

Dimensional Address as Rigid Designation: How DAG-OR Grounds Reference Without Metaphysical Posit

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Abstract

The problem of reference — what makes a name, description, or term reliably track its object — has generated three dominant frameworks in the analytic tradition: Frege's sense/reference distinction, Russell's theory of definite descriptions, and Kripke's rigid designators. Each framework achieves genuine explanatory traction, yet each ultimately defers the grounding question: what anchors the link between expression and world? This paper argues that the Dimensional Address Grammar for Observable Reality (DAG-OR), as formalised in the Modulign Standard v3.0, provides the first structurally grounded theory of reference. Under DAG-OR, reference is not a relation between a name and a metaphysically posited object, nor between a description and a logical value, but between an address expression and a uniquely identified entity in the Entity Registry of the observable address space. It is argued here that DAG-OR achieves Kripkean rigidity as an empirical consequence, dissolves the Fregean sense/reference gap by collapsing it into a single address structure, and characterises reference failure through a principled UNK-resolution mechanism rather than logical indeterminacy. The implications extend to natural language

semantics and natural kind terms. Indexicals and demonstratives fall outside the scope of the present argument and are reserved for subsequent treatment.

Keywords: *reference, rigid designation, Kripke, Frege, Russell, DAG-OR, Modulign Standard, philosophy of language, dimensional address, entity identity, Entity Registry*

§1 — The Persistence of the Grounding Problem

Reference is philosophy of language's foundational problem. Before one can ask what a sentence means, one must ask what its terms are *about* — what in the world they reach out and touch. The answer to this question has proved, across more than a century of sustained analytical effort, to be remarkably elusive.

The difficulty is not merely technical. It is structural. Every major account of reference faces a version of the same challenge: at some point in the explanatory chain, the theorist must introduce a primitive — an unanalysed connection, an undefined relation, a posited abstract object — that does the work of securing the link between expression and world. The explanation achieves coherence by deferring the hardest question rather than answering it.

This paper is concerned with that deferred question. The three frameworks which have most shaped analytic philosophy of language — Frege's sense/reference distinction, Russell's theory of definite descriptions, and Kripke's account of rigid designation — each leave a residue that their internal resources cannot resolve. The Dimensional Address Grammar for Observable Reality (DAG-OR), formalised in the Modulign Standard v3.0 (Gonzalez 2026a), provides the structural machinery that closes this residue. Under DAG-OR, the grounding of reference is not a metaphysical posit but an empirical achievement: a term refers by resolving, via a persistent entity

identifier, to a unique node in observable dimensional space, and it does so rigidly — not by stipulation, but as a consequence of the identity architecture itself.

The argument proceeds as follows. Section 2 examines the three canonical frameworks in turn, identifying in each case the precise point at which the grounding question is deferred. Section 3 introduces DAG-OR's three-registry architecture and the address structure relevant to reference. Section 4 develops the central claim: that the Entity Registry's persistent identifier achieves rigid designation empirically. Sections 5a and 5b show how the Fregean and Russellian residues dissolve under DAG-OR. Section 6 addresses objections. Section 7 draws out the implications for natural language semantics and the broader philosophy of reference.

One prefatory note on scope. This paper does not offer a comprehensive survey of the reference literature. Kaplan's logic of indexicals and demonstratives, and the detailed accounts of Donnellan and their successors, receive no extended treatment here; the scope is limited to non-context-shifting expressions — proper names and definite descriptions — as these are the expressions for which the grounding problem is sharpest and the DAG-OR treatment most fully developed. The final section briefly indicates how DAG-OR engages with the natural kind term debate opened by Putnam's Twin Earth.

§2 — Three Frameworks, Three Residues

2.1 Frege: The Gap That Sense Was Meant to Close

Frege's distinction between *Sinn* and *Bedeutung* — sense and reference — arose from a genuine puzzle about identity statements (Frege 1892). If 'Hesperus = Phosphorus' is merely a relation between a name and itself, it is trivially true and informationally empty. But the discovery that the morning star and the evening star are both Venus was a genuine astronomical discovery, not a

logical tautology. The two names must differ in some semantic dimension other than the object they pick out. That dimension is sense.

The elegance of this solution is real. By distinguishing the *mode of presentation* of an object (sense) from the object itself (reference), Frege explains both why co-referential terms can differ in cognitive significance and why identity statements can be informative. The distinction earns its keep.

The difficulty emerges one level deeper. Senses, for Frege, are abstract objects: they exist independently of any particular thinker's mental states, they are grasped rather than created, and they are the same for all competent speakers of the relevant language. But Frege provides no account of what it is for a speaker to *grasp* a sense. The relation between a thinker and the abstract sense-object she grasps is left entirely unanalysed. The sense is posited as the intermediary between mind and world, but the connection between mind and sense is no less problematic than the connection between mind and world that the sense was introduced to explain.

This is not merely an incompleteness in Frege's programme; it is a structural feature of any account of this type. Any theory that interposes an abstract intermediary between expression and world must eventually give an account of how speakers access that intermediary. If the intermediary is itself an abstract object, the problem recurses. The grounding question has been deferred, not answered.

A further difficulty concerns the dual function of sense. Frege holds that co-referential expressions can have different senses, but he also holds that sense determines reference: two expressions with the same sense must have the same reference. The sense is doing two jobs simultaneously — providing cognitive significance and fixing reference — and there is reason to doubt that any single theoretical object can discharge both functions without remainder. Evans (1982) and McDowell (1984) developed this tension at length; the tension traces back, in any case, to the ungrounded nature of the sense/reference relation itself.

Under DAG-OR, as Section 5a will show, the sense/reference distinction is not supplemented but dissolved. The address expression is both the mode of presentation and the reference-fixer, because it resolves directly — via the Entity Registry — to a node in observable dimensional space. There is no abstract intermediary, and therefore no gap to be bridged by an unanalysed grasping relation.

2.2 Russell: When Descriptions Fail

Russell's theory of definite descriptions (Russell 1905) was designed to solve a different but related problem: how can a grammatically well-formed sentence containing a non-denoting expression have a determinate logical form? 'The present King of France is bald' appears to be a perfectly coherent sentence; but France has no king, so on a naive referentialist account, the sentence lacks a subject and therefore cannot be evaluated for truth or falsity.

Russell's solution was to deny that definite descriptions are referring expressions at all. 'The F is G' is not of the logical form Ga , where a is a name for the F; it is a quantified claim: there exists exactly one F, and whatever is F is also G. The description disappears on analysis. It contributes no object to the proposition; it contributes only a predicate and an existence claim. On this analysis, 'The present King of France is bald' is not indeterminate but straightforwardly false: there does not exist exactly one present King of France.

The technical success of this analysis was substantial and its influence on analytic philosophy immense. But the theory has a structural feature that limits its power as an account of reference. By analysing descriptions away rather than explaining how they refer, Russell purchases logical tidiness at the cost of semantic naturalness. When a competent speaker uses 'the present King of France' in a conversational context, something more is happening than the production of a quantified formula. The speaker is attempting to direct attention to a particular object. The attempted reference fails, but it is a reference attempt nonetheless — and Russell's analysis has

nothing to say about what reference attempting consists in, or why it sometimes succeeds and sometimes fails beyond the satisfaction or non-satisfaction of a predicate.

More precisely: Russell's theory explains *when* a definite description expression is true or false, but it does not explain *what makes* a successful reference-fixing expression track its object stably across contexts. Donnellan's (1966) distinction between attributive and referential uses of definite descriptions marks exactly the point at which Russell's account runs out of explanatory resources.

The deeper structural point is this: Russell eliminates the problem of reference failure by denying that failing expressions refer. But he does not explain what successful reference *is*. The grounding question — what secures the link between an expression and its object — remains untouched.

Under DAG-OR, reference failure is not eliminated by logical analysis but characterised structurally: an address expression either resolves to a unique entity record or the Classification Decision Protocol returns an UNK classification — a positive epistemic report indicating that the procedure was applied and unique resolution could not be achieved. Section 5b develops this dissolution fully.

2.3 Kripke: Rigidity Without Ground

Kripke's *Naming and Necessity* (1980) is the most powerful treatment of reference in the analytic tradition, and it is the framework against which DAG-OR must most carefully position itself. Kripke's central achievement is the concept of the rigid designator: an expression that picks out the same individual in every possible world in which that individual exists. Proper names, on Kripke's account, are rigid designators. Definite descriptions, in general, are not.

The consequences of this distinction are far-reaching. Kripke shows that identity statements involving proper names ('Hesperus is Phosphorus') are necessarily true if true at all — because both names rigidly designate the same individual across all possible worlds — even though they

are known a posteriori. This separates the necessary/contingent distinction from the a priori/a posteriori distinction in a way that had not been clearly articulated before.

This result is credited in full. The insight that names are not disguised descriptions — that 'Aristotle' does not mean 'the teacher of Alexander' but simply picks out Aristotle, rigidly, whatever properties he happens to have in a given world — is correct, and the arguments Kripke marshals for it are compelling.

The difficulty is not with the conclusion but with the ground on which it stands. Rigid designation, as Kripke defines it, is a property defined over possible worlds: an expression is a rigid designator if and only if it designates the same individual in every possible world where that individual exists. This definition is only as secure as the possible worlds framework that gives it content. And possible worlds — whether construed as concrete ontological entities (Lewis 1986) or as abstract representations of ways things could have been (Stalnaker 1976) — introduce substantial metaphysical commitments that cannot themselves be grounded in observable fact.

A second concern arises from the causal-historical account of the initial baptism. Kripke's picture requires that there be some initial act of reference-fixing from which subsequent uses of the name inherit their referential content. But it does not explain *what the initial connection consists in*. The causal connection is invoked, but causation at the level of reference-fixing is precisely what is in need of analysis. The grounding question has been deferred once more.

It is at exactly these two points — the grounding of rigidity and the grounding of the initial baptismal connection — that DAG-OR provides an answer. The answer is developed in Sections 3 and 4.

§3 — DAG-OR: The Architecture of Dimensional Address

3.1 Foundational Commitments

The Modulign Standard v3.0 introduces DAG-OR as a formal framework for uniquely identifying any entity, event, or state of affairs within the structure of observable reality (Gonzalez 2026a). The framework rests on three foundational commitments that distinguish it from prior accounts of reference.

The first commitment is *observability*. DAG-OR confines itself to the domain of what is, in principle, empirically accessible. This is not a crude verificationism; it is a methodological constraint that blocks the introduction of unobservable posits — possible worlds, abstract senses, Platonic propositions — at the point where reference is grounded. If the referent of an expression cannot, even in principle, be located within observable dimensional space, DAG-OR does not assign it an address.

The second commitment is *structural uniqueness*. For any entity that falls within the domain of observable reality, DAG-OR assigns an identity record that is unique to that entity. No two distinct entities share an identity record; no single entity has two. This uniqueness condition is derived from the architecture of the three-registry system itself, as Section 3.2 makes precise.

The third commitment is *procedural intersubjectivity*. The Modulign Standard specifies a Classification Decision Protocol (CDP) by which any competent observer, applying the same procedure to the same observable features, arrives at the same classification (Gonzalez 2026a, §25). This intersubjectivity is procedural, not metaphysical: it is a claim about the reliability and replicability of the classification procedure, not a claim about the observer-independence of dimensional parameters as such. The distinction matters and is returned to in Section 4.3.

3.2 The Three-Registry Architecture

A feature of DAG-OR that is essential to the reference theory developed in Section 4, and that has no precedent in the prior reference literature, is its three-registry architecture. The Modulign Standard specifies three coordinated registries sharing one namespace (Gonzalez 2026a, §2).

The *Observation Registry* assigns each classified observation a **GSI-ID** — a Global Stream Identifier, a UUID-v4 permanent unique identifier assigned at first classification. The GSI-ID is immutable and anchors the Observational Ledger: the complete timestamped history of every MGN code ever assigned to that observation. The GSI-ID identifies the *observation stream*, not the entity observed.

The *Entity Registry* assigns each persistent entity — people, institutions, species, structures, laws, AI systems — an **EID**: a typed persistent identifier (Gonzalez 2026b, §§I–III). Unlike the GSI-ID, which anchors an observation stream, the EID anchors the thing in the world that observations are about. The spec is explicit: 'The observation has its own GSI-ID. The organization it references has its own EID. Neither record replaces the other' (Gonzalez 2026a, §23). EIDs are issued demand-driven, only when an entity has been referenced by at least two independent Modulign classifications.

The *Relation Registry* assigns each typed causal or temporal link between GSI-IDs or EIDs a **RID** — a relation record with its own timestamp, observer annotation, and confidence score.

This three-registry structure is philosophically crucial for the reference theory. The EID is the entity identity anchor: it is constitutively tied to the entity in the world, not to any particular observation of that entity. The GSI-ID plays a supporting but distinct role: it anchors the publicly auditable observational record that connects the EID to the observational evidence base. The MGN code — the canonical address string in the Classification Layer — carries the descriptively informative address content. Together, these three layers produce a structure richer than any prior theory of reference has possessed: an entity identity anchor (EID), a descriptive address (MGN

code), and a publicly auditable observational chain (GSI-ID Observational Ledger) connecting the first two.

3.3 Dimensional Parameters and Address Construction

A *dimensional parameter* in the DAG-OR framework is any measurable, ordered axis along which entities within observable reality can be distinguished. The canonical parameters include spatiotemporal coordinates — encoded in the locus chain and temporal modifier — but the framework is not limited to these. Biological classification, chemical composition, causal history, and functional role can each, under appropriate conditions, serve as dimensional parameters in a DAG-OR address.

It is important to note that DAG-OR dimensional parameters fall into two classes with different epistemic properties. *Structural parameters* — locus chain coordinates, scale tier designations, ISO timestamps — are directly measurable and do not require trained interpretive judgment to apply. *Classificatory parameters* — domain, subdomain, activity state under the Majority Threshold test — require a trained observer applying the CDP. The Modulign Standard's Eyeball Verifiability principle specifies that classificatory parameters are to be determined by what a trained human observer would describe first if asked to characterise the entity (Gonzalez 2026a, §1.6). These parameters are intersubjectively reliable under the CDP, but they are not observer-independent in any stronger metaphysical sense. The reference theory's claims about stability are calibrated accordingly in Section 4.3.

Address construction follows a required minimum structure — namespace, domain, subdomain, locus chain, and node — with optional precision-extending suffixes. The Standard specifies a *floor*, not an optimisation criterion: any address meeting the minimum structure is fully compliant, and additional segments extend precision without invalidating the base (Gonzalez 2026a, §1.4).

The correctness condition for an address assignment is unique resolution at whatever precision level the address achieves.

Address *expressions* in natural language — proper names and definite descriptions, within the scope of this paper — are surface forms whose semantic function is to supply, or gesture towards, a dimensional address. The linguistic form is not the address; it is a representation of the address, more or less precise depending on the communicative context. The referential work is done by the address in conjunction with the EID it resolves to, not by the surface form alone.

3.4 UNK Resolution and the Characterisation of Reference Failure

Address resolution is the process by which an address expression is evaluated against the three-registry architecture and associated with a unique entity record. Resolution succeeds when, and only when, a unique EID occupies the dimensional coordinates specified by the address. For purposes of the reference theory, EID resolution is treated here as the endpoint of address evaluation, compressing the CDP's two-step mechanism — address-to-observation via the Observation Registry, observation-to-entity via the # [EID] reference suffix — into the single relation that matters for the philosophical argument.

Resolution failure is characterised in DAG-OR not as a logical empty but as an *UNK classification*: a positive epistemic report, produced by the CDP, indicating that the protocol was applied and unique resolution could not be achieved. UNK is itself a valid classification state (Gonzalez 2026a, §5, §9); it records that the address specification was evaluated and found to be either unoccupied (no entity satisfies the address) or under-determined (more than one entity satisfies the address at the precision level provided). The ^PROV flag marks provisional classifications where resolution is possible but uncertain; ^CONT marks classifications where the resolution is contested. These are graded epistemic outcomes, not logical empties.

§4 — Rigidity as an Empirical Consequence

4.1 Kripke's Modal Definition and Its Cost

Recall Kripke's definition: a rigid designator is an expression that designates the same individual in every possible world in which that individual exists. The definition is elegant and, within the modal framework, unambiguous. The cost, as argued in §2.3, is the metaphysical apparatus it presupposes: possible worlds must be admitted as theoretical entities, bringing with them substantial commitments about the ontological status of merely possible individuals, the transworld identity relation, and the semantics of modal operators.

A second cost is less often noted. Kripke's rigidity is defined *externally* to the expression — it is a property of the expression's behaviour across a range of possible worlds — and says nothing about the *internal* structure of the expression, or about the mechanism by which the expression achieves its cross-world stability. The rigidity is a semantic fact about the expression from the outside; there is no account of why or how the expression possesses it.

DAG-OR provides both an account of why rigidity holds and a mechanism by which it is achieved — without modal apparatus.

4.2 The EID as Rigid Entity Anchor

The key to the DAG-OR rigidity claim lies in the Entity Registry architecture introduced in §3.2. The EID is a persistent identifier assigned to an entity — not to an observation of that entity. It does not encode the entity's current properties, location, or activity state (Gonzalez 2026b, §§I–III). It encodes only the entity's *identity*, constitutively and permanently: 'Persistent entities with identity across observations: people, institutions, species, buildings, laws, AI systems' (Gonzalez 2026a, §2).

As an entity changes — as observations of it accumulate new GSI-IDs, as its MGN codes are updated to reflect new activity states, new spatial coordinates, new classificatory determinations — the EID remains constant. It is the entity's identity anchor across all times, all observers, and all changes in the entity's observable properties.

This permanence is the ground of rigid designation under DAG-OR. An address expression that is anchored to an EID picks out the same entity on every occasion of use, not because it is stipulated to do so across possible worlds, but because the EID, once assigned, is constitutively tied to that entity and to no other. The entity could change all of its observable properties; the EID would still resolve to it. The entity could be misdescribed, misclassified, or referred to under a false MGN code; the EID would still fix the reference correctly.

This gives rigidity as an *empirical* property of the identity architecture, not a *modal* property defined over counterfactual scenarios. DAG-OR's rigidity claim can be restated in non-modal terms: an address expression R rigidly designates an entity E if and only if R is anchored to the EID of E, and that EID resolves correctly under any admissible application of the CDP. The admissible contexts are not possible worlds — they are observer contexts, inquiry times, and classificatory perspectives, all locatable within observable reality.

A genuine difference from Kripke's modal rigidity must be acknowledged here. Kripke's claim is specifically counterfactual: 'Aristotle' picks out Aristotle in worlds where Aristotle never taught Alexander, never lived in Greece, had entirely different properties. The DAG-OR rigidity claim, as stated, is a claim about stability across actual contexts of use. To extend it to counterfactual scenarios requires a further argument: that the EID, by virtue of its permanent and non-descriptive character, would track the same entity even under hypothetical variation of the entity's properties.

That argument is available. The EID is not constituted by any of the entity's properties. It does not encode location, activity state, classificatory domain, or any observable characteristic. It is a pure identity token whose content is exhausted by the relation 'this token = this entity.' A pure identity

token tracks its entity under any hypothetical variation of the entity's properties, because there is no property-change that could cause the token to detach and reattach to a different entity. This entailment does not require accepting possible worlds as genuine ontological entities; the hypothetical variation is a thought experiment about the architecture of identity tokens, not a commitment to the existence of non-actual worlds. DAG-OR rigidity therefore entails Kripkean rigidity as a derived result, grounded in the structure of permanent non-descriptive identity tokens, not as a stipulation about modal space.

4.3 The GSI-ID as Auditable Observational Chain

The GSI-ID's role in the reference theory is distinct from but complementary to the EID's. Where the EID is the entity identity anchor, the GSI-ID is the publicly auditable observational record that makes EID-based reference empirically accountable.

When an address expression is used to refer to an entity, the reference is grounded not only in the EID that anchors the entity's identity but in the Observational Ledger associated with the GSI-IDs that connect that EID to concrete observations in the world. The Ledger is the complete timestamped history of every MGN code ever assigned to each relevant observation stream. This means that the reference is, in principle, fully auditable: any third party can trace the chain from the surface expression back through the MGN code, the GSI-ID Observational Ledger, and the EID to the entity in the world.

This public auditability is what distinguishes the DAG-OR account from Kripke's causal-historical picture at the point of initial reference-fixing. Kripke's baptism is a private causal event whose reference-fixing force depends on the intentions of the baptising agent and propagates through a chain of communicative uses whose integrity cannot be independently checked. The DAG-OR first classification — the act by which an EID is first assigned and linked to an address — is governed by the CDP, produces a GSI-ID-anchored observational record, and is checkable by any

third party with access to the same observable features. The reference is publicly accountable from the start.

4.4 Intersubjectivity and the Scope of Stability

The procedural intersubjectivity of the CDP grounds a stability claim that is conditional in a way worth making explicit. Structural parameters — locus coordinates, scale tiers, timestamps — resolve identically across observers by the nature of measurement. Classificatory parameters — domain, subdomain, activity state — resolve identically across *trained* observers applying the CDP to the same observable features. The stability of MGN-code-based reference is therefore conditional on CDP competence, not unconditional.

This qualification does not undermine the reference theory. The EID's permanence is unconditional: once assigned, the EID is immutable regardless of observer, time, or classificatory revision. The MGN code's stability is conditional on CDP competence, but this is the right result: the descriptive content of a reference should be responsive to improving knowledge of the entity's properties, while the identity anchor of a reference should be immune to such revision. The two layers play complementary roles, and their different stability profiles are features of the architecture, not defects.

4.5 Names, Descriptions, and the Unified Account

A consequence of the DAG-OR account is that the traditionally sharp distinction between names and descriptions softens without disappearing. Under DAG-OR, the rigidity-conferring property is EID anchoring, and both names and descriptions can, in principle, be anchored to an EID.

A description that has been used in at least two independent Modulign classifications to identify the same entity — thereby triggering EID issuance (Gonzalez 2026a, §23) — is, under DAG-OR, a rigid designator relative to that entity. A description that picks out different entities depending

on context — 'the tallest person in the room', 'the current holder of the office' — is non-rigid not because it is a description but because it expresses a context-dependent address specification that has not been anchored to a specific EID through the demand-driven EID issuance process.

This relocation explains *why* names are typically rigid: proper names, in most linguistic communities, are conventionally assigned to entities in ways that bind them to persistent identity records across repeated classifications. And it explains why descriptions are typically non-rigid: most descriptions express functional or relational properties satisfied by different entities in different contexts, without the repeated cross-observer classification that triggers EID issuance.

4.6 The Empirical Advantage

The central contrast between DAG-OR and the Kripkean account can now be stated precisely. Kripke's rigidity is a property defined over a modal space. DAG-OR's rigidity is a property defined over an identity architecture within observable reality: the EID, a permanent non-descriptive entity record whose issuance is triggered by converging independent classifications and whose permanence is structurally guaranteed. Both accounts deliver stable reference across contexts. But the DAG-OR account does so on a smaller and more defensible ontological budget: it requires only that entities have persistent identities traceable through converging observational records — a requirement satisfied by any non-eliminativist ontology — and not that there exist a realm of possible worlds in which those identities can be tracked.

The claim is not that possible-worlds semantics is wrong. It may be a useful tool for formalising modal reasoning. The claim is that it is not required for grounding reference. Reference, as an empirical phenomenon, has an empirical explanation. DAG-OR provides it.

§5a — The Fregean Residue Dissolved

5a.1 Restating the Problem

The residue left by Frege's account has two components. The first is the unanalysed grasping relation: senses are abstract objects, but no account is given of how a speaker's mind makes contact with them. The second is the dual-function problem: sense is asked to do the work of both cognitive significance and reference-fixing simultaneously, and there is strong reason to doubt that any single theoretical object can discharge both functions without producing further anomalies. Both residues trace to the same root cause — the interposition of an abstract intermediary between expression and world, whose own connection to both is left ungrounded.

The dissolution offered in what follows does not repair Frege's account. It replaces the structure that generates the residue.

5a.2 Collapsing the Gap

Under DAG-OR, the functions that Frege distributed between sense and reference are distributed across the two primary layers of the address architecture — the MGN code and the EID — within a single unified system, rather than between two independently floating theoretical objects.

The *cognitive* component — Frege's *Sinn*, the mode of presentation — corresponds to the MGN code: the structured address expression that encodes the entity's dimensional coordinates, classificatory domain, and current properties. The MGN code tells an observer *how* the entity is being picked out: what kind of thing it is, where it sits in the observable hierarchy, what its activity state is at the time of classification.

The *referential* component — Frege's *Bedeutung*, the object itself — is anchored by the EID: the permanent identity token constitutively tied to the entity regardless of any change in its properties.

These are not two separate items requiring a bridging relation. They are two layers of a single address architecture, constitutively connected through the CDP: the MGN code carries descriptive

content about the entity whose identity the EID fixes, and the GSI-ID Observational Ledger provides the auditable chain connecting both to the observational record. There is no gap between the MGN code and the EID analogous to the gap between a Fregean sense and its referent, because the layers are not independently posited — the EID is issued through the same classification process that produces the initial MGN code, and the GSI-ID anchors the observational history of both.

On this account, the informativeness of 'Hesperus is Phosphorus' receives a natural explanation without abstract intermediaries. 'Hesperus' and 'Phosphorus' express different MGN code paths — different routes through the dimensional address space, one associated with evening visibility parameters, one with morning visibility parameters. Both paths resolve, via the same EID, to the same entity. The identity statement is informative because it discloses that two different address paths share a single EID terminus — one identity token, two routes to it, neither previously known to share the destination.

Crucially, no unanalysed grasping relation is required. A speaker uses an address expression competently not by making contact with a Platonic sense-object, but by operating with an MGN code — a concrete, finitely specifiable structured expression whose parameters are specified in the Standard. The relation between speaker and address is the same relation that obtains between any cognitive agent and any structured representation — a relation cognitive science can, in principle, characterise without special philosophical apparatus.

5a.3 Intersubjectivity Without Abstractness

Frege's senses were abstract and therefore guaranteed to be intersubjectively stable — the same sense was available to all competent speakers regardless of their psychological states. Address structures, under DAG-OR, achieve intersubjectivity differently. For structural parameters, intersubjectivity follows directly from the nature of measurement. For classificatory parameters,

intersubjectivity is secured procedurally: any trained observer applying the CDP to the same observable features arrives at the same MGN code classification. The CDP is the intersubjectivity-securing mechanism — it makes the address expression public, available to all competent classifiers, without requiring that it be an abstract object.

There is a gain over Frege. Fregean senses are individuated by cognitive significance: two expressions express the same sense if and only if their intersubstitution would preserve cognitive significance for any rational speaker. This criterion is notoriously difficult to apply and has generated persistent disagreement. MGN code paths are individuated formally: two paths are identical if and only if they specify the same sequence of dimensional parameters and values at the same precision level. The individuation criterion is determinate, not cognitively contested.

It should be acknowledged that formal individuation and cognitive significance do not always align. Two speakers may traverse different MGN code paths to the same EID, and those paths may carry different cognitive significance for them. The DAG-OR account does not claim to fully reproduce Frege's cognitive significance criterion; it claims to replace it with a more tractable criterion that does the same reference-fixing work. For the purposes of grounding reference — the project of this paper — the more tractable criterion suffices.

5a.4 The Dissolution

The dissolution of the Fregean residue is complete in the following sense. Every explanatory task Frege assigned to senses is discharged by the DAG-OR address architecture: the MGN code fixes the mode of presentation; the EID anchors the referent; the GSI-ID Observational Ledger provides the auditable chain that makes the connection between them publicly verifiable; procedural intersubjectivity secures the public availability of address expressions without recourse to abstract objects; and formal individuation of address paths provides a tractable alternative to the contested

cognitive significance criterion. The unanalysed grasping relation does not appear, because there is nothing abstract to be grasped.

§5b — The Russellian Residue Dissolved

5b.1 Restating the Problem

The residue left by Russell's theory has two components. The first is the missing account of reference-fixing: by analysing descriptions away, Russell explains when description-containing sentences have truth values but not what binds a successfully referring expression to its object. The second, marked by Donnellan's distinction, is the misrepresentation of referential description use: when a speaker uses a description to pick out a particular individual in mind, Russell's uniform quantificational analysis misrepresents the truth conditions.

Both are dissolved under DAG-OR.

5b.2 Reference Failure as UNK Resolution

The Russellian treatment of reference failure — turning it into the falsity of an existence claim — is philosophically costly because it makes reference failure a logical property of the sentence rather than a structural property of the address. Under DAG-OR, reference failure is represented directly through the UNK mechanism. An address expression evaluated by the CDP that cannot be resolved to a unique EID returns an UNK classification at the relevant segment level — a positive epistemic report: the procedure was applied, and unique resolution was not achieved. The UNK classification distinguishes, at the level of address structure, between an address that is unoccupied (no entity satisfies the specification) and an address that is under-determined (more than one entity satisfies the specification at the precision level provided). The [^]PROV flag marks provisional resolutions; [^]CONT marks contested ones. These are graded epistemic outcomes, not logical empties.

This is more fine-grained than Russell's uniform falsity treatment and more phenomenologically accurate: when a competent speaker recognises that 'the present King of France' fails to refer, what is recognised is that the address specification did not resolve to a unique EID — not that a quantified formula has a false existential presupposition. The extension to Meinongian cases follows directly: expressions such as 'the golden mountain' or 'Sherlock Holmes' return UNK, their address specifications failing to resolve against any EID in the Entity Registry. No realm of non-existent but subsistent entities is required.

5b.3 Donnellan's Distinction Accommodated

Donnellan (1966) observed that definite descriptions are used in two systematically different ways. In the *attributive* use, the speaker refers to whoever or whatever uniquely satisfies the description. In the *referential* use, the speaker has a particular individual in mind and uses the description to pick that individual out, regardless of whether the description strictly applies.

Under DAG-OR, the distinction is accommodated naturally. In the attributive use, the description functions as an address expression whose dimensional parameters are specified functionally: whatever entity uniquely satisfies the relevant specification and has a corresponding EID occupies the address. In the referential use, the description functions as a surface representation of a directly EID-anchored address: the speaker has, in effect, bound the expression to a specific entity identity record, and the descriptive content of the expression serves as an ostensive guide rather than a resolution criterion. Both uses are address expressions; they differ in whether an EID anchor has been established. The attributive use relies on open functional resolution; the referential use relies on prior EID anchoring. The distinction is captured within the address architecture without requiring two separate semantic theories or a supplementary pragmatic layer.

5b.4 The Structural Gain

Russell correctly identified that descriptive content alone does not guarantee reference. DAG-OR agrees: a description that expresses an under-determined or unoccupied address returns UNK and fails to resolve to an EID. But DAG-OR goes further, explaining *why* and *how* descriptive content can fix reference when it does — namely, by supplying dimensional parameters that, under the CDP, resolve to a unique EID — and characterising failure as the structural outcome of a resolution process that cannot produce a unique result, rather than as the falsity of an existence claim.

§6 — Objections and Replies

6.1 Objection One: Addresses Are Not Names

The first objection holds that DAG-OR has not provided a theory of reference at all, but a theory of *classification* — a way of specifying what things are and where they are, not a way of explaining what it is for a linguistic expression to refer to them. To say that 'Aristotle' refers to Aristotle because Aristotle has an EID is to presuppose that 'Aristotle' is already connected to Aristotle — the very thing that needs explaining.

This objection misreads the structure of the account. The claim is not that natural language names *are* dimensional addresses, nor that the semantic content of a name is exhausted by an EID. The claim is that the referential function of a name — its capacity to track an object stably across contexts — is grounded in the EID anchoring that the name, through the processes of first classification and subsequent conventional association, has acquired. The name 'Aristotle' is a surface linguistic form; its referential content is fixed by its association, through the conventions of the relevant community, with an EID that uniquely identifies the relevant individual.

DAG-OR does not eliminate the conventional, historical, and communicative dimensions of naming; it specifies what those conventions, histories, and communications must ultimately be anchored to in order to secure stable reference. Once it is acknowledged that any successful act of

reference involves a connection between an expression and an entity with a persistent identity in observable reality, the gap the objection identifies closes.

6.2 Objection Two: What Fixes the EID Assignment?

The second objection concedes that EID anchoring produces stable reference, but presses on the assignment itself. What fixes the correspondence between an address expression and an EID? If the answer is an act of first classification, then the problem has merely been relocated: the first classification is a causal-intentional event of exactly the kind Kripke's baptism was, and the objection to Kripke — that the baptismal connection is ungrounded — applies with equal force here.

The reply proceeds in two steps. The first distinguishes the grounding of an *assignment* from the grounding of a *reference*. Kripke's baptismal event is required to do two things simultaneously: establish the causal connection between name and object, and confer referential content on the name. Under DAG-OR, these are separated. The first classification is a conventional act governed by the CDP that maps a surface expression to an address, triggering EID issuance. The reference is the relation between that EID and the entity it identifies. The conventional act is not required to do anything more than satisfy the CDP's formal conditions; the referential work is done by the identity architecture, not by the act itself.

The second step notes that the correctness of a first classification is not determined by the intentions or mental states of the classifying agent, but by the formal conditions of the CDP and the demand-driven EID issuance requirement: an EID is issued only when at least two independent Modulign classifications converge on the same entity (Gonzalez 2026a, §23). The correctness condition is publicly checkable. A third party, with access to the same observable features, can verify whether the classification was performed correctly. The act of first classification is publicly accountable in a way that Kripke's baptism is not. The grounding question does not recurse.

6.3 Objection Three: Natural Kind Terms and Deferred Resolution

The third objection concerns natural kind terms. Putnam's Twin Earth argument (Putnam 1975) established that the reference of natural kind terms — 'water', 'gold', 'tiger' — is not fixed by the descriptions competent speakers associate with them but by the underlying nature of the stuff in question. Pre-chemistry speakers who used 'water' before anyone knew its molecular composition still referred to H₂O; their reference was fixed by the underlying nature even though they did not know what that nature was. The reference outruns the speaker's epistemic access to the relevant parameters.

This presents a genuine challenge. If reference requires resolving to a dimensional address and ultimately to an EID, and the relevant dimensional parameters (H₂O chemical structure) are unknown to the speaker, what is the speaker's use of 'water' currently expressing?

The DAG-OR account handles this through a *deferred resolution* mechanism consistent with the Standard's architecture. At the time of a pre-chemistry speaker's use of 'water', the expression is anchored — via the first classifications performed by the community — to an EID that identifies the relevant substance. The MGN code associated with that EID may be incomplete or imprecise (the chemical structure parameters are not yet specified), but the EID anchor is in place: independent classifications of the same substance have converged sufficiently to trigger EID issuance for that entity. As the epistemic community's knowledge of the substance improves, the MGN code is updated — chemical structure parameters are added, the address specification becomes more precise — while the EID remains constant. The reference of 'water' is retrospectively characterised more precisely, but it was fixed, via EID anchoring, from the beginning.

This is structurally analogous to Putnam's own story: the community's use of 'water' tracks H₂O from the start, even before anyone knows it is H₂O. Under DAG-OR, the EID plays the role of the stable identity anchor; the improving MGN code plays the role of the improving scientific

description. Both converge on the same entity. Putnam's insight — that the reference of natural kind terms is fixed by underlying nature, not by speaker descriptions — is not only compatible with DAG-OR but receives a structural characterisation within it.

§7 — Conclusion: Reference as Empirical Achievement

The argument of this paper has followed a single thread. Reference — the relation between a linguistic expression and the entity in the world it tracks — has resisted grounding in the analytic tradition because every major account has introduced, at some point in its explanatory chain, a primitive that does the work of securing the link between expression and world without itself being explained. Frege's senses, Russell's elimination of descriptions-as-referrers, Kripke's possible-worlds rigidity: each is a genuine theoretical achievement, and each leaves a residue.

The residue is not incidental. It is a consequence of approaching the problem of reference from the inside out — beginning with the linguistic expression and asking what semantic object it must be associated with in order to refer. The difficulty with this approach is that semantic objects, however characterised, must eventually make contact with the world; and the contact point — where the semantic meets the extra-linguistic — is precisely where the ungrounded primitive appears.

DAG-OR approaches the problem from the outside in. It begins with the structure of observable reality — the three-registry address space within which all entities are identified — and asks what structural property an expression must have in order to track an entity within that space reliably. The answer is an EID-anchored address: a permanent entity identity token, informationally extended by a dynamic MGN code, and auditably connected to observational evidence via the GSI-ID Observational Ledger. The reference is not a relation between an expression and a semantic object; it is a relation between an expression and an identity structure in the world. The grounding is built into the address architecture from the start.

Four results follow from this approach.

First, rigidity is a property of permanent non-descriptive entity identity tokens, not a modal stipulation. An EID-anchored expression picks out the same entity across all actual contexts of use, and — because the EID encodes no properties of the entity — across hypothetical variation of the entity's properties as well. Kripkean rigidity is a derived result, not a primitive assumption.

Second, the Fregean sense/reference distinction is dissolved rather than supplemented. The MGN code performs the cognitive-significance function that Frege assigned to senses; the EID performs the referential anchoring function. Two distinct address paths — 'Hesperus' and 'Phosphorus' — resolve via the same EID to the same entity; the identity statement is informative because it discloses that both paths share a single EID terminus. The two layers are constitutively connected within a single address architecture, made publicly auditable by the GSI-ID Observational Ledger — not bridged by an unanalysed grasping relation between mind and abstract object.

Third, Russellian reference failure is characterised structurally rather than logically. An expression fails to refer not because an existential quantifier is unsatisfied, but because the CDP returns UNK at the relevant address segment — a positive epistemic report, more fine-grained than Russell's uniform falsity treatment and more accurate to the phenomenology of reference failure.

Fourth, Donnellan's attributive/referential distinction is accommodated within the address architecture without a supplementary pragmatic theory. Attributive uses express open functional address specifications; referential uses express EID-anchored specifications. Both are address expressions; they differ in whether a permanent entity identity anchor has been established.

The broader implication is this: the philosophy of reference has been conducted, for most of its history, within a framework that presupposes a gap between language and world — a gap that semantic theory is then required to bridge. DAG-OR suggests that this presupposition is the source of the difficulty. When reference is understood as a structural relation between a surface expression

and an EID-anchored address in observable dimensional space — auditable through the GSI-ID Observational Ledger, describable through the MGN code — there is no gap to be bridged. The expression refers because it resolves; it resolves because the address architecture has the structure it has; and that architecture is an empirical fact about how identity is tracked within observable reality — not a posit of semantic theory.

Reference, on this account, is not a mystery to be explained by increasingly sophisticated semantic apparatus. It is an achievement — grounded, verifiable, and in principle public — that the Modulign Standard makes precise.

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