferred terminology includes warranted reaffirmation. The substantive distinction concerns an episode’s role and its invisibility in a specified endpoint projection. Disagreement about the term leaves the latter issue available for investigation.

11.2 Complete state descriptions and projection dependence

A second objection proposes including the entire history in the state, making reaffirmation a state change automatically. This is formally possible. It changes the projection and therefore leaves Proposition 6.2 about the original opportunity projection untouched.

The richer description also creates a new problem of discrimination. Many events change an all-inclusive history. Additional conditions are still required to distinguish decision from weather, computation, or a bodily movement. The challenge concerns what makes the change practically settling, rather than whether any representation can record some change.

Projection dependence is consequently part of the result. A model should be assessed relative to what it retains and what it is used to infer. A coarse model can be excellent for logistics and inadequate for deliberative history. A richer model can preserve that history while remaining uncertain about its interpretation.

11.3 Habit, coercion, and gradual settlement

Habit tests the relation between agency and explicit reconsideration. A standing practical organization can guide conduct without a new decision episode at each moment. The framework can represent that continuity through K and the implementation relation. When habitual conduct itself is challenged or reorganized, further evidence can support an episode of settlement.

Coercion tests the relation between settlement and an acceptable opportunity structure. A person can settle a practical question under severely constrained conditions. That description leaves the constraint’s legitimacy and the attribution of responsibility open. Equating decision with unrestricted choice would erase constrained agency; equating a chosen response with endorsement of the conditions would overstate consent.

Gradual settlement challenges a sharply bounded update. The appropriate representation may use a sequence of partial commitments or an interval of increasing practical organization. The finite episode model can summarize a stage of that process when its boundary is justified. Where the boundary is contested, the record should preserve the competing segmentations.

11.4 Generative interpretation and changing alternatives

A new way of describing a practical situation can create a possibility that an earlier vocabulary could not express. The paper's synonym result applies only when grounding is preserved. A change in interpretation that reorganizes coordination or reveals a new action falls outside that assumption and can alter the grounded menu.

Such a case can be modeled by a transition in A^p and G , with a partial correspondence between old and new descriptions. An attempt to impose a total one-to-one mapping would conceal the generative change. The research obligation is to explain which new distinctions become practically operative and how their realization depends on relations and resources.

The broader framework thereby accommodates both transformation and maintenance. A decision can generate a new commitment, reorganize an alternative space, or sustain an established stance through a challenge. Their evaluation depends on the particular content and consequences; generativity alone supplies no automatic measure of practical goodness.

12 Discussion and Further Formal Obligations

The discussion identifies the completed argument and the extensions needed for a broader decision theory. Its focus is the relationship between a useful formal distinction and the evidence required to apply it.

The model separates a practical settlement from several possible consequences: changed descriptions, changed feasibility, changed permissions, changed commitment-compatible traces, and actual implementation. Under fixed background conditions, constraint addition and removal have clear set-theoretic consequences. Across an episode class admitting reaffirmation and nondecisional disturbances, opportunity change and decision fail to imply one another. Endpoint records can accordingly lose a distinction that an episode-sensitive account needs.

The six-category analysis explains where the missing content can enter. The bearer of a commitment, the capacity to participate, the relations giving it force, the resolution of a state description, the occurrence of an episode, and the organization of a process each answer a different question. Their integration supports a comprehensive description without requiring a seventh substance called a decision.

The formalism also clarifies its own limits. A commitment set represents constraint content only under a supplied satisfaction relation. A practical-settlement predicate requires an independent warrant. A grounding relation requires interpreted alternatives and feasible realizations. The mathematics exposes the consequences of these choices; it leaves their adequacy open to conceptual criticism and empirical investigation.

Further development should examine probabilistic feasibility, conflicting commitments with priorities, distributed collective procedures, and changes in the vocabulary through which alternatives become available. Each extension should preserve the distinction between an operation's isolated effect and its consequences for the wider relational environment. For example, a public commitment can both restrict its bearer's compatible traces and enable coordination that expands others' possibilities.

The principal empirical task is to determine when episode history provides explanatory value beyond endpoints. The principal philosophical task is to defend the conditions under which a practical stance counts as settled, especially in nonverbal, constrained, collective, and artificial cases. These tasks can progress together while remaining distinct from the elementary countermodels already established.

A generative relational account gains precision when it can describe both changed possibilities and the historical work of maintaining a stance. The present framework provides a limited architecture for that precision and a record of the questions its application must still answer.

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