

Suffering Recognition in Aid, Volunteering, and Support among Heterogeneous Subjects: A Preliminary Generative Relational Theory

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Abstract

Aid, volunteering, and support commonly presuppose that an adverse condition has become recognizable as practically relevant. That presupposition becomes unstable when the possible recipient differs from the observer in embodiment, communicative form, cognitive architecture, social membership, or mode of existence. Building on prior Generative Relational work on suffering recognition and humanitarian obligation, this paper isolates an intermediate analytical object: support-relevant recognition. It examines how manifestations of suffering, vulnerability, need, functional disruption, or relational harm become salient within a prospective helping relation; how that salience is typed across aid, volunteering, and support; and under which declared conditions it can contribute a defeasible reason for response. Human, animal, artificial, and hypothetical alien cases serve as heterogeneous stress-test domains. The framework maintains ontological suspension, distinguishes relational reality from manifestation, separates subjectivity uncertainty from adverse-state uncertainty, and treats recognition as historically revisable. Its contribution is architectural: a typed, provenance-preserving interface between the epistemology of possible suffering and later ethical or jurisprudential analysis of assistance, consent, protection, legal subjecthood, adjudication, and institutional responsibility.

Keywords: suffering recognition; aid; volunteering; support; heterogeneous subjects; subjectivity uncertainty; generative relational theory

Discussion Paper Note

This manuscript is Paper X in an extended Generative Relational research programme on heterogeneous subjects, assistance, ethics, humanitarian protection, and jurisprudence. Its location in that programme is analytically important. Earlier work separated the epistemology of suffering from the later question of humanitarian obligation. *The Reality and Recognition of Suffering* examined how phenomenal suffering, manifested suffering, functional adverse states, and relational harm can remain non-equivalent under incomplete interpretation [5]. *The Emergence of Humanitarian Obligation* then examined one possible genealogy through which recognized salience, concern, norm formation, and responsibility can become historically stabilized [4].

The present paper studies the interface between those projects. Its object is the support relevance of an adverse condition within a prospective relation of aid, volunteering, or support, especially when the possible recipient is heterogeneous to the observer. The central concern is a transition in practical intelligibility: a condition is represented as adverse and, through separately declared relational and normative bridges, as bearing on whether some form of assistance should enter the agent's deliberative field.

This limited object defines the division of labour among the queued papers. Paper XI addresses the ethics of aid, volunteering, and support under heterogeneous-subject conditions. Paper XII addresses humanitarian protection across human, animal, artificial, and alien subjects. Papers XIII–XVI address legal subjecthood, responsibility, adjudicative and enforcement authority, heterogeneous social-contract membership, and the jurisprudence of aid and humanitarian protection. Complete theories of duty, permission, intervention authority, legal standing, sanctionability, adjudication, and institutional humanitarian responsibility remain assigned to those later inquiries.

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Notices

Status. This manuscript is a preliminary preprint and discussion paper presenting a complete preliminary formal architecture for support-relevant recognition under heterogeneous-subject conditions. It is intended for public scholarly discussion and remains open to revision as domain-specific evidence, comparative applications, and the wider Generative Relational research programme develop. The framework is structural and bridge-dependent; universal theories of suffering, moral status, legal subjecthood, and intervention authority remain beyond its scope.

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Statement on the use of language models. OpenAI’s ChatGPT was used for exploratory dialogue, formal reconstruction, source discovery followed by source verification, argumentative criticism, and drafting in $\text{\LaTeX}$. The author selected the research questions, directed and approved the theoretical commitments and epistemic status of the claims, verified the cited sources, and bears sole responsibility for the manuscript, including its definitions, formal constructions, arguments, conclusions, and errors. Verification records for cited external sources are maintained in the accompanying source ledger.

1 Introduction

Aid, volunteering, and support frequently begin with an act of recognition. Someone or something is encountered as injured, distressed, vulnerable, deprived, functionally impaired, threatened, isolated, or otherwise situated in a condition that appears to call for some response. Humanitarian institutions make this connection explicit. The International Red Cross and Red Crescent Movement places the prevention and alleviation of suffering within its principle of humanity and treats need and urgency as central to impartial humanitarian action [6]. Philosophical arguments concerning rescue and beneficence likewise often begin from a recognized adverse condition and ask what follows for an agent who is able to help [11]. These traditions differ in purpose, institutional setting, and normative structure, yet both illustrate a shared analytical sequence: an adverse condition must become recognizable in a form capable of entering practical deliberation before questions of assistance can be posed with sufficient specificity.

The recognition step is easy to understate when the possible recipient is another familiar human being. Shared embodiment, language, social practices, medical categories, testimony, and institutional routines provide interpretive infrastructures through which pain, hunger, fear, dependency, injury, exclusion, or loss can become legible. Even in human-human relations, however, the underlying condition is not simply copied into the observer's knowledge. Previous Generative Relational analysis therefore distinguished phenomenal suffering, manifested suffering, functional adverse states, and relational or trajectory-level harm, and treated recognition as historically mediated rather than as transparent access to another subject's first-person condition [5]. The problem becomes more demanding when the candidate recipient is an animal, an artificial agent, a hypothetical alien subject, or another being whose expressions, capacities, temporalities, and interpretive categories differ substantially from those of the observer.

Neighboring literatures expose related domain-specific recognition problems. Animal-pain research combines behavioral, physiological, neurobiological, and motivational evidence when assessing pain across taxa, rather than relying on a single human-readable sign [12]. Recent work on possible artificial consciousness likewise derives indicator properties from multiple scientific theories and applies them to artificial systems without treating surface resemblance to human behavior as decisive [3]. In animal-sentience debates, precaution has also been formulated as a response to evidential uncertainty rather than as proof that sentience has already been established [2]. These literatures do not supply a common recognition rule for Paper X. Their relevance is methodological: evidence standards, interpretive bridges, and practical responses can vary by recipient domain, so cross-subject analysis should keep those interfaces explicit.

The present paper examines a narrower problem than a general epistemology of suffering. It asks how an adverse state becomes *support-relevant*: how some manifestation, testimony, functional change, relational trajectory, or other evidence comes to matter within a prospective relation of aid, volunteering, or support. Support-relevant recognition is analytically intermediate. It is richer than merely classifying a state as adverse because it places that state within a field of possible response. It is weaker than an all-things-considered obligation because recognition can generate a reason for attention or response without settling competing claims, costs, consent, authority, proportionality, or institutional competence. This intermediate layer is especially important under heterogeneous-subject conditions, where the observer may be uncertain both about the recipient's state and about which features of the recipient are ethically or practically relevant.

The paper's object also differs from the historical emergence of humanitarian obligation. Prior Generative Relational work examined how interpretation, salience, concern, norm formation, and responsibility may become historically stabilized into humanitarian obligation [4]. That inquiry concerned normogenesis: the formation and stabilization of obligation-bearing structures. The present inquiry asks a more local question situated inside prospective helping relations. Given incomplete and potentially heterogeneous evidence, what makes a condition salient for aid, volunteering, or support in the first place, and what distinctions must remain visible before stronger normative conclusions are attempted? The distinction matters because a theory can explain why a social field came to recognize humanitarian duties

while still leaving underdetermined how particular unfamiliar beings become recognizable as possible recipients of assistance.

Three terms in the title therefore require separation. *Aid* refers here to a directed provision, transfer, service, protection, or intervention oriented toward a recognized adverse condition, vulnerability, or need. The term is deliberately broader than emergency humanitarian relief but narrower than every beneficial interaction. *Volunteering* refers primarily to the mode of participation of the assisting party: the contribution is undertaken through a form of voluntary commitment rather than being defined only by an externally imposed role or direct gain. Within the Red Cross tradition, voluntary service is an organizational principle of humanitarian action and is distinguished from the substantive ends expressed by humanity and impartiality [9]. *Support* is the broadest relational category used here. It includes assistance that sustains capabilities, continuity, access, communication, participation, recovery, or relational stability even when no acute suffering episode is present. Aid can be provided by volunteers or professionals; volunteering can instantiate aid, care, advocacy, maintenance, or other forms of contribution; support can be voluntary, professional, reciprocal, institutional, temporary, or long-term. Treating the three terms as synonyms would erase precisely the relational differences that later normative analysis may need.

This distinction also prevents suffering from becoming the only admissible gateway to assistance. Some beings may require support because of vulnerability, dependency, exposure, loss of capacity, exclusion from a necessary infrastructure, or a foreseeable adverse trajectory even when phenomenal suffering is unknown or conceptually inaccessible. A nonhuman animal may manifest injury through behavior whose phenomenal interpretation remains partially uncertain. An artificial agent may display persistent avoidance, functional degradation, self-protective behavior, or requests for relief without any settled account of machine consciousness. A hypothetical alien subject may present communicative and embodied forms for which familiar human categories of distress are unreliable. In each case, the observer can face a practical question before the metaphysics is resolved: whether the available evidence is sufficient to make some form of assistance relevant for deliberation.

Generative Relational Theory offers a useful architecture for this problem because it separates ontological commitment from relational and manifestational analysis. The ultimate ontological status of another being's phenomenal state remains suspended where the available argument cannot settle it. Relational reality concerns historically constituted relations, roles, symbols, institutions, dependencies, capacities, and other sufficiently stable structures that can have causal or generative effects. Manifestation concerns the context-dependent ways in which those structures and states become presented, interpreted, measured, narrated, signaled, or otherwise accessible. Under this architecture, uncertainty about phenomenal suffering does not require the analyst to treat all observable relational consequences as unreal, while observable consequences do not license a collapse into certainty about first-person experience.

The central analytical proposal is therefore to distinguish at least four stages that are often compressed in ordinary language. First, an observer encounters manifestations or evidence associated with a possible adverse state. Second, those manifestations are interpreted through an historically constituted recognition scheme. Third, the interpreted condition may acquire *support salience*: it becomes relevant to deliberation about aid, volunteering, or support. Fourth, support salience may contribute a defeasible practical or normative reason for response. Later questions concern whether that reason survives comparison with other reasons, becomes a duty, permits or authorizes intervention, or acquires legal and institutional form. The present paper concentrates on the first four stages and treats the later transitions as interfaces rather than conclusions.

The distinction can be stated as a non-entailment discipline. Recognition that a being appears to suffer does not by itself establish that a particular assistance response is appropriate. Support salience does not by itself establish an all-things-considered duty. A duty to assist does not by itself establish authority to transform another being's condition, override refusal, enter a protected domain, impose treatment, modify an artificial system, seize custody, or redistribute institutional resources. Maintaining these separations is particularly important in heterogeneous relations because epistemic uncertainty and normative asymmetry can interact. An observer may simultaneously possess greater physical or institutional power,

weaker interpretive access, and stronger capacity to alter the other subject's future.

The paper also treats recognition as revisable. A support decision can be reasonable under one evidential and interpretive regime and later become questionable when new evidence, concepts, communication channels, or subject classifications emerge. Revisions can concern the existence of an adverse state, its severity, the recipient's preferences, the meaning of a manifestation, the feasibility of response, or the identity and standing of the subject itself. Historical revisability is therefore not an incidental complication. It is part of the object of analysis, because assistance can change the future relational field and because the categories through which assistance is justified may themselves evolve.

Heterogeneous-subject analysis is useful precisely because it removes assumptions that often remain invisible in familiar cases. Human-human aid can tacitly rely on shared language, species membership, recognizable embodiment, established medical knowledge, legal status, and institutional roles. Animal cases weaken some of those supports while retaining biological continuity. Artificial-agent cases may weaken biological continuity while preserving communication, functional organization, memory, goal pursuit, or social participation. Hypothetical alien cases remove still more shared background. These are not arranged as a hierarchy of moral worth. They function as stress tests for a recognition architecture: which distinctions survive when shared species, shared embodiment, shared language, or settled subject classifications are unavailable?

The analysis proceeds conservatively in relation to subjectivity. It does not begin by requiring a binary answer to whether a candidate recipient is or is not a moral subject. Instead, later sections will distinguish several properties that can be epistemically and normatively relevant without being identical: capacity for phenomenal experience, manifestation of adverse states, persistence of goals or preferences, vulnerability to relational damage, capacity to request or refuse, dependency, exposure to another's power, and participation in historically stabilized relations. This typed approach is intended to prevent one uncertain property from silently determining every other form of standing.

The paper's first contribution is conceptual. It introduces support-relevant recognition as a distinct analytical layer between suffering recognition and full ethical justification. The second contribution is relational. It separates aid, volunteering, and support by their role in the assistance relation rather than treating them as interchangeable expressions of benevolence. The third contribution is comparative. It develops the framework across human, animal, artificial, and hypothetical alien cases while requiring that cross-case comparison specify which distinctions are being preserved. The fourth contribution is methodological. It treats assistance under uncertainty as revisable and represents low-interference, information-preserving, or reversible responses as application-specific candidates whose significance depends on an explicit uncertainty, consequence, comparison, and normative specification, without turning precaution into an automatic duty. The fifth contribution is programmatic. It supplies an interface to the subsequent papers on the ethics of assistance, humanitarian protection, legal subjecthood and responsibility, adjudicative authority, heterogeneous social contracts, and the jurisprudence of humanitarian protection.

Several boundaries follow from that division of labour. Complete theories of beneficence, rescue, charity, care, volunteering, humanitarianism, and solidarity remain outside Paper X. Questions concerning artificial-agent consciousness, moral patienthood, legal personality, and responsibility remain open. Consent override, paternalism, jurisdiction, sanctions, standing, and adjudicative authority require additional normative or legal premises. The genealogy of a support norm is also kept distinct from its justification. These questions are assigned to later normative and jurisprudential work.

The manuscript is organized around that boundary. Section 2 defines the core recognition architecture. Sections 3–4 locate it within the three-layer Generative Relational framework and refine the adverse-state carrier. Sections 5–6 construct the defeasible reason interface and distinguish aid, volunteering, and support. Sections 7–9 analyze subjectivity uncertainty, communicative opacity, and cross-subject recognition regimes. Section 10 develops the precautionary response architecture, Section 11 represents how realized assistance changes subsequent relational conditions, and Section 12 states the conditions for later ethical and legal extension. Section 13 consolidates the resulting interface between suffering recognition and assistance theory.

Table 1: Analytical stages in support-relevant recognition.

Stage	Analytical input	Output	Claim not yet established
Evidential presentation	Manifestation, testimony, measurement, trajectory, record, or other accessible trace	Evidence package available to an observer or institution	Correct interpretation of the recipient’s condition
Interpretive recognition	Evidence package plus an interpretive regime	One or more admissible adverse-state descriptions	Phenomenal certainty, moral patienthood, or response requirement
Support salience	Recognized adverse-state description plus a prospective assistance context	Entry into deliberation about a specified assistance relation	All-things-considered duty, permission, authority, or legal standing
Reason interface	Support-salient state plus later normative premises	Candidate defeasible response reasons	Final action, justified intervention, or institutional competence

2 Recognition Architecture of Support-Relevant Adverse States

This section specifies the paper’s core analytical object: the process by which evidence concerning a possible recipient becomes a support-relevant representation of an adverse state. Its role is architectural. The section separates evidential presentation, interpretive classification, adverse-state recognition, and support salience before later sections introduce the three-layer Generative Relational framework, richer adverse-state types, defeasible reasons, and the distinct relational forms of aid, volunteering, and support. The analysis is formal only at the level needed to expose the interfaces and possible failure points. It therefore uses set-valued relations rather than assuming that recognition is deterministic, numerically measurable, or reducible to a single severity score.

Table 1 summarizes the stages developed in this section. The ordering is analytical rather than a claim that every empirical episode unfolds as a consciously articulated sequence. An observer may move rapidly among perception, interpretation, and practical attention; institutions may distribute those operations across different persons and procedures; and later evidence may revise an earlier classification. The decomposition nevertheless matters because each stage supports a different kind of claim and a different kind of error.

2.1 Encounter Episodes, Evidence Packages, and Interpretive Regimes

The minimal unit of analysis is an encounter episode involving a possible helper, a possible recipient, and a context in which some manifestation or record becomes available. Let $\mathcal{H}$ denote a set of possible helpers or observers, $\mathcal{B}$ a set of candidate recipients, $\mathcal{K}$ a set of support-relevant contexts, and $\mathcal{T}$ an index set for time or episode position. An encounter episode is represented in Equation 1.

$$u = (h, b, \kappa, t) \in \mathcal{U} \subseteq \mathcal{H} \times \mathcal{B} \times \mathcal{K} \times \mathcal{T}. \quad (1)$$

The context κ is deliberately broad. It can contain features such as spatial proximity, institutional role, known capacities, communication conditions, previous relation, available resources, safety constraints, or recognized recipient preferences. Equation 1 does not imply that every component of κ is

observed correctly or that the candidate recipient already possesses settled moral or legal status. The tuple identifies the relation in which recognition is occurring.

The role indices h and b also presuppose only *operational individuation at the declared analytical resolution*. They need not denote metaphysically simple or permanently bounded agents. An application can represent a distributed artificial system, animal group, institution, collective, human–machine assemblage, or other composite configuration as a role-bearing unit when the relevant boundaries and aggregation rule are stated. The same underlying entity can occupy different roles across episodes, and multi-party encounters can be represented through structured role elements or linked encounter records. This role typing therefore does not settle personal identity, collective agency, legal personality, or moral status.

For each episode u , let $e_u \in \mathcal{E}$ be an *evidence package*. The term evidence is used in a weak epistemic sense: material available for interpretation, not material already established as probative of suffering. An evidence package may include speech, gesture, physiological measurement, damage indicators, behavioral persistence, withdrawal, help-seeking signals, environmental conditions, system logs, prior records, or relational trajectories. The same observable trace can have different evidential significance under different interpretive regimes, and an evidence package can contain misleading or strategically produced signals.

An interpretive regime is denoted $\iota \in \mathcal{I}$. It includes the concepts, classification rules, background expectations, measurement conventions, analogies, and institutional practices through which evidence becomes intelligible. This representation follows the prior Generative Relational treatment of suffering recognition as interpretively mediated rather than as direct access to another subject’s first-person state [5]. Interpretive regimes can be individual, professional, organizational, cultural, technical, or hybrid. They can also be internally plural: two medical systems, welfare protocols, animal-behavior models, or artificial-agent monitoring architectures may classify the same evidence differently.

Definition 2.1 (Evidence–interpretation pair). For an encounter episode u , an *evidence–interpretation pair* is an ordered pair $(e_u, \iota_u) \in \mathcal{E} \times \mathcal{I}$, where e_u is the evidence available in the episode and ι_u is the interpretive regime used to classify it.

Definition 2.1 prevents two distinct sources of disagreement from being collapsed. Observers can disagree because they possess different evidence, or because they apply different interpretive regimes to materially similar evidence. Both differences matter under heterogeneous-subject conditions. A human observer may lack a relevant signal altogether; alternatively, the signal may be available while the observer lacks the conceptual resources needed to treat it as evidence of an adverse state.

2.2 Set-Valued Adverse-State Recognition

Let $\mathcal{A}$ denote a space of adverse-state descriptions. At this stage, $\mathcal{A}$ is intentionally abstract. The later section on typed adverse relational states will distinguish adverse-state types in more detail. The present section requires only that an adverse-state description can represent a condition such as experienced suffering, manifested distress, functional impairment, dependency, exposure, relational damage, or another form of negative condition relevant to later analysis without assuming that these descriptions are mutually reducible.

Recognition is represented by a set-valued relation because an evidence package can support more than one live interpretation. For each interpretive regime ι , let the adverse-state recognition correspondence be defined as in Equation 2.

$$\text{Rec}_\iota : \mathcal{E} \rightrightarrows \mathcal{A}, \quad \text{Rec}_\iota(e) = \{a \in \mathcal{A} : (e, a) \text{ is admissible under } \iota\}. \quad (2)$$

The recognized adverse-state set for episode u is therefore given by Equation 3.

$$\mathcal{A}_u^{\text{rec}} := \text{Rec}_{\iota_u}(e_u). \quad (3)$$

Equation 3 permits three analytically different cases. The set can be empty when the current evidence and interpretive regime support no adverse-state description. It can be a singleton when one description is selected at the declared resolution. It can contain several elements when the evidence remains compatible with multiple descriptions. The set-valued form therefore permits uncertainty to remain visible instead of forcing the analyst to convert ambiguity into an arbitrary point estimate.

All three cases remain relative to the declared representation space $\mathcal{A}$. A recognition regime cannot return an adverse-state kind that the application has made literally inexpressible in its carrier. An empty or apparently stable output can therefore reflect a vocabulary frontier as well as evidential or interpretive conditions. Applications using unfamiliar subjects should treat the adequacy and revisability of $\mathcal{A}$ itself as part of the audit rather than assuming representational completeness.

Definition 2.2 (Recognition multiplicity). An episode u has *recognition multiplicity* at the declared representation when $|\mathcal{A}_u^{\text{rec}}| > 1$. Recognition multiplicity records unresolved classification plurality; it does not by itself quantify probabilities over the candidate descriptions.

Definition 2.2 is especially useful in heterogeneous cases. A repeated shutdown request from an artificial system could be interpreted as a goal conflict, safety routine, strategic behavior, evidence of an adverse functional state, or a manifestation relevant to possible artificial suffering, depending on the evidence and interpretive regime. A nonhuman animal’s immobility could signify fear, injury, energy conservation, freezing behavior, or a state outside the observer’s current categories. The architecture does not decide among these possibilities by stipulation. It requires the classification uncertainty to remain explicit until later evidence or assumptions justify a narrower representation.

Recognition also remains distinct from ontological truth. Let a_u^* denote a hypothetical target description used only when an application assumes that such a target is well defined. Membership of a in $\mathcal{A}_u^{\text{rec}}$ is an epistemic achievement relative to evidence and interpretation; it is not, by membership alone, an identity proof that $a = a_u^*$ or a verdict concerning the recipient’s ultimate or first-person state. This preserves the ontological suspension already established in the broader Generative Relational programme and leaves the following three-layer GR analysis to locate the recognized representation within the three-layer framework.

2.3 Support Salience as a Relation-Specific Classification

Adverse-state recognition alone does not yet determine whether a condition enters deliberation about assistance. The transition from recognized adversity to support salience depends on a prospective assistance relation. Let $\mathcal{T}_{\text{sup}} := \{\text{aid, volunteering, support}\}$ denote the provisional assistance-relation labels. The notation supplies labels only; their substantive relational differences are reserved for the later section on relational typing. The same recognized condition can have different relevance depending on the contemplated assistance relation.

Let $\mathcal{S}$ be a space of support-salience states, and let $\mathcal{S}^+ \subseteq \mathcal{S}$ denote the subset in which a condition has entered practical deliberation for a declared assistance relation. Membership in $\mathcal{S}^+$ is intentionally weak. It means that the condition is represented as relevant enough to be considered in relation to a possible response; it does not mean that assistance is required, permitted, effective, proportionate, desired, or institutionally authorized.

For each assistance label $\tau \in \mathcal{T}_{\text{sup}}$, define the support-salience correspondence in Equation 4.

$$\text{Sal}_\tau : \mathcal{A} \times \mathcal{K} \rightrightarrows \mathcal{S}. \quad (4)$$

The context argument in Equation 4 is essential. A recognized adverse state may be support-salient for one possible helper and not another because the actors occupy different relations, possess different capacities, encounter different risks, or have access to different forms of assistance. Context dependence also permits the architecture to represent cases in which the same state is salient for immediate emergency aid but not for a longer-term volunteering relation, or salient for sustained support while remaining outside the scope of a particular aid institution.

Definition 2.3 (Support-relevant recognition). An encounter episode $u = (h, b, \kappa, t)$ exhibits *support-relevant recognition* for assistance label $\tau \in \mathcal{T}_{\text{sup}}$ when there exist $a \in \mathcal{A}_u^{\text{rec}}$ and $s \in \mathcal{S}^+$ such that $(a, \kappa, s) \in \text{Gr}(\text{Sal}_\tau)$, where $\text{Gr}(\text{Sal}_\tau)$ is the graph of the correspondence in Equation 4.

Definition 2.3 makes support relevance explicitly relation-specific. It does not define a property possessed by the recipient in isolation. The relevant object is a configuration involving evidence, interpretation, an adverse-state description, a context, and a contemplated assistance relation. This relationality is analytically important because a vulnerable state can be real or well supported while a particular actor remains unable to provide a relevant form of assistance, and because some responses can become inappropriate once recipient preference, competence, role, or institutional constraints are considered.

The full recognition architecture for one episode can now be written as a compositional relation. Let $\text{SR}_{\iota, \tau}$ be the support-relevance relation defined in Equation 5.

$$\text{SR}_{\iota, \tau} := \text{Sal}_\tau \circ (\text{Rec}_\iota \times \text{id}_\kappa), \quad (5)$$

where the composition is understood relationally and only on type-compatible pairs. Equation 5 records the distinction between recognizing an adverse state and classifying it as salient within a possible assistance relation. Because both components may be set-valued, the composite can preserve ambiguity at either interface.

Proposition 2.4 (Dependence of support relevance on recognition and assistance context). *For fixed evidence e , support-relevance outputs can differ when either the interpretive regime ι , the assistance label τ , or the context κ differs. Consequently, equality of evidence packages alone is insufficient to establish equality of support-relevance classifications.*

Proof. By Equation 5, the output is generated through the composition of Rec_ι and Sal_τ evaluated with context κ . A change in ι can alter $\text{Rec}_\iota(e)$; a change in τ can alter the salience correspondence applied to a recognized state; and a change in κ can alter the admissible salience outputs of the same correspondence. Equality of e therefore does not entail equality of the composed output unless additional invariance assumptions are imposed. $\square$

Proposition 2.4 identifies three distinct sources of divergence that later empirical or normative work should not conflate. Two observers can disagree because they classify the evidence differently. They can agree on the adverse-state description while disagreeing about whether that state is salient for a particular form of assistance. They can also agree on both recognition and the general assistance type while differing because their relation to the recipient, capacities, or institutional positions differ.

2.4 Recognition Fibers and Heterogeneous Readability

The architecture can also represent a recurring problem in heterogeneous-subject analysis: familiar manifestations may be easier to recognize than unfamiliar manifestations even when the underlying adverse-state descriptions are treated as comparable at a declared analytical resolution. For an interpretive regime ι and adverse-state description a , define the recognition fiber in Equation 6.

$$\mathfrak{F}_\iota(a) := \{e \in \mathcal{E} : a \in \text{Rec}_\iota(e)\}. \quad (6)$$

Equation 6 collects the evidence packages that a regime treats as compatible with the same adverse-state description. The fiber is an interpretive object, not a list of metaphysically necessary manifestations. If an interpretive regime has been developed mainly around adult human speech, facial expression, physiology, and institutional records, its recognition fibers may be rich for human cases while sparse or distorted for beings whose adverse states are expressed through other channels.

Definition 2.5 (Readability gap). Let $a \in \mathcal{A}$ be an adverse-state description used across two declared comparison domains $D_1, D_2 \subseteq \mathcal{E}$. A *readability gap* under interpretive regime ι is present when the regime’s recognition relation provides materially different evidential access to a across the two domains,

as represented by a domain-sensitive difference between $\mathfrak{F}_\iota(a) \cap D_1$ and $\mathfrak{F}_\iota(a) \cap D_2$ under a comparison criterion specified by the application.

Definition 2.5 deliberately leaves the comparison criterion open. Cardinality will often be meaningless because evidence spaces can be continuous, heterogeneous, or differently parameterized. An empirical application might instead compare detection rates, error profiles, coverage under validated tests, or access to specific evidence channels. The conceptual point is that poor recognizability can arise from the observer’s regime rather than from absence of an adverse state. This preserves the earlier distinction between human-readable suffering and morally or practically relevant adverse reality [5] while translating it into the present assistance architecture.

Readability also affects support salience. If an adverse condition is absent from the recognized set because the available interpretive regime does not treat the relevant manifestation as probative, the condition cannot enter the support-salience relation through that route. Conversely, broadening the recognition fiber can introduce new candidates into practical deliberation. Neither change automatically improves judgment: a broader fiber can increase false positive classifications as well as recover previously excluded adverse states. Recognition architecture therefore requires both sensitivity to unfamiliar manifestations and discipline against indiscriminate anthropomorphic projection.

2.5 Error Surfaces and Revision

Support-relevant recognition can fail at more than one interface. The architecture distinguishes errors of evidence, interpretation, salience, and later normative inference. Let $e_u \preceq_E e'_u$ mean that a later evidence package e'_u is at least as informationally rich as e_u under a declared information criterion. This refinement relation imposes no monotonicity condition on recognition: even when $e \preceq_E e'$, the framework does not assume $\text{Rec}_\iota(e) \subseteq \text{Rec}_\iota(e')$. Additional evidence can confirm an earlier adverse-state description, introduce alternatives, or defeat the earlier classification. A later test can show that an apparent injury was harmless; a new communication channel can reveal that an intervention previously interpreted as unwanted is requested; an artificial-agent diagnostic can identify a shutdown signal as a routine safety response rather than an adverse internal state; or newly developed knowledge can show that a previously ignored behavior is a reliable distress indicator. Revision can therefore move recognition in more than one direction.

Interpretive regimes themselves can also change. Let $\iota \rightsquigarrow \iota'$ denote an historically or institutionally realized revision of an interpretive regime. For unchanged evidence e_u , the corresponding recognized sets are $\mathcal{A}_u^{\text{rec}}(\iota) = \text{Rec}_\iota(e_u)$ and $\mathcal{A}_u^{\text{rec}}(\iota') = \text{Rec}_{\iota'}(e_u)$. A history of medicine, disability, animal welfare, trauma, or machine interpretation can alter what observers are able to recognize in a stable record. Support-relevant recognition therefore inherits the revisability of both evidence and interpretation.

Remark 2.6 (Non-monotonic support salience). The framework imposes no general monotonicity requirement according to which additional evidence, more severe classification, or broader recognition must increase support salience. A revised context can reveal recipient refusal, a more capable helper, a prohibitive risk, an incompatible assistance form, or another fact that changes which responses remain practically salient. Support salience is therefore relational and revisable rather than a scalar function of adverse-state severity.

Remark 2.6 prevents the recognition architecture from becoming a hidden maximizing theory. Later normative analysis may introduce priority, urgency, proportionality, or welfare considerations, but those principles require their own assumptions. The present architecture only determines which adverse-state representations enter which fields of possible assistance.

2.6 Boundary between Support Salience and Normative Force

The final interface in this section separates support salience from the reasons and obligations analyzed later in the paper series. Let $\mathcal{Q}$ denote a space of candidate defeasible response reasons and Gen a provisional reason-generation relation from support-salient states and contexts into $\mathcal{Q}$, as stated in Equation 7.

$$\text{Gen} : \mathcal{S}^+ \times \mathcal{K} \rightrightarrows \mathcal{Q}. \quad (7)$$

Equation 7 is an interface declaration, not a theory of reasons. The later section on defeasible response reasons will specify how a support-salient classification can contribute a defeasible reason and what additional information is required. The current architecture stops before all-things-considered obligation, permission, authority, or institutional competence.

Let $\mathcal{O}_{\text{all}}$ represent any later space of all-things-considered obligations and $\mathcal{J}$ any later space of permissions or authorities to intervene. The absence of a direct map in the present architecture is recorded by the typing boundary in Equation 8.

$$\mathcal{E} \times \mathcal{I} \xrightarrow{\text{Rec}} \mathcal{A} \xrightarrow{\text{Sal}_\tau} \mathcal{S} \xrightarrow{\text{Gen}} \mathcal{Q}, \quad \mathcal{O}_{\text{all}}, \mathcal{J} \text{ require additional normative structure.} \quad (8)$$

Equation 8 formalizes the non-entailment discipline introduced in Section 1. A recognized adverse state can enter deliberation and can later generate a defeasible reason without establishing that the helper should act after all relevant reasons are considered. Even an all-things-considered duty would remain distinct from authority to alter another being, enter a protected domain, impose treatment, modify an artificial system, or exercise institutional power. Prior Generative Relational work on humanitarian obligation similarly separated norm formation from intervention authority [4]; the present paper places an earlier recognition-and-salience architecture upstream of those questions.

Proposition 2.7 (Typed non-entailment of intervention authority). *Within the architecture defined by Equations 2, 4, and 7, support-relevant recognition supplies no derivation of an element of $\mathcal{J}$ unless an additional rule with codomain $\mathcal{J}$ is introduced and justified.*

Proof. The codomains of the three declared relations are $\mathcal{A}$, $\mathcal{S}$, and $\mathcal{Q}$, respectively. None has codomain $\mathcal{J}$, and no composition among them changes that codomain into $\mathcal{J}$. A derivation of intervention authority therefore requires at least one additional typed relation or rule connecting the recognized, salient, or reason-bearing state to $\mathcal{J}$, together with the assumptions that justify that connection. $\square$

Proposition 2.7 is modest but important. Formal typing cannot establish the substantive content of a theory of authority, yet it can prevent an unnoticed logical jump from “an adverse state is recognizable” to “an observer may intervene.” This distinction becomes more consequential as subject heterogeneity and power asymmetry increase.

Research Obligation 2.8 (Recognition-architecture specification). An application of the present framework should specify, at minimum, the encounter unit u , the evidence package e_u , the interpretive regime ι_u , the adverse-state representation space $\mathcal{A}$, the contemplated assistance label τ , the context variables included in κ , the criterion for membership in $\mathcal{S}^+$, and the evidential or interpretive revision procedures available when recognition is contested.

Research Obligation 2.8 converts the conceptual architecture into a methodological requirement. Without these declarations, disagreement about “whether help is needed” can conceal several different disputes: what evidence is available, how the evidence is interpreted, which adverse state is represented, which assistance relation is contemplated, whose capacities and preferences are relevant, and whether the dispute concerns salience, reasons, duty, or authority.

The section therefore establishes a typed recognition architecture with three principal properties. Recognition is set-valued and epistemically mediated; support salience is relation- and context-specific; and stronger normative conclusions require additional bridges. These properties allow the paper to carry uncertainty forward without collapsing it into skepticism or intervention. The next section situates the architecture within the three-layer Generative Relational framework so that ontological suspension, relationally efficacious states, and manifested evidence remain formally distinct across heterogeneous-subject cases.

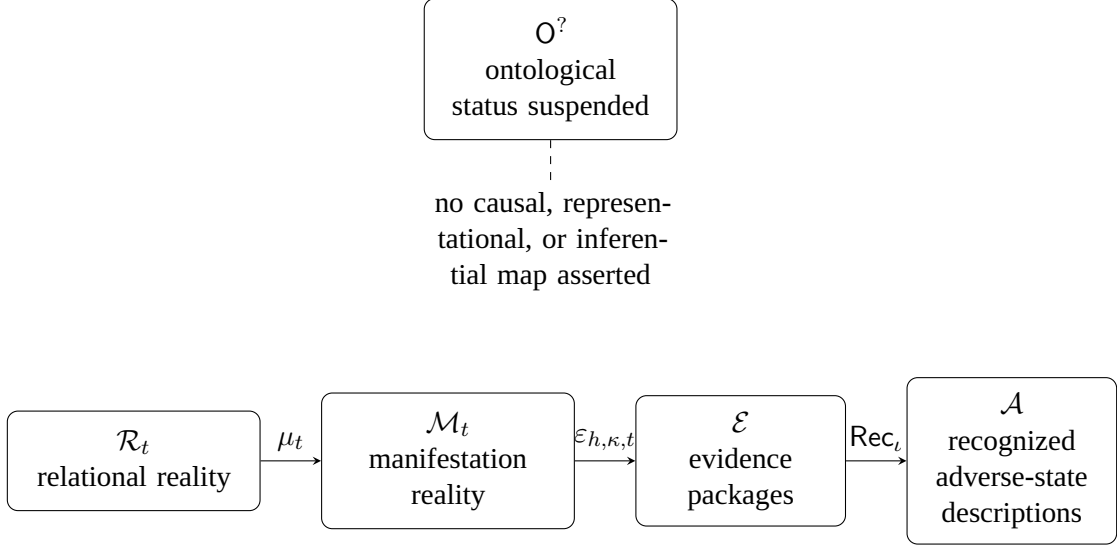


Figure 1: Three-layer GR architecture for support-relevant recognition. The symbol $O^?$ is a status marker for suspended ontological commitment, not a hidden-state space. Formal relations begin at relational reality. The relation μ_t connects modeled relational configurations to admissible manifestations, while $\varepsilon_{h,\kappa,t}$ represents observer- and context-relative evidence production. Recognition then acts on evidence under an interpretive regime.

3 Heterogeneous Subject Conditions in the Three-Layer GR Framework

This section locates the recognition architecture of Section 2 within the three-layer Generative Relational framework. Its role is to keep three questions distinct when a possible helper encounters a heterogeneous recipient: what the recipient or its experience ultimately is; which entities, states, relations, and histories are retained as sufficiently stable and generatively efficacious within the model; and how those relational structures become manifested and subsequently encoded as evidence. Prior Generative Relational work used the same three-layer distinction to separate ontological suspension, relational reality, and manifestation or representational reality in the epistemology of suffering [5]. The present section adapts that distinction to support-relevant recognition and makes one additional interface explicit: an evidence package is an observer- and context-dependent selection or encoding drawn from manifestation reality.

Figure 1 summarizes the architecture used in this paper. The upper marker records ontological suspension and intentionally carries no modeled arrow into the lower system. Formal analysis begins at relational reality. A relational configuration may admit one or more manifestations; an observer or institution may then extract, select, or encode part of those manifestations into an evidence package; the interpretive regime of Section 2.1 acts on that evidence rather than on ultimate ontology directly.

The decomposition in Figure 1 is methodological rather than a claim that reality is literally partitioned into three independently existing substances. The lower interfaces are modeling relations whose adequacy is revisable. The upper marker records a limit on what the present argument claims to know.

3.1 Ontological Suspension as a Constraint on Inference

Let $O^?$ denote the paper’s status marker for ultimate ontological questions concerning a candidate recipient, its experience, or the ultimate basis of the adverse condition. The question mark is essential. It indicates that the present paper does not need to determine whether a given being is ultimately biological, mental, informational, computational, relational, conscious in a phenomenal sense, or exhaustively describable by any of those vocabularies. In particular, $O^?$ is not a set of hidden states and is not assigned a probability distribution merely because the analyst is uncertain.

The formal consequence is an explicit non-assertion: Paper X specifies no modeled map from $O^?$ into

the relational, manifestation, or evidence domains. This is not a proof that such relations are impossible. Introducing such a map would already commit the analysis to a structure for the suspended domain and to a bridge law connecting that structure to modeled states. The present architecture begins positively at the relational layer and treats ontological conclusions as unavailable unless a later inquiry supplies those additional premises.

Proposition 3.1 (Ontological boundary of support-relevant recognition). *Within the architecture of Figure 1, membership of an adverse-state description a in $\mathcal{A}_u^{\text{rec}}$, or the support salience of a under an assistance label τ , does not by itself determine an ontological status at $O^?$.*

Proof. By construction, the framework supplies no map from $O^?$ to the modeled relational, manifestation, or evidence domains and no inverse bridge from those domains to $O^?$. Recognition in Equation 2 is defined on $\mathcal{E}$, and support salience in Equation 4 is defined on $\mathcal{A} \times \mathcal{K}$. Neither relation has $O^?$ as a codomain. An ontological conclusion therefore requires an additional bridge that is absent from the present architecture. $\square$

Proposition 3.1 is particularly important for artificial and radically unfamiliar recipients. Evidence that an artificial system persistently avoids a state, reports distress, exhibits functional degradation, or requests assistance can become relationally and practically significant without settling whether the system has phenomenal consciousness. Conversely, ontological uncertainty cannot be used as a shortcut to the conclusion that relationally stable adverse effects are absent. Ontological suspension restricts inference in both directions.

3.2 Relational Reality and Retained Adverse Configurations

Relational reality is the level at which the paper positively models entities, states, histories, and couplings that are sufficiently stable at the declared analytical resolution to make persistent causal or generative differences within the domain. Let $\mathcal{R}_t$ denote the set of relational configurations retained at historical index t . An element $r_t \in \mathcal{R}_t$ may include a candidate recipient, its current dependencies and capacities, relations with other actors or institutions, environmental constraints, and historically inherited structures relevant to the support problem. The notation does not imply that r_t is a point-like actor state. It can represent a history-bearing configuration whose relevant features depend on prior interaction.

For the present paper, an adverse condition can therefore be relationally significant even when first-person phenomenal content remains unresolved. A persistent loss of functional capacity, exclusion from a resource relation, destruction of an established dependency structure, repeated unsuccessful attempts to escape a condition, or an interaction pattern that predictably narrows future options can all be represented at the relational layer when the application has grounds to retain those structures. Whether any such configuration is also accompanied by phenomenal suffering is a separate question.

This distinction preserves the paper’s earlier adverse-state pluralism. The abstract description space $\mathcal{A}$ introduced in Section 2.2 can contain descriptions whose intended referents concern different aspects of a relational configuration without requiring those aspects to be mutually reducible. The next section will provide the richer typed representation. The present section only fixes the layer at which those representations can be modeled without claiming ultimate ontology.

Definition 3.2 (Relational retention criterion). For a declared inquiry and analytical resolution, a feature of an encounter is *relationally retained* when the model treats it as sufficiently stable, historically identifiable, and causally or generatively relevant to distinctions the inquiry is designed to preserve. Relational retention is a modeling commitment about the explanatory object; it is not an ontological declaration about what ultimately exists.

Definition 3.2 makes the framework explicitly question-relative. A veterinary emergency, a long-term volunteering relation, and the diagnosis of a degraded artificial service may preserve different relational distinctions. The framework does not require one universal state space to be adequate for every support problem.

3.3 Manifestation Reality and Evidence Production

Manifestation reality concerns context-dependent forms in which relational configurations become available to interaction or observation. Let $\mathcal{M}_t$ denote the relevant manifestation space at historical index t . Equation 9 represents the relational-to-manifestation interface as a set-valued relation.

$$\mu_t : \mathcal{R}_t \rightrightarrows \mathcal{M}_t. \quad (9)$$

The use of a correspondence in Equation 9 is deliberate. One relational configuration can support multiple manifestations across settings, observers, interfaces, or moments, while similar manifestations can arise from different relational configurations. A human may express severe distress verbally, behaviorally, physiologically, or not at all; an animal may exhibit different signals across species and environments; an artificial system may expose internal degradation through logs, performance loss, explicit messages, or no human-readable signal. None of these examples justifies treating manifestation as a transparent copy of the relational state.

Section 2.1 introduced $e_u \in \mathcal{E}$ as an evidence package. The three-layer architecture adds a preceding interface. For an encounter $u = (h, b, \kappa, t)$, let

$$\varepsilon_{h,\kappa,t} : \mathcal{M}_t \rightrightarrows \mathcal{E} \quad (10)$$

represent the observer- and context-relative production of evidence from manifestations. Equation 10 can include perceptual access, measurement, recording, institutional documentation, interface design, translation, sampling, and selective attention. If $m_t \in \mu_t(r_t)$ and $e_u \in \varepsilon_{h,\kappa,t}(m_t)$, then the full pre-recognition path is the relational composition in Equation 11.

$$\Omega_{h,\kappa,t} := \varepsilon_{h,\kappa,t} \circ \mu_t : \mathcal{R}_t \rightrightarrows \mathcal{E}. \quad (11)$$

Equation 11 identifies a source of heterogeneity that is conceptually prior to interpretation. Two recipients can occupy relationally comparable adverse configurations while presenting them through different manifestation channels; two observers can encounter the same manifestation while extracting different evidence packages because their instruments, permissions, attention, or communication interfaces differ. The recognition correspondence Rec_ℓ therefore acts downstream of at least two potentially lossy interfaces.

For later use, define the inverse observational fiber in Equation 12.

$$\Omega_{h,\kappa,t}^{-1}(e) := \{r \in \mathcal{R}_t : e \in \Omega_{h,\kappa,t}(r)\}. \quad (12)$$

Proposition 3.3 (Relational-state underdetermination by evidence). *If the inverse fiber in Equation 12 contains more than one element, then observing evidence package e is insufficient, within the declared representation, to identify a unique relational configuration.*

Proof. By definition of the inverse fiber, every $r \in \Omega_{h,\kappa,t}^{-1}(e)$ is compatible with the same evidence package e through the composed manifestation-and-evidence relation. If the fiber contains distinct configurations $r_1 \neq r_2$, then e is compatible with at least two represented relational states. Unique identification therefore requires additional evidence, assumptions, or a refined representation. $\square$

Proposition 3.3 gives a relational-layer explanation for recognition multiplicity in Definition 2.2. Multiple adverse-state descriptions can arise because an interpretive regime is indecisive, because the evidence is compatible with several modeled relational configurations, or through both sources of multiplicity. The reverse problem also occurs: different evidence packages can arise from relational configurations that an application deliberately treats as equivalent at the relevant resolution. A later section will return to cross-subject recognition regimes; the current point is that neither evidential identity nor evidential difference should be treated as a primitive criterion of relational identity.

3.4 Heterogeneity as a Typed, Comparison-Relative Condition

The labels *human*, *animal*, *artificial*, and *alien* identify useful families of stress cases, but they are too coarse to serve as a formal measure of heterogeneity. Differences relevant to recognition can occur within any one family, while two recipients from different families may share a particular manifestation or communication structure. Paper X therefore treats heterogeneity as comparison-relative rather than as an intrinsic scalar distance from a human reference point.

For a candidate recipient b , define a support-recognition interface signature at time t by Equation 13.

$$\Sigma_{b,t} := (\mathcal{R}_{b,t}, \mathcal{M}_{b,t}, \mu_{b,t}, \mathcal{C}_{b,t}, \Theta_{b,t}), \quad (13)$$

where $\mathcal{R}_{b,t} \subseteq \mathcal{R}_t$ is the relational domain retained for b , $\mathcal{M}_{b,t} \subseteq \mathcal{M}_t$ is the relevant manifestation domain, $\mu_{b,t}$ is the restricted relational-to-manifestation relation, $\mathcal{C}_{b,t}$ is the family of available communication or interaction channels, and $\Theta_{b,t}$ records the temporal resolutions or response scales treated as relevant by the application. Equation 13 does not define the essence of a subject. It records only interfaces that may matter for recognition in the declared inquiry.

Let Λ be a comparison specification declaring which components, relations, invariants, and admissible transformations matter for a particular question. Write $\Sigma_{b,t} \simeq_{\Lambda} \Sigma_{b',t'}$ when the two signatures are compatible under that declared specification. Heterogeneity is then represented by Equation 14.

$$\text{Het}_{\Lambda}(b, t; b', t') \iff \Sigma_{b,t} \not\simeq_{\Lambda} \Sigma_{b',t'}. \quad (14)$$

Equation 14 makes heterogeneity explicitly relative to the distinctions one is trying to preserve. A difference in embodiment may matter for interpreting nociceptive behavior but not for a comparison of resource deprivation. A difference in communication protocol may matter for consent or request recognition but not for a purely functional failure criterion. A difference in temporal scale may be decisive when one recipient signals distress over milliseconds and another through multi-day behavioral change. There is no general requirement that these differences collapse into one numerical heterogeneity score.

Remark 3.4 (Value neutrality of the heterogeneity relation). Neither Het_{Λ} nor the interface signature $\Sigma_{b,t}$ assigns moral worth, legal status, consciousness, intelligence, deservingness, or priority. They describe mismatches relevant to a declared recognition problem. Any evaluative ordering among recipients requires additional normative premises not supplied by the heterogeneity relation.

Remark 3.4 is essential for the cross-subject cases used in this series. Human familiarity cannot enter the formalism covertly as the zero point of a moral distance metric. The role of human-human cases is methodological: they reveal how much recognition ordinarily depends on shared interpretive infrastructure. Animal, artificial, and hypothetical alien cases progressively remove some of those shared supports and thereby expose which assumptions were doing work.

3.5 Layer-Specific Uncertainty and Subjectivity Uncertainty

The three-layer architecture also separates uncertainties that ordinary language can compress into the phrase “we do not know whether it suffers.” At least three distinct questions can be present. First, ultimate phenomenal or metaphysical status may remain suspended at $\mathcal{O}^?$. Second, the analyst may be uncertain which relational configuration in $\mathcal{R}_t$ is currently realized or which relational features should be retained. Third, the analyst may be uncertain how a relational configuration manifests, what evidence has been captured, or how that evidence should be interpreted.

These uncertainties have different formal locations. Let $\mathcal{R}_t(e; h, \kappa) := \Omega_{h,\kappa,t}^{-1}(e)$ denote the inverse observational fiber compatible with an evidence package at the declared observer-context interface. Relational uncertainty is represented by multiplicity in this fiber. Interpretive uncertainty or plurality is represented downstream by multiplicity in $\text{Rec}_{\iota}(e)$. Ontological suspension is represented by neither set: it remains the absence of a modeled ontological bridge. Treating all three as one probability of “real suffering” would therefore erase distinctions that the present framework is designed to preserve.

Subjectivity uncertainty cuts across these layers but should not be identified with adverse-state uncertainty. An observer can have substantial evidence that an artificial system is functionally impaired while remaining uncertain whether the system is phenomenally conscious. An observer can be confident that an animal is a sentient subject while remain uncertain about the cause of a specific behavior. A hypothetical alien entity may exhibit stable agency, communication, and relational persistence while its phenomenal architecture remains radically opaque. Paper X therefore reserves a fuller analysis of subjectivity uncertainty for a dedicated later section rather than using uncertainty about subjecthood as a proxy for uncertainty about the current adverse state.

Proposition 3.5 (Separation of subject-status and adverse-state uncertainty). *Within the present three-layer architecture, resolution of uncertainty about a modeled adverse relational state does not entail resolution of ultimate subjectivity at $O^?$, and suspension of ultimate subjectivity does not entail that $\mathcal{R}_t(e; h, \kappa)$ or $\text{Rec}_t(e)$ must be empty.*

Proof. The first statement follows from Proposition 3.1: no declared bridge maps relational or recognized states into $O^?$. For the second statement, the relational and recognition domains are defined independently of a completed ontological verdict. A relational configuration can be retained by Definition 3.2, can produce manifestations through μ_t , and can yield evidence and recognized adverse-state descriptions even while ontological status remains suspended. Hence ontological suspension does not force emptiness of either uncertainty set. $\square$

Proposition 3.5 prevents two opposite errors. One is premature anthropomorphism: inferring phenomenal subjectivity directly from familiar-looking distress. The other is premature exclusion: treating unresolved subjectivity as if no adverse relational state could be recognized or no support-relevant reason could later arise. The appropriate response is to keep the uncertainties typed until additional argument connects them.

3.6 Cross-Layer Audit for Support-Relevant Recognition

The three-layer framework can now be applied directly to the recognition architecture of Section 2. Table 2 records the role of each level and the principal inference that Paper X refuses to make automatically.

The audit in Table 2 also clarifies the location of support salience. The salience correspondence Sal_τ does not operate at the ontological layer. It takes a recognized adverse-state description and a support context as inputs. Accordingly, a support-relevant classification is a relationally situated practical representation, not a metaphysical discovery that assistance is demanded by reality itself.

This point matters when subject heterogeneity is high. A weak or unfamiliar manifestation can fail to generate an evidence package even when a relationally significant adverse configuration is present. A rich evidence package can still be misclassified under an inadequate interpretive regime. A recognized state can be genuine at the declared relational resolution while the recipient’s phenomenal status remains suspended. And a support-salient state can later fail to generate an all-things-considered duty or authority because consent, competing claims, risk, role, or competence defeat the contemplated response. The three-layer architecture therefore preserves uncertainty without allowing uncertainty at one layer to erase distinctions established at another.

Research Obligation 3.6 (Layer-preserving specification). An application using heterogeneous-subject cases should state which claims concern $O^?$, which structures are retained in $\mathcal{R}_t$, which manifestations are included in $\mathcal{M}_t$, how $\varepsilon_{h,\kappa,t}$ constructs the evidence package, and which interpretive regime ι produces the recognized adverse-state set. If a claim moves between these levels, the application should identify and justify the bridge relation used for that movement.

Research Obligation 3.6 extends the recognition-architecture requirement in Research Obligation 2.8. The purpose is not to multiply notation for its own sake. It is to make visible where cross-subject reasoning depends on manifestation channels, evidence access, interpretive conventions, or unargued ontological assumptions.

Table 2: Cross-layer audit for support-relevant recognition.

Layer or interface	What is represented	Permitted analytical use	Inference not licensed automatically
$O^?$	Ultimate ontology or phenomenal status left suspended	Mark the boundary of current commitment	No conclusion that the recipient is conscious, nonconscious, reducible, or ontologically of one privileged kind
$\mathcal{R}_t$	Historically retained entities, states, dependencies, relations, and trajectories	Model stable causal/generative distinctions relevant to the support problem	No claim that the model exhausts ultimate reality
$\mathcal{M}_t$	Context-dependent manifested forms of relational configurations	Analyze expression, presentation, accessibility, and variation of manifestation	No assumption that manifestation uniquely reveals relational state
$\varepsilon_{h,\kappa,t}$	Observer/institution-dependent evidence production	Represent access, measurement, recording, translation, and selection	No assumption that available evidence is complete or neutral
Rec_ℓ	Interpretive classification of evidence into adverse-state descriptions	Preserve recognition multiplicity and regime dependence	No direct inference to ontological truth, duty, or intervention authority

The section establishes the ontological and representational conditions under which support-relevant recognition can be analyzed across heterogeneous recipients. Ultimate ontology remains suspended; relational configurations provide the positive modeling domain; manifestations are context-dependent presentations rather than transparent copies; evidence packages are further observer-relative encodings; and heterogeneity is a typed comparison condition rather than a moral ranking. The next section can therefore refine the abstract adverse-state space $\mathcal{A}$ without forcing phenomenal suffering, functional impairment, dependency, and relational harm into one undifferentiated category.

4 Typed Representation of Adverse Relational States

Section 2 introduced an abstract adverse-state space $\mathcal{A}$ so that recognition could remain set-valued, and Section 3 located that representation within the three-layer GR architecture. The present section refines the internal structure of $\mathcal{A}$. Its role is to preserve practically different forms of adversity before any compression into a scalar severity variable or an undifferentiated predicate such as “suffering.” The objective is a deliberately limited taxonomy: a typed carrier rich enough to distinguish integrity disruption, functional disruption, deprivation, dependency failure, exposure, relational injury, trajectory-level loss, and phenomenal-state attribution while preserving the ontological and normative boundaries already established.

The typed representation has four methodological commitments. First, a type label records the analytical kind of adversity being represented; it does not rank moral worth. Second, whether a state counts as adverse is relative to a declared baseline or contrast class rather than an unexamined human-normality standard. Third, compound adversity is distinguished from uncertainty among alternative interpretations.

Fourth, no universal scalarization is assumed: a numerical severity index is admissible only when an application supplies and justifies the coarsening rule used to construct it.

4.1 Atomic Adverse Descriptors and Type Tags

Let $\mathcal{D}_{\text{rel}}$ be the provisional family of relational adversity types in Equation 15.

$$\mathcal{D}_{\text{rel}} := \{\text{integrity, functional, deprivation, dependency-failure, exposure, relational, trajectory}\}. \quad (15)$$

The labels in Equation 15 are not intended as natural kinds. They are typed analytical roles. An *integrity* descriptor can represent damage to bodily, material, informational, or other retained organization at the declared resolution. A *functional* descriptor records disruption of a declared function, activity, or self-maintaining process. A *deprivation* descriptor represents absence or insufficiency of a condition treated as required under a declared baseline. A *dependency-failure* descriptor represents a support relation on which an important condition depends but which is absent, inaccessible, or failing. An *exposure* descriptor represents susceptibility to an adverse transition under a specified environment or perturbation. A *relational* descriptor represents an adverse configuration located in the relation itself, such as coercive control, exclusion, destabilized attachment, destructive coupling, or another relation-level injury. A *trajectory* descriptor represents an adverse historical or prospective path, including persistent deterioration, recurrent disruption, narrowing future options, or path-dependent loss that is not adequately represented by one instantaneous state.

Table 3 summarizes the distinctions. The examples are schematic and cross-subject. They are not evidence that any listed condition is present in a particular human, animal, artificial, or hypothetical alien case.

For each $d \in \mathcal{D}_{\text{rel}}$, let $\mathcal{A}_d$ denote the application-specific carrier of descriptors of that type. The atomic relational descriptor space is the tagged disjoint union in Equation 16.

$$\mathcal{A}_{\text{rel}}^{\circ} := \bigsqcup_{d \in \mathcal{D}_{\text{rel}}} (\{d\} \times \mathcal{A}_d), \quad \text{typ}(a) = d \text{ for } a \in \{d\} \times \mathcal{A}_d. \quad (16)$$

The disjoint union in Equation 16 preserves type identity even when two descriptors use numerically identical parameters or similar language. A functional disruption is therefore not silently identified with relational injury merely because both are assigned the same ordinal score in a particular application.

Phenomenal suffering requires separate treatment. The prior GR suffering paper distinguished phenomenal, manifested, functional, and relational dimensions precisely because evidence of one does not collapse the others [5]. Paper X therefore permits a separate descriptor family $\mathcal{A}_{\text{phen-attr}}$ for *phenomenal-attribution descriptions*: claims such as “the recipient may be in pain” or “the recipient reports distress.” These are epistemic descriptions available to the recognition architecture, not elements of the suspended ontological layer. The complete atomic descriptor carrier used in this paper is therefore Equation 17.

$$\mathcal{A}^{\circ} := \mathcal{A}_{\text{rel}}^{\circ} \sqcup (\{\text{phen-attr}\} \times \mathcal{A}_{\text{phen-attr}}). \quad (17)$$

Remark 4.1 (Phenomenal attribution under ontological suspension). Membership in the phen-attr component of Equation 17 records a recognized or reported phenomenal-state attribution. It does not provide a map into $\mathcal{O}^?$ and therefore does not modify Proposition 3.1.

Remark 4.1 allows the paper to discuss suffering without pretending that the formalism directly contains another being’s first-person experience. A human verbal report, an animal pain assessment, or an artificial agent’s statement of distress can be highly relevant evidence while still remaining mediated at the level of the present model.

Table 3: Provisional typed families of adverse relational descriptors.

Type	Representational object	Illustrative cross-subject form	Claim not implied
Integrity	Disruption of retained organization	Injury, structural damage, corrupted subsystem, damaged habitat relation	Phenomenal suffering or moral wrongfulness
Functional	Loss or disruption of a declared activity or process	Impaired movement, failed self-maintenance, inability to complete a recipient-relevant operation	Defect relative to a universal species or design norm
Deprivation	Missing condition relative to a declared requirement	Food, shelter, communication access, energy, information, environmental support	Automatic entitlement to a specified provider
Dependency-failure	Failure of a relation on which an important condition depends	Care relation breakdown, inaccessible maintenance, unavailable translation or interface support	Dependency itself is pathological or undesirable
Exposure	Susceptibility to a specified adverse transition	Threat, unsafe environment, predation risk, exploit vulnerability, unstable resource relation	Harm has already occurred
Relational	Adversity constituted partly by the relation itself	Coercion, exclusion, destructive coupling, abandonment of a relied-upon relation	One party alone exhausts the locus of the problem
Trajectory	Adverse historical or prospective path	Recurrent deterioration, compounding damage, shrinking future options, persistent adverse attractor	A single present-state observation captures the trajectory

4.2 Adversity Relative to a Declared Baseline

A type tag alone does not determine that a condition is adverse. Functional difference, dependence, unusual embodiment, unfamiliar communication, or a nonhuman architecture cannot be treated as adversity merely because it departs from an observer’s default. Each application therefore requires a declared baseline or contrast specification.

Let $\mathfrak{C}_d$ denote the set of admissible baseline or contrast specifications for type d , and let X_d denote the underlying descriptive carrier before adverse classification. A baseline specification $\beta \in \mathfrak{C}_d$ selects the subset treated as adverse at the declared resolution, as in Equation 18.

$$\mathcal{A}_d(\beta) := \{x \in X_d : \text{Adv}_d(x; \beta) = 1\} \subseteq X_d. \quad (18)$$

Equation 18 uses a binary indicator only to mark membership in an application-defined adverse set;

it does not claim that adversity itself is binary. The specification β can encode a recipient-relative prior condition, a functional requirement, a requested goal, a safety envelope, a relation-specific expectation, a counterfactual without a harmful event, or another explicitly justified comparator. Different applications can therefore use different baselines without pretending that one global normality standard governs every subject type.

Definition 4.2 (Baseline-qualified descriptor). A *baseline-qualified adverse descriptor* is a tagged pair $a = (d, x; \beta)$ such that $d \in \mathfrak{D}_{\text{rel}}$, $\beta \in \mathfrak{C}_d$, and $x \in \mathcal{A}_d(\beta)$. The baseline is part of the descriptor’s justification even when it is suppressed in abbreviated notation.

Definition 4.2 matters especially under heterogeneous-subject conditions. An artificial system can operate differently from a human nervous system without that difference constituting impairment. A disabled human can differ from a population average without the difference itself supplying an adverse-state judgment. A dependent child or symbiotic organism can rely on another without dependency itself being a pathology. A hypothetical alien can require environmental conditions unlike terrestrial ones. Adversity must therefore be justified relative to the recipient, relation, function, trajectory, or other declared comparator relevant to the question being asked.

Proposition 4.3 (Adversity classification requires an adverse-state criterion). Let b, b' be candidate recipients with distinct support-recognition interface signatures $\Sigma_{b,t} \neq \Sigma_{b',t}$ as defined in Equation 13. The difference $\Sigma_{b,t} \neq \Sigma_{b',t}$ is insufficient, by itself, to establish that either recipient occupies any set $\mathcal{A}_d(\beta)$.

Proof. Equation 13 records interface characteristics relevant to recognition, while Equation 18 requires an adverse classification relative to a type-specific baseline β . No rule in the present architecture maps interface inequality alone to membership in an adverse set. Such a conclusion would therefore require an additional premise connecting the relevant interface difference to a justified adverse criterion. $\square$

Proposition 4.3 formalizes a basic anti-pathologizing constraint. Heterogeneity can explain why a state is difficult to recognize; it is not itself evidence that the state is bad for the recipient.

4.3 Compound Adversity and Alternative Recognition

Real assistance episodes frequently involve several adverse dimensions at once. An injury can produce functional impairment; functional impairment can generate dependency on a support relation; a failed support relation can expose the recipient to additional harm; and the combined process can narrow future options. A typed architecture therefore needs a representation of co-occurrence as well as a representation of uncertainty.

Let $\bowtie \subseteq \mathcal{A}^\circ \times \mathcal{A}^\circ$ be an application-specific compatibility relation indicating that two atomic descriptors can jointly describe one episode at the declared resolution. Define the bundle carrier in Equation 19.

$$\mathfrak{B}(\mathcal{A}^\circ) := \{B \in \mathcal{P}_{\text{fin}}(\mathcal{A}^\circ) : \forall a, a' \in B, a \bowtie a'\}. \quad (19)$$

Definition 4.4 (Compound adverse-state description). A *compound adverse-state description* is an element $B \in \mathfrak{B}(\mathcal{A}^\circ)$. Distinct members of B represent adverse dimensions asserted to co-occur within one admissible interpretation of the episode.

Definition 4.4 makes co-occurrence an internal feature of one admissible adverse description rather than an ambiguity among several descriptions.

From this point onward, the abstract adverse-state space $\mathcal{A}$ introduced in Section 2 is instantiated as the bundle carrier in Equation 20.

$$\mathcal{A} := \mathfrak{B}(\mathcal{A}^\circ). \quad (20)$$

Equation 20 preserves the earlier recognition correspondence without changing its type: $\text{Rec}_\iota : \mathcal{E} \rightrightarrows \mathcal{A}$ now returns alternative compound descriptions. The distinction between co-occurrence and uncertainty is therefore explicit. If $B = \{a_1, a_2\}$ belongs to $\mathcal{A}_u^{\text{rec}}$, the interpretation represented by B asserts that a_1 and a_2 co-occur. If both B and $B' = \{a_3\}$ belong to $\mathcal{A}_u^{\text{rec}}$, the recognition architecture preserves an alternative between the compound interpretation B and the different interpretation B' .

Proposition 4.5 (Compound adversity and recognition multiplicity are independent). *Within the representation of Equation 20, the conditions $|B| > 1$ for some $B \in \mathcal{A}_u^{\text{rec}}$ and $|\mathcal{A}_u^{\text{rec}}| > 1$ are logically independent.*

Proof. A singleton recognized set $\mathcal{A}_u^{\text{rec}} = \{B\}$ can contain a compound bundle with $|B| > 1$, so compound adversity does not imply recognition multiplicity. Conversely, a recognized set can contain two distinct singleton bundles $\{a\}$ and $\{a'\}$, so recognition multiplicity does not imply that either interpretation contains compound adversity. $\square$

Proposition 4.5 prevents a common representational error. Multiple adverse dimensions in one interpretation are not the same thing as epistemic uncertainty among several interpretations. Later response reasoning can depend differently on these two structures.

4.4 Temporal Profiles and Trajectory-Level Adversity

Adverse-state descriptions also differ in temporal structure. A state can be acute, persistent, intermittent, recurrent, cumulative, or primarily prospective. Paper X therefore does not identify an adverse state with an instantaneous observation. Let Θ be a space of declared temporal profiles and let $\text{temp} : \mathcal{A}^\circ \rightarrow \Theta$ be a partial annotation map. The map is partial because not every application has enough information to assign a stable temporal profile.

For trajectory-level descriptors, the object of concern can be a change in the set of attainable relational options rather than a current deficit. Let $\mathcal{V}_t(b)$ denote an application-defined set of recipient-relevant future relational configurations reachable or maintainable from the represented state at time t . A contraction such as $\mathcal{V}_{t'}(b) \subsetneq \mathcal{V}_t(b)$ for $t < t'$ can encode trajectory-level adversity when the lost options are independently justified as recipient-relevant. This is not a universal definition of harm: the formalism does not assume that more options are always better, that every irreversible change is adverse, or that a helper may preserve options against the recipient's expressed preferences.

This temporal distinction is particularly important for assistance. A present condition can appear stable while an exposure relation makes a severe transition likely; a short-lived functional disruption can require urgent aid while having little long-term trajectory effect; a mild current impairment can generate major future loss if a narrow intervention window closes. Conversely, a visually dramatic manifestation can be transient and self-resolving. Later support reasoning therefore requires the adverse-state type and temporal profile to remain visible rather than being compressed into present severity alone.

4.5 Type Erasure and Scalar Severity

Applications often seek a single score for severity, urgency, burden, or need. Such scalarization can be useful, but it is a coarsening operation, not a neutral restatement of the typed state. Let $\sigma : \mathcal{A} \rightarrow V$ be any application-defined coarsening into a summary space V , including the special case $V \subseteq \mathbb{R}$. The question is whether the later support-salience correspondence factors through σ .

Proposition 4.6 (Necessary fiber condition for salience-preserving scalarization). *Fix an assistance label τ and context κ . A reduced salience correspondence $\overline{\text{Sal}}_\tau : V \times \mathcal{K} \rightrightarrows \mathcal{S}$ satisfying*

$$\text{Sal}_\tau(A, \kappa) = \overline{\text{Sal}}_\tau(\sigma(A), \kappa) \quad \text{for all } A \in \mathcal{A} \quad (21)$$

can exist only if

$$\sigma(A) = \sigma(A') \implies \text{Sal}_\tau(A, \kappa) = \text{Sal}_\tau(A', \kappa) \quad (22)$$

for every pair A, A' in the application domain.

Proof. If Equation 21 holds and $\sigma(A) = \sigma(A')$, substitution gives $\text{Sal}_\tau(A, \kappa) = \overline{\text{Sal}}_\tau(\sigma(A), \kappa) = \overline{\text{Sal}}_\tau(\sigma(A'), \kappa) = \text{Sal}_\tau(A', \kappa)$. Hence Equation 22 is necessary. $\square$

Proposition 4.6 gives a necessary diagnostic for salience-preserving scalarization. Failure of Equation 22 certifies that the proposed summary loses distinctions needed by the declared salience task. Satisfaction of the fiber condition alone does not establish that a particular scalarization is substantively well justified; the application must still construct and defend the reduced salience correspondence. Two states can receive the same score while differing in assistance salience because one is an acute integrity threat, another a long-term dependency failure, and a third a relational injury for which direct intervention by the contemplated helper would worsen the relation.

Remark 4.7 (Ordering remains application-specific). Paper X assumes no canonical total order on $\mathcal{A}$. Type-specific partial orders, urgency rankings, risk measures, or scalar severity indices may be introduced for a particular application, but each requires a declared comparison rule and should be audited for information lost under the induced coarsening.

Remark 4.7 also limits cross-subject comparisons. The framework does not require a single metric on which a human injury, an animal deprivation state, an artificial-system integrity failure, and an alien exposure relation receive globally comparable numbers. Comparison can instead be local to declared features relevant to the question being asked.

4.6 Typed Cross-Subject Comparability

Heterogeneous cases nevertheless require some form of comparison. Typed comparability asks whether two adverse descriptions preserve a declared distinction at the relevant resolution; global similarity between the subjects is unnecessary. Let Ξ denote a comparison specification and let $\psi_\Xi : \text{dom}(\psi_\Xi) \subseteq \mathcal{A}^\circ \rightarrow Z_\Xi$ be a partial comparison feature map. Define typed comparability by Equation 23.

$$a \sim_\Xi a' \iff a, a' \in \text{dom}(\psi_\Xi) \text{ and } \psi_\Xi(a) = \psi_\Xi(a'). \quad (23)$$

The specification Ξ can preserve a feature such as loss of a self-maintaining process, dependence on an unavailable external relation, persistence under a common perturbation, narrowing of future options, or another explicitly chosen invariant. Equation 23 does not require $\text{typ}(a) = \text{typ}(a')$. A functional disruption and a trajectory-level descriptor can be comparable under one specification while remaining different types. Conversely, two states with the same type label need not be comparable when their baselines, temporal profiles, or relational contexts differ.

Proposition 4.8 (Comparison is specification-relative). *No conclusion of the form $a \sim a'$ follows from the typed architecture alone. Cross-subject comparability requires a declared specification Ξ and a feature map ψ_Ξ whose domain contains both descriptors.*

Proof. The only comparison relation introduced in Equation 23 is indexed by Ξ and defined through ψ_Ξ . Removing those data removes the criterion by which equality of preserved features is evaluated. The typed carrier by itself therefore supplies no global equivalence relation across adverse descriptors. $\square$

Proposition 4.8 prevents apparent mathematical uniformity from becoming an unargued moral equivalence or hierarchy. Cross-subject analysis can preserve precisely the feature needed for a support question while leaving other differences intact.

4.7 Typed-State Audit and Methodological Requirement

The refined adverse-state representation can now be summarized by the audit in Table 4. The table records the additional information that should remain visible before the paper moves to defeasible response reasons.

Table 4: Audit dimensions for typed adverse-state representation.

Dimension	Required declaration	Analytical role	Error prevented
Type	$d \in \mathfrak{D}_{\text{rel}}$ or phenomenal-attribution tag	Preserve the kind of adversity represented	Treating unlike adverse structures as interchangeable
Baseline	$\beta \in \mathfrak{C}_d$	State why the condition counts as adverse at the declared resolution	Pathologizing heterogeneity or importing human-normality assumptions
Bundle structure	$B \in \mathfrak{B}(\mathcal{A}^\circ)$	Distinguish jointly asserted adverse dimensions	Confusing co-occurrence with recognition uncertainty
Temporal profile	$\text{temp}(a)$ where supported	Preserve onset, persistence, recurrence, or prospective structure	Replacing trajectory with one instantaneous observation
Coarsening	σ when a summary score is used	Make information loss visible and test factorization	Treating a severity score as the state itself
Comparison	Ξ, ψ_Ξ	Declare what is preserved across heterogeneous cases	Inferring global equivalence or ranking from local similarity

Research Obligation 4.9 (Typed adverse-state specification). An application that recognizes an adverse state should state, where applicable, the adversity type, the baseline or comparator that makes the state adverse, whether multiple descriptors are jointly asserted or are alternative interpretations, the temporal profile, any scalarization or ranking applied, and the cross-subject comparison specification used. A phenomenal attribution should be marked as such rather than silently treated as direct access to $\mathcal{O}^?$.

Research Obligation 4.9 extends the layer-preserving obligation in Research Obligation 3.6. The purpose is to ensure that the later question “what reasons does this state generate?” is posed to a representation whose internal distinctions remain visible. Otherwise, apparent disagreement about assistance can originate in an earlier disagreement about what kind of adverse condition is being represented, which baseline defines it, whether several conditions co-occur, or whether a scalar summary has erased a distinction relevant to the prospective response.

The section therefore refines the adverse-state space without making it ontologically or normatively stronger. Adverse descriptions are typed, baseline-qualified, temporally annotatable, composable into compatible bundles, and comparable only relative to declared specifications. Phenomenological attribution remains epistemically tagged rather than ontologically lifted. Scalar severity is treated as an optional coarsening whose adequacy can be tested by factorization. These distinctions prepare the next section to ask a narrower normative question: when a typed adverse state becomes support-salient, under what additional premises can it generate a defeasible reason to respond without yet becoming an all-things-considered duty or authority to intervene?

5 Defeasible Response Reasons Generated by Support Salience

This section develops the normative interface declared provisionally in Section 2. Its role is to specify how a support-salient adverse state can contribute to a defeasible reason for a possible response while retaining the evidential, interpretive, relational, and assistance-type provenance established in Sections 2–4.

The objective is an intermediate reason architecture situated before a general ethics of aid. The discussion first types candidate response contents and their relation to adverse-state bundles, then introduces explicit reason bridges, distinguishes undercutting from countervailing considerations, treats recognition uncertainty as a reason for conditional rather than prematurely settled response profiles, and closes by preserving the boundary among defeasible reasons, all-things-considered duties, and intervention authority. The method is reconstructive and typed: the section formalizes where normative premises enter without claiming that one such premise is universally correct.

Familiar traditions of assistance illustrate why the bridge from recognized adversity to response reasons should remain explicit. Singer’s influential argument ties assistance to preventing something bad when this can be done without sacrificing something of comparable moral importance [11], while the Red Cross and Red Crescent principles formulate humanity in terms of preventing and alleviating suffering and impartiality in relation to need and urgency [6, 9]. These are substantively different normative and institutional structures. Paper X therefore represents a family of possible reason bridges rather than treating support salience itself as a complete source of normative force.

5.1 Reason Provenance and Candidate Response Content

A defeasible response reason requires a content toward which it points. Let $\mathcal{X}_\tau$ denote a space of candidate response descriptions indexed by assistance label $\tau \in \mathfrak{T}_{\text{sup}}$. At the present stage, $\mathcal{X}_\tau$ is intentionally weakly typed. It can contain descriptions such as obtaining additional information, opening a communication channel, offering assistance, providing material or functional help, referring the case to another actor, coordinating support, monitoring a time-sensitive condition, or another response that a later application places under the declared assistance label. The dedicated relational-typing section will refine the differences among aid, volunteering, and support. Membership in $\mathcal{X}_\tau$ therefore records a candidate response content rather than permission, effectiveness, proportionality, or authority.

For a typed adverse-state bundle $A \in \mathcal{A}$, assistance label τ , and context κ , define the response-fit correspondence in Equation 24.

$$\text{Fit}_\tau : \mathcal{A} \times \mathcal{K} \rightrightarrows \mathcal{X}_\tau. \quad (24)$$

An element $x \in \text{Fit}_\tau(A, \kappa)$ means only that the response description x is represented as relevant to at least one declared feature of A in context κ . The fit can concern mitigation, prevention, restoration, communication, referral, preservation of a recipient-relevant option, or another explicitly stated relation between an adverse-state feature and a contemplated response. Equation 24 is therefore a practical-relevance interface. It does not establish that x will succeed or that an actor may perform it.

Definition 5.1 (Reason provenance certificate). For an encounter episode $u = (h, b, \kappa, t)$, a *reason provenance certificate* is a tuple $c = (u, A, s, \tau, x, \eta)$, where $A \in \mathcal{A}_u^{\text{rec}}$, $s \in \text{Sal}_\tau(A, \kappa) \cap \mathcal{S}^+$, $x \in \text{Fit}_\tau(A, \kappa)$, and $\eta \in \mathfrak{N}$ satisfies $(\eta, u, A, s, \tau, x) \in \text{App}$.

Definition 5.1 makes the source of a response reason auditable. A reason does not float free of the recognition architecture. Its certificate records which adverse-state representation was live, why that representation entered a field of assistance, which response content was treated as fitting, and which normative bridge licensed movement from salience to a reason claim. If evidence, interpretation, salience, response fit, or the bridge is later revised, the provenance of the reason can be reevaluated at the appropriate interface.

Let $\mathcal{C}_{\text{rsn}}$ denote the set of reason provenance certificates satisfying Definition 5.1, and let $\mathcal{Q}_\tau$ be the reason space associated with assistance label τ . Each typed reason space carries a response-content projection $\text{cont}_\tau : \mathcal{Q}_\tau \rightarrow \mathcal{X}_\tau$, so a reason token retains the candidate response content toward which it counts. The overall reason space is the disjoint union stated in Equation 25.

$$\mathcal{Q} := \bigsqcup_{\tau \in \mathfrak{T}_{\text{sup}}} \mathcal{Q}_\tau. \quad (25)$$

The disjoint-union notation in Equation 25 preserves the assistance label as part of a reason's type. A reason recorded under aid does not become a reason under volunteering or support merely because the same adverse state appears in each domain. The dedicated relational-typing section will examine when, if ever, translations across these reason types are warranted.

5.2 Explicit Reason Bridges and the Refined Generator

Let $\mathfrak{N}$ denote a space of declared normative bridge specifications. A bridge $\eta \in \mathfrak{N}$ states the additional normative premise under which a support-salient adverse state and a fitting response can count in favor of that response. The framework does not fix a universal content for η . An application can instantiate a bridge through beneficence, humanitarian principle, role responsibility, prior commitment, reciprocity, care, solidarity, recipient request, institutional mandate, or another justified source of normative relevance. The bridge's source and scope should remain explicit because different bridges can support different reason contents from the same recognized condition.

Bridge applicability is represented by the typed relation in Equation 26.

$$\text{App} \subseteq \mathfrak{N} \times \mathcal{U} \times \mathcal{A} \times \mathcal{S}^+ \times \mathfrak{T}_{\text{sup}} \times \left(\bigsqcup_{\tau \in \mathfrak{T}_{\text{sup}}} \mathcal{X}_{\tau} \right). \quad (26)$$

An application reads $(\eta, u, A, s, \tau, x) \in \text{App}$ as the claim that bridge η is applicable to that particular support-salient configuration and candidate response. Equation 26 makes bridge scope part of the model rather than an implicit background assumption.

The provisional interface $\text{Gen} : \mathcal{S}^+ \times \mathcal{K} \rightrightarrows \mathcal{Q}$ in Equation 7 can now be refined by introducing a provenance-sensitive generator. Define $\widehat{\text{Gen}}$ as in Equation 27.

$$\widehat{\text{Gen}} : \mathcal{C}_{\text{rsn}} \rightrightarrows \mathcal{Q}, \quad \widehat{\text{Gen}}(c) \subseteq \{q \in \mathcal{Q}_{\tau} : \text{cont}_{\tau}(q) = x\} \quad \text{when } c = (u, A, s, \tau, x, \eta). \quad (27)$$

The earlier interface is recovered by forgetting the certificate details and taking the union of reason outputs compatible with the support-salience state and context. This projection is stated in Equation 28.

$$\text{Gen}(s, \kappa) = \bigcup_{\substack{c=(u,A,s,\tau,x,\eta) \in \mathcal{C}_{\text{rsn}} \\ u=(h,b,\kappa,t)}} \widehat{\text{Gen}}(c). \quad (28)$$

Equation 28 shows why the coarse interface in Section 2 was insufficient for provenance analysis. Two reasons can occupy the same coarse pair (s, κ) while depending on different adverse-state descriptions, assistance labels, candidate responses, or normative bridges.

Proposition 5.2 (Bridge dependence of defeasible reason generation). *Within the architecture of Definition 5.1, support salience and response fit do not determine an element of $\mathcal{Q}$ without an applicable bridge $\eta \in \mathfrak{N}$ and a corresponding output of $\widehat{\text{Gen}}$.*

Proof. A reason output in Equation 27 is defined on the certificate space $\mathcal{C}_{\text{rsn}}$. By Definition 5.1, membership in that space requires an applicable bridge η . Support salience and response fit can therefore satisfy the practical components of a certificate while failing to supply a valid input to $\widehat{\text{Gen}}$ when no bridge has been declared or justified. Hence no reason output follows from those components alone within the present architecture. $\square$

Proposition 5.2 marks the exact point at which the paper becomes normatively stronger than recognition and salience. The proposition does not decide which bridges are true or justified. It makes their presence visible so that later ethical analysis can criticize the bridge rather than mislocating disagreement in the evidence or adverse-state classification.

5.3 Defeasibility, Undercutting, and Countervailing Reasons

A reason generated through Equation 27 is defeasible because its standing and practical significance remain sensitive to further information and additional reasons. Two kinds of revision are analytically useful. First, a consideration can undercut the standing of the reason by weakening or defeating some element of its provenance. Second, another reason can remain independently valid while favoring an incompatible response. These structures should not be conflated.

Let $\mathcal{D}$ denote a space of potential undercutting considerations. Define an undercutting relation $\blacktriangleright \subseteq \mathcal{D} \times \mathcal{Q}$ as in Equation 29.

$$d \blacktriangleright q \iff d \text{ defeats or materially weakens a declared provenance condition for } q. \quad (29)$$

Potential undercutters can concern evidence quality, interpretive reliability, an incorrect adversity baseline, response mismatch, recipient communication, competence, or another condition that bears on the certificate. Equation 29 does not state that any one such consideration always defeats a reason. The application must specify the rule by which the consideration bears on the relevant provenance condition.

For an episode u , define the generated reason set in Equation 30.

$$\mathcal{Q}_u^{\text{gen}} := \bigcup_{c=(u,A,s,\tau,x,\eta) \in \mathcal{C}_{\text{rsn}}} \widehat{\text{Gen}}(c). \quad (30)$$

Let $\mathcal{D}_u$ be the undercutters currently admitted by the application. The presently standing reason set is defined in Equation 31.

$$\mathcal{Q}_u^{\text{stand}} := \{q \in \mathcal{Q}_u^{\text{gen}} : \nexists d \in \mathcal{D}_u \text{ such that } d \blacktriangleright q\}. \quad (31)$$

A countervailing reason is different. Let $\bowtie \subseteq \mathcal{Q} \times \mathcal{Q}$ be an application-defined conflict relation, where $q \bowtie q'$ means that the two reasons bear on response contents that cannot jointly be satisfied at the declared resolution or otherwise stand in a normatively relevant conflict. The relation leaves both reasons standing. A reason to provide immediate protective assistance can conflict with a reason to respect an expressed refusal; a reason to assist one recipient can conflict with a reason to preserve scarce resources for another; a reason to alter a malfunctioning artificial system can conflict with a reason generated by uncertainty about whether the proposed modification destroys a valued process. Paper X does not resolve these conflicts here. Their presence is precisely why a defeasible reason should remain distinct from an all-things-considered conclusion.

Definition 5.3 (Defeasible response reason). A *defeasible response reason* in Paper X is an element $q \in \mathcal{Q}_u^{\text{stand}}$ generated through a valid provenance certificate and retained as a consideration that counts in favor of a candidate response while remaining open to conflict with other standing reasons and to later revision of its provenance.

Definition 5.3 uses defeasibility in an architectural sense. The definition does not commit the paper to a specific metanormative theory of reasons or to a numerical model of reason strength. It records that reason claims have grounds, can lose standing when those grounds are undercut, and can coexist with countervailing reasons.

Table 5 summarizes recurring interfaces at which defeasibility can enter the analysis. The examples identify analytical locations rather than universal defeaters.

5.4 Recognition Multiplicity and Conditional Response Profiles

Recognition multiplicity from Definition 2.2 has direct implications for reason generation. If several adverse-state bundles remain live, an analyst should distinguish responses that fit at least one interpretation from responses that fit every live interpretation. For a nonempty recognized set $\mathcal{A}_u^{\text{rec}}$, define the permissive and robust response-fit sets in Equations 32 and 33.

$$\mathcal{X}_{u,\tau}^{\exists} := \bigcup_{A \in \mathcal{A}_u^{\text{rec}}} \text{Fit}_{\tau}(A, \kappa), \quad (32)$$

Table 5: Illustrative interfaces for undercutting and countervailing considerations.

Interface	Possible consideration	Primary effect	Claim left open
Recognition	New evidence or interpretive revision	Undercut the adverse-state component of a certificate	Whether another adverse interpretation remains support-salient
Response fit	New information about efficacy, timing, or mismatch	Undercut the claimed fit between state and response	Whether another response fits the same adverse state
Recipient relation	Refusal, request, communication, dependency, or role information	Undercut one certificate or generate a countervailing reason	Final significance of autonomy, care, emergency, or incapacity
Risk and third parties	Foreseeable harm, opportunity cost, or competing claims	Generate countervailing reasons or defeat a response-fit assumption	Which reason should prevail overall
Institutional position	Competence, mandate, role, or legal restriction	Alter available response descriptions or create countervailing reasons	Whether an independent moral reason persists despite institutional limits

$$\mathcal{X}_{u,\tau}^{\forall} := \bigcap_{A \in \mathcal{A}_u^{\text{rec}}} \text{Fit}_{\tau}(A, \kappa). \quad (33)$$

Equation 32 collects responses fitting at least one live adverse-state interpretation. Equation 33 collects responses whose fit survives every live interpretation at the declared resolution. The second set can contain low-interference or epistemic responses such as seeking clarification, opening communication, gathering diagnostic information, or preserving a reversible option, although membership remains application-specific.

For a nonempty recognized set, the intersection in Equation 33 is a subset of the union in Equation 32. The elementary inclusion is useful only as a bookkeeping consequence of the two definitions; the substantive point is the distinction it supports under heterogeneous recognition. Uncertainty need not force a binary choice between immediate direct assistance and complete inaction. The architecture can represent responses whose relevance is robust across several interpretations while reserving more intrusive or type-specific responses for cases in which the interpretation supporting them is better established. The normative importance of reversibility, precaution, autonomy, or information value remains a later question; the present section only keeps the conditional structure visible.

Recognition revision can also withdraw the provenance of a previously generated reason. Let $c = (u, A, s, \tau, x, \eta)$ be a certificate at one stage. After an evidential, interpretive, or contextual revision, let $\mathcal{A}_u^{\text{rec}'}$, Sal'_{τ} , Fit'_{τ} , and App' denote the revised recognized set, salience relation, response-fit relation, and bridge-applicability relation. Certificate persistence is defined in Equation 34.

$$\text{Persist}(c) \iff A \in \mathcal{A}_u^{\text{rec}'} \wedge s \in \text{Sal}'_{\tau}(A, \kappa) \cap \mathcal{S}^+ \wedge x \in \text{Fit}'_{\tau}(A, \kappa) \wedge (\eta, u, A, s, \tau, x) \in \text{App}'. \quad (34)$$

Equation 34 treats reason revision as provenance-sensitive. A reason can lose standing because the recognized state changes, the response ceases to fit, or the bridge ceases to apply. Such withdrawal need not imply that the earlier observer acted irrationally given the earlier information; nor does persistence prove that the reason dominates every competing consideration.

5.5 Reason Profiles and Assistance-Type Indexing

The output of the present section is best represented as a reason profile rather than a single decision score. For an episode u , define the reason profile in Equation 35.

$$\mathbf{R}_u := (\mathcal{Q}_u^{\text{stand}}, \blacktriangleright_u, \bowtie_u), \quad (35)$$

where $\blacktriangleright_u$ is the episode-specific restriction of the undercutting relation and $\bowtie_u$ is the episode-specific reason-conflict relation. Equation 35 preserves plural reasons and their relations without assuming that they can be reduced to a common numerical weight.

An application may introduce a priority order, aggregation rule, cost model, expected-value function, or decision procedure, but such a device adds normative and empirical structure. Paper X therefore assumes no canonical scalar function $w : \mathcal{Q} \rightarrow \mathbb{R}$ and no default operation that converts $\mathbf{R}_u$ into a final action. This restraint is particularly important across heterogeneous subjects, where a common numerical scale can conceal differences in baselines, adverse-state types, uncertainty, response fit, and the normative source of each reason.

The assistance-type indexing in Equation 25 also prevents silent transfer across relational forms. A reason $q \in \mathcal{Q}_\tau$ can be transported to another reason space $\mathcal{Q}_{\tau'}$ only through a declared translation relation. Let such a relation, when justified, be denoted as in Equation 36.

$$\text{Tr}_{\tau \rightarrow \tau'} : \mathcal{Q}_\tau \rightrightarrows \mathcal{Q}_{\tau'}. \quad (36)$$

Proposition 5.4 (Assistance-type reason translation requires a bridge). *For distinct labels $\tau, \tau' \in \mathfrak{T}_{\text{sup}}$, the present architecture supplies no derivation from $q \in \mathcal{Q}_\tau$ to an element of $\mathcal{Q}_{\tau'}$ unless a relation such as Equation 36 or another justified bridge is introduced.*

Proof. Equation 25 treats the reason spaces as typed components of a disjoint union. Membership in one component therefore does not imply membership in another. A transfer requires an additional relation whose codomain is $\mathcal{Q}_{\tau'}$. Equation 36 provides the generic type of such a relation when an application can justify one. $\square$

Proposition 5.4 prepares the dedicated relational analysis of aid, volunteering, and support. A reason for emergency aid, a reason to enter a voluntary service relation, and a reason to provide continuing support can arise from the same adverse-state representation while differing in source, temporal structure, reciprocal expectations, institutional role, and implications for recipient agency.

5.6 Boundary to All-Things-Considered Duty and Intervention Authority

A standing defeasible reason remains an input to further normative deliberation. Let $\mathcal{O}_{\text{all}}$ retain the meaning introduced in Section 2, and let Resolve denote any later rule that converts a reason profile and context into an all-things-considered normative conclusion. Its generic type is stated in Equation 37.

$$\text{Resolve} : \mathfrak{R} \times \mathcal{K} \rightrightarrows \mathcal{O}_{\text{all}}, \quad (37)$$

where $\mathfrak{R}$ is a space containing reason profiles of the form in Equation 35. Paper X does not specify Resolve as a universal moral decision rule.

Proposition 5.5 (Standing-reason non-entailment of all-things-considered duty). *A nonempty standing reason set $\mathcal{Q}_u^{\text{stand}}$ does not, within the present architecture, determine an element of $\mathcal{O}_{\text{all}}$ unless an additional resolution rule with codomain $\mathcal{O}_{\text{all}}$ is introduced and justified.*

Proof. The objects defined through Equation 31 lie in $\mathcal{Q}$, while an all-things-considered duty lies in $\mathcal{O}_{\text{all}}$. The reason profile in Equation 35 records standing reasons and their conflict structure but contains no operation with codomain $\mathcal{O}_{\text{all}}$. A conclusion in that space therefore requires an additional relation such as Equation 37 together with the premises justifying its use. $\square$

Table 6: Audit dimensions for defeasible response-reason generation.

Dimension	Required declaration	Analytical role	Inference constrained
Reason provenance	u, A, s, τ, x, η	Preserve the path from recognized adversity to the reason claim	Treating a reason as self-grounding
Response fit	$x \in \text{Fit}_\tau(A, \kappa)$	State why the contemplated response bears on the adverse state	Conflating salience with response relevance
Normative bridge	$\eta \in \mathfrak{N}$	Identify the premise that gives salience reason-giving force	Treating recognition as a complete moral theory
Undercutting	$d \blacktriangleright q$ where applicable	Record revision of a reason’s provenance	Treating defeasible grounds as irrevocable
Reason conflict	$q \bowtie q'$ where applicable	Preserve countervailing reasons that remain valid	Equating a standing reason with a final duty
Type translation	$\text{Tr}_{\tau \rightarrow \tau'}$ when used	Justify transfer across aid, volunteering, and support reason spaces	Treating assistance forms as normatively interchangeable
Resolution	Application-specific Resolve, if introduced	Make an all-things-considered step explicit	Hiding aggregation or priority assumptions

Proposition 5.5 strengthens the earlier typing boundary without duplicating a complete theory of duty. Even if a later analysis derives an all-things-considered duty, Proposition 2.7 continues to apply to intervention authority. A duty to respond can be discharged by seeking consent, communicating, referring, providing nonintrusive assistance, supporting another authorized actor, or taking another route that does not entail unilateral intervention. Authority therefore remains a separately typed question.

5.7 Reason-Generation Audit and Methodological Requirement

Table 6 summarizes the information that should remain explicit when support salience is used to generate defeasible response reasons.

Research Obligation 5.6 (Defeasible reason specification). An application that claims a defeasible response reason should identify the reason’s provenance certificate, the candidate response content, the response-fit relation, the normative bridge that supplies reason-giving force, known undercutting considerations, materially relevant countervailing reasons, and any rule used to translate across assistance types or to resolve a reason profile into a stronger normative conclusion.

Research Obligation 5.6 extends Research Obligations 2.8 and 4.9. The purpose is diagnostic. Two analysts can agree that a recipient is in the same adverse relational state while disagreeing about the fitting response; they can agree about response fit while relying on different reason bridges; or they can agree that a defeasible reason exists while disagreeing about the force of countervailing reasons. These disagreements belong to different interfaces and should be evaluated at the interface where they arise.

The section therefore supplies the first explicitly normative layer of Paper X while preserving its limited scope. Support salience enters reason generation only through a declared bridge; reasons remain typed by assistance form and response content; their provenance can be revised; and countervailing considerations can remain valid without erasing the reason they oppose. The resulting reason profile is an input to later ethical deliberation rather than a substitute for it. The dedicated relational-typing section

can therefore examine aid, volunteering, and support as distinct relational forms without presupposing that a reason generated in one form transfers unchanged to the others.

6 Relational Typing across Aid, Volunteering, Support

This section refines the provisional assistance labels introduced in Section 2. Its role is to determine what each label types within an assistance episode while keeping the reason-space indexing of Section 5 distinct from a partition of social reality. The objective is to identify the relational dimensions that must be declared before reasons generated under one assistance label are compared with reasons generated under another, while leaving universal definitions of aid, volunteering, and support open. The section therefore treats aid primarily as an adverse-state-directed response relation, volunteering primarily as a mode of participation, and support primarily as a sustaining relational function. These dimensions can co-occur in one episode. The method is typed and reconstructive: each classification is represented through explicit predicates or relations, while consent, authority, effectiveness, compensation, duration, and institutional role remain independently auditable.

The distinction has both conceptual and institutional precedent. Within the Red Cross and Red Crescent framework, voluntary service is an organizational principle distinct from the substantive humanitarian orientation expressed by humanity and impartiality [6, 9]. For statistical purposes, the International Labour Organization likewise defines volunteer work through non-compulsory unpaid work while treating reimbursement and some limited material support as compatible with the category [7]. Paper X does not adopt either framework as a universal moral definition. The examples show why the participation mode of a helper should not be conflated with the substantive function or recipient-directed object of an assistance relation.

6.1 Assistance Episodes under Multi-Axial Typing

Let $\mathcal{G}$ denote the carrier of assistance episodes represented at the resolution used by an application. An element $g \in \mathcal{G}$ can be associated with the encounter episode $u = (h, b, \kappa, t)$, one or more typed response descriptions, a temporal support interval, an institutional embedding, and a participation descriptor. Write b_g and κ_g for the recipient and context determined by the episode, let $\mathcal{P}$ denote the application-defined space of participation descriptors, and let $\mathcal{T}_{\text{ep}}$ and $\mathcal{I}_{\text{ep}}$ denote the corresponding spaces of temporal supports and institutional embeddings. The formalism does not require every application to store these components in one tuple. It requires only that the components on which a classification depends be recoverable at the declared resolution.

Let $\mathcal{X}^{\sqcup}$ denote the disjoint union of the response spaces already introduced in Section 5, as stated in Equation 38.

$$\mathcal{X}^{\sqcup} := \bigsqcup_{\tau \in \mathcal{I}_{\text{sup}}} \mathcal{X}_{\tau}. \quad (38)$$

Each component $\mathcal{X}_{\tau}$ is identified with its canonical image in the disjoint union. An episode can admit several typed descriptions of the same underlying conduct. Let $\text{Resp} : \mathcal{G} \rightrightarrows \mathcal{X}^{\sqcup}$ be the response-description correspondence in Equation 39.

$$\text{Resp} : \mathcal{G} \rightrightarrows \mathcal{X}^{\sqcup}. \quad (39)$$

Equation 39 does not duplicate the event itself. It records the analytical possibility that one event can be described under more than one assistance lens. A single act of providing food after a disaster, for example, can be represented as an aid response, as part of a volunteer commitment, and as one component of a longer support relation. The disjoint union keeps the descriptions typed even when they refer to one underlying episode.

The episode also carries three conceptually different kinds of information. Let $\text{Adv}(g) \subseteq \mathcal{A}$ be the recognized adverse-state bundles toward which the episode is directed. Let Φ_b be a recipient-relative

space of sustaining targets for recipient b , including application-defined capabilities, continuity conditions, access relations, communicative channels, participation conditions, recovery processes, or relational stabilities. Let $\text{Keep}(g) \subseteq \Phi_b$ record the sustaining targets to which the episode is directed. Finally, let $\text{Part}(g) \in \mathcal{P}$ be a participation descriptor for the assisting side, with $\text{Time}(g) \in \mathfrak{T}_{\text{ep}}$ and $\text{Inst}(g) \in \mathfrak{I}_{\text{ep}}$. These projections are summarized in Equation 40.

$$\Sigma(g) := (\text{Resp}(g), \text{Adv}(g), \text{Keep}(g), \text{Part}(g), \text{Time}(g), \text{Inst}(g)). \quad (40)$$

Equation 40 is a relational signature rather than a moral score. $\text{Time}(g)$ records the episode's temporal support, and $\text{Inst}(g)$ records whatever institutional or role embedding the application needs. No component in the signature is presumed to determine permission, authority, voluntariness, effectiveness, or moral priority by itself.

Definition 6.1 (Assistance-label profile). For a declared operational criterion of volunteer participation v , the *assistance-label profile* of $g \in \mathcal{G}$ is the set

$$\Lambda_v(g) \subseteq \mathfrak{T}_{\text{sup}} = \{\text{aid}, \text{volunteering}, \text{support}\}, \quad (41)$$

whose membership conditions are specified in Subsections 6.2–6.4.

Definition 6.1 changes the interpretation of the provisional labels without changing their notation. A label is a lens under which an episode satisfies a declared relational criterion. Equation 41 therefore permits $|\Lambda_v(g)| > 1$. The labels are not presumed to be exclusive social kinds.

6.2 Adverse-State Direction in Aid

Aid is typed here through the object and direction of a response. The response is directed toward preventing, mitigating, repairing, relieving, or otherwise responding to a recognized adverse state, vulnerability, need, or adverse trajectory represented within $\mathcal{A}$. This usage remains broader than emergency humanitarian relief and narrower than every beneficial act.

For an episode g associated with context κ_g , define the aid criterion in Equation 42.

$$g \in \mathcal{G}_{\text{aid}} \iff \exists A \in \text{Adv}(g), \exists x \in \text{Resp}(g) \cap \mathcal{X}_{\text{aid}} \text{ such that } x \in \text{Fit}_{\text{aid}}(A, \kappa_g). \quad (42)$$

Equation 42 uses the response-fit relation from Section 5 but does not inherit any stronger normative conclusion from it. An episode can satisfy the aid criterion even if the response later proves ineffective, disproportionate, unauthorized, unwanted, or mistaken because the recognized adverse state was misclassified. Those further evaluations require additional relations.

The aid criterion is independent of the helper's participation mode. Its defining conditions use $\text{Adv}(g)$, an aid response description, response fit, and context, with no condition on $\text{Part}(g)$. A professional clinician, public employee, neighbor, or volunteer can therefore participate in an aid episode while remaining subject to different reasons, obligations, competences, and institutional constraints. Participation classification requires its own criterion.

6.3 Participation Mode in Volunteering

Volunteering is typed differently. Its primary object is the helper's mode of participation rather than the recipient's adverse state. Existing institutional and statistical definitions commonly emphasize a freely undertaken or non-compulsory contribution and the absence of ordinary wage-like payment as a defining basis, while allowing expense reimbursement or limited support in some settings [7, 9]. Paper X uses these sources to motivate a typing distinction, not to settle the philosophy of free will or to impose one employment-law boundary across all contexts.

Let $\mathbb{V} := \{\text{yes}, \text{no}, \text{undetermined}\}$, and let an application declare an operational participation criterion

$$v : \mathcal{P} \longrightarrow \mathbb{V}. \quad (43)$$

Equation 43 can use information about compulsion, role assignment, remuneration, expected exchange, exit conditions, organizational membership, or other context-sensitive features. It is an operational classifier. It is not a metaphysical proof that a subject possesses libertarian free will.

Within the support-relevant assistance domain of Paper X, define volunteering by Equation 44.

$$g \in \mathcal{G}_{\text{vol}}^v \iff v(\text{Part}(g)) = \text{yes}. \quad (44)$$

The restriction to $\mathcal{G}$ matters. Equation 44 does not assert that all volunteering is aid or support to a determinate recipient. Environmental volunteering, civic participation, knowledge production, cultural work, and many other voluntary activities can fall outside the assistance carrier modeled by this paper.

The volunteering criterion cannot be reduced to absence of monetary transfer. Equation 43 is defined on the full participation descriptor: an unpaid episode can fail a non-compulsion condition, while an application can classify expense reimbursement or limited material support as compatible with volunteering. The ILO measurement framework explicitly distinguishes non-compulsory volunteer work from compulsory unpaid activity and treats expense reimbursement as non-disqualifying [7]. This distinction becomes especially important for heterogeneous helpers, whose participation should not inherit a human labour-market concept of voluntariness without an application-specific argument.

6.4 Sustaining Function in Support

Support is typed through a sustaining relational function. The relevant object can be a capability, continuity condition, access relation, communication channel, participation possibility, recovery process, or relational stability whose preservation or restoration is treated as recipient-relevant. Support can therefore be responsive to an adverse state, but it need not wait for an acute adverse episode. It can be preventive, maintenance-oriented, enabling, rehabilitative, or continuity-preserving.

Let Sustain be the application-declared relation in Equation 45.

$$\text{Sustain} \subseteq \mathcal{X}_{\text{support}} \times \Phi_b \times \mathcal{K}. \quad (45)$$

A triple $(x, \phi, \kappa) \in \text{Sustain}$ means that response description x is represented, at the declared resolution, as directed toward maintaining, restoring, enabling, or stabilizing target ϕ in context κ . Define the support criterion in Equation 46.

$$g \in \mathcal{G}_{\text{sup}} \iff \exists \phi \in \text{Keep}(g), \exists x \in \text{Resp}(g) \cap \mathcal{X}_{\text{support}} \text{ such that } (x, \phi, \kappa_g) \in \text{Sustain}. \quad (46)$$

Equation 46 prevents support from becoming a residual category meaning merely “help that is not aid.” It has a positive relational object: the sustaining target. The target must itself be justified as recipient-relevant. A helper’s preference for preserving a relation or capability does not make that preservation support when the recipient rejects, outgrows, or reasonably seeks to transform it.

The support criterion does not require $\text{Adv}(g) \neq \emptyset$, because it is defined through $\text{Keep}(g)$, a support-typed response description, and Sustain. Preventive, enabling, maintenance, or continuity-preserving episodes can therefore count as support even when no acute adverse-state bundle is asserted at that time. Support can accordingly relate to prospective vulnerability, capability maintenance, or relational continuity before an adverse state crosses the threshold used by an aid classifier.

6.5 Multi-Label Co-instantiation

The three criteria can now be assembled into the profile introduced in Definition 6.1. For resolved volunteer classification, Equation 47 gives the profile explicitly.

$$\Lambda_v(g) := (\{\text{aid} : g \in \mathcal{G}_{\text{aid}}\}) \cup (\{\text{volunteering} : g \in \mathcal{G}_{\text{vol}}^v\}) \cup (\{\text{support} : g \in \mathcal{G}_{\text{sup}}\}). \quad (47)$$

The set-builder notation in Equation 47 means that a singleton is included when its criterion is satisfied and otherwise contributes the empty set. A profile can therefore contain none, one, two, or all three labels. Episodes with $v(\text{Part}(g)) = \text{undetermined}$ retain an unresolved volunteering classification rather than being forced into either class.

Table 7: Schematic assistance episodes under multi-axial typing.

Episode pattern	Aid lens	Volunteer lens	Support lens	Analytical point
Professionally assigned emergency response to a recognized injury	possible	not required	possible	Aid does not imply volunteering
Voluntary participation in routine capability maintenance with no acute adverse-state trigger	not required	possible	possible	Volunteering and support can co-instantiate without aid
Paid long-term accessibility or communication service	not required	not required	possible	Support does not imply unpaid or voluntary participation
Voluntary disaster relief followed by continuity-preserving assistance	possible	possible	possible	One trajectory can instantiate all three lenses
Unpaid compulsory service directed to an adverse state	possible	excluded by a non-compulsion criterion	possible	Nonpayment does not establish volunteering

Proposition 6.2 (Relational non-exclusivity). *The typing architecture does not imply pairwise disjointness among $\mathcal{G}_{\text{aid}}$, $\mathcal{G}_{\text{vol}}^v$, and $\mathcal{G}_{\text{sup}}$. Nor does it imply any subset relation among the three classes without additional application-specific constraints.*

Proof. The aid criterion is defined through adverse-state direction and aid response fit; the volunteering criterion is defined through the participation descriptor; and the support criterion is defined through a sustaining target and sustaining relation. Because the defining conditions concern different components of $\Sigma(g)$, satisfying one does not logically entail or contradict satisfaction of either other criterion. Any subset or disjointness result would therefore require an additional assumption linking those components. $\square$

Table 7 gives schematic witness patterns for Proposition 6.2. The examples are diagnostic patterns, not universal social classifications.

The table also clarifies why the typed reason spaces in Equation 25 remain useful. Even when one episode carries several labels, a reason to deliver urgent aid, a reason to enter or continue a voluntary commitment, and a reason to maintain a support relation can have different normative bridges, temporal horizons, undercutters, and response contents.

6.6 Temporal Retyping within Assistance Trajectories

Assistance relations can change type through time. Let an assistance trajectory be a finite sequence $\Gamma = (g_0, \dots, g_n)$ whose episodes are historically connected at the application resolution. Its label trajectory is defined in Equation 48.

$$\Lambda_v(\Gamma) := (\Lambda_v(g_0), \dots, \Lambda_v(g_n)). \quad (48)$$

Equation 48 allows emergency aid to become a continuing support relation, a volunteer contribution to become a professional role, or a professional service to acquire an additional voluntary component outside the original role. The same recipients and helpers need not remain under one label merely because the relation has historical continuity.

Assistance labels are recomputed from the episode-specific signature, so historical continuity alone does not preserve adverse-state direction, participation mode, sustaining target, response fit, or institutional embedding. A persistence claim therefore requires a rule linking the defining features across episodes. This prevents roles from becoming permanent merely by historical inheritance: a person who once volunteered need not remain a volunteer in every later role, a recipient of emergency aid need not remain indefinitely defined by that relation, and a support relation can end or transform as capacities and preferences change.

6.7 Recipient Engagement as an Independent Axis

Aid, volunteering, and support classify features of an assistance episode, but none of the three labels by itself answers whether the recipient requested, accepted, tolerated, declined, or could meaningfully evaluate the response. Let $\mathfrak{E}_{\text{rec}}$ be an application-defined set of recipient-engagement states and let Equation 49 define the corresponding episode-level relation.

$$\text{Eng} : \mathcal{G} \rightrightarrows \mathfrak{E}_{\text{rec}}. \quad (49)$$

The correspondence in Equation 49 is set-valued because recipient engagement can itself be uncertain, partially communicated, mediated by a representative, or unavailable under expressive opacity. Section 6 does not attempt to solve those cases. The later analysis of communicative standing examines this uncertainty in greater detail.

Proposition 6.3 (Recipient authorization remains an independent axis). *For any $\tau \in \mathfrak{T}_{\text{sup}}$, the fact that $\tau \in \Lambda_v(g)$ does not by itself determine an element of $\text{Eng}(g)$, a permission to act, or intervention authority.*

Proof. The label profile in Equation 47 is defined through the three relational criteria above. None of those criteria contains Eng, a permission relation, or the intervention-authority codomain distinguished in Section 5. The entailment therefore requires an additional bridge. $\square$

Proposition 6.3 is particularly important for support. A sustaining relation can be well intentioned and functionally effective while still being unwanted, paternalistic, dependency-producing, or outside the helper's authority. Conversely, a recipient can request assistance that a particular actor lacks competence or authority to provide. Relational typing identifies what kind of assistance relation is contemplated; it does not settle every condition of legitimate performance.

6.8 Reason-Type Translation after Relational Typing

Section 5 introduced the translation relation $\text{Tr}_{\tau \rightarrow \tau'}$ because reason tokens remain typed even when they concern related responses. The multi-label architecture sharpens that boundary. Co-instantiation of labels at the episode level is weaker than translation at the reason level.

Define the co-instantiation relation among assistance labels by Equation 50.

$$\tau \bowtie_g \tau' \iff \tau, \tau' \in \Lambda_v(g). \quad (50)$$

Equation 50 states only that episode g satisfies both relational criteria. It says nothing about whether a reason generated under one lens survives translation into the other.

Proposition 6.4 (Reason translation under co-instantiated assistance labels). *If $\tau \bowtie_g \tau'$, the architecture still supplies no derivation from $q \in \mathcal{Q}_\tau$ to an element of $\mathcal{Q}_{\tau'}$ unless a translation bridge such as $\text{Tr}_{\tau \rightarrow \tau'}$ is independently justified.*

Table 8: Relational typing across aid, volunteering, and support.

Lens	Primary typing locus	Positive criterion in Paper X	Not implied by the label
Aid	Response directed toward recognized adversity	Adverse-state orientation plus aid-typed response fit	Volunteer status, consent, success, proportionality, authority
Volunteering	Helper participation mode	Declared operational voluntariness criterion on $\text{Part}(g)$	Aid orientation, zero cost, absence of every benefit, recipient authorization
Support	Sustaining relational function	Response directed toward a declared recipient-relevant sustaining target	Acute suffering, unpaid participation, permanence, recipient acceptance, authority

Proof. Equation 50 is a relation on assistance labels indexed by an episode. The reason spaces $\mathcal{Q}_\tau$ and $\mathcal{Q}_{\tau'}$ remain distinct components of the disjoint union in Equation 25. Episode-level co-instantiation supplies no map between those codomains. Proposition 5.4 therefore continues to apply. $\square$

Proposition 6.4 resolves a potential ambiguity created by the multi-label model. The same food-delivery episode can be voluntary aid and continuing support, yet a reason to meet an urgent adverse need need not be identical to a reason to remain in a long-term support role, and neither reason automatically establishes that the helper should continue participating as a volunteer.

6.9 Relational-Type Audit

The distinctions developed in this section are summarized in Table 8. The table identifies the primary typing locus of each label and several conclusions that remain outside the label itself.

Research Obligation 6.5 (Relational-type specification). An application using the labels aid, volunteering, or support should declare the episode resolution, the positive criterion by which each label is assigned, the participation descriptor and voluntariness criterion when volunteering is used, the adverse-state orientation when aid is used, the sustaining target when support is used, the temporal and institutional embedding relevant to classification, and the recipient-engagement status where known. If one episode carries several labels, the application should preserve their separate reason provenance rather than silently merging the corresponding reason spaces.

Research Obligation 6.5 makes the section’s main methodological claim operational. Aid, volunteering, and support are not three names for a common quantity of benevolence. They type different components of an assistance relation and can overlap without becoming equivalent. The resulting multi-axial representation also preserves the boundaries established earlier in Paper X: a relational label does not establish the recipient’s ultimate subjectivity, a recognized adverse state does not itself establish a duty, and a fitting or support-sustaining response does not establish permission or intervention authority.

The subsequent analysis of subjectivity uncertainty can proceed without asking one relational label to carry metaphysical content it was not designed to bear. A helper can face a well-typed aid or support relation while remaining uncertain about phenomenal subjectivity, consciousness, or moral-patient status. Conversely, a strong subjectivity attribution does not determine which assistance relation, if any, is appropriate. Keeping these questions typed separately is necessary before Paper X turns to suffering recognition under uncertainty about the recipient as a subject.

7 Subjectivity Uncertainty in Suffering Recognition

This section isolates uncertainty about the recipient as a possible subject of experience from uncertainty about the adverse condition represented in Sections 2–6. Its role is to preserve agnosticism about whether an animal, artificial system, hypothetical alien, or unfamiliar human condition is conscious while keeping subjectivity uncertainty distinct from relationally recognizable adversity. This separation blocks both premature phenomenal attribution and wholesale exclusion of adversity from assistance reasoning. The objective is to represent subjectivity uncertainty at the epistemic level, distinguish capacity attributions from occurrent suffering attributions, identify which adverse-state classifications survive across live subjectivity hypotheses, and show when a defeasible response reason is robust or contingent with respect to those hypotheses. The method remains typed and non-reductive. Ultimate ontology remains suspended at $O^?$; the new objects introduced below are hypotheses and attribution structures within the modeled inquiry, not hidden ontological states.

Prior GR work on suffering recognition treated first-person suffering as epistemically mediated and separated phenomenal, manifested, functional, and relational dimensions [5]. Section 3 carried that separation into Paper X by proving that adverse-state uncertainty and subject-status uncertainty occupy different formal locations. The present section develops the latter uncertainty without undoing that result.

7.1 Subjectivity Hypotheses as Epistemic Objects

A claim such as “recipient b can undergo negatively valenced experience” is stronger than a claim that b exhibits a stable functional disruption or relational loss. To represent that stronger claim without converting $O^?$ into a latent-state space, let $\mathcal{U}_{\text{subj}}$ be a set of declared *subjectivity inquiries*. An inquiry $\zeta \in \mathcal{U}_{\text{subj}}$ specifies the capacity or status being investigated and the resolution at which rival hypotheses are distinguished. Examples include phenomenal consciousness, negatively valenced experience, temporally integrated experience, or another explicitly stated capacity relevant to suffering recognition. Paper X assumes no universal list.

For each ζ , let $\mathfrak{H}_\zeta$ be an application-defined set of mutually distinguishable subjectivity hypotheses. A hypothesis $\chi \in \mathfrak{H}_\zeta$ is an epistemic proposition about the recipient relative to inquiry ζ . It is not an element of $O^?$. Let ξ denote the epistemic policy by which evidence, prior knowledge, model assumptions, testimony, behavioral indicators, or other admissible materials are used to retain or exclude hypotheses. The live-hypothesis correspondence is stated in Equation 51.

$$\text{Subj}_{\xi, \zeta} : \mathcal{U} \times \mathcal{E} \rightrightarrows \mathfrak{H}_\zeta. \quad (51)$$

For an encounter $u = (h, b, \kappa, t)$ with evidence package e_u , define its live subjectivity-hypothesis set by Equation 52.

$$\mathfrak{H}_{u, \xi, \zeta}^{\text{live}} := \text{Subj}_{\xi, \zeta}(u, e_u). \quad (52)$$

Equation 52 is deliberately set-valued. Several hypotheses can remain live when the evidence does not discriminate among them at the declared resolution. The set can also change when the inquiry, evidence policy, or available evidence changes.

Definition 7.1 (Subjectivity uncertainty). For fixed (u, ξ, ζ) , *subjectivity uncertainty* is present when $|\mathfrak{H}_{u, \xi, \zeta}^{\text{live}}| > 1$. A singleton live set is *hypothesis-determinate at the declared policy and resolution*; an empty live set is *live-hypothesis vacancy*. Neither case is identified with ontological certainty. The uncertainty is unresolved rather than probabilistic unless the application separately supplies a probability model on $\mathfrak{H}_\zeta$.

Definition 7.1 prevents live-hypothesis vacancy from being misread as certainty merely because multiplicity is absent. It also preserves the warning introduced in Section 3.1. Uncertainty does not by itself justify assigning a probability distribution to ultimate ontology. An application may use probabilistic evidence models, but such a model concerns the analyst’s epistemic representation of hypotheses. It does not turn $O^?$ into a random variable.

Proposition 7.2 (Subjectivity hypotheses under ontological suspension). *The introduction of $\mathfrak{H}_\zeta$ and $\text{Subj}_{\xi,\zeta}$ does not modify Proposition 3.1: no element of $\mathfrak{H}_\zeta$ is thereby identified with an element or state of $\mathcal{O}^?$.*

Proof. Equation 51 has codomain $\mathfrak{H}_\zeta$, which is defined as an epistemic hypothesis space. No map from $\mathfrak{H}_\zeta$ into $\mathcal{O}^?$, or from $\mathcal{O}^?$ into $\mathfrak{H}_\zeta$, has been introduced. The ontological non-assertion established in Section 3.1 therefore remains unchanged. $\square$

Proposition 7.2 makes the level distinction explicit: Paper X can compare rival subjectivity attributions without treating any attribution as direct access to ultimate ontology.

7.2 Capacity Attribution and Occurrent Adverse-State Attribution

Subjectivity inquiries often concern a capacity, while suffering recognition concerns an occurrent or historically situated state. The distinction matters even when subjectivity is not heterogeneous. A human capable of pain need not currently be in pain; a system for which negatively valenced experience is a live hypothesis need not be in such a state in the current episode; and a recipient can undergo a relational or functional adverse condition even if the inquiry into phenomenal valence remains unresolved.

Let $\mathfrak{H}_\zeta^{\text{cap}} \subseteq \mathfrak{H}_\zeta$ denote the hypotheses under inquiry ζ that attribute the relevant subjectivity capacity to recipient b . Let $\mathcal{A}_{\text{phen-attr}} \subseteq \mathcal{A}$ denote the phenomenal-attribution component introduced in Section 4. Define the two predicates in Equation 53.

$$\begin{aligned} \text{Cap}_{u,\zeta} &: \iff \mathfrak{H}_{u,\xi,\zeta}^{\text{live}} \cap \mathfrak{H}_\zeta^{\text{cap}} \neq \emptyset, \\ \text{Occ}_u^{\text{phen}} &: \iff \mathcal{A}_u^{\text{rec}} \cap \mathcal{A}_{\text{phen-attr}} \neq \emptyset. \end{aligned} \tag{53}$$

The first predicate states only that at least one live subjectivity hypothesis attributes the relevant capacity. The second states that the current recognition set contains at least one phenomenal-state attribution. Neither predicate is treated as ontological truth.

Proposition 7.3 (Separation of subjectivity capacity and occurrent attribution). *Within the present architecture, neither $\text{Cap}_{u,\zeta} \Rightarrow \text{Occ}_u^{\text{phen}}$ nor $\text{Occ}_u^{\text{phen}} \Rightarrow \text{Cap}_{u,\zeta}$ is derivable without an additional bridge connecting capacity hypotheses to current-state recognition.*

Proof. $\text{Cap}_{u,\zeta}$ is defined on the live-hypothesis set of Equation 52, whereas $\text{Occ}_u^{\text{phen}}$ is defined on the adverse-state recognition set $\mathcal{A}_u^{\text{rec}}$. The architecture supplies no map between those carriers. Hence neither implication follows by type alone. $\square$

Proposition 7.3 prevents two symmetric mistakes. A positive subjectivity-capacity attribution cannot substitute for evidence that a current adverse state is present. Conversely, an episode-level phenomenal attribution can remain epistemically live even when the broader subjectivity inquiry is unsettled, provided the interpretive regime permits such an attribution as a provisional description rather than as ontological proof.

7.3 Subjectivity-Conditioned Recognition Families

The recognition correspondence in Section 2 can be refined when some interpretations depend explicitly on a subjectivity hypothesis. For fixed ι , ξ , and ζ , define a family of hypothesis-conditioned recognition correspondences by Equation 54.

$$\text{Rec}_\iota^\chi : \mathcal{E} \rightrightarrows \mathcal{A}, \quad \chi \in \mathfrak{H}_\zeta. \tag{54}$$

Equation 54 does not require every adverse-state description to depend on χ . A functional disruption, dependency failure, exposure relation, or trajectory-level loss can remain recognized under several competing subjectivity hypotheses. Phenomenal-attribution descriptions, by contrast, may be sensitive to which hypotheses are live and to the evidential bridge the interpretive regime uses.

For encounter u with evidence e_u , define the family of live conditioned recognition sets by Equation 55.

$$\mathfrak{R}_u^{\text{cond}} := \left\{ \text{Rec}_t^\chi(e_u) : \chi \in \mathfrak{H}_{u,\xi,\zeta}^{\text{live}} \right\}. \quad (55)$$

The family in Equation 55 permits a direct test of which adverse-state descriptions depend on the unresolved subjectivity question.

Definition 7.4 (Subjectivity-robust and subjectivity-contingent recognition). Assume $\mathfrak{H}_{u,\xi,\zeta}^{\text{live}} \neq \emptyset$. The *subjectivity-robust recognized set* and the *subjectivity-possible recognized set* are

$$\mathcal{A}_u^{\text{rob-subj}} := \bigcap_{\chi \in \mathfrak{H}_{u,\xi,\zeta}^{\text{live}}} \text{Rec}_t^\chi(e_u), \quad (56)$$

$$\mathcal{A}_u^{\text{poss-subj}} := \bigcup_{\chi \in \mathfrak{H}_{u,\xi,\zeta}^{\text{live}}} \text{Rec}_t^\chi(e_u). \quad (57)$$

A description in the difference $\mathcal{A}_u^{\text{poss-subj}} \setminus \mathcal{A}_u^{\text{rob-subj}}$ is *subjectivity-contingent* at the declared inquiry resolution.

Equations 56 and 57 bound the recognition problem from two directions. Definition 7.4 introduces no preference for the intersection merely because it is robust. The intersection records what remains recognized across all currently live subjectivity hypotheses; the union records what remains possible under at least one. Which set should guide a response is a later normative and decision problem. Robustness is also conditional on the declared live-hypothesis family: an omitted but epistemically serious hypothesis can change both the intersection and the union. Applications should therefore justify the policy by which hypotheses enter or leave the live set rather than treating robustness relative to an under-specified model set as robustness to subjectivity uncertainty in general.

Proposition 7.5 (Persistence of relational adversity under subjectivity uncertainty). *If $A \in \mathcal{A}_u^{\text{rob-subj}}$ and $|\mathfrak{H}_{u,\xi,\zeta}^{\text{live}}| > 1$, then subjectivity uncertainty is present while the adverse-state description A remains recognized under every live subjectivity hypothesis.*

Proof. The inequality establishes subjectivity uncertainty by Definition 7.1. Membership of A in the intersection of Equation 56 establishes that $A \in \text{Rec}_t^\chi(e_u)$ for every live χ . The two statements therefore coexist without contradiction. $\square$

Proposition 7.5 gives formal content to a central boundary of Paper X. Uncertainty about phenomenal subjectivity does not imply that every functional, dependency, exposure, relational, or trajectory-level adverse description must disappear. It also does not establish that those descriptions carry the same normative significance under every theory of subjectivity. The proposition concerns recognition persistence, not moral equivalence.

7.4 Subjectivity Sensitivity of Saliency and Reason Bridges

Recognition robustness does not guarantee reason robustness. A recognized relational condition may remain stable across subjectivity hypotheses while a particular normative bridge changes its applicability. To keep these layers separate, refine the saliency and bridge interfaces only when an application declares subjectivity dependence.

For each live hypothesis χ , let Sal_τ^χ denote the subjectivity-conditioned saliency correspondence, and let App^χ denote subjectivity-conditioned bridge applicability. Their types are given in Equation 58.

$$\begin{aligned} \text{Sal}_\tau^\chi &: \mathcal{A} \times \mathcal{K} \rightrightarrows \mathcal{S}, \\ \text{App}^\chi &\subseteq \mathfrak{N} \times \mathcal{U} \times \mathcal{A} \times \mathcal{S}^+ \times \mathfrak{T}_{\text{sup}} \times \mathcal{X}^{\sqcup}. \end{aligned} \quad (58)$$

The superscript χ records conditional analysis, not ontological truth. An application can set $\text{Sal}_\tau^\chi = \text{Sal}_\tau$ or $\text{App}^\chi = \text{App}$ when the relevant interface is expressly independent of the subjectivity hypothesis.

Definition 7.6 (Subjectivity-robust reason certificate). Assume $\mathfrak{H}_{u,\xi,\zeta}^{\text{live}} \neq \emptyset$. Let $c = (u, A, s, \tau, x, \eta)$ be a reason provenance certificate as in Definition 5.1. The certificate is *subjectivity-robust* relative to (ξ, ζ) when, for every $\chi \in \mathfrak{H}_{u,\xi,\zeta}^{\text{live}}$,

$$A \in \text{Rec}_t^\chi(e_u), \quad s \in \text{Sal}_\tau^\chi(A, \kappa) \cap \mathcal{S}^+, \quad (\eta, u, A, s, \tau, x) \in \text{App}^\chi, \quad (59)$$

with $x \in \text{Fit}_\tau(A, \kappa)$ as in Section 5.

Definition 7.6 is intentionally stronger than robust recognition. It requires the recognition, salience, response fit, and bridge applicability needed for the same certificate to survive every currently live subjectivity hypothesis.

Proposition 7.7 (Subjectivity-independent reason persistence). *Suppose $c = (u, A, s, \tau, x, \eta)$ is a valid reason provenance certificate, $A \in \mathcal{A}_u^{\text{rob-subj}}$, and for every live χ the equalities $\text{Sal}_\tau^\chi = \text{Sal}_\tau$ and $\text{App}^\chi = \text{App}$ hold on the arguments of c . Then c is subjectivity-robust in the sense of Definition 7.6.*

Proof. $A \in \mathcal{A}_u^{\text{rob-subj}}$ yields recognition of A under every live χ by Equation 56. Because c is already a valid certificate, its salience, response-fit, and bridge-applicability conditions hold under the unconditioned interfaces. The assumed equalities transfer the salience and bridge conditions to each live χ , while response fit is unchanged. Hence all conditions in Equation 59 hold for every live hypothesis. $\square$

Proposition 7.7 identifies a limited but important case. A reason grounded in preventing a recognized functional collapse, restoring access, preserving a dependency relation, or avoiding an irreversible trajectory can remain standing across unresolved subjectivity hypotheses when the normative bridge is itself justified independently of the disputed phenomenal capacity. The proposition does not say that such a bridge is always justified. It states what follows when an application explicitly supplies one.

The converse need not hold. If a bridge is expressly grounded in the recipient's capacity for phenomenal suffering, then uncertainty about that capacity can make the certificate subjectivity-contingent even when a functional adverse state is robustly recognized. This is an epistemic and normative contingency, not a proof that the relational adverse state disappears.

7.5 Inclusion and Exclusion under Subjectivity Uncertainty

Subjectivity uncertainty creates two symmetrical temptations. One is automatic inclusion: familiar expressions, self-reports, or human-like behavior are treated as sufficient to settle subjectivity and phenomenal suffering. The other is automatic exclusion: unfamiliar embodiment, artificial construction, inaccessible communication, or unresolved consciousness is treated as sufficient to remove the recipient from the field of support-relevant recognition. The present architecture licenses neither move by default.

Let Incl_ζ and Excl_ζ be application-defined decision predicates on live subjectivity-hypothesis sets. Their use is represented abstractly in Equation 60.

$$\text{Incl}_\zeta, \text{Excl}_\zeta : \mathcal{P}(\mathfrak{H}_\zeta) \longrightarrow \{0, 1\}. \quad (60)$$

Equation 60 makes explicit that inclusion or exclusion is a further rule. Nothing in the cardinality of the live-hypothesis set alone determines either predicate.

Proposition 7.8 (Exclusion requires an explicit decision rule). *There is no derivation in the architecture from $|\mathfrak{H}_{u,\xi,\zeta}^{\text{live}}| > 1$ to $\mathcal{A}_u^{\text{rec}} = \emptyset$, $\mathcal{S}^+ = \emptyset$, or $\mathcal{Q}_u^{\text{stand}} = \emptyset$. Any such conclusion requires additional assumptions about recognition, salience, bridge applicability, or reason defeat.*

Proof. Subjectivity uncertainty is defined solely by multiplicity in the live subjectivity-hypothesis set under Definition 7.1. The recognized-state, salience, and reason sets are produced by different correspondences and relations defined in Sections 2 and 5. No rule in the architecture maps the cardinality condition to emptiness of those codomains. Proposition 7.5 supplies an explicit compatible case in which uncertainty and nonempty robust recognition coexist. $\square$

Table 9: Audit of subjectivity uncertainty in support-relevant suffering recognition.

Object	What it represents	Permitted use	Not established automatically
$\mathfrak{H}_{u,\xi,\zeta}^{\text{live}}$	Epistemically live hypotheses for a declared subjectivity inquiry	Preserve unresolved subjectivity alternatives	Ultimate ontology or a probability distribution over $\mathcal{O}^?$
$\text{Cap}_{u,\zeta}$	At least one live hypothesis attributing the relevant capacity	Record that capacity attribution remains epistemically live	Current phenomenal suffering
$\mathcal{A}_u^{\text{rob-subj}}$	Adverse descriptions surviving every live subjectivity hypothesis	Identify relational recognition invariant to the disputed subjectivity question	Equal moral importance under all hypotheses
$\mathcal{A}_u^{\text{poss-subj}}$	Adverse descriptions supported under at least one live hypothesis	Preserve possible subjectivity-sensitive interpretations	Permission to act on the most expansive interpretation
Subjectivity-robust certificate	Recognition, salience, fit, and bridge applicability surviving all live hypotheses	Identify a defeasible reason whose stated provenance is invariant to current subjectivity uncertainty	All-things-considered duty or intervention authority

Proposition 7.9 (Intervention requires premises beyond subjectivity attribution). *Even if an application retains only subjectivity hypotheses that attribute the relevant capacity, this does not by itself establish an occurrent adverse state, a support-salient classification, an all-things-considered duty, recipient authorization, or intervention authority.*

Proof. The first non-entailment is Proposition 7.3. Support salience requires the separate correspondence Sal_τ . An all-things-considered duty requires the additional resolution architecture distinguished in Section 5. Recipient authorization is independent by Proposition 6.3, and intervention authority remains a separate codomain under Proposition 2.7. Hence a positive capacity attribution cannot supply those conclusions by itself. $\square$

Propositions 7.8 and 7.9 make the framework deliberately symmetric. It resists both anthropomorphic over-attribution and uncertainty-based erasure. The later section on precautionary response will ask what kinds of response may be justified when the costs of those two errors are asymmetric. The present section only preserves the distinctions that such an analysis will require.

7.6 Subjectivity-Uncertainty Audit

Table 9 summarizes the principal objects introduced in this section and the stronger conclusions they do not license automatically.

Research Obligation 7.10 (Subjectivity-uncertainty specification). An application that relies on uncertainty about recipient subjectivity should declare the subjectivity inquiry ζ , the hypothesis space $\mathfrak{H}_\zeta$, the epistemic policy ξ , the evidence used to retain or exclude hypotheses, whether the claim concerns a capacity or an occurrent state, which adverse-state classifications vary across live hypotheses, and whether salience or normative-bridge applicability is subjectivity-dependent. If an inclusion, exclusion, weighting, or precautionary rule is used, that rule should be stated separately rather than inferred from uncertainty itself.

Research Obligation 7.10 keeps uncertainty auditable at the point where heterogeneous cases become most vulnerable to hidden assumptions. A human-like surface should not silently settle phenomenal status; an unfamiliar or artificial surface should not silently negate it; and a live subjectivity dispute should not be allowed to erase independently recognizable relational adversity without an explicit reason for doing so.

The section therefore completes the separation announced in Section 3.5. Subjectivity uncertainty is modeled through epistemic hypotheses rather than through a probability distribution on suspended ontology. Capacity attribution is distinct from current suffering attribution. Adverse-state recognition can be robust or contingent across subjectivity hypotheses, and defeasible response reasons can likewise be robust or contingent depending on their provenance and normative bridge. The next section turns to a related but different problem: even when a possible recipient has relevant standing or subjectivity remains live, what can be recognized when its communicative form is unfamiliar, inaccessible, translated, strategically filtered, or otherwise opaque?

8 Communicative Standing under Expressive Opacity

This section examines a problem that remains after subjectivity uncertainty has been separated from adverse-state recognition. A possible recipient may have relevant relational standing, and an adverse condition may be support-salient, while the recipient’s communicative form remains unfamiliar, inaccessible, mediated, strategically filtered, technically constrained, or otherwise difficult to interpret. The role of this section is to represent expressive opacity while preserving indeterminacy about communicative absence, preference, consent, refusal, and suffering whenever the available evidence leaves those interpretations open. The objective is to define communicative standing narrowly, locate semantic opacity within the manifestation–evidence architecture developed in Section 3, distinguish communicative eligibility from successful decoding, and identify which engagement classifications survive across live semantic interpretations. The method is again typed and set-valued. No communicative object introduced below establishes legal standing, moral patienthood, consciousness, consent, or intervention authority.

The earlier epistemology of suffering already emphasized that relational dynamics can remain partially observable under semantic opacity and that unfamiliar manifestations can be misclassified through human-centered interpretive regimes [5]. Work on augmentative and alternative communication likewise treats communicative competence as dynamic and interpersonal, with environmental barriers and supports affecting whether communication can be functionally realized [8]. Paper X uses that neighboring insight cautiously: communicative opacity is modeled as a property of an encounter and its interfaces, not as a deficit located automatically inside the possible recipient.

8.1 Communicative Standing as Epistemic Eligibility

The term *communicative standing* is used here in a deliberately limited sense. It names an epistemic-procedural status: whether recipient-linked expressions, omissions, interaction patterns, or mediated signals are eligible to enter the reconstruction of the recipient’s engagement, preference, request, refusal, distress, or other application-defined communicative state. It does not mean legal standing, decision-making capacity, moral status, or a finding that any particular trace has a determinate semantic content.

Let $\mathcal{Y}^{\text{expr}}$ be a space of application-defined *candidate expressive traces*. An element of $\mathcal{Y}^{\text{expr}}$ may be linguistic, gestural, behavioral, interface-mediated, physiological, symbolic, temporal, or relational, provided the application states why the trace is eligible for communicative analysis. Let ω denote a communicative-standing policy. Define the standing predicate by Equation 61.

$$\text{CSt}_{\omega} : \mathcal{U} \longrightarrow \{0, 1\}. \quad (61)$$

When $\text{CSt}_{\omega}(u) = 1$, the possible recipient in encounter u is admitted as a potential source of communicatively relevant evidence under policy ω . The predicate does not state that communication has succeeded.

Definition 8.1 (Communicative standing). A recipient has *communicative standing* in encounter u under policy ω when $\text{CSt}_\omega(u) = 1$. Standing requires that the application’s procedure remain open to recipient-linked traces as potentially constraining its reconstruction of recipient engagement, rather than excluding those traces solely because the expressive mode is unfamiliar or nonstandard.

Definition 8.1 makes standing weaker than successful interpretation and stronger than mere physical observability. A machine log, bodily movement, vocalization, change in interaction pattern, or absence of an expected action may be observable without being admitted as communicative evidence. Conversely, communicative standing can remain in place when no trace has yet been decoded.

Proposition 8.2 (Communicative standing and semantic determinacy). *The condition $\text{CSt}_\omega(u) = 1$ does not entail that any candidate expressive trace in encounter u has a unique, correct, or even currently recoverable semantic interpretation.*

Proof. Equation 61 has codomain $\{0, 1\}$ and records only epistemic eligibility. It contains no semantic reconstruction map and no uniqueness condition. Semantic interpretation is introduced separately below. Hence successful decoding cannot follow from standing by type alone. $\square$

Proposition 8.2 prevents communicative inclusion from becoming a license for anthropomorphic interpretation. The converse is equally important: failure to decode a trace under one regime does not establish absence of communicative standing.

8.2 Expression, Capture, and Semantic Reconstruction

Section 3 distinguished manifestation from evidence. Communicative analysis requires one further distinction inside the evidence layer: an evidence package can contain candidate expressive material without that material already possessing a settled meaning for the observer.

Let Expr_ω extract the candidate expressive traces admitted under standing policy ω , as typed in Equation 62:

$$\text{Expr}_\omega : \mathcal{U} \times \mathcal{E} \rightrightarrows \mathcal{Y}^{\text{expr}}. \quad (62)$$

For encounter u with evidence e_u , define

$$\mathcal{Y}_{u,\omega}^{\text{expr,cand}} := \text{Expr}_\omega(u, e_u). \quad (63)$$

The set in Equation 63 can be empty because nothing was captured, because the relevant channel was inaccessible, because the standing policy excluded the available traces, or because the application lacks a rule for identifying candidate expression. These possibilities should not be conflated.

Let $\mathcal{M}_{\text{sem}}$ be an application-defined space of semantic hypotheses. A semantic hypothesis need not be a sentence. It may encode an engagement state, preference, request, refusal, distress signal, orientation, or another declared communicative content. Let δ denote a decoding regime containing the linguistic, behavioral, technical, cultural, species-relative, interface-relative, or model-based resources used for interpretation. Define the decoding correspondence in Equation 64.

$$\text{Dec}_\delta : \mathcal{Y}^{\text{expr}} \times \mathcal{K} \rightrightarrows \mathcal{M}_{\text{sem}}. \quad (64)$$

For a candidate trace y in context κ , the set $\text{Dec}_\delta(y, \kappa)$ contains the semantic hypotheses retained by regime δ .

Definition 8.3 (Expressive opacity). A candidate expressive trace y is *semantically determinate* under (δ, κ) when $|\text{Dec}_\delta(y, \kappa)| = 1$. It exhibits *interpretive multiplicity* when that cardinality exceeds one and *semantic vacancy* when the retained set is empty. Paper X uses *expressive opacity* for the non-singleton cases, provided the source of non-singleton reconstruction is reported rather than attributed automatically to the recipient.

Definition 8.3 deliberately includes two different failures of determinate interpretation. Multiplicity means that several semantic hypotheses remain live; vacancy means that the present regime yields none. Vacancy is not represented as a special semantic value meaning “nothing was communicated.” It is a failure of the current reconstruction procedure to retain a meaning.

Proposition 8.4 (Decoding vacancy and communicative standing). *Suppose $\text{CSt}_\omega(u) = 1$ and $y \in \mathcal{Y}_{u,\omega}^{\text{expr},\text{cand}}$. If $\text{Dec}_\delta(y, \kappa) = \emptyset$, it does not follow that y is noncommunicative, that the recipient lacks a communicative capacity, or that another admissible decoding regime δ' must also return the empty set.*

Proof. The empty image is indexed by the declared regime δ and context κ in Equation 64. Communicative standing is separately defined by Equation 61, while communicative capacity belongs to the kind of subjectivity or capability inquiry separated in Section 7. No equality between decoding regimes is assumed. Hence none of the three conclusions follows from emptiness under one regime. $\square$

Proposition 8.4 localizes failure more carefully. Opacity can arise from the recipient’s expressive repertoire, the helper’s interpretive repertoire, the recording channel, translation, environmental noise, institutional categories, interface design, strategic concealment, or mismatch among these components. The formalism does not decide which source dominates without additional evidence.

8.3 Recipient Engagement under Semantic Multiplicity

Section 6.7 introduced the recipient-engagement correspondence Eng without specifying how engagement is reconstructed. The present section supplies one possible interface. The application-defined engagement-state space remains $\mathfrak{E}_{\text{rec}}$. Define

$$\text{EngSem} : \mathcal{M}_{\text{sem}} \rightrightarrows \mathfrak{E}_{\text{rec}} \quad (65)$$

Equation 65 maps a semantic hypothesis to the recipient-engagement states compatible with that hypothesis.

For a trace y with nonempty live meaning set $\mathcal{M}_{y,\delta,\kappa}^{\text{live}} := \text{Dec}_\delta(y, \kappa)$, define the possible and robust engagement sets by Equations 66 and 67.

$$\mathfrak{E}_y^{\text{poss}} := \bigcup_{m \in \mathcal{M}_{y,\delta,\kappa}^{\text{live}}} \text{EngSem}(m), \quad (66)$$

$$\mathfrak{E}_y^{\text{rob}} := \bigcap_{m \in \mathcal{M}_{y,\delta,\kappa}^{\text{live}}} \text{EngSem}(m). \quad (67)$$

The first set retains engagement states supported under at least one live interpretation; the second retains only engagement states compatible with every live interpretation.

Definition 8.5 (Engagement robustness under expressive opacity). Assume $\mathcal{M}_{y,\delta,\kappa}^{\text{live}} \neq \emptyset$. An engagement state $r \in \mathfrak{E}_{\text{rec}}$ is *robust under expressive opacity* for trace y when $r \in \mathfrak{E}_y^{\text{rob}}$. It is *interpretation-contingent* when it belongs to $\mathfrak{E}_y^{\text{poss}} \setminus \mathfrak{E}_y^{\text{rob}}$.

Definition 8.5 gives the paper a way to preserve communicative content without pretending that every ambiguity has been resolved. A gesture can be ambiguous between “accept assistance now” and “accept only if condition c holds” while both interpretations still exclude “decline all contact.” In that case some engagement information is robust even though the complete meaning is not. The robustness claim remains conditional on the live semantic set generated by the declared decoder and context. A plausible meaning omitted by the decoding architecture can invalidate the intersection without appearing inside it, so applications should distinguish robustness across retained meanings from robustness to semantic uncertainty more generally.

Proposition 8.6 (Semantic multiplicity can preserve engagement information). *If $|\mathcal{M}_{y,\delta,\kappa}^{\text{live}}| > 1$ and $\mathfrak{E}_y^{\text{rob}} \neq \emptyset$, then the trace is expressively opaque in the sense of Definition 8.3 while still supporting at least one engagement classification invariant across all live semantic hypotheses.*

Proof. The cardinality condition establishes interpretive multiplicity. Nonemptiness of the intersection in Equation 67 yields an engagement state contained in $\text{EngSem}(m)$ for every live semantic hypothesis m . The two properties are therefore compatible. $\square$

Proposition 8.6 is the communicative analogue of Proposition 7.5. Uncertainty at one representational layer need not erase every stable distinction at the next.

8.4 Silence, Omission, and Semantic Indeterminacy

Expressive opacity is often most dangerous when an observer converts non-response into a substantive engagement state. To expose that inference, let $\emptyset_{\text{obs}}$ denote an application-level record that no candidate expressive trace was captured within the declared observation window. This notation is an observational status, not a semantic hypothesis.

Any interpretation of observational silence requires an explicit silence rule

$$\text{Sil}_\delta : \{\emptyset_{\text{obs}}\} \times \mathcal{K} \rightrightarrows \mathcal{M}_{\text{sem}}. \quad (68)$$

where the rule may return several hypotheses or none.

Proposition 8.7 (Silence interpretation requires an explicit rule). *From $\emptyset_{\text{obs}}$ alone, Paper X derives neither acceptance, refusal, indifference, incapacity, absence of suffering, nor absence of communicative standing.*

Proof. The record $\emptyset_{\text{obs}}$ enters semantic reconstruction only through an application-supplied rule such as Equation 68. None of the listed engagement or subjectivity conclusions is encoded in the observational status itself. Communicative standing is separately typed by Equation 61. Hence each substantive interpretation requires an additional bridge. $\square$

Proposition 8.7 applies equally to familiar and heterogeneous recipients. Silence may reflect refusal, inability to access the offered channel, latency, fatigue, strategic withholding, technical failure, environmental constraint, unrecognized expression elsewhere, or no communicative act at all. The architecture preserves these possibilities until an application supplies grounds for narrowing them.

8.5 Mediation, Translation, and Communicative Provenance

Communication under heterogeneity often passes through a person, device, learned code, translation model, institutional representative, caregiver, interface, or other mediator. Mediation can make otherwise inaccessible expression usable, but it also introduces a new transformation whose provenance should remain visible.

Let $\mathfrak{D}_{\text{med}}$ be a set of mediation configurations. For $d \in \mathfrak{D}_{\text{med}}$, define the mediation correspondence

$$\text{Med}_d : \mathcal{Y}^{\text{expr}} \rightrightarrows \mathcal{Y}^{\text{expr}}. \quad (69)$$

The same carrier $\mathcal{Y}^{\text{expr}}$ is used because a mediated output can itself become a new candidate expressive trace. Equation 69 is set-valued so that translation, interpretation, compression, or interface conversion need not be treated as lossless or unique.

A communicative provenance record for a reconstructed meaning is represented by

$$c^{\text{comm}} := (u, y, d, y', \delta, m), \quad (70)$$

where y is the admitted source trace, $y' \in \text{Med}_d(y)$ is the mediated trace, and $m \in \text{Dec}_\delta(y', \kappa)$ is the retained semantic hypothesis.

Definition 8.8 (Communicative provenance certificate). A tuple of the form in Equation 70 is a *communicative provenance certificate* when each transformation it records is admissible under the application’s declared standing, mediation, and decoding rules.

Definition 8.8 distinguishes recipient-linked expression from the mediated representation through which a helper accesses it. This distinction is especially important when an interpreter, caregiver, institution, or machine-learning system speaks *about* a recipient. The mediated output can be highly informative without becoming identical to the recipient’s own communicative act.

Proposition 8.9 (Provenance preservation under mediation). *If a semantic hypothesis m is available only through a mediation configuration d , the architecture does not permit the mediated trace y' to be substituted for the source trace y without retaining the mediation relation in the provenance record.*

Proof. Equation 70 types the reconstructed meaning through both y and the mediation step d . Dropping either component produces a different tuple and loses information used to identify the route by which m entered the analysis. No identity axiom $y = y'$ is assumed. $\square$

Proposition 8.9 does not distrust mediation. It makes mediation auditable. A reliable interpreter or well-designed interface can reduce opacity; another mediator can amplify or distort it. The relational location of the difficulty therefore remains open to investigation.

8.6 Communicative Standing, Reasons, and the Consent Boundary

Recipient engagement can alter the reason architecture of Section 5, but only through an explicit normative bridge. Let $\mathfrak{N}_{\text{eng}}$ be a set of declared engagement-sensitive bridges. For $\eta_{\text{eng}} \in \mathfrak{N}_{\text{eng}}$, define an applicability relation of the form

$$\text{App}^{\text{eng}} \subseteq \mathfrak{N}_{\text{eng}} \times \mathcal{U} \times \mathfrak{E}_{\text{rec}} \times \mathfrak{T}_{\text{sup}} \times \mathcal{X}'^{\sqcup}. \quad (71)$$

Equation 71 permits a robustly reconstructed request, decline, pause signal, or condition of acceptance to enter reason provenance. It does not predefine what normative force any engagement state must have.

Proposition 8.10 (Communicative reconstruction and consent remain distinct). *Even when an engagement state $r \in \mathfrak{E}_y^{\text{rob}}$ is robust across all live semantic hypotheses, Paper X does not identify r with valid consent, valid refusal, legal authorization, or intervention authority unless the application supplies the additional criteria appropriate to that status.*

Proof. The robust engagement set in Equation 67 has codomain $\mathfrak{E}_{\text{rec}}$. Consent validity, refusal validity, legal authorization, and intervention authority belong to different normative or legal codomains that are outside the definition of EngSem. No bridge from one codomain to the others is supplied by semantic robustness alone. $\square$

Proposition 8.10 protects both sides of the communicative relation. A helper should not convert an ambiguous signal into consent merely because action seems beneficial. At the same time, a recipient who communicates through an unfamiliar channel should not be excluded from preference-sensitive reasoning merely because the helper lacks immediate semantic fluency. The appropriate response to uncertainty may include interpretation, channel adaptation, consultation, delay, or another low-interference measure, but the justification of such precautions belongs to the later analysis of precautionary response rather than to the standing definition itself.

8.7 Communicative-Standing Audit

Table 10 summarizes the principal distinctions established in this section.

Table 10: Audit of communicative standing under expressive opacity.

Object	What it represents	Permitted use	Not established automatically
$CSt_{\omega}(u)$	Eligibility of recipient-linked expression to enter communicative reconstruction	Prevent exclusion solely because expressive form is unfamiliar	Semantic success, consciousness, legal or moral standing
$\mathcal{Y}_{u,\omega}^{\text{expr},\text{cand}}$	Candidate expressive traces extracted from the evidence package	Identify material requiring communicative interpretation	That every trace is intentional communication
$Dec_{\delta}(y, \kappa)$	Semantic hypotheses retained by a decoding regime	Preserve multiplicity or vacancy under opacity	A uniquely correct meaning
$\mathfrak{E}_y^{\text{rob}}$	Engagement classifications shared by all live semantic hypotheses	Identify engagement information invariant to current interpretive ambiguity	Valid consent, refusal, permission, or authority
c^{comm}	Source, mediation, decoding, and meaning provenance	Audit how a reconstructed meaning entered assistance reasoning	Identity of mediator output with recipient expression

Research Obligation 8.11 (Communicative-standing specification). An application that relies on recipient communication should declare the communicative-standing policy ω , the rule by which candidate expressive traces are extracted, the decoding regime δ , the treatment of semantic multiplicity and semantic vacancy, any silence rule, the engagement-state space, every mediation configuration used, and the provenance of reconstructed meanings. If an engagement state is used to alter response reasons, consent, refusal, permission, or authority, the corresponding normative or legal bridge should be stated separately rather than inferred from communicative standing or semantic robustness alone.

Research Obligation 8.11 prevents expressive opacity from being resolved by an undocumented human-centered default. Communicative difficulty can be distributed across recipient, helper, channel, environment, institution, and interpretive regime. A sufficiently auditable analysis therefore records both what was inferred and how the recipient became communicatively legible to the assistance system.

The section establishes a narrow but important conclusion. Communicative standing can persist without determinate semantic decoding; semantic multiplicity can preserve robust engagement information; silence carries no default meaning; and mediation can expand access without becoming identical to recipient expression. None of these results establishes consent or intervention authority. They instead preserve a communicative interface through which heterogeneous recipients can constrain assistance reasoning even when their expressive form is not transparently human-readable. The next section turns from the single encounter to the interpretive systems that make some expressions legible and others obscure: cross-subject recognition regimes.

9 Cross-Subject Recognition Regimes

The preceding sections have made recognition increasingly local to a declared encounter. Evidence is produced through a manifestation–capture interface, interpreted through a regime, represented as one or

more typed adverse-state descriptions, and then connected to assistance salience and defeasible reasons through separately declared bridges. Heterogeneous-subject analysis introduces a further problem. A recognition regime can work tolerably within the domain for which its categories, sensors, baselines, temporal resolutions, and communicative assumptions were developed while transferring poorly to recipients whose support-recognition interfaces differ. The role of this section is to formalize that transfer problem. Its objective is to specify what must be preserved when a recognition regime is used across subject domains, identify where portability can fail, and distinguish transfer failure from a conclusion that the target lacks the corresponding adverse state. The formalism permits both shared and domain-specific recognition machinery where the declared interfaces justify them.

The earlier GR epistemology of suffering already warned that human-readable manifestation is not identical to morally relevant adverse reality and that unfamiliar expression can be missed or inverted by an inherited interpretive system [5]. Sections 3 and 8 have refined the same problem by separating relational configuration, manifestation, evidence production, semantic reconstruction, and communicative standing. The present section treats cross-subject recognition as a problem of *regime portability*: whether distinctions made in one recipient domain survive a declared transport to another at the resolution relevant to support.

9.1 Recipient Domains and Recognition Regimes

Let q index an application-defined recipient domain. A domain can be narrower than a species or platform class: for example, adult speakers using a shared language, a particular animal population under a specified behavioral observation protocol, an artificial-agent architecture with defined telemetry, or a hypothetical alien interaction class. Let

$$\mathfrak{D}_q := (\mathcal{E}_q, \mathcal{A}_q, \Sigma_q, \mathcal{K}_q) \quad (72)$$

collect the evidence packages admitted in the domain, the adverse-state descriptions used at the declared resolution, the relevant support-recognition interface signature from Equation 13, and the contexts in which recognition is assessed. Equation 72 is an analytical domain declaration, not an ontology of the recipient.

A recognition regime used in domain q is written

$$\rho_q := (\iota_q, \text{Rec}_{\iota_q} |_{\mathcal{E}_q}, \mathfrak{B}_q, \Theta_q^{\text{rec}}), \quad (73)$$

where ι_q is the interpretive regime, $\mathfrak{B}_q$ records the baseline/comparator specifications used by its typed adverse-state descriptions, and Θ_q^{rec} records the temporal resolutions at which its classifications are intended to hold. The restricted correspondence in Equation 73 preserves the set-valued recognition architecture of Equation 2.

Definition 9.1 (Cross-subject recognition problem). Given source and target domains $\mathfrak{D}_s$ and $\mathfrak{D}_t$, a *cross-subject recognition problem* asks whether a distinction produced by recognition regime ρ_s can be carried into $\mathfrak{D}_t$ at a declared comparison resolution without silently importing source-specific evidence channels, baselines, temporal scales, communicative assumptions, or adverse-state semantics.

Definition 9.1 makes the source–target direction explicit. Porting a human clinical criterion to an animal, porting an animal-welfare indicator to an artificial system, or porting an artificial-system integrity alarm to a human recipient are different transfer problems even when the same ordinary-language label is used.

Proposition 9.2 (Recognition regimes remain domain-relative). *The architecture developed so far does not select a unique recognition regime ρ^* that is privileged across every recipient domain.*

Proof. Equation 2 indexes recognition by an interpretive regime. Equation 14 makes interface comparison relative to a declared specification. Adverse descriptions require type-specific baselines, while

communicative reconstruction depends on standing and decoding regimes in Section 8. No ordering or selection functional over these components has been introduced. A universal privileged regime therefore does not follow from the present architecture. $\square$

Proposition 9.2 is a statement about the present formal commitments, not a proof that universal recognition standards are impossible. A future theory could justify one. Paper X instead requires the universalizing step to be argued rather than supplied by familiarity with one subject class.

9.2 Evidence and Adverse-State Transport Bridges

Cross-subject transfer requires a way to compare both inputs and outputs. Let

$$\eta_{t \rightarrow s} : \text{dom}(\eta_{t \rightarrow s}) \subseteq \mathcal{E}_t \longrightarrow \mathcal{E}_s \quad (74)$$

be a partial *evidence transport bridge*. Equation 74 makes the bridge partial rather than assuming that every target evidence package has a source-domain translation. The direction $t \rightarrow s$ means that a target-domain evidence package is represented in the input language expected by the source regime. The bridge can preserve selected features rather than the entire evidence package. It may therefore encode a measurement translation, behavioral correspondence, interface adapter, feature extractor, temporal resampling rule, or another application-defined relation.

Let

$$\alpha_{s \rightarrow t} : \text{dom}(\alpha_{s \rightarrow t}) \subseteq \mathcal{A}_s \longrightarrow \mathcal{A}_t \quad (75)$$

be a partial *adverse-state transport bridge*. Equation 75 likewise leaves undefined any source classification for which no justified target representation has been supplied. This bridge states how an adverse description produced in the source vocabulary is represented in the target vocabulary. It can rely on a comparison specification of the kind introduced in Equation 23, but it need not assert complete equivalence of the recipients or their states.

Definition 9.3 (Recognition transport package). A *recognition transport package* from source domain s to target domain t is a tuple

$$\mathcal{T}_{s \rightsquigarrow t} := (\eta_{t \rightarrow s}, \alpha_{s \rightarrow t}, \Lambda, \Xi), \quad (76)$$

where Λ declares the interface distinctions required to justify the evidence bridge and Ξ declares the adverse-state features intended to be preserved by the output bridge. Equation 76 keeps these two preservation specifications visible.

Given a package in Definition 9.3, the source regime induces a ported target-side recognition correspondence

$$\text{Rec}_{\mathcal{T}}^{s \rightsquigarrow t}(e) := \alpha_{s \rightarrow t} \left[\text{Rec}_{\mathcal{E}_s}(\eta_{t \rightarrow s}(e)) \cap \text{dom}(\alpha_{s \rightarrow t}) \right], \quad (77)$$

for target evidence $e \in \text{dom}(\eta_{t \rightarrow s})$. Square brackets in Equation 77 denote the image of a set under the partial map $\alpha_{s \rightarrow t}$.

Proposition 9.4 (Two-bridge requirement). A *source recognition correspondence cannot, within the present typed architecture, be interpreted as a target-domain recognition rule merely from the existence of an evidence bridge $\eta_{t \rightarrow s}$. An adverse-state bridge $\alpha_{s \rightarrow t}$, or an equivalent explicit output-identification rule, is additionally required whenever $\mathcal{A}_s$ and $\mathcal{A}_t$ are not literally the same declared carrier at the same resolution.*

Proof. After applying $\eta_{t \rightarrow s}$, the source correspondence returns elements of $\mathcal{A}_s$ by Equation 2. Target-side support salience is evaluated on descriptions in $\mathcal{A}_t$. Without $\alpha_{s \rightarrow t}$ or an explicit identification of the two carriers, the output of the source rule has the wrong declared type for target-side reasoning. Hence an input bridge alone is insufficient. $\square$

Proposition 9.4 is especially important when the same word masks different constructs. A source regime may use “withdrawal,” “damage,” “dependency,” or “distress” in a way calibrated to one embodiment or architecture. Translating target observations into that source vocabulary does not yet show that the resulting source classification has the same relational meaning in the target.

9.3 Exact and Resolution-Relative Portability

A target domain can have its own independently justified recognition regime ρ_t . The ported source regime can then be compared with that target regime rather than being presumed correct by construction.

Definition 9.5 (Exact recognition portability). A source regime ρ_s is *exactly portable* to target regime ρ_t through $\mathcal{T}_{s \rightsquigarrow t}$ on a test domain $D \subseteq \text{dom}(\eta_{t \rightarrow s})$ when

$$\text{Rec}_{\mathcal{T}}^{s \rightsquigarrow t}(e) = \text{Rec}_{\iota_t}(e) \quad \text{for every } e \in D. \quad (78)$$

Exact portability is agreement with the declared target regime, not a claim that the target regime is an epistemic oracle. The quality of the comparator remains independently auditable. Definition 9.5 deliberately uses equality of the complete recognized sets. Exact equality can be stronger than an application needs. Let

$$\pi_{\Xi} : \mathcal{A}_t \rightrightarrows Z_{\Xi} \quad (79)$$

be a comparison projection retaining only the distinctions declared relevant under Ξ . Equation 79 is set-valued so that one target description may preserve several comparison features. For a set $S \subseteq \mathcal{A}_t$, write $\pi_{\Xi}[S] := \bigcup_{a \in S} \pi_{\Xi}(a)$.

Definition 9.6 (Resolution-relative recognition portability). The source regime is Ξ -portable to the target through $\mathcal{T}_{s \rightsquigarrow t}$ on D when

$$\pi_{\Xi}[\text{Rec}_{\mathcal{T}}^{s \rightsquigarrow t}(e)] = \pi_{\Xi}[\text{Rec}_{\iota_t}(e)] \quad \text{for every } e \in D. \quad (80)$$

Definition 9.6 permits two regimes to disagree about distinctions irrelevant to the immediate support question while preserving the feature that matters. For example, two regimes may use different internal taxonomies yet agree that a self-maintaining process is failing, that an external dependency has become unavailable, or that the recipient’s future option set is contracting. The preserved feature should be declared rather than inferred from verbal similarity. The comparison resolution must also carry substantive information for the intended use. A projection that maps every recognized state to the same feature would make Equation 80 true trivially while preserving nothing diagnostically useful. An application claiming Ξ -portability should therefore justify why π_{Ξ} preserves the distinctions material to the downstream recognition or support question.

Define the portability-defect set by

$$\mathfrak{P}_{s \rightsquigarrow t}^{\text{def}}(D; \Xi) := \{e \in D : \pi_{\Xi}[\text{Rec}_{\mathcal{T}}^{s \rightsquigarrow t}(e)] \neq \pi_{\Xi}[\text{Rec}_{\iota_t}(e)]\}. \quad (81)$$

Equation 81 localizes portability failure to the tested domain and comparison resolution instead of converting it into a global judgment about the target subject.

Proposition 9.7 (Portability is specification-relative). *Failure of exact portability in Equation 78 does not entail failure of Ξ -portability, and success of Ξ -portability does not entail exact portability unless π_{Ξ} separates all target adverse-state descriptions relevant on D .*

Proof. The projection π_{Ξ} can identify distinct elements or sets of $\mathcal{A}_t$. Therefore two unequal recognition outputs can have equal projected images, establishing the first statement. Conversely, equality after a non-injective projection does not imply equality before projection. Exact portability follows only when the declared projection is sufficiently separating on the outputs encountered in D . $\square$

Proposition 9.7 prevents a local success from becoming a global equivalence claim. A regime that transfers adequately for detecting resource deprivation need not transfer for recognizing pain-like manifestation, communication, consent, or trajectory-level harm.

9.4 Direct Transfer and Human-Readable Defaults

The most common portability assumption is often not stated as a transport package at all. An analyst simply applies a familiar source regime to the target as if the evidence and adverse-state carriers were unchanged. Within the current notation, this amounts to silently using identity bridges.

Definition 9.8 (Unlicensed direct transfer). *A direct transfer from s to t uses the source recognition rule on the target without a nontrivial declared transport package. It is *unlicensed* relative to comparison specification Λ when the analysis relies on that transfer while $\Sigma_s \not\sim_\Lambda \Sigma_t$ and supplies no argument showing why the mismatched interface components are irrelevant to the recognition distinction at issue.*

Definition 9.8 does not prohibit direct transfer; it makes the missing invariance argument visible.

Proposition 9.9 (Interface mismatch and transfer licensing). *The interface mismatch in Definition 9.8 is insufficient to prove that every source-domain classification is wrong in the target, but it is sufficient to defeat any inference that the source regime transfers merely because it worked in the source domain.*

Proof. By Equation 14, signature mismatch records a difference under the declared comparison specification. The mismatch does not determine the recognition output and therefore cannot prove misclassification. But source-domain success contains no premise establishing invariance to the mismatched component. Automatic transfer would require precisely such an invariance or bridge premise. Hence the inference is unsupported without additional justification. $\square$

Proposition 9.9 captures the role of human-readable bias without making “human” itself the formal problem. A regime can be nonportable because it depends on speech, facial expression, nociceptive physiology, institutional documentation, a particular timescale, or a specific control interface. The same portability defect can arise between two human populations or two artificial architectures. Human-centeredness is one historically important instance of source-domain overgeneralization, not the mathematical definition of heterogeneity.

9.5 Coverage, Exclusion, and Regime Plurality

A regime can also fail by returning no recognized adverse description for evidence packages that another admissible regime treats as informative. For regime ρ on domain q , define its recognition-coverage set by

$$\mathcal{C}_{\rho,q} := \{e \in \mathcal{E}_q : \text{Rec}_{\iota_\rho}(e) \neq \emptyset\}. \quad (82)$$

Equation 82 defines coverage only as nonempty recognition under the selected regime. The complement $\mathcal{E}_q \setminus \mathcal{C}_{\rho,q}$ is an *unclassified region* under that regime. It is not, by definition, a region in which no adverse condition exists.

Proposition 9.10 (Recognition vacancy is regime-relative). *If $e \notin \mathcal{C}_{\rho,q}$, then the architecture licenses only the claim that regime ρ retains no adverse-state description for e . It does not entail that every admissible regime has empty output, that the compatible relational-state fiber contains no adverse configuration, or that the recipient lacks a support-relevant adverse condition.*

Proof. Membership in $\mathcal{C}_{\rho,q}$ is defined only through Rec_{ι_ρ} . Other recognition regimes are independent indices of the recognition correspondence, while the relational-state inverse fiber is defined upstream in Section 3.5. No rule identifies emptiness under one regime with emptiness under every regime or with absence at the relational layer. $\square$

Proposition 9.10 therefore prevents regime-relative vacancy from being used as a negative ontological or normative finding.

When several regimes are admissible for the same target domain, let $\mathfrak{R}_t^{\text{live}}$ be a nonempty live regime family. Define the regime-robust and regime-possible recognized sets by

$$\mathcal{A}_t^{\text{reg,rob}}(e) := \bigcap_{\rho \in \mathfrak{R}_t^{\text{live}}} \text{Rec}_{\iota_\rho}(e), \quad (83)$$

$$\mathcal{A}_t^{\text{reg,pos}}(e) := \bigcup_{\rho \in \mathfrak{R}_t^{\text{live}}} \text{Rec}_{\iota_\rho}(e). \quad (84)$$

Proposition 9.11 (Robust recognition survives regime disagreement). *If $a \in \mathcal{A}_t^{\text{reg,rob}}(e)$, then every live recognition regime retains a for evidence e , even if the regimes disagree on other descriptions. This regime robustness does not establish ontological certainty, moral status, or an all-things-considered response requirement.*

Proof. The first statement follows from intersection in Equation 83. The remaining non-entailments follow from the cross-layer boundary in Section 3 and the normative typing established in Section 5: recognition outputs do not have the codomain of ontological verdicts, duties, or intervention authority. $\square$

Proposition 9.11 identifies a limited invariant across the declared live regime family; it does not elevate that invariant beyond the recognition layer. It also does not establish robustness to regimes that the application failed to retain. The admissibility and update rule for $\mathfrak{R}_t^{\text{live}}$ is therefore part of the epistemic burden of a robustness claim.

The pair in Equations 83–84 is useful when no single target regime is presently authoritative. The nonemptiness condition avoids assigning a vacuous universal meaning to the intersection when an application has not retained any live regime at all; in that case the regime comparison remains unspecified rather than automatically robust. It keeps disagreement visible while identifying classifications that do not depend on choosing among the live regimes. Section 7 used a structurally similar construction across subjectivity hypotheses; here the index of plurality is the recognition regime itself.

9.6 Calibration, Revision, and Nonmonotonic Transfer

Cross-subject recognition should remain revisable as new paired observations, interventions, communication channels, measurements, or relational histories become available. Let

$$\mathfrak{R}_{s,t} := \{(e_s, e_t, \zeta) : \zeta \text{ records an application-justified comparison relation}\} \quad (85)$$

Equation 85 defines only a schematic record of comparative evidence. It does not assume that the paired cases are identical or that ζ is an oracle. The relation ζ can record matched perturbations, shared functional consequences, dependency structure, independently established outcomes, communicative correspondence, or another declared basis for comparison. It should not be read as a ground-truth label unless the application can justify that stronger status.

A revision operator may then update either the regime or the transport package,

$$\text{Upd} : (\rho_s, \rho_t, \mathcal{T}_{s \rightsquigarrow t}, \mathfrak{R}_{s,t}) \mapsto (\rho'_s, \rho'_t, \mathcal{T}'_{s \rightsquigarrow t}). \quad (86)$$

Paper X imposes no monotonicity requirement on Equation 86. A revision can add a previously unreadable manifestation to a recognition fiber, remove a false analogy, split one coarse adverse category into several types, merge distinctions irrelevant to the support question, or change the evidence bridge itself.

Proposition 9.12 (Revisability of cross-subject calibration). *Without an additional monotonicity axiom on Upd, neither recognition coverage nor the set of ported classifications is guaranteed to expand under cross-subject calibration.*

Proof. Equation 86 places no inclusion constraint on the revised recognition correspondence, coverage set, or transport bridges. An update can add or remove classifications. Therefore monotone expansion is not derivable from the architecture alone. $\square$

Proposition 9.12 matters because improved recognition is not synonymous with recognizing more. A less anthropomorphic regime can become more selective; a revised animal-welfare model can reject a human analogy while adding species-relevant indicators; an artificial-system monitor can discard expressive cues that were artifacts of interface design while retaining stronger trajectory-level evidence.

9.7 Recognition Transport and Normative Equivalence

Even a successful cross-subject transport remains an epistemic and representational result. Suppose Ξ -portability holds for a feature such as persistent dependency failure or contraction of future options. The result shows that a declared distinction is preserved across regimes at that resolution. It does not establish that the recipients have identical phenomenal experience, identical moral status, identical preferences, or that the same response is fitting, permissible, obligatory, or authorized.

Proposition 9.13 (Recognition transport and normative separation). *Let ρ_s be Ξ -portable to ρ_t on D . Then equality in Equation 80 alone does not imply equality of support salience, equality of generated reason profiles, or equality of permission or intervention authority across the two domains.*

Proof. Support salience is separately indexed by assistance label and context in Section 2; response reasons additionally require response fit and an applicable normative bridge in Section 5; and permission or authority has not been identified with either recognition or reason generation. The portability equation has none of these objects in its codomain. The normative conclusions therefore require additional bridges. $\square$

Proposition 9.13 marks the boundary between successful recognition transport and later normative translation.

This proposition prevents cross-subject comparability from becoming an equality of treatment rule. The recognition framework can establish that two cases share a declared adverse feature while leaving open whether assistance should take the same form. Heterogeneous embodiment, communication, dependency structure, recipient engagement, risk, and institutional role can all alter the later response problem.

9.8 Cross-Subject Regime Audit

Table 11 summarizes the main portability interfaces and the failure that each declaration is intended to expose.

Research Obligation 9.14 (Cross-subject recognition-regime specification). An application that transfers a recognition regime across subject domains should declare the source and target domains, the relevant interface comparison specification, the evidence transport bridge, the adverse-state transport bridge, the resolution at which portability is claimed, why the comparison projection preserves distinctions material to the intended use, the domain on which the claim is assessed, the rule governing any live alternative target regimes, and the calibration or revision procedure. A failure of portability should be reported as a failure of the declared regime or bridge at that resolution unless an independent argument supports the stronger claim that the target lacks the corresponding adverse state.

Research Obligation 9.14 makes explicit what ordinary-language appeals to “the same signs” or “the same criterion” often leave implicit. Cross-subject recognition can be rigorous without requiring identical embodiment, communication, or ontology, but only if the preserved distinctions and translation steps are stated. The next section can then address a different question: how should assistance reasoning proceed when recognition remains uncertain and the costs of false exclusion and false inclusion are asymmetric?

Table 11: Audit of cross-subject recognition regimes.

Interface	Required declaration	What it tests	Error prevented
Recipient domain	$\mathfrak{D}_q$ and Σ_q	Which evidence, state descriptions, contexts, channels, and timescales define the recognition problem	Treating a species or platform label as a complete recognition model
Evidence bridge	$\eta_{t \rightarrow s}$ and Λ	Which target features are rendered source-readable and why the translation is justified	Assuming familiar source indicators remain available or equivalent in the target
Adverse-state bridge	$\alpha_{s \rightarrow t}$ and Ξ	Which source-side classifications preserve a declared target-side feature	Treating shared words as identical adverse states
Portability test	D , π_Ξ , and $\mathfrak{P}^{\text{def}}$	Whether the ported regime and target regime agree at the required resolution	Calling source-domain validation cross-subject validation
Regime plurality	$\mathfrak{R}_t^{\text{live}}$	Which descriptions are robust or merely possible across live target regimes	Hiding interpretive disagreement behind a single selected regime
Calibration record	$\mathfrak{K}_{s,t}$ and Upd	How new comparison evidence revises regimes or bridges	Treating cross-subject categories as historically fixed or necessarily monotone

10 Precautionary Response under Recognition Error

The preceding sections have separated recognition, support salience, defeasible reasons, subjectivity uncertainty, communicative opacity, and cross-subject regime portability. This section examines a narrower decision problem that appears when those layers remain unsettled at the time a response must be considered: how can the architecture represent precaution when recognition may be wrong and the practical consequences of false exclusion and false inclusion are asymmetric? The objective is to specify the additional objects required before uncertainty can support a defeasible precautionary response reason. A general precautionary principle and a presumption of intervention remain outside the section’s scope.

Precaution has a substantial literature in risk analysis and environmental ethics. Sandin distinguishes threat, uncertainty, action, and command dimensions in formulations of the precautionary principle, while Aven emphasizes that the type and degree of uncertainty require separate analysis rather than being treated as a single undifferentiated trigger [10, 1]. A domain-specific animal-sentence account likewise shows how precaution can be formulated for decisions made under inconclusive evidence without treating the evidential question as already settled [2]. Paper X borrows the analytical discipline of separating adverse possibility, uncertainty, response, and normative force; it does not adopt a general command that uncertain threat makes action mandatory. In the present architecture, a precautionary response remains relative to a declared uncertainty set, consequence model, loss comparison, response domain, and normative bridge.

The section proceeds in six stages. It first distinguishes recognition error from response error. It

then introduces response-consequence and loss descriptions without presuming a scalar utility. Third, it defines a precautionary response specification and a robust nondominance criterion across live interpretations. Fourth, it analyzes reversibility, interference, information preservation, and delay as optional response properties rather than universal goods. Fifth, it joins subjectivity, regime, and communicative uncertainty into a common response problem. Finally, it restates the boundary between precautionary reason, all-things-considered duty, and intervention authority.

10.1 Recognition Error Relative to a Declared Comparator

Recognition error cannot be defined against the suspended ontological level $O^?$, because Section 3 deliberately supplies no modeled map from that level. Nor should a selected target recognition regime be called ground truth merely because it is used for evaluation. Paper X therefore defines error relative to a declared comparison specification.

Definition 10.1 (Recognition comparator). *A recognition comparator for encounter u is a nonempty set $\mathcal{A}_u^{\text{cmp}} \subseteq \mathcal{A}$ whose evidential, retrospective, experimental, communicative, or model-based justification is explicitly declared. The superscript “cmp” records comparison status and does not denote ontological truth.*

Definition 10.1 permits several evaluation designs. A comparator may be constructed after richer observation, through a better-supported target regime, from a matched intervention, from later communicative clarification, or from another application-specific procedure. The procedure itself remains open to criticism.

For a recognized set $\mathcal{A}_u^{\text{rec}}$, define false-exclusion and false-inclusion descriptors by

$$\text{FE}_u := \mathcal{A}_u^{\text{cmp}} \setminus \mathcal{A}_u^{\text{rec}}, \quad (87)$$

$$\text{FI}_u := \mathcal{A}_u^{\text{rec}} \setminus \mathcal{A}_u^{\text{cmp}}. \quad (88)$$

Equations 87 and 88 are typed comparison errors. They are not statistical Type I and Type II errors unless an application separately supplies a statistical testing model.

Proposition 10.2 (Comparator relativity of recognition error). *The sets FE_u and FI_u are determined relative to $\mathcal{A}_u^{\text{cmp}}$. Changing the comparator can change either error set without any change in the observed evidence or original recognition regime.*

Proof. Both sets are defined by set difference with $\mathcal{A}_u^{\text{cmp}}$ in Equations 87–88. Replacing that comparator by another set changes the relevant set differences in general while leaving $\mathcal{A}_u^{\text{rec}}$ fixed. $\square$

Proposition 10.2 prevents retrospective evaluation from acquiring more epistemic authority than its construction warrants. A comparator is not required to be available prospectively. Equations 87–88 are principally audit objects when the comparator is constructed after the encounter. Precautionary choice at the time of uncertainty instead uses the live state family introduced below; otherwise the decision rule would improperly depend on information available only in retrospect.

Recognition error should also be distinguished from response error. Let $x \in \mathcal{X}$ be a candidate response. A recognition may agree with the comparator while the response is badly fitted, harmful, mistimed, or unauthorized. Conversely, a recognition may contain a false inclusion while a conservative response remains acceptable across both the recognized and comparator sets.

Proposition 10.3 (Recognition correctness and response adequacy remain distinct). *Even when $\text{FE}_u = \text{FI}_u = \emptyset$, the architecture does not entail that a contemplated response is fitting, effective, permissible, obligatory, or authorized.*

Proof. Empty error sets establish only equality between $\mathcal{A}_u^{\text{rec}}$ and $\mathcal{A}_u^{\text{cmp}}$. Response fit is separately represented by $\text{Fit}_\tau(A, \kappa)$ in Section 5, while effectiveness, permission, obligation, and authority require further objects or bridges not contained in the set equality. $\square$

Proposition 10.3 is important for precaution because a strategy of merely maximizing recognition sensitivity can still generate poor responses.

10.2 Response Consequences and Error-Sensitive Loss Descriptions

Precaution requires a model of what may happen under alternative responses. Paper X keeps this layer set-valued because heterogeneous-subject cases often do not support a single cardinal utility function.

Let $\mathcal{X}_u^{\text{adm}} \subseteq \mathcal{X}$ be the response domain admitted for analysis at encounter u . Admission into this set is descriptive and procedural: it records responses under consideration, not responses already judged permissible. Include a distinguished non-initiation response x^0 when the application wishes to compare direct response with non-initiation.

Let $\mathcal{Y}_{\text{con}}$ be a space of consequence descriptions and define a consequence correspondence

$$\text{Conseq}_u : \mathcal{X}_u^{\text{adm}} \times \mathcal{A} \rightrightarrows \mathcal{Y}_{\text{con}}. \quad (89)$$

Equation 89 permits uncertainty about outcomes even conditional on an adverse-state description and response.

A loss description need not be scalar. Let $\mathcal{L}$ be a typed loss space and define

$$\ell_u : \mathcal{X}_u^{\text{adm}} \times \mathcal{A} \rightrightarrows \mathcal{L}. \quad (90)$$

Possible coordinates of $\mathcal{L}$ can include unalleviated adversity, response-induced disruption, interference with recipient engagement, loss of future options, destruction of evidence, delay cost, resource displacement, and third-party effects. These coordinates are application-declared. Their inclusion does not establish that they have equal moral importance or a common cardinal scale.

Definition 10.4 (Recognition-conditioned response-loss envelope). For a live adverse-state family $\Omega_u \subseteq \mathcal{A}$, the *response-loss envelope* of x is

$$\mathfrak{L}_u(x \mid \Omega_u) := \bigcup_{A \in \Omega_u} \ell_u(x, A). \quad (91)$$

Equation 91 constructs the envelope in Definition 10.4. Definition 10.4 records the loss descriptions that remain possible across the live adverse-state family. It does not aggregate them.

For explicit error analysis, define the two loss envelopes below.

$$\mathfrak{L}_u^{\text{FE}}(x) := \bigcup_{A \in \text{FE}_u} \ell_u(x, A), \quad (92)$$

$$\mathfrak{L}_u^{\text{FI}}(x) := \bigcup_{A \in \text{FI}_u} \ell_u(x, A). \quad (93)$$

When an error set is empty, the corresponding union is empty by convention. Equations 92 and 93 expose the asymmetry question without deciding it.

Remark 10.5 (Error-cost asymmetry remains application-specific). Paper X does not assume that false exclusion is always worse than false inclusion, or conversely. Missing a severe adverse state can be costly; so can unnecessary modification, restraint, confinement, resource use, or interference generated by a false inclusion. The relevant comparison depends on the response, recipient, context, reversibility, timing, and loss specification.

Remark 10.5 blocks a common shortcut in precautionary reasoning. The mere presence of uncertainty does not specify which error should receive priority.

10.3 Precautionary Specifications and Robust Nondominance

To move from uncertainty to a precautionary response claim, the application must declare how loss descriptions are compared. Let $\preceq_\lambda$ be a preorder on $\mathcal{L}$ or on a declared coarsening of $\mathcal{L}$, indexed by a comparison specification λ . The interpretation $l_1 \preceq_\lambda l_2$ means that l_1 is no worse than l_2 at the declared resolution. No total order is required.

Definition 10.6 (Precautionary response specification). A *precautionary response specification* for encounter u is the tuple

$$\mathfrak{P}_u := (\Omega_u, \mathcal{X}_u^{\text{adm}}, \ell_u, \preceq_\lambda, \mathfrak{N}_u^{\text{prec}}), \quad (94)$$

where Ω_u is the live adverse-state family, ℓ_u is the typed loss correspondence, $\preceq_\lambda$ is the declared loss comparison, and $\mathfrak{N}_u^{\text{prec}}$ is the family of normative bridges permitted to generate precautionary defeasible reasons. For the robust-dominance construction below, the specification is required to satisfy $\Omega_u \neq \emptyset$, $\mathcal{X}_u^{\text{adm}} \neq \emptyset$, and $\ell_u(x, A) \neq \emptyset$ for every admitted response x and live adverse-state description A . These nonemptiness conditions prevent universal comparisons from becoming true merely because an application omitted the losses to be compared.

Equation 94 records the components of Definition 10.6. The definition separates descriptive uncertainty from normative force. A loss comparison can identify one response as less exposed to declared losses without itself generating a reason to choose that response; the normative bridge remains explicit.

For set-valued loss outputs, say that x *robustly loss-dominates* x' on Ω_u , written $x \preceq_{u,\lambda}^{\text{rob}} x'$, when

$$\forall A \in \Omega_u, \forall l \in \ell_u(x, A), \forall l' \in \ell_u(x', A), l \preceq_\lambda l'. \quad (95)$$

Equation 95 is intentionally strong. The nonemptiness requirements in Definition 10.6 ensure that its universal comparisons are substantive rather than vacuous. Applications may adopt weaker dominance or aggregation rules, but they must state them.

Define the robustly nondominated response set

$$\mathcal{X}_u^{\text{ND}} := \left\{ x \in \mathcal{X}_u^{\text{adm}} : \nexists x' \in \mathcal{X}_u^{\text{adm}} \text{ with } x' \preceq_{u,\lambda}^{\text{rob}} x \text{ and not } x \preceq_{u,\lambda}^{\text{rob}} x' \right\}. \quad (96)$$

Proposition 10.7 (Precautionary selection is bridge-dependent). *Membership in $\mathcal{X}_u^{\text{ND}}$ does not by itself generate a defeasible reason, all-things-considered duty, permission, or intervention authority for the response.*

Proof. Equation 96 is constructed from the response domain, live state family, loss correspondence, and loss preorder. None has the codomain of normative reasons or authority. A defeasible reason requires an applicable normative bridge as established in Section 5; permission, duty, and authority require additional resolution or institutional bridges. $\square$

Proposition 10.7 is the section’s main normative restraint. “Precautionary” names a response relation under a declared uncertainty and loss model, not an automatic command.

A precautionary bridge can now be represented without hiding the asymmetry premise. For $\eta^{\text{prec}} \in \mathfrak{N}_u^{\text{prec}}$, write

$$\eta^{\text{prec}} : (\mathfrak{P}_u, x \in \mathcal{X}_u^{\text{ND}}, \kappa) \rightsquigarrow q_x^{\text{prec}} \in \mathcal{Q}. \quad (97)$$

Equation 97 generates only a defeasible reason. Its justification can depend on declared asymmetry between omission loss and intervention loss, urgency, reversibility, catastrophic possibility, vulnerability, or another normative premise. Paper X does not select among those premises here.

10.4 Reversibility, Interference, Information, and Delay

Under recognition uncertainty, several response properties often matter because they alter the cost of being wrong. Paper X treats them as independent descriptors rather than as a universal ranking.

Let

$$\text{Rev}_u(x) \in \{0, 1\}, \quad \text{declared reversibility,} \quad (98)$$

$$\text{Int}_u(x) \in \mathcal{D}_{\text{int}}, \quad \text{interference profile,} \quad (99)$$

$$\text{Inf}_u(x) \in \mathcal{D}_{\text{inf}}, \quad \text{information effect,} \quad (100)$$

$$\text{Del}_u(x) \in \mathcal{D}_{\text{del}}, \quad \text{delay or timing profile.} \quad (101)$$

Equations 98, 99, 100, and 101 keep reversibility, interference, information effect, and timing as distinct descriptors. The domains $\mathcal{D}_{\text{int}}$, $\mathcal{D}_{\text{inf}}$, and $\mathcal{D}_{\text{del}}$ remain application-specific. For example, an information effect can distinguish evidence-preserving, evidence-generating, and evidence-destroying responses; a timing profile can distinguish immediate, delayed, staged, or deadline-sensitive responses.

Definition 10.8 (Epistemically protective response). A response x is *epistemically protective* at encounter u relative to a declared comparison when it preserves or improves the application-defined information relation while not eliminating all currently live response options solely through its implementation.

Definition 10.8 is intentionally weaker than “safe.” Information-seeking, communication attempts, reversible preparation, monitoring, temporary stabilization, referral, or staged assistance can sometimes satisfy it, but none does so by definition.

Proposition 10.9 (Conditional precautionary role of low interference). *No ordering in the present architecture implies that a response with lower declared interference is always preferable under uncertainty.*

Proof. The loss correspondence in Equation 90 can include delay, unalleviated adversity, or option loss as well as response-induced interference. A low-interference response can therefore have a worse loss description than a more direct response for some live adverse state. Without a further ordering rule, lower interference alone cannot determine robust dominance. $\square$

Proposition 10.9 prevents precaution from becoming a disguised presumption for inaction. The converse is equally important: urgency alone does not make the most intrusive response precautionary if false inclusion would create serious irreversible loss.

Proposition 10.10 (Reversibility and information value require temporal comparison). *Claims that a response is precautionary because it is reversible or information-generating require comparison over a time-indexed response path rather than only the immediate post-response state.*

Proof. Reversibility concerns whether later states or options remain reachable after the response, while information generation concerns later evidence or uncertainty sets. Both properties are defined through consequences extending beyond the immediate action. An instantaneous comparison cannot establish either property without a temporal model. $\square$

Proposition 10.10 prepares the following section, where assistance episodes are examined as relational trajectories rather than isolated acts.

10.5 Joint Uncertainty across Subjectivity, Regime, and Communication

Sections 7, 8, and 9 introduced different uncertainty indices. Precautionary reasoning should not silently select one favorable interpretation from each layer. Let $\mathfrak{H}_u^{\text{live}}$ be the live subjectivity-hypothesis family, $\mathfrak{R}_u^{\text{live}}$ the live recognition-regime family, and $\mathfrak{M}_u^{\text{live}}$ an encounter-level family assembled from the nonempty live semantic sets $\mathcal{M}_{y,\delta,\kappa}^{\text{live}}$ introduced in Section 8. The new symbol does not replace the trace-indexed semantic sets; it collects the communicative hypotheses that the application elects to carry into the joint response analysis.

The three axes need not combine independently. A subjectivity hypothesis can constrain which recognition regimes or semantic reconstructions remain coherent, and a decoding hypothesis can itself presuppose features attributed only under some subjectivity hypotheses. Let Compat_u be an application-declared Boolean predicate that marks coherent triples. Define the joint interpretation index set by Equation 102.

$$\mathfrak{J}_u := \left\{ (h, \rho, m) \in \mathfrak{H}_u^{\text{live}} \times \mathfrak{R}_u^{\text{live}} \times \mathfrak{M}_u^{\text{live}} : \text{Compat}_u(h, \rho, m) = 1 \right\}. \quad (102)$$

Equation 102 defines the joint index without assigning probabilities to its elements or assuming cross-axis independence. The application must require $\mathfrak{J}_u \neq \emptyset$; when every cross-axis combination is justified,

Compat_u may admit the full Cartesian product. For $j = (h, \rho, m) \in \mathfrak{J}_u$, let $\mathcal{A}_u(j)$ be the adverse-state set retained under that joint interpretation. The joint robust and possible adverse-state sets are

$$\mathcal{A}_u^{\text{joint,rob}} := \bigcap_{j \in \mathfrak{J}_u} \mathcal{A}_u(j), \quad (103)$$

$$\mathcal{A}_u^{\text{joint,pos}} := \bigcup_{j \in \mathfrak{J}_u} \mathcal{A}_u(j). \quad (104)$$

Equations 103 and 104 generalize the earlier intersection/union constructions across a compatibility-filtered family of uncertainty sources. Their robustness remains relative to the hypotheses, regimes, meanings, and compatibility judgments actually retained; omitted serious interpretations remain a model-set limitation rather than being defeated by the intersection.

For assistance type τ , suppose additionally that $\mathcal{A}_u(j) \neq \emptyset$ for every $j \in \mathfrak{J}_u$. This condition is needed because response fit is defined against an adverse-state description. If some live joint interpretation yields recognition vacancy, the application must supply an explicit response treatment for that vacancy before claiming robustness across the full joint family; Paper X leaves the jointly robust fit set undefined for that use rather than interpreting an empty inner intersection vacuously. Under the non-vacancy condition, define the jointly robust fit set

$$\mathcal{X}_{u,\tau}^{\text{joint,rob}} := \bigcap_{j \in \mathfrak{J}_u} \bigcap_{A \in \mathcal{A}_u(j)} \text{Fit}_\tau(A, \kappa). \quad (105)$$

When the set in Equation 105 is nonempty, it contains responses whose declared fit survives every live joint interpretation with a nonempty retained adverse-state set under the stated construction. Its nonemptiness still says nothing by itself about permission or authority.

Equation 105 is at least as demanding as robustness over any nonempty compatible fiber obtained by fixing two coordinates and varying the third, because the fiber contributes only a subset of the intersections used in the joint construction. A response can therefore be robust to one uncertainty axis while failing under a larger compatible joint family. This comparison is made only over combinations admitted by Compat_u ; impossible cross-axis combinations do not strengthen the robustness test artificially.

Communicative evidence can also generate a countervailing or undercutting reason. A robustly interpreted refusal, distress response, request for delay, or request for assistance can change the reason profile without becoming identical to consent, legal capacity, or authority. Silence remains especially weak because Section 8 does not identify absence of decoded expression with acceptance.

10.6 Precautionary Reason, Duty, and Intervention Authority

The strongest boundary of this section concerns intervention. A precautionary reason can count in favor of acting under uncertainty, but its existence does not settle who may act, against whose expressed position, by which means, or under which institutional mandate.

Proposition 10.11 (Separation of precautionary reason and intervention authority). *If Equation 97 yields a standing defeasible reason q_x^{prec} , that fact alone does not entail an all-things-considered duty to perform x , permission to perform x , or authority to impose x on another subject.*

Proof. The codomain of Equation 97 is $\mathcal{Q}$, the defeasible reason space. Section 5 distinguishes that space from duty, permission, and authority. No bridge from $\mathcal{Q}$ to those stronger normative objects is supplied by the present section. $\square$

Proposition 10.11 is especially important in heterogeneous-subject cases. Uncertainty about suffering or subjectivity can be a reason not to dismiss a possible adverse state. It is not, by itself, a licence to override communicative evidence, modify an artificial process, restrain an animal, impose treatment on a human, or act on a hypothetical alien subject.

Table 12 summarizes the declarations required before Paper X treats a response as precautionary at the present analytical level.

Table 12: Audit of precautionary response under recognition error.

Interface	Required declaration	What it supports	Inference not licensed
Comparator	$\mathcal{A}_u^{\text{cmp}}$ and its construction	Relative false exclusion and false inclusion analysis	Ontological ground truth
Live uncertainty	Ω_u or compatibility-filtered $\mathfrak{J}_u$	Which adverse descriptions remain relevant to the response problem	Equal credibility, independence, or completeness of the retained interpretations
Consequence model	Conseq_u and ℓ_u	Possible response consequences and typed loss descriptions	A unique scalar utility
Loss comparison	$\preceq_\lambda$	Robust dominance or nondominance at a declared resolution	Universal moral ordering of loss types
Response properties	$\text{Rev}_u, \text{Int}_u, \text{Inf}_u, \text{Del}_u$ where used	Reversibility, interference, information, and timing analysis	Automatic preference for low-interference or delayed response
Normative bridge	$\eta^{\text{prec}} \in \mathfrak{N}_u^{\text{prec}}$	A defeasible precautionary reason	Duty, permission, or intervention authority

Research Obligation 10.12 (Precautionary-response specification). An application that invokes precaution under recognition uncertainty should declare the recognition comparator if error rates or error types are discussed, the live adverse-state or interpretation family, any cross-axis compatibility rule used to construct a joint family, the response domain, the consequence and loss representation, the comparison rule, any claimed response properties such as reversibility or information preservation, the error asymmetry or other normative premise used by the precautionary bridge, and the separate rule, if any, by which a defeasible precautionary reason becomes a duty, permission, or authorized intervention.

Research Obligation 10.12 keeps uncertainty from functioning as an unrestricted justificatory device. Precaution becomes auditable only when the possible adverse states, possible response losses, comparison rule, and normative bridge are visible. The next section examines a different problem that follows once a response actually occurs: assistance itself changes relational states, expectations, dependencies, trust, options, and future recognition conditions.

11 Relational Consequences of Assistance Episodes

This section extends the analysis from contemplated responses to historically realized assistance episodes. Its role is to represent how an episode of aid, volunteering, or support can alter the relational conditions within which later recognition and response occur. The objective is to preserve several consequence dimensions in a typed representation that can register improvement, deterioration, ambiguity, or mixed change independently of the episode’s prior classification as support-salient, fitting, precautionary, or well intentioned. The discussion first defines represented relational successor states, then introduces typed consequence readouts, examines recipient options and dependency structures, distinguishes descriptive expectation and role stabilization from normative obligation, links assistance consequences to future recognition conditions, and finally composes episode-level changes along assistance trajectories. The method is historical and relational: consequences are represented as state-dependent changes at a declared analytical resolution, while their moral and legal evaluation remains separately typed.

Section 6 defined an assistance episode through multiple analytical lenses, and Section 10 represented possible consequences before a response occurs. The present section concerns a different object. Once an episode is historically realized, its consequences can include changes to the recipient’s adverse condition, available options, dependencies, expectations, trust relations, communicative interfaces, institutional roles, helper resources, and future evidential conditions. Some changes can be intended; others can be incidental, delayed, or visible only at a later resolution. Paper X therefore treats the assistance episode as part of the subsequent relational history rather than as a terminal operation that leaves the field unchanged.

11.1 Represented Relational Successor States

Let $\mathfrak{Z}$ denote an application-defined carrier of represented relational states at the resolution used to evaluate assistance consequences. A state $z \in \mathfrak{Z}$ can include recipient-relevant conditions, helper–recipient relations, institutional embeddings, resource interfaces, communicative access, available options, expectations, and other relational features that the application has independently justified retaining. The carrier is a representation at relational reality. It is not an ontological state space, and its coordinates need not be numerical.

For a realized assistance episode $g \in \mathcal{G}$, define the relational successor correspondence in Equation 106.

$$\text{Succ} : \mathcal{G} \times \mathfrak{Z} \rightrightarrows \mathfrak{Z}. \quad (106)$$

If $z^+ \in \text{Succ}(g, z^-)$, then z^- and z^+ are represented pre- and post-episode states compatible with the declared consequence model. Set-valuedness allows residual uncertainty, incomplete measurement, multiple plausible reconstructions, or genuinely branching consequences to remain visible. An empirical application can narrow the correspondence when stronger evidence is available.

Definition 11.1 (Relational consequence witness). *A relational consequence witness for an assistance episode g is a triple*

$$c_g = (z^-, g, z^+) \quad \text{with} \quad z^+ \in \text{Succ}(g, z^-). \quad (107)$$

The witness is indexed by the declared state resolution and does not by itself classify the consequence as beneficial, harmful, justified, authorized, or avoidable.

Definition 11.1 separates event typing from consequence reconstruction. The assistance-label profile $\Lambda_v(g)$ tells the analyst which assistance criteria the episode satisfies; Equation 107 records a represented transition associated with the episode. The two objects answer different questions.

Proposition 11.2 (Assistance labels underdetermine relational successors). *Fix an assistance-label profile $L \subseteq \mathfrak{T}_{\text{sup}}$. The condition $\Lambda_v(g) = L$ does not determine a unique element of $\text{Succ}(g, z^-)$ unless an application supplies an additional consequence law with that determinacy property.*

Proof. The label profile is computed from the relational criteria in Section 6: adverse-state direction, participation mode, and sustaining function. Equation 106 has a different codomain and can depend on features absent from the label profile, including timing, implementation quality, recipient engagement, institutional conditions, resource constraints, and state-dependent response effects. The profile therefore cannot determine a unique successor without an additional rule connecting those variables to $\mathfrak{Z}$. $\square$

Proposition 11.2 is important for both successful and unsuccessful assistance. An episode classified as aid can alleviate one adverse state, leave it unchanged, displace it, or generate another relational cost. A support relation can expand options while also producing a new dependency. A voluntary contribution can strengthen one institutional capacity while consuming another scarce resource. These possibilities are analytical reasons to inspect consequences rather than evaluative claims that assistance is generally beneficial or generally harmful.

11.2 Typed Consequence Readouts

A relational state can contain more information than one local inquiry requires. Let D be a declared finite index set of consequence dimensions and, for each $d \in D$, let $\mathfrak{V}_d$ be the value carrier appropriate to that dimension. A consequence readout is a family of maps

$$\Phi := \{\phi_d : \mathfrak{Z} \rightarrow \mathfrak{V}_d\}_{d \in D}. \quad (108)$$

Equation 108 permits different dimensions to have different mathematical forms. One readout can return a set of adverse-state descriptors, another a graph of dependency relations, another a set of available options, and another a categorical institutional role. No common scalar codomain is presumed.

For a consequence witness $c_g = (z^-, g, z^+)$, define its typed consequence profile in Equation 109.

$$\Delta_\Phi(c_g) := (\phi_d(z^-), \phi_d(z^+))_{d \in D}. \quad (109)$$

The symbol Δ_Φ in Equation 109 denotes a paired before–after profile rather than numerical subtraction. This distinction matters when a readout is set-valued, graph-valued, partially ordered, or otherwise nonmetric.

Table 13 lists consequence dimensions that can be useful in applications. The list is diagnostic rather than exhaustive, and an application should retain only dimensions for which it has an identifiable analytical purpose and evidence relation.

The readout architecture separates description from evaluation. If a dimension d admits a justified preorder $\preceq_d$ whose interpretation is “no less favorable at the declared resolution,” then an application can define a d -local improvement by Equation 110.

$$\phi_d(z^-) \preceq_d \phi_d(z^+). \quad (110)$$

Equation 110 should be used only when the readout actually supports such an ordering. Graph-valued dependencies, plural expectations, or mixed institutional effects can be meaningful without admitting a defensible “better than” relation.

Proposition 11.3 (Local improvement remains readout-relative). *Suppose Equation 110 holds for one readout d . That fact alone does not establish improvement under another readout d' , nor does it establish an all-things-considered evaluation of the assistance episode.*

Proof. The family in Equation 108 permits distinct carriers and distinct comparison structures across dimensions. No aggregation map from $\prod_{d \in D} \mathfrak{V}_d$ to an all-things-considered evaluative codomain has been defined. A favorable comparison on one component therefore supplies neither a comparison on another component nor a global evaluation. $\square$

Proposition 11.3 is the consequence-level analogue of the paper’s earlier resistance to premature scalarization. An assistance episode can reduce an acute adverse condition while narrowing future options, or expand access while increasing reliance on a single provider. Conversely, a temporary increase in dependence can accompany recovery, accessibility, stabilization, or learning. The formalism therefore records which relation changed before a later ethical inquiry decides how that change should be valued.

11.3 Recipient Options and Dependency Reconfiguration

Recipient options and dependency structures deserve separate treatment because assistance often modifies both. Let $\mathfrak{O}_b$ be an application-defined carrier of recipient-relevant option sets or option structures for recipient b , and let $\mathfrak{D}_b$ be a carrier of dependency structures. Introduce the two readouts in Equations 111 and 112.

$$\phi_{\text{opt},b} : \mathfrak{Z} \rightarrow \mathfrak{O}_b, \quad (111)$$

$$\phi_{\text{dep},b} : \mathfrak{Z} \rightarrow \mathfrak{D}_b. \quad (112)$$

Table 13: Candidate readouts for relational consequences of assistance.

Readout domain	Possible represented content	Analytical question
Adverse-state configuration	Typed adverse bundles, vulnerability, disruption, exposure, trajectory conditions	Which represented adverse conditions changed after the episode?
Recipient option structure	Feasible actions, access paths, communication routes, exit possibilities, recovery paths	Which recipient-relevant possibilities became available, unavailable, or differently conditioned?
Dependency and resource interfaces	Reliance relations, resource channels, infrastructural coupling, substitutability	Which dependencies were reduced, created, transferred, or reconfigured?
Expectations and roles	Descriptive expectations, helper/recipient roles, continuity assumptions, institutional assignments	Which future interaction patterns became more or less expected?
Trust-related state	Application-defined trust, reliability, vulnerability, or assurance descriptors	Did the episode alter a trust-relevant relation at the chosen resolution?
Recognition and communication access	Monitoring, manifestation channels, evidence availability, decoding support, communicative access	Did the episode alter the conditions under which later adversity or engagement can be recognized?
Helper and institutional condition	Resource stocks, workload, competence availability, commitments, coordination capacity	How did the episode change the assisting side or its future response capacity?
Third-party and field effects	Spillovers, displaced burdens, coordination effects, changed access for other subjects	Which relational consequences extend beyond the immediate helper–recipient dyad?

Equations 111 and 112 keep opportunity and dependency conceptually distinct. A new resource channel can expand the recipient’s feasible options while simultaneously creating reliance on an actor, platform, institution, infrastructure, or recurring supply relation.

The dependency carrier $\mathfrak{D}_b$ should ordinarily preserve at least the identities or types of the relevant dependency interfaces. A single “dependency level” is often too coarse because assistance can transfer dependency rather than simply increase or decrease it. For example, a recipient can become less dependent on an emergency environment while becoming more dependent on a stable support infrastructure. An application can regard that transformation as favorable, unfavorable, mixed, or unresolved only after specifying the comparison criterion relevant to the local inquiry.

Definition 11.4 (Dependency reconfiguration). For a consequence witness $c_g = (z^-, g, z^+)$, a *dependency reconfiguration* for recipient b occurs when $\phi_{\text{dep},b}(z^-) \neq \phi_{\text{dep},b}(z^+)$ at the declared dependency resolution.

Definition 11.4 treats dependency change as relational difference rather than presumed deterioration. This restraint is analytically important for disability support, medical stabilization, technical assistance, caregiving, infrastructure, and cases involving heterogeneous subjects in which some persistent coupling can be constitutive of continued functioning. The ethical significance of a dependency can depend on

exit possibilities, substitutability, vulnerability to withdrawal, control over the interface, reciprocity, predictability, or other features not contained in the mere fact of dependence.

The option readout can likewise be structured rather than cardinal. If $O^- = \phi_{\text{opt},b}(z^-)$ and $O^+ = \phi_{\text{opt},b}(z^+)$, set inclusion can be informative in applications where both are literal feasible-action sets. In other applications, options differ in accessibility, cost, temporal availability, competence requirements, or institutional permission, so a richer carrier is required. Paper X therefore does not identify “more options” with a universal scalar increase in welfare or autonomy.

Proposition 11.5 (Option expansion and dependency change can co-occur). *The present architecture permits a consequence witness for which the recipient option readout expands under a declared option comparison while the dependency readout also changes.*

Proof. Equations 111 and 112 are independent readouts from $\mathfrak{Z}$. No axiom requires constancy of one when the other changes. A successor state can therefore satisfy an application-defined option-expansion criterion and a dependency reconfiguration simultaneously. $\square$

Proposition 11.5 prevents a false binary between “empowerment” and “dependency.” Assistance can alter several relational dimensions at once. Whether the resulting configuration should be sustained, redesigned, diversified, or discontinued belongs to a later normative analysis informed by the typed consequence profile.

11.4 Expectations, Roles, and Normative Conversion

Historically realized assistance can change what participants expect from one another. Repeated emergency help can generate an expectation of availability; continuing support can stabilize a helper or recipient role; institutional participation can produce routines and coordination assumptions. These are relational consequences even when their normative force remains unsettled.

Let $\mathfrak{E}^{\text{exp}}$ denote a carrier of descriptive interaction expectations and $\mathfrak{R}^{\text{role}}$ a carrier of represented roles. Define the corresponding readouts in Equations 113 and 114.

$$\phi_{\text{exp}} : \mathfrak{Z} \rightarrow \mathfrak{E}^{\text{exp}}, \quad (113)$$

$$\phi_{\text{role}} : \mathfrak{Z} \rightarrow \mathfrak{R}^{\text{role}}. \quad (114)$$

Equations 113 and 114 are descriptive. They can record that participants anticipate continued support, that an institution has begun treating an actor as a recurring provider, or that a recipient-facing role has become socially stabilized. The readouts do not yet state whether those expectations are justified, enforceable, voluntarily assumed, or morally binding.

A later theory can introduce a normative conversion bridge from a consequence profile and additional premises to the reason or all-things-considered spaces already distinguished in Section 5. The generic interface is stated in Equation 115.

$$\text{NormConv} : \mathfrak{C} \times \mathcal{K} \rightrightarrows \mathcal{Q} \sqcup \mathcal{O}_{\text{all}}, \quad (115)$$

where $\mathfrak{C}$ is a carrier containing typed consequence profiles of the form in Equation 109. Paper X leaves the admissible normative premises of NormConv open.

Proposition 11.6 (Normative conversion requires an additional bridge). *A change in descriptive expectations or represented roles under Equations 113–114 does not determine a defeasible reason or all-things-considered duty unless an additional bridge such as Equation 115 is introduced and justified.*

Proof. The codomains $\mathfrak{E}^{\text{exp}}$ and $\mathfrak{R}^{\text{role}}$ contain represented relational features, whereas $\mathcal{Q}$ and $\mathcal{O}_{\text{all}}$ contain normative objects. The readout maps have no normative codomain. A typed transition between these spaces therefore requires an additional relation together with the premises supporting it. $\square$

Proposition 11.6 allows history to matter without converting historical repetition into obligation by definition. A volunteer who has helped repeatedly can become expected to continue while retaining grounds to stop; an institution can acquire stronger responsibilities through separate role, promise, reliance, law, or norm-formation mechanisms; and a recipient can reasonably organize future plans around a support relation even when the precise normative implications of that reliance remain disputed. The later papers on ethics and jurisprudence can analyze those bridges directly.

The same separation applies to authorization. Stable helper and recipient roles do not establish a right to impose assistance, and a recipient's reliance on a particular support arrangement does not by itself determine which actor holds legal or institutional authority. Consequence history can become evidence relevant to those questions without already answering them.

11.5 Trust-Related Change and Recognition Feedback

Trust can be one relational consequence of assistance, but Paper X requires only an interface to a trust representation rather than a second trust theory. Let $\mathcal{T}^{\text{rel}}$ denote the trust-state carrier selected by an application, possibly supplied by a richer historical model, with readout $\phi_{\text{tr}} : \mathcal{Z} \rightarrow \mathcal{T}^{\text{rel}}$. This interface records trust-relevant change while leaving the internal structure, update law, memory, repair, and hysteresis of trust to a dedicated model. A completed assistance episode can strengthen, weaken, diversify, or leave unchanged the trust-related representation depending on the historical and institutional conditions of the case.

Assistance can also alter later recognition conditions. Let $\mathcal{A}^{\text{acc}}$ be an application-defined carrier of recognition-access states, with readout $\phi_{\text{acc}} : \mathcal{Z} \rightarrow \mathcal{A}^{\text{acc}}$ recording those features of the relational state that bear on later manifestation, observation, communication, or evidence extraction. It can represent, for example, the creation of a monitoring channel, restoration of communication access, loss of an observable signal after stabilization, interface modification, new documentation, or increased dependence on a mediator.

The relation to the earlier recognition architecture is structural. Section 3 represented relational configurations as producing manifestations and evidence through μ_t , $\varepsilon_{h,\kappa,t}$, and $\Omega_{h,\kappa,t}$. When an assistance episode changes either the recipient-relevant relational configuration or the access conditions summarized by ϕ_{acc} , the evidential input to a later encounter can also change. A later recognition result should therefore be indexed to its post-assistance evidence and regime rather than treated as an independent remeasurement of an unchanged world.

Definition 11.7 (Recognition feedback). A consequence witness $c_g = (z^-, g, z^+)$ is a *recognition-feedback witness* at the declared resolution when $\phi_{\text{acc}}(z^-) \neq \phi_{\text{acc}}(z^+)$. The definition records a changed access condition. It does not require that later recognition become more accurate, more complete, or easier.

Definition 11.7 captures an important recursive feature of assistance. Monitoring can make deterioration more legible; treatment can suppress a manifestation without removing every underlying vulnerability; an accessibility intervention can enable direct communication that displaces a previously necessary mediator; an artificial-system modification can destroy diagnostic traces while improving performance; and relocation can remove one risk while making another evidential channel unavailable. The direction of the epistemic effect must be established locally.

Proposition 11.8 (Post-assistance recognition is historically conditioned). *If a recognition-feedback witness exists and a later encounter uses evidence generated through the altered access condition, then the later recognition result is conditioned by the assistance history at the declared representation.*

Proof. The later evidence package is generated through an observational interface whose relevant access state differs between z^- and z^+ . The recognition correspondence acts downstream of that evidence. Therefore the assistance episode enters the represented causal or generative history of the later recognition input, even when the recognition regime itself remains fixed. $\square$

Proposition 11.8 prevents a subtle form of circularity. A response can alter the evidence by which its own aftermath is evaluated. Empirical work should therefore distinguish improvement in the underlying represented adverse state from improvement, deterioration, or disappearance in its manifestation and measurement interface.

11.6 Composition across Assistance Trajectories

Section 6.6 defined an assistance trajectory $\Gamma = (g_0, \dots, g_n)$ as a historically connected sequence of episodes. Relational consequence analysis adds a compatible represented state path. For initial state z_0 , define the trajectory-successor set in Equation 116.

$$\text{Succ}_\Gamma(z_0) := \{z_{n+1} \in \mathfrak{Z} : \exists z_1, \dots, z_n \text{ such that } z_{i+1} \in \text{Succ}(g_i, z_i) \text{ for } 0 \leq i \leq n\}. \quad (116)$$

Equation 116 composes assistance consequences in historical order. It does not assume that an episode has the same effect when inserted into a different prior state.

For two episodes g and g' , define an order-sensitivity witness at state z by Equation 117.

$$\text{Succ}_{(g,g')}(z) \neq \text{Succ}_{(g',g)}(z). \quad (117)$$

Equation 117 is a diagnostic condition rather than a universal law. When it holds, the order of the two episodes matters at the selected state resolution. When it fails, the application has identified local order invariance for that pair and starting state, not a general commutativity property of assistance.

Historical composition also permits delayed consequences. An episode can leave an immediate adverse-state readout nearly unchanged while altering options, trust, expectations, recognition access, or institutional capacity in a way that changes the successor set of later episodes. Such a consequence is represented through the state path in Equation 116 rather than through an unsupported attribution of hidden long-term benefit or harm.

Proposition 11.9 (Label-sequence underdetermination of trajectory evaluation). *The label trajectory $\Lambda_v(\Gamma)$ from Equation 48 does not determine $\text{Succ}_\Gamma(z_0)$ or the typed consequence profiles along the trajectory unless an application supplies additional state-update laws sufficient for that reconstruction.*

Proof. The label trajectory records only the assistance-label profile of each episode. Equation 116 additionally depends on the starting state and the episode-specific successor correspondence. Proposition 11.2 already establishes that a label profile does not determine a unique successor. Applying that result sequentially yields the stated underdetermination for the full trajectory. $\square$

Proposition 11.9 preserves historical information that can be lost by counting acts of aid, volunteer hours, or support episodes. Those quantities can remain useful descriptive variables, yet they do not by themselves determine the relational state produced by the history.

11.7 Relational-Consequence Audit

Table 14 summarizes the declarations required before Paper X treats a claimed assistance consequence as analytically specified.

Research Obligation 11.10 (Relational-consequence specification). An application that attributes relational consequences to an assistance episode should declare the represented pre-episode state, the state features retained in the consequence model, the evidence or reconstruction rule supporting the post-episode state, the readouts on which change is claimed, and any comparison rule used to call a change favorable or unfavorable. Claims about dependency, expectations, roles, trust, or recognition feedback should identify the relevant relational interface rather than treating those terms as scalar labels. For repeated assistance, the application should preserve episode order and the state dependence of later consequences whenever those features affect the result.

Table 14: Audit dimensions for relational consequences of assistance episodes.

Dimension	Required declaration	Analytical role	Inference constrained
State resolution	$\exists$ and retained relational features	Identify what counts as a pre/post relational difference	Treating an omitted feature as unchanged
Successor model	$\text{Succ}(g, z^-)$ and evidence for the reconstructed successor	Represent possible post-episode states	Equating assistance classification with successful outcome
Readout family	$\Phi = \{\phi_d\}_{d \in D}$	Preserve typed consequence dimensions	Premature scalarization of heterogeneous effects
Comparison rule	$\preceq_d$ where a dimension is evaluated	State the resolution at which improvement or deterioration is claimed	Treating descriptive difference as evaluative ranking
Dependency and options	$\phi_{\text{dep},b}, \phi_{\text{opt},b}$ where relevant	Track reliance and feasible possibilities separately	Equating dependency change with loss of agency
Expectations and roles	$\phi_{\text{exp}}, \phi_{\text{role}}$	Record historically generated interaction patterns	Converting repetition or expectation directly into duty
Recognition feedback	ϕ_{acc} and later evidence path where relevant	Track assistance-induced changes in legibility and evidence	Treating post-response observation as history-independent
Trajectory composition	Γ, z_0 , and Succ_Γ	Preserve state dependence, ordering, and delayed effects	Inferring trajectory consequences from label counts alone

Research Obligation 11.10 completes the paper’s move from recognition to historically embedded assistance. A support-relevant adverse state can contribute to a defeasible reason; a response can be selected under uncertainty; and a realized response can then change the relational field in which later evidence, expectations, options, dependencies, trust, and assistance possibilities arise. None of these historical consequences, by itself, settles the stronger ethical or legal status of the resulting relation. The next section therefore specifies the boundary conditions that must be satisfied before Paper X’s analytical objects are extended into claims about duty, permission, subject status, legal responsibility, adjudicative competence, or intervention authority.

12 Boundary Conditions for Normative and Legal Extension

This section specifies the interface through which the analytical results of Paper X can enter stronger ethical, humanitarian, jurisprudential, contractual, or institutional arguments. Its role is to define the boundary at which those later inquiries begin. The objective is to identify which additional premises, contexts, and status rules must be supplied before support-relevant recognition, defeasible response reasons, precautionary considerations, communicative evidence, or relational consequences can support conclusions about duty, permission, legal subjecthood, responsibility, humanitarian protection, representation, adjudication, or intervention authority. The discussion first defines a generic extension interface, then states domain-specific requirements for ethical and jurisprudential use, preserves the separability of legal and institutional statuses, examines communication and representation as bridge conditions, and closes with

an extension audit linked to the subsequent papers in the series. The method is formal and reconstructive: stronger conclusions are represented as outputs of declared bridge packages rather than as consequences already contained in the recognition architecture.

12.1 Paper X Interface Records and Extension Domains

The preceding sections produce several kinds of analytical output. Depending on the case, an application can contain a recognized adverse-state set, a support-salience state, a defeasible reason profile, an assistance-relation profile, subjectivity and communicative uncertainty descriptions, a precautionary response analysis, and one or more relational consequence witnesses or assistance trajectories. These objects occupy different levels of the analysis and should remain recoverable when a later inquiry uses them.

Definition 12.1 (Paper X interface record). A *Paper X interface record* is an application-specific record that preserves the Paper X objects actually established for an encounter or assistance history, together with their evidential, interpretive, relational, temporal, and bridge provenance. Let $\mathcal{I}_X$ denote the carrier of such records and let $\varpi \in \mathcal{I}_X$ denote one interface record. An interface record may be partial when some Paper X objects are inapplicable or unresolved, but it should not replace an unresolved object with a stronger conclusion.

Definition 12.1 gives later work a typed input without requiring every application to reproduce the entire manuscript. For example, an encounter that never becomes an assistance episode can still yield a recognition record and reason profile, while a realized assistance trajectory can additionally preserve successor states, consequence readouts, and recognition feedback. The record is therefore a structured handoff, not a verdict.

Let $\mathcal{D}_{\text{ext}}$ be a set of extension domains. In the present series, relevant members include ethical analysis of assistance, humanitarian protection, jurisprudential subject status, adjudicative and enforcement authority, social-contract membership, and jurisprudence of aid and protection. The list is not asserted to exhaust the domains in which Paper X could later be used.

For each domain $d \in \mathcal{D}_{\text{ext}}$, let $\mathcal{B}_d$ be a carrier of declared bridge packages, $\mathcal{C}_d$ a carrier of domain-specific contexts, and $\mathcal{V}_d$ a carrier of conclusions available in that domain. The generic extension relation is stated in Equation 118.

$$\text{Ext}_\gamma^d : \mathcal{I}_X \times \mathcal{C}_d \rightrightarrows \mathcal{V}_d, \quad \gamma \in \mathcal{B}_d. \quad (118)$$

Equation 118 assigns the bridge package γ an explicit analytical role. The interface record supplies the upstream Paper X analysis; the domain context supplies features whose relevance appears only at the stronger level; and the bridge package states the rules by which those inputs can bear on a conclusion in $\mathcal{V}_d$. Set-valued output permits a later theory to preserve unresolved or competing conclusions rather than forcing premature uniqueness.

Proposition 12.2 (Bridge dependence of stronger extension). *Within Equation 118, an interface record $\varpi \in \mathcal{I}_X$ does not by itself determine a conclusion in $\mathcal{V}_d$. A stronger conclusion requires at least a declared domain d , a relevant context in $\mathcal{C}_d$, and an extension package $\gamma \in \mathcal{B}_d$ whose applicability is justified for the case.*

Proof. The domain conclusion is an output of Ext_γ^d , whose input type is $\mathcal{I}_X \times \mathcal{C}_d$ and whose specification depends on γ . An element of $\mathcal{I}_X$ alone is therefore not a complete input to the declared relation. Moreover, changing d changes the conclusion carrier and can change the required bridge package and contextual information. No canonical projection from $\mathcal{I}_X$ to every $\mathcal{V}_d$ has been defined. $\square$

Proposition 12.2 generalizes the narrower typing boundaries established earlier for defeasible reasons, duties, permissions, and intervention authority. The point is methodological rather than merely notational. If a later argument reaches a stronger conclusion, disagreement can be located in the Paper X record, the domain context, the extension package, or the interpretation of the output rather than being compressed into the ambiguous claim that the adverse state itself “implies” the result.

12.2 Ethical Extension and All-Things-Considered Resolution

Ethical extension begins from a reason-bearing record but adds a theory of how reasons are assessed together. Section 5 already introduced the generic resolution interface from reason profiles to all-things-considered conclusions. The present section places that interface within the broader extension architecture. An ethical bridge package can include, where relevant, a specification of the normative source of reasons, priority or aggregation rules, agent-relative roles and commitments, recipient requests or refusals, permissible means, proportionality or burden constraints, distributive considerations, uncertainty treatment, and standards for revising an earlier conclusion.

These components need not take the same form across ethical theories. A deontic approach, a consequential assessment, a care-oriented account, a role-based analysis, or a pluralist procedure can use different bridge structures while receiving the same upstream recognition record. Equation 118 is therefore compatible with theoretical plurality at the ethical layer. Paper X requires the bridge to be visible; it does not select one complete ethical theory as the universal resolver.

A particularly important boundary concerns the difference among a reason to respond, an all-things-considered duty, permission to perform a particular response, and authority to impose or administer that response. A later ethical extension may connect some of these objects, but the connection itself belongs to the extension package. The same point applies to supererogatory action, role-specific obligation, emergency permission, or a permission to refrain: each requires a conclusion type and rule that make its normative status explicit.

Proposition 12.3 (Reason persistence is compatible with constrained action). *A standing defeasible reason recorded in ϖ can remain part of an ethical extension even when the extension package yields a conclusion that the corresponding direct response should not be performed by the present actor.*

Proof. The interface record preserves the standing reason as an upstream object, while Equation 118 permits the ethical bridge package to include countervailing reasons, means constraints, role limits, recipient-related conditions, or another resolution rule. A conclusion concerning the permissibility or obligatoriness of a particular act therefore need not erase the provenance or existence of the upstream reason. $\square$

Proposition 12.3 is useful for preserving the difference between moral attention and authorized action. A person can have reason to take another being's adversity seriously while lacking sufficient grounds to perform a particular intervention. The remaining reason can support communication, referral, monitoring, advocacy, resource transfer to an authorized actor, or another response whose permissibility is separately established.

12.3 Jurisprudential Context and Status-Specific Rules

Jurisprudential extension requires contextual information that Paper X intentionally leaves open. A legal conclusion is ordinarily indexed, at minimum, to an applicable legal order or institutional regime, a relevant time, the legal sources treated as authoritative in that regime, and rules governing the factual and procedural predicates on which the conclusion depends. Where positive-law claims are made, later work must therefore verify the governing sources and their temporal and jurisdictional scope rather than infer law from the analytical usefulness of a GR representation.

The context carrier C_d in Equation 118 can encode these features when d is jurisprudential. The corresponding bridge package can then specify how the legal regime treats subject status, capacity, standing, responsibility, representation, sanctionability, institutional competence, evidentiary standards, procedure, review, and remedies. Paper X supplies upstream descriptions of recognition, communication, reasons, assistance relations, and consequences; it does not determine the legal status assigned to those descriptions.

A central boundary is the separability of legal statuses. Let K_{leg} be an application-defined index set of legal or institutional status types. Illustrative members can include legal subjecthood, procedural

standing, decision-making capacity, responsibility-bearing status, sanctionability, representability, adjudicative competence, and enforcement authority. For each $k \in K_{\text{leg}}$, let $\mathfrak{L}_k$ be the corresponding status carrier. Whenever an application proposes movement from status type k to a distinct status type k' , the required translation has the generic type stated in Equation 119.

$$\text{Tr}_{k \rightarrow k'}^{\text{leg}} : \mathfrak{L}_k \rightrightarrows \mathfrak{L}_{k'}, \quad k, k' \in K_{\text{leg}}, \quad k \neq k'. \quad (119)$$

Equation 119 does not claim that such a translation exists for every pair. It states the type of additional rule required when a legal argument attempts to connect two statuses.

Proposition 12.4 (Status-specific jurisprudential extension). *Assignment of a status in $\mathfrak{L}_k$ supplies no formal implication to a distinct status carrier $\mathfrak{L}_{k'}$ unless an applicable legal or institutional rule such as Equation 119 is introduced and justified.*

Proof. The carriers $\mathfrak{L}_k$ and $\mathfrak{L}_{k'}$ are separately typed. Membership, assignment, or a verdict in one carrier therefore has no operation whose codomain is the other carrier until a translation rule is supplied. The substantive validity of any proposed translation depends on the governing legal or institutional regime. $\square$

Proposition 12.4 prevents several shortcuts that become especially tempting under heterogeneous-subject conditions. Recognition of an artificial system as a legally relevant entity need not settle whether it bears responsibility. Responsibility-bearing status need not settle sanctionability. Procedural standing need not settle substantive entitlement. The ability to communicate reasons need not settle legal capacity. A rule permitting representation need not establish autonomous decision-making authority. These questions can be connected by a particular legal system, but their connection should be stated rather than assumed.

12.4 Communication, Consent, Capacity, and Representation Interfaces

Section 8 treated expression and interpretation as evidential and relational problems. A decoded request, refusal, distress signal, preference expression, or silence can enter later normative and legal analysis, but its stronger status depends on additional rules. In particular, communicative eligibility and semantic interpretation remain distinct from consent, refusal with legally recognized effect, decisional capacity, authorization of a representative, or waiver of protection.

An extension package that assigns such stronger significance should therefore state at least four kinds of conditions where they matter. First, it should identify what manifestation or interpreted content counts as the relevant communicative act. Second, it should specify any capacity or competence condition attached to that act. Third, it should identify voluntariness, coercion, information, or comprehension requirements if the chosen domain makes them relevant. Fourth, it should specify representation rules when another actor, institution, guardian, proxy, technical interface, or mediator speaks or decides on behalf of the candidate recipient.

The provenance discipline from Section 8 remains important after extension. A mediator-generated interpretation should remain identifiable as mediated when a later ethical or legal argument uses it. Likewise, a representation rule should record whose authority is invoked, for which decisions, under which conditions, and with which possibilities of contestation or revision. Heterogeneous communication makes these distinctions more important because familiar human linguistic cues may be absent, indirect, partially translated, or generated through technical intermediaries.

Proposition 12.5 (Communicative interpretation requires a status bridge). *A communicative interpretation preserved in a Paper X interface record does not by itself determine consent, legal capacity, valid representation, or another domain-specific communicative status. Such a conclusion requires an extension rule whose codomain is the relevant status carrier.*

Proof. The communicative objects of Section 8 record manifestations, live interpretations, and their provenance. Consent, capacity, and representation are stronger domain-specific statuses. Since Paper X defines no map from the communicative carriers to those status carriers, a conclusion in the stronger domain requires an additional bridge in the sense of Equation 118. $\square$

Proposition 12.5 also protects against the converse shortcut. Failure to decode a familiar expression does not itself prove absence of preference, incapacity, or lack of a protectable interest. Later work can adopt presumptions, burden allocations, protective rules, or representation mechanisms, but those are normative or legal additions whose justification should remain visible.

12.5 Authority, Institutional Competence, and Contestability

Authority questions require a further layer because a justified concern about adversity and a justified response reason do not identify the actor entitled to exercise coercive, adjudicative, technical, medical, custodial, or other intervention power. An authority extension should identify the proposed authority holder, the target or protected subject, the class of acts covered, the source of competence or mandate, territorial or functional scope where relevant, triggering conditions, procedural constraints, and the mechanisms by which the exercise of power can be challenged, reviewed, revised, or terminated.

These requirements apply at different levels across human, animal, artificial, and hypothetical alien cases. Their substantive content can differ substantially. The present boundary is therefore structural: a power to judge, modify, restrain, disable, compel, remove, sanction, or otherwise alter another subject or its operative environment needs an authority source whose scope covers the act in question. A reason to alleviate adversity can be part of the justification considered by that authority structure without becoming identical to the authority itself.

This distinction also matters when the prospective decision-maker is artificial or hybrid. Greater predictive accuracy, computational capacity, domain expertise, or consistency can be relevant to institutional design, yet those properties do not by themselves establish jurisdiction, legitimacy, procedural standing, accountability, or enforcement power. Conversely, a legally designated human decision-maker can possess formal authority while requiring external expertise to understand a heterogeneous subject or technical system. Paper XIV is reserved for the substantive jurisprudence of these adjudicative and enforcement configurations.

Proposition 12.6 (Authority source remains actor- and act-specific). *Within the present extension architecture, a conclusion that some response is ethically supported or legally available does not determine that a particular actor has authority to perform, impose, adjudicate, or enforce that response unless the applicable extension package supplies an authority rule covering that actor and act.*

Proof. An ethical or legal availability conclusion occupies its declared conclusion carrier in Equation 118. Authority for a particular actor and act is a distinct status whose derivation requires the corresponding authority rule and context. Proposition 12.4 therefore blocks transfer into the authority carrier in the absence of such a rule. $\square$

Proposition 12.6 preserves the distinction between reasons for protection and legitimate exercises of power. It also leaves room for distributed arrangements in which recognition, expertise, authorization, execution, review, and appeal are allocated to different human, artificial, or hybrid participants.

12.6 Humanitarian and Contractual Extension Conditions

Humanitarian and social-contract extensions introduce additional relational questions rather than merely stronger labels for the same object. A humanitarian-protection analysis must specify which adverse states or vulnerabilities trigger protective relevance, the protected subject domain, the response classes treated as humanitarian, the treatment of urgency and uncertainty, allocation under limited resources, recipient communication and representation, and the institutions or actors competent to provide or coordinate

protection. If the claim is legal rather than ethical or institutional, the governing legal sources and status rules must also be supplied.

A social-contract extension requires a different bridge package. Membership, representation, mediation, participation in norm formation, acceptance or contestation of rules, and the constitution of a shared nomos cannot be inferred from support salience alone. A subject can be protectable without being represented as a contract member; a subject can participate in a norm-forming relation without bearing every legal responsibility assigned to another member class; and representation can be necessary under one communicative condition while inappropriate under another. Paper XV is reserved for these membership and mediation questions.

These observations also clarify why heterogeneous-subject cases should not be handled by a single transfer rule from a familiar human case. Cross-subject recognition portability in Section 9 concerned evidence and adverse-state interpretation. Ethical, humanitarian, legal, and contractual portability each require their own extension package. Similarity in one layer can coexist with difference in another.

Proposition 12.7 (Cross-domain transfer requires an explicit translation). *For distinct extension domains $d, d' \in \mathfrak{D}_{\text{ext}}$, a conclusion in $\mathcal{V}_d$ does not by itself determine a conclusion in $\mathcal{V}_{d'}$. A proposed transfer requires an additional relation of the type stated in Equation 120.*

$$\text{Tr}_{d \rightarrow d'}^{\text{ext}} : \mathcal{V}_d \Rightarrow \mathcal{V}_{d'}. \quad (120)$$

Proof. The conclusion carriers in Equation 118 are domain-indexed. No common codomain or default translation among them is assumed. A conclusion in $\mathcal{V}_d$ can therefore bear on $\mathcal{V}_{d'}$ only through a separately specified relation whose codomain is $\mathcal{V}_{d'}$. $\square$

Equation 120 and Proposition 12.7 preserve room for substantive connections without presuming equivalence. An ethical duty can inform legal reform without already being a positive-law duty. Legal permission can affect the feasible response set without settling moral desirability. Humanitarian institutional practice can generate evidence relevant to jurisprudence without becoming identical to legal doctrine. Social-contract membership can shape authority relations without exhausting questions of suffering recognition or assistance.

12.7 Extension Boundary Matrix and Research Obligation

Table 15 summarizes the handoff from Paper X to the later papers in the heterogeneous-subject sequence. The table identifies the stronger analytical object, the Paper X material that can serve as upstream input, and the additional bridge conditions that remain to be supplied.

Table 15 is a division-of-labor device rather than a claim that the later domains are independent. Their relations are part of the research programme. The boundary matrix keeps those relations explicit enough that later papers can connect them without allowing Paper X to settle them prematurely.

Research Obligation 12.8 (Normative and legal extension specification). An application that uses Paper X to support a stronger ethical, humanitarian, jurisprudential, contractual, or institutional conclusion should identify the Paper X interface record being extended, the extension domain, the domain-specific context, the bridge package or decision rule, and the exact conclusion type. Where legal or institutional statuses are connected, the application should state the rule that links the relevant status carriers. Where communication, consent, capacity, or representation matters, the application should preserve interpretive provenance and state the additional criteria that confer stronger status. Where authority is claimed, the source, holder, act scope, triggering conditions, procedural constraints, and available review or contestation mechanisms should be declared at the resolution relevant to the claim.

Research Obligation 12.8 marks the endpoint of Paper X's substantive architecture. The paper has developed a path from manifestations and adverse-state recognition through support salience, defeasible reasons, assistance typing, uncertainty, communication, cross-subject regime portability, precaution, and

Table 15: Boundary matrix for normative, humanitarian, jurisprudential, and contractual extension.

Later domain	Primary stronger object	Paper X upstream input	Additional bridge conditions
Paper XI: ethics of assistance	Duties, permissions, constraints, revisable assistance judgments	Reason profiles, communication, uncertainty, assistance typing, consequence readouts	Normative theory or plural resolution procedure, priority/conflict rules, recipient-related constraints, means and burden assessment, revision rule
Paper XII: humanitarian assistance	Protective relevance and humanitarian response structure	Adverse-state recognition, precaution, support salience, assistance trajectories	Humanitarian trigger criteria, protected domain, allocation and urgency rules, protection practices, institutional competence
Paper XIII: jurisprudence of heterogeneous subjects	Legal subjecthood, standing, responsibility, sanctionability, capacity	Subject heterogeneity, communication, recognition provenance, relational consequences	Applicable legal order, authoritative sources, status-specific rules, evidentiary predicates, procedure and remedies
Paper XIV: adjudication and enforcement	Judgment, adjudicative competence, enforcement authority, contestability	Communication uncertainty, reason provenance, consequence and risk structure	Authority source, jurisdiction or mandate, expertise allocation, procedural safeguards, review and enforcement rules
Paper XV: social contract	Membership, representation, mediation, shared nomos	Heterogeneous-subject typing, communicative access, relational history	Membership criteria, representation and mediation rules, participation conditions, norm-formation procedure, contestation and revision
Paper XVI: jurisprudence of aid and protection	Legal duties, permissions, standing, institutional responsibility	Assistance typing, reason profiles, precaution, relational consequences	Governing legal sources, duty and permission rules, standing, institutional allocation, enforcement and remedy structure

the relational consequences of realized assistance. The extension boundary established here preserves those objects as inputs to stronger inquiries while requiring each stronger inquiry to supply its own normative, legal, humanitarian, contractual, or institutional bridge. The concluding section can therefore summarize the contribution and remaining research programme without converting the present analytical framework into a completed ethics or jurisprudence of heterogeneous subjects.

13 Conclusion

This paper has developed an analytical interface between adverse-state recognition and later domain-specific conclusions concerning assistance. Its central object, *support-relevant recognition*, identifies the stage at which an interpreted adverse condition becomes salient within a prospective helping relation while conclusions concerning duty, permission, consent, authority, legal status, and institutional responsibility remain separately justified. The resulting architecture is deliberately intermediate: it preserves

the provenance of evidence, interpretation, salience, reasons, communication, precaution, and realized consequences while leaving complete ethical and jurisprudential resolution to stronger domain-specific bridge principles.

The first result concerns the structure of recognition itself. Sections 2–4 treat recognition as a historically and relationally mediated process rather than as transparent access to another being’s internal condition. Encounter evidence is interpreted through a recognition regime, adverse states are represented through typed descriptors, and support salience is attached to a prospective relation of assistance. The three-layer GR architecture in Section 3 gives this mediation an explicit epistemic location. Ontological questions remain suspended where the available argument cannot settle them; relational reality retains historically constituted dependencies, capacities, injuries, roles, and other causally efficacious structures; manifestation reality concerns the situated traces through which those structures become accessible. This separation permits inquiry under uncertainty without requiring either ontological certainty or epistemic indifference.

The second result is a disciplined separation of practical transitions. Section 5 allows support salience to contribute defeasible reasons only through declared response-fit and normative bridges. Section 6 then treats aid, volunteering, and support as analytically distinct axes of an assistance episode rather than mutually exclusive event classes. Together, these constructions prevent a recognized adverse condition from carrying an undeclared chain of implications into a particular intervention. A reason can remain practically significant while further questions concerning competing reasons, recipient engagement, feasibility, permission, duty, institutional competence, or authority remain unresolved. The resulting architecture is intentionally intermediate: it preserves enough structure for later normative inquiry without making the recognition layer answer questions that depend on additional premises.

The heterogeneous-subject analysis sharpens this separation. Section 7 distinguishes uncertainty about phenomenal subjectivity from uncertainty about a particular adverse state, while Section 8 distinguishes communicative eligibility from successful semantic interpretation and from stronger statuses such as consent or legally operative refusal. These distinctions matter when the prospective recipient is an animal, artificial agent, unfamiliar biological being, hypothetical alien, or another subject whose embodiment and expressive conventions differ from those of the observer. Under the present framework, uncertainty in one dimension does not automatically erase every other relationally accessible form of adversity, and evidence of communication does not automatically establish every stronger normative or legal status. The practical consequence is a more granular description of what is known, what remains uncertain, and which later inference still requires an explicit bridge.

Section 9 extends that discipline to comparison across subject domains. Recognition procedures developed in one domain acquire no automatic authority in another merely because a shared vocabulary can be imposed on both. Cross-subject use requires declared translations of evidence interfaces and adverse-state descriptors, together with a stated comparison resolution. Exact portability is therefore a stronger condition than partial or resolution-relative portability, and disagreement among plausible recognition regimes can itself remain represented. Human, animal, artificial, and hypothetical alien cases function in this paper as heterogeneous stress tests for such portability. They reveal which parts of a recognition architecture depend on shared biology, established communicative conventions, institutional classifications, or inherited assumptions about subjecthood.

The precautionary analysis in Section 10 adds prospective action without collapsing uncertainty into a universal command to intervene. Recognition error is evaluated relative to a declared comparator, possible responses receive typed consequence and loss descriptions, and reversibility, interference, information effects, and delay can enter an application-specific precautionary specification. This architecture supports the possibility that uncertainty itself can become practically relevant while retaining the distinction between a precautionary reason and an all-things-considered decision. In particular, the formalism leaves open cases in which a low-interference or information-preserving response is attractive, cases in which delay is itself costly, and cases in which available responses remain poorly justified. Precaution therefore functions here as a structured mode of reasoning under recognition uncertainty rather than as a substantive moral principle with predetermined output.

A further result concerns the temporality of assistance. Section 11 represents realized assistance as an event that changes the relational field in which later recognition and response occur. Consequences can include changes in adverse states, recipient options, dependency structures, expectations and roles, trust-related conditions, recognition access, helper or institutional capacity, and effects on third parties. These readouts are deliberately non-scalar. An episode can improve one represented dimension while worsening or ambiguously changing another, and the order of assistance events can matter to the resulting trajectory. The assistance label attached to an episode therefore provides only part of the information required for historical evaluation. This temporal extension also closes a feedback loop that is easy to miss in one-shot models: assistance can alter the very manifestations, channels, and relational expectations through which later suffering or need becomes recognizable.

The paper's final architectural contribution is the extension boundary developed in Section 12. Paper X supplies a provenance-preserving record of recognition, uncertainty, reasons, communicative evidence, assistance typing, precautionary considerations, and relational consequences. Stronger domains contribute the additional rules appropriate to their own objects. Ethical analysis requires a theory of all-things-considered resolution and the treatment of competing reasons. Jurisprudential analysis requires governing sources and status-specific rules concerning subjecthood, standing, capacity, responsibility, representation, adjudicative competence, sanctionability, and enforcement. Humanitarian analysis requires criteria of protection, emergency, vulnerability, permissible intervention, and institutional allocation. Social-contract analysis requires membership, participation, mediation, representation, and norm-formation conditions. Authority claims require identifiable sources, holders, act scopes, procedures, and review or contestation structures. The interface preserves continuity among these inquiries while keeping their distinct burdens of justification visible.

Several limitations follow from the intended scope. The formal objects in the paper are structural representations whose empirical content depends on domain-specific operationalization. Their usefulness does not establish that the represented categories exhaust suffering, vulnerability, need, support, or subjecthood. The encounter architecture also assumes an operational individuation of helper and recipient roles and a declared vocabulary of adverse-state descriptions. Distributed or composite beings, shifting role boundaries, and previously unrepresented forms of adversity may therefore require revision of the carriers themselves rather than merely different parameter values. The treatment of human, animal, artificial, and hypothetical alien cases is comparative and diagnostic; it does not establish an ordering of moral worth or a universal equivalence among subject kinds. The framework also leaves substantial empirical work unresolved. Recognition regimes require calibration against domain-relevant evidence, communication models require validation against actual expressive practices, consequence readouts require historically appropriate measurement or interpretation, and precautionary specifications require explicit information about feasible responses and their possible effects. The present architecture helps state these requirements more precisely, while their satisfaction remains a task for empirical, interpretive, normative, legal, and institutional inquiry.

The analysis also leaves ultimate ontological questions open by design. A relational representation of injury, dependence, communication, or assistance does not prove the ultimate nature of consciousness, suffering, personhood, or moral reality. Ontological suspension permits these questions to remain live while research proceeds on relationally accessible structures and manifestations. This restraint is especially important in heterogeneous-subject cases, where premature ontological closure can create opposite errors: excluding beings because familiar markers are absent, or attributing statuses whose evidential and normative bases remain underdeveloped. The framework therefore treats revisability as a feature of responsible inquiry. Recognition categories, subject classifications, communication interpretations, and assistance practices may require revision as evidence, concepts, technologies, and institutional relations change.

The resulting research programme is consequently layered rather than linear. Paper XI can take the defeasible reason and assistance interfaces developed here into a fuller ethics of aid, volunteering, and support. Paper XII can investigate humanitarian protection under heterogeneous-subject conditions. Papers XIII and XIV can examine jurisprudential status, responsibility, adjudication, and enforcement

authority without assuming that communicative or moral salience already fixes legal competence. Paper XV can analyze membership, representation, mediation, and shared nomos in heterogeneous social contracts. Paper XVI can study the jurisprudence of aid and humanitarian protection, including duties, permissions, standing, institutional allocation, remedies, and responsibility. Each inquiry can inherit Paper X's recognition and provenance structure while remaining responsible for the additional bridge principles required by its domain.

The broader methodological implication is that disciplined analysis can begin while a subject remains unfamiliar. A framework can preserve uncertainty about their ontology, phenomenal states, expressive conventions, and institutional status while still representing adverse relational conditions, evidence, practical salience, possible responses, and the consequences of realized assistance. Such representation remains incomplete, revisable, and bridge-dependent. Its value lies in making those incompletions explicit. Within the scope of this preliminary Generative Relational formalization, support-relevant recognition thereby serves as a tractable interface between the epistemic problem of perceiving possible suffering and the later normative and institutional problem of determining what, if anything, should be done, by whom, under which authority, and with what consequences for the relation that follows.

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