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Posted Date: 25 November 2025

doi: 10.20944/preprints202511.1801.v1

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Gestures and Signs Are Phrases Not Words: A High Definition Account

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Abstract

Traditional linguistic analysis segments gestures and signs into discrete morphemes—handshape, location, movement—treating these as combinable building blocks. This segmentation, however, reflects analytical resolution rather than ontological structure. At coarse-grained analysis, continuous trajectorial dynamics *appear* segmented because fine distinctions fall below the analytical thresholds of the model's toolkit. This paper argues that gestures and signs function as complete phrasal units whose meaning emerges through navigation rather than morphemic assembly. The supposed "atoms" of manual-visual communication are observational artifacts generated by insufficient analytical resolution. We posit that the fundamental unit of gesture and sign is not the morpheme but the trajectory—a continuous navigational arc through informational space guided by conventional traces. Our high-definition approach refers not to perceptual refinement but to analytical granularity: developing theoretical tools capable of tracking trajectorial dynamics at finer informational scales without imposing artificial segmentation. Conventional traces saturate through repeated navigation into specialized attractors (gestural configurations, modal semantics, conceptual prototypes) that emerge as differentiated regions within pre-representational informational space, analogous to stem cell specialization into distinct tissues. This trajectorial approach resolves persistent paradoxes in classifier-predicate analysis, verb segmentation, and gradient iconicity by recognizing them as resolution-dependent phenomena. The analysis extends beyond manual-visual modalities: spoken utterances reveal trajectorial character when examined at sufficient spatiotemporal resolution, challenging written-language models that artificially atomize continuous phonetic-semantic flow. Gestures and signs, precisely because they resist orthographic reification, provide exceptionally clear windows into the trajectorial dynamics underlying all human meaning-making.

Keywords: trace & trajectory Semantics; gesture linguistics; sign language phonology; continuous semantics; pre-representational dynamics; multimodal communication; conventionalization; observational resolution

1. Introduction: From Pixels to Trajectories

When someone makes the "call me" gesture—hand configured like a telephone, thumb to ear, pinky to mouth, slight oscillating motion near the head—what are you seeing? At low resolution, you might attempt to parse it into discrete components: a particular handshape, proximity to the face, rotational movement. But increase the analytical resolution—let your componential model approach the granularity at which the gesture actually unfolds in real time—and those supposed components dissolve into something fundamentally different.

What emerges is not an assembly of independent parts but a continuous trajectory—meaning moves as the hand moves: departure from neutral baseline, progressive configuration during elevation, momentary stabilization near the head, micro-adjustments for communicative precision, dissipation back toward rest. At no analytical resolution—coarse, medium, or fine—do you encounter discrete, combinable units. You find only trajectories of varying informational density.

 doi:10.20944/preprints202511.1801.v1

This distinction between low-resolution segmentation and high-definition continuity captures precisely what distinguishes morphemic analysis from trajectorial semantics [9]. Traditional linguistic approaches operate like coarse pixelation rendering: they impose discrete boundaries ("this is the handshape morpheme," "this is the location morpheme," "this is the movement morpheme") onto phenomena that resist such segmentation. The coarse pixel error occurs when analysts mistake their observational threshold for ontological structure. At coarse-grained analysis, continuous gestural trajectories *appear* segmented because fine-grained distinctions fall below the analytical threshold of the model's *toolkit*. The analyst sees "blocks"—handshape, location, movement—and concludes that they must be morphemes because they are the units visible at that analytical resolution and, more importantly, because he has no alternative within his immediate theoretical scope. But this is precisely analogous to mistaking pixel boundaries for natural divisions in an image. Maybe you just needed to buy a 4k flatscreen.

The critical observation is epistemic, not phenomenological: these coarse-grained categories (handshape, location, movement) can be analytically useful, but *only* when recognized as **thread saturation points**—regions where trajectorial dynamics exhibit sufficient informational density to serve as navigational anchors—rather than as primitive morphological units. What remains is the trajectory itself: a continuous navigational arc through informational space guided by conventional traces. The "morphemes" were observational artifacts generated by insufficient analytical resolution, not ontological primitives discovered in the data.

This claim extends beyond manual-spatial modalities. In situated interaction, even spoken "words" reveal themselves as trajectories when analyzed at sufficient spatiotemporal resolution. What writing systems present as discrete lexical atoms—separated by spaces on the page—are continuous navigational arcs through informational space guided by conventional traces, artificially segmented by orthographic convention. The word "climb," when produced in discourse, is not retrieved from a mental lexicon as a pre-formed unit but enacted as a trajectory: navigational departure from neutral baseline, movement through informational space where conventionalized traces have saturated into recognizable landmarks (voicing onset, tongue elevation, lip rounding)—specialized attractors that emerge from repeated navigation rather than pre-existing spatial properties—and return to baseline. These landmarks—often analyzed as discrete phonetic positions in traditional frameworks—function as thread saturation points where trajectorial dynamics coordinate intersubjective access, not as primitive units assembled to construct meaning. The fact that speakers perceive words as discrete reflects two factors: writing systems impose spatial separation that creates the illusion of atoms, and spoken language exhibits higher conventionalization than gesture, producing stereotyped trajectories that *appear* discrete when observed at coarse analytical resolution.

1.1. Theoretical Framework: Traces, Threads, and Trajectories

This insight—that gestures and signs function as complete phrasal trajectories rather than assembled morphemic units—requires formal tools capable of tracking continuous dynamics without imposing artificial segmentation. **Trace & Trajectory (T&T) Semantics**, operationalized through Radial Analysis [8], provides such tools by treating meaning as navigation through pre-representational informational space rather than combination of representational content.

In this framework, the minimal semiotic unit is not the morpheme (a representational atom) but the *trace*—a pre-representational informational residue that guides subsequent navigation without encoding fixed meaning. Semiotic stabilizations elaborate traces into *threads*: conventionalized pathways through semantic space. These threads are analogous to what cognitive linguistics calls the instantiation of a schema (the token of a type), but operating at a pre-representational level that preserves high-definition granularity. Where cognitive linguistics treats schemas as abstract mental representations that get filled with specific content, T&T treats threads as accumulated informational residue—differential patterns in a substrate that guide navigation without storing semantic content.

A *trajectory* is the actual navigational arc through this space—the process by which meaning emerges dynamically rather than being retrieved from storage. Crucially, trajectories are not paths

 doi:10.20944/preprints202511.1801.v1

through representations but movements through pre-representational informational space that *generate* phenomenal experience through their navigational dynamics. The trace-space itself has no inherent properties—no pre-given articulatory, semantic, or conceptual structure. What appear as distinct dimensions (gestural articulation, modal semantics, conceptual prototypes) are **specialized attractors** that emerge through conventionalization: regions where repeated navigation saturates traces into stable landmarks, analogous to how stem cells differentiate into specialized tissues. The gesture does not represent an event; it enacts a trajectory that leaves traces enabling intersubjective coordination.

This approach dissolves the representationalist assumption that meaning consists of content encoded in expressive forms. Traditional frameworks—whether morphemic, constructional, or cognitive-linguistic—share the premise that linguistic expressions carry meaning by mapping onto mental representations, concepts, or situations. T&T rejects this architecture entirely. Meaning does not consist of represented content but emerges from navigational dynamics through informational configurations. A gesture does not "stand for" something else; it *is* a trajectory whose execution constitutes the semiotic event.

The distinction matters empirically. If gestures were representations, we should be able to segment them into representational components ("this part represents the entity, this part represents the path"). If gestures are trajectories, such segmentation will systematically fail because continuous dynamics resist discrete boundaries. The empirical literature consistently documents this resistance across gesture types, sign language phenomena, and multimodal integration—precisely what trajectorial ontology predicts.

1.2. Contributions and Roadmap

Our contribution is threefold. First, we systematize scattered empirical observations under a coherent pre-representational architecture. Decades of gesture studies and sign linguistics have documented phenomena that resist morphemic decomposition, yet these insights have remained theoretically fragmented. By adopting a trajectorial framework, we unify these observations under a single explanatory principle: meaning-making operates through navigation, not combination.

Second, we resolve specific technical problems that have resisted morphemic approaches. Classifier predicate analysis in sign languages generates persistent paradoxes ("Are handshapes morphemes or gestures?"). Depicting verb segmentation produces forced decompositions that violate holistic character. Gradient iconicity puzzles morphological frameworks that assume discrete form-meaning mappings. T&T demonstrates that these are not genuine ontological mysteries but artifacts of imposing inappropriate analytical categories—attempting to parse trajectories as if they were assembled from discrete units.

Third, we open new empirical investigations across modalities. If gestures and signs are inherently phrasal, what does this reveal about spoken "words" in embodied interaction? How do writing systems create the illusion of lexical atomicity? What are the consequences for language acquisition, linguistic typology, and cognitive models of meaning? By recognizing trajectorial dynamics as foundational, we shift the theoretical landscape: phrases become the ontological primitive, and "words" emerge as analytical abstractions imposed retrospectively.

The remainder of this paper proceeds as follows. Section 2 examines the holophrase heritage in gesture and sign research, reviewing foundational insights from Kendon, McNeill, and Liddell that already point toward trajectorial dynamics even while analyzed within morphemic frameworks. We identify both convergence across these traditions and critical theoretical fragmentations, particularly the representationalist trap that obscures phrasal character. Section 3 presents two extended empirical cases—classifier predicates in sign languages and personal indexicality in co-speech gesture—demonstrating how trajectorial analysis at higher observational resolution resolves persistent descriptive puzzles. Section 4 synthesizes implications for a trajectorial linguistics, clarifying that our contribution lies in formalization rather than empirical discovery, exploring consequences across gesture studies, sign linguistics, and spoken language analysis, and outlining methodological shifts

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and future research directions. The paper concludes with reflections on what gestures reveal about the fundamental nature of human signification.

The phrasal character of gesture is not exceptional. It is foundational. Gestures reveal trajectorial dynamics that operate in all semiosis but are obscured in speech by orthographic conventions and high conventionalization. Recognizing gestures as phrases is the first step toward recognizing that phrases are the ontological primitive, and "words" are analytical abstractions imposed retrospectively—pixels mistaken for reality when we fail to adjust our observational resolution.

For readers seeking a comprehensive treatment of the formal architecture underlying these claims—the mathematics of positional navigation, epistemic operators, and radial structures—detailed specifications are available in a companion technical publication [8]. This paper maintains a conceptual register to ensure accessibility for empirical researchers in gesture studies and sign linguistics whose work provides the evidential foundation for these theoretical claims.

2. The Holophrase Heritage: What We Already Know

The idea that gestures and signs function as complete utterances rather than lexical atoms is not new. Decades of empirical research across gesture studies, sign linguistics, and multimodal communication have documented phenomena that resist traditional word-based analysis. This section surveys three foundational lines of inquiry that establish the phrasal character of gestural and signed expressions, demonstrating both the empirical robustness of the observation and the theoretical challenges that persist when analysis remains anchored in representationalist assumptions.

2.1. Terminological Clarification: "Phrase" as Trajectorial Unit

Before developing the formal apparatus, we must clarify a critical terminological point. Throughout this paper, we use *phrase* not in the restrictive syntactic sense of head-complement structures (e.g., nominal phrases as determiner-noun-modifier configurations) but as **integrated trajectories of meaning**—navigational arcs that may be composed of multiple threads: indexical, temporal, directional, or involving complex states.

This usage reflects a fundamental theoretical commitment. In trajectorial semantics, a phrase is not a syntactic construction that assembles discrete units according to combinatorial rules. Rather, a phrase is any semiotic event that "happens"—that is, any expression that already "means something" by virtue of being produced in a semiotic context. The gesture "call me" is phrasal not because it combines separate morphemes but because it enacts a complete navigational trajectory whose semantic landmarks and their interrelations (what traditional syntax would parse as "head," "complement," "modifier") are already present and dynamically integrated within what appears to be a mono-lexematic expression.

This is not terminological convenience but ontological claim. Traditional approaches reserve "phrasal" for structures demonstrably built from multiple words or morphemes, treating single-unit expressions as atomic. Trajectorial analysis inverts this: *all* meaningful expressions are inherently phrasal because meaning-making is inherently navigational. What varies is not phrasality itself but structural differentiation—the degree to which internal landmarks remain perceptually accessible versus having undergone conventionalization collapse.

Concrete example: The ASL sign GIVE-CONTINUOUSLY involves what morphemic analysis would parse as "verb root + aspect marker + directional affix." Trajectorial analysis recognizes a unified trajectory whose phases (initial configuration, durational extension, spatial path) constitute an integrated navigation through semantic space. The semantic landmarks (agent, theme, recipient, temporal extension) and their syntactic relations (transitivity, agreement, aspect) do not require assembly from discrete morphemes—they emerge through the continuous dynamics of the trajectory itself, already structured and already meaningful.

Thus, when we claim that "gestures and signs are phrases, not words," we are not arguing that they pattern like multi-word syntactic phrases rather than single lexemes. We are arguing that they function as complete navigational trajectories whose internal structure (threads and their dynamics,

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landmarks and their interrelations) exists prior to and independently of any morphemic segmentation. The phrase is the minimal unit of meaning-making because navigation is the minimal process through which meaning emerges.

2.2. Kendon's Gesture Phrases

Adam Kendon's pioneering work on gesture established the fundamental insight that gestural units function as complete communicative acts, not as supplements to verbal lexemes. His concept of the *gesture phrase*—a bounded sequence of movement phases (preparation, stroke, retraction) forming a unified utterance—revealed that gestures exhibit internal temporal structure comparable to spoken phrases [15,16]. Critically, Kendon demonstrated that gesture phrases operate as "visible action as utterance," conveying propositional content independently of accompanying speech. In co-speech contexts, gestures do not merely illustrate words but provide complementary or even contradictory information, functioning as autonomous communicative channels.

Cross-linguistic evidence supports this characterization. Haviland's analysis of Tzotzil Mayan gesture practices documents the grammaticalization pathway from spontaneous iconic gesture to conventionalized holophrase [12]. The "come here" gesture in Tzotzil—initially an ad hoc manual motion—stabilized into a conventionalized imperative functioning as a complete utterance equivalent to a verbal command. This trajectory demonstrates that gestural holophrases are not marginal phenomena but can achieve the same conventionalization and grammatical status as spoken constructions. Similarly, Le Guen's documentation of Yucatec Maya temporal gestures reveals holistic expressions (e.g., *pa'atiki'* "later") that replace entire verbal phrases, not individual words [18].

Kendon's framework captures the utterance-level functionality of gestures but stops short of explaining *why* gestures resist morphemic decomposition. The gesture phrase concept describes temporal organization—preparation, stroke, retraction—yet remains agnostic about the semantic architecture that prevents higher definition analysis. This descriptive gap persists because Kendon's model, while rejecting gesture-as-word conceptualization, does not fundamentally challenge the representationalist assumption that meaning consists of units combined by rules.

2.3. McNeill's Global-Synthetic Imagery

David McNeill's Growth Point theory provides a complementary perspective, contrasting gestural and verbal meaning-making at the cognitive-semiotic level. McNeill characterizes gestures as *global-synthetic* representations—holistic, imagistic depictions of events or states—in opposition to the *segmented-analytic* structure of speech [20]. When a speaker says "he climbs up the hill" while tracing an ascending spiral with their hand, the verbal utterance segments the event into discrete morphemes (pronoun, verb, adverbial phrase), whereas the gesture presents a unified spatial-kinetic image encoding entity, path, and manner simultaneously.

This global-synthetic character manifests across gesture types. Iconic gestures depicting object manipulation (e.g., turning a doorknob) integrate configuration, movement, and spatial relation in a single continuous form. Metaphoric gestures presenting abstract concepts through spatial mappings (e.g., "putting an idea behind us" with backward hand movement) convey complete conceptual frames rather than atomic semantic features. McNeill's concept of *catchments*—gestural themes recurring across multiple utterances—further demonstrates that gestural coherence operates at discourse level, tracking narrative threads through imagistic continuity rather than lexical repetition [21].

Growth Point theory proposes that gesture and speech emerge from a unified cognitive origin—the growth point itself, a pre-linguistic unit of thinking combining imagistic and linguistic dimensions. Yet McNeill's framework does not resolve the fundamental question: if gestures are global-synthetic, why does language retain segmented-analytic structure? The answer typically invokes modality constraints—speech unfolds linearly in time, necessitating segmentation, whereas gesture exploits spatial dimensions enabling simultaneity. But this explanation presupposes that segmentation is necessitated by production constraints, not by semantic architecture itself. Trajectorial semantics

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argues that even speech, in situated interaction, exhibits continuous structure obscured by writing-based analytical traditions.

2.4. Liddell's Depicting Constructions

Sign linguistics confronted the phrasal question most directly through the analysis of classifier predicates and depicting signs. Traditional morphemic analysis produces what we might call "Frankenstein" decompositions—forced segmentations that violate the holistic character of signed expressions. Liddell (2003) demonstrated this problem extensively with his work on American Sign Language [19]. Depicting verbs (Liddell's preferred term for classifier predicates) function as complete predicative structures integrating entity type (handshape), path (movement trajectory), manner (movement quality), and spatial relations (location and orientation) in a single continuous articulation.

Consider the ASL construction depicting a vehicle moving along a winding road. Traditional classifier analysis segments this into morphemes: handshape classifier (vehicle type), movement path (trajectory), speed (movement dynamics). Yet these "morphemes" cannot be produced in isolation without destroying the construction's meaning. The handshape is meaningless without the path; the path is uninterpretable without the handshape; speed and manner modulations are inseparable from the movement itself.

Liddell argued that depicting signs operate through *gradient analog mapping*—a continuous correspondence between signing space and conceptual space—rather than through discrete morphological composition. This gradient character extends to other sign language phenomena. Constructed action (role shift)—where signers embody characters through postural, facial, and manual expression—presents complete predicative scenarios rather than assembling lexical units [5,23]. Spatial reference systems in sign languages allow simultaneous predication across multiple articulators (dominant hand, non-dominant hand, facial expression, body orientation), each contributing to a unified propositional structure that resists segmentation [6].

Liddell's critique of morphemic analysis is devastating for lexicocentric approaches, yet his alternative—gradient analog mapping—remains descriptive rather than explanatory. What prevents segmentation? Why does simultaneity preclude discrete units? Liddell appeals to iconicity and spatial analogy, but these are representational concepts that assume a mapping relation between sign and referent. Trajectorial semantics reframes the question: depicting signs are not "representing" events through analog mapping but *navigating* through informational space in ways that mirror experiential dynamics. The resistance to segmentation is not a special property of iconic signs but a general consequence of trajectorial meaning-making.

2.5. Convergence and Fragmentation

These three research traditions converge on a shared empirical observation: gestural and signed expressions exhibit holistic, phrasal character that resists decomposition into minimal meaningful units. Kendon documents gesture phrases functioning as complete utterances. McNeill contrasts global-synthetic gestural imagery with segmented verbal structure. Liddell demonstrates that classifier predicates cannot be analyzed as morpheme combinations without violating their semantic integrity.

Yet this convergence has not produced theoretical unification. Each framework identifies the phenomenon but explains it differently. Kendon emphasizes temporal organization (gesture phases as utterance structure). McNeill invokes cognitive origins (growth points as pre-linguistic thinking). Liddell appeals to modality properties (spatial iconicity enabling gradient mapping). These explanations are not incompatible, but neither do they constitute a unified theory. They describe the same empirical facts from different analytical perspectives without establishing *why* holistic structure is inevitable.

The fragmentation stems from a shared limitation: all three frameworks remain anchored in representationalist assumptions. Kendon treats gestures as conveying propositional content through visible action. McNeill characterizes gestures as representing events through imagistic depiction. Liddell describes depicting signs as mapping signing space onto conceptual space. Each assumes that meaning consists of represented content, even if that content resists segmentation into discrete units.

 doi:10.20944/preprints202511.1801.v1

Trajectorial semantics dissolves this representationalist foundation. If meaning emerges from navigational dynamics through informational space rather than from combination of representational units, the resistance to segmentation requires no special explanation. Trajectories are continuous by nature; attempting to segment them into discrete morphemes is a category error, like trying to identify the "moving units of water" of a flowing river or even coarser chunks of properties like "movement", "direction", and "substance quality". The holistic character of gestures and signs is not a puzzle to be solved but the natural consequence of recognizing meaning-making as fundamentally trajectorial.

2.6. The Representationalist Trap

The persistence of morphemic analysis despite overwhelming evidence of holistic structure reflects what we term the *representationalist trap*: the assumption that because linguistic expressions *can* be segmented (perceptually, orthographically, analytically), they *must* consist of segments (ontologically). This assumption generates pseudo-problems that dissolve once we abandon the premise that meaning consists of combinable units.

Consider the debate over classifier predicates in sign linguistics. Are handshape classifiers morphemes or gestural components? Do they encode semantic features (entity type, animacy, shape) or provide analog spatial anchors? Should they be listed in the lexicon or generated productively in discourse? These questions presuppose that classifiers must be either discrete units (morphemes) or holistic gestures. The representationalist framework forces a binary choice because it cannot accommodate continuous variation between conventionalized threads and spontaneous trajectories.

Trajectorial analysis reveals this as a false dichotomy. Classifier handshapes are neither discrete morphemes nor gestural atoms but positions along trajectories through signing space. Some handshapes have undergone conventionalization collapse, stabilizing into recognizable configurations that facilitate intersubjective coordination (analogous to cognitive-linguistic schemas). Others remain dynamically modulated in real-time production, exhibiting the continuous variation characteristic of spontaneous gesture. The boundary between “lexical” and “gestural” is not ontological but reflects differential degrees of conventionalization—the extent to which particular trajectory segments have semiotic stability (low dissipation rates) to function as navigational anchors.

This perspective dissolves the classifier paradox. We need not choose between morpheme and gesture because both categories impose discrete boundaries onto continuous phenomena. Handshapes are trajectory segments that vary in **thread saturation depth** (conventionalization), navigational stability, and perceptual salience depending on discourse context, signing rate, and interlocutor familiarity. High thread saturation *enables* informational economy—agents can actualize compressed pathways exploiting stereotyped threads—producing “word-like” behavior reliant on community-specific conventions. Low thread saturation allows agents to navigate via sensoriomotor principles that linguistic theory identifies as iconic affordances [26,27], producing “gesture-like” behavior grounded in embodied coordination. Critically, this distinction is modality-independent [24]: both manual and vocal expressions can exhibit either “gesture-like” or “word-like” trajectorial character depending on thread saturation depth rather than articulatory channel. But both extremes, and everything in between, reflect the same underlying architecture: navigation through informational space, leaving differential traces.

The choice between extended and compressed trajectory actualization depends on multiple interacting factors beyond conventionalization. **Intersubjective conditions** modulate elaboration: unfamiliarity between interlocutors can favor extended trajectories (maximizing informational accessibility), while established rapport can enable compressed trajectories (trusting shared contextual anchors). **Temporal constraints** pressure economy, favoring compressed actualization even when extended trajectories would enhance clarity. **Discourse function** determines whether granular configurational detail serves communicative goals: pedagogical contexts invite extended elaboration, whereas narrative flow rewards compression. **Emotional investment** drives trajectory length: highly salient events attract extended actualization, peripheral details undergo compression. Thread saturation through conventionalization *enables* compressed pathways—creating stable stereotyped routes—but

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does not *determine* trajectory length. Contextual dynamics (intersubjective conditions, temporal constraints, discourse function, emotional investment) interact with conventionalization to determine which navigational option agents actually realize in situated production.

The representationalist trap extends beyond classifier analysis. Debates over lexical versus productive processes, compositional versus holistic structure, discrete versus gradient phenomena—all reflect the mistaken assumption that observable segmentation reveals ontological structure. Trajectorial semantics cuts through these debates by recognizing that segmentation is always an analytical imposition, never an ontological discovery. We can segment trajectories for descriptive purposes, just as we can measure a river's flow at particular points. But the measurements do not reveal atomic units; they impose arbitrary boundaries onto continuous dynamics.

2.7. Overt and Covert Phrases

If gestures and signs are inherently phrasal, why do some expressions appear segmented while others resist decomposition? The answer lies in recognizing that expressions vary in **trajectorial actualization length**—the informational distance agents navigate in real-time production. Critically, **form and meaning are identical** in T&T semantics: there is no underlying conceptual structure that gets "packed" into surface forms. An expression *is* its trajectorial actualization. What varies is whether agents realize **extended** versus **compressed** navigational arcs through informational space.

Some expressions are actualized through **extended navigational arcs**—agents traverse longer informational distances, elaborating configurational detail across multiple thread-level positions $\{p_1 \rightarrow p_2 \rightarrow p_3\}$. Consider depicting verbs in sign languages: signers navigate through extended trajector-landmark-manner configurations, actualizing rich phenomenological detail. We term these **overt phrases**—not because they reveal hidden structure, but because their extended trajectory length renders phases perceptually accessible at ordinary observational resolution.

Other expressions are actualized through **compressed navigational arcs**—agents traverse shorter informational distances, collapsing potential elaboration into economical enactment. Conventionalization provides stereotyped pathways enabling direct transitions between distant positions $\{p_1 \rightarrow p_5\}$, bypassing intermediate elaboration. The sign CASA (house) in Mexican Sign Language exemplifies this: signers actualize a compressed trajectory that *feels* atomic at ordinary resolution. Yet this appearance reflects **trajectory compression**, not absence of phrasal character. Examined at fine temporal-configurational resolution, even maximally compressed signs reveal continuous navigational dynamics. We term these **covert phrases**—their compressed actualization creates gestalt appearance, but they remain inherently trajectorial.

Strictly speaking, **all expressions are "overt" in that they ARE their trajectorial actualization**—there is no hidden conceptual structure beneath observable form. The Overt/Covert distinction is an **analytical convenience**, not an ontological division. We employ it to bridge terminologically with Cognitive Linguistics' elaboration/schematization framework while maintaining radical incompatibility with representationalist ontology. In representationalism, "packing" compresses deep conceptual structures into surface forms, presupposing form-meaning duality. In T&T, what appears as "packing" is simply **agents actualizing compressed trajectories**—shorter navigational arcs through informational space. There is no structure being "packed"; there is only differential trajectory length in real-time navigation.

This distinction is not categorical—but neither is it merely impressionistic. Trajectory length is **measurable** in principled ways. Expressions can be characterized by their **actualized navigational extent** (the informational distance traversed from initiation to completion) and their **conventionalization depth** (the thread saturation density enabling different pathways). Together, these parameters determine observational accessibility—whether trajectory phases remain perceptually distinguishable or collapse into gestalt appearance. Extended trajectories favor analytical transparency in the traditional descriptive sense, analogous to detailed interview narration. Compressed trajectories create apparent atomicity, analogous to monosyllabic responses. But in both cases, the expression *is* its trajectory—longer or shorter actualization, not deep structure versus surface form.

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Expressions vary continuously along this multidimensional space depending on conventionalization history, production context, and discourse function. Newly coined depicting verbs could exhibit high structural differentiation: sparse conventionalization leaves configurational phases accessible at fine temporal resolution (overt structure). Centuries-old lexical signs exhibit low structural differentiation: low relevance within the trajectorial complex leads to thread thinning. This is not the same as a covert phrase. Since less active engagement on the part of speakers (less use) flattens its path in an opposite direction from conventionalization, and towards dissipation. Intermediate cases populate the entire continuum, demonstrating that apparent categorical boundaries (word vs. phrase, lexical vs. gestural) emerge from observational resolution rather than ontological structure.

Critically, the overt/covert distinction reifies neither modality (gesture vs. sign vs. speech) nor grammatical category (verb vs. noun vs. classifier). It reflects the interaction between **thread saturation processes** (which enable compressed pathway options through conventionalization) and **contextual production factors** (which determine whether agents actualize extended or compressed trajectories). High conventionalization does not cause compression; it provides the structural option for compression that contextual factors may or may not exploit: in T&T Semantics *conventionalization* and *informational economy* are parallel but not always conflating functions. Cognitive linguistics terms this "packing/unpacking" or "elaboration"—but this terminology **obscures a fundamental ontological difference**. Representationalist frameworks posit dual levels: deep conceptual structures that get "packed" into surface forms. T&T posits **no such duality**. What appears as "packing" is agents actualizing **shorter trajectories**; what appears as "unpacking" is agents actualizing **longer trajectories**.

There is no underlying structure being manipulated—only differential navigational actualization through informational space. A long trajectorial expression has a shorter alternative linked by common **initial conditions**—not shared conceptual representations—, if {p1→p2...} have been navigated, then there could be "a fork in the road" either (*short-t*) {p1→p2→p5} or (*long-t*) {p1→p2→p3→p4→p5}. This could be, in explanatory discourse ("I was walking down the street when I passed right next to them, but I completely ignored them"), where the agent invests informational effort in temporal-spatial-affective detail, or in rapid narrative ("I walked past them") where we decide (and have the conventional *means* to) actualize the shorter trajectory. What appears as structural accessibility is not a fixed property but emerges from the relation between informational differentiation (effort invested) and observational threshold (awareness of alternative routes).

This framework explains why morphemic analysis succeeds for some expressions and fails for others. Conceptual archetypes modulate this effect. Following Langacker's [17] distinction between nominal and processual profiling, expressions stabilized around thing-like configurations (atemporal regions scanned summarily) more readily undergo covert conventionalization: HOUSE, TREE, PERSON appear gestalt-like even when articulated through complex handshape-location sequences. Expressions stabilized around process-like trajectories (temporal relations scanned sequentially) more readily maintain overt accessibility: WALK, BUILD, TRANSFORM preserve their phase structure because sequential scanning aligns with phenomenological experience. Crucially, this is not deterministic—conventionalization can collapse any trajectory—but thing-archetypes facilitate perceptual atomicity while process-archetypes facilitate phase-salience.

The coarse pixel error, then, is mistaking the visibility threshold of our observational instruments for the boundary of ontological structure. Morphemic analysis operates like low-resolution imaging: it identifies the largest visible units (words, morphemes) and treats them as building blocks. Trajectorial analysis operates like high-resolution imaging: it preserves continuous dynamics across all scales. The difference is not merely descriptive preference but reflects fundamentally opposed commitments about what meaning *is*—assembled representations versus navigated trajectories.

2.8. Empirical Predictions

The trajectorial framework generates testable predictions that distinguish it from morphemic approaches:

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1. **Gradient structural accessibility**: Expressions should exhibit continuous variation in structural transparency rather than binary opposition (morpheme vs. holophrase). Undefinable cases should be standard, not exceptional—most expressions will fall along a continuum between high and low differentiation.
2. **Context-dependent variation**: Expressions exhibit different granular definitions depending on discourse context, production rate, and interlocutor familiarity; they are each a unique expression but could share common stabilization patterns that constrain trajectorial possibilities. Highly conventionalized signs in careful citation can be decompressed in spontaneous narrative, presented by the speaker *as having* internal structure.
3. **Diachronic trajectories**: Newly emerging expressions, depending on the conventional semiosis of the collective environment—e.g., synthetic versus analytic—could begin with high structural differentiation (overt phrasing) and gradually undergo both *thread saturation* (conventionalization) and *informational economy* (compression). These parallel processes often correlate: as threads saturate, communities can rely on compressed actualizations because stereotyped pathways enable contextual recovery. Historical linguistics has documented numerous cases where conventionalization enables (though does not necessitate) subsequent compression across languages and modalities [4].
4. **Cross-linguistic systematicity**: Languages should differ not in whether they have "morphemes" but in which trajectorial granularity they favour and in which situated conditions; global-synthetic versus analytical. Typological differences reflect differential stabilization patterns — i.e., which pathways through informational space have *thicker threads* that function as conventional anchors.
5. **Production-comprehension asymmetry**: The speaker could maintain awareness of the potential trajectorial path longer than hearers require it—to what extent he could have been attentive to details in his expression of an event. Signers may modulate fine configurational detail; their awareness of the trajectorial possibilities is, in principle, invisible to observers—since they didn't manifest as linguistic behavior —, creating systematic gaps between production precision and comprehension sufficiency.

These predictions contrast sharply with morphemic approaches, which predict discrete categorical boundaries, context-invariant structure, and universal compositional architecture. The empirical literature increasingly supports trajectorial predictions. Kendon's documentation of gesture-phase variability, McNeill's analysis of gradient iconicity, and Liddell's demonstration of depicting verb continuity all converge on the same observation: structural accessibility is a fine-grained, context-dependent, interactional work. It is shaped by informational differentiation and observational resolution.

2.9. Bridging to Empirical Analysis

With these foundational distinctions established—trajectorial versus morphemic ontology, overt versus covert phrases, structural differentiation versus observational resolution—we can now address specific empirical domains where morphemic analysis has generated persistent problems. The following sections demonstrate how trajectorial semantics resolves classifier predicate paradoxes, depicting verb segmentation controversies, and gradient iconicity puzzles by recognizing them as artifacts of inappropriate analytical framing rather than genuine ontological mysteries. The holophrase heritage provides the empirical foundation; trajectorial analysis provides the theoretical architecture capable of explaining what previous frameworks could only describe.

3. High Definition Analysis: Two Cases

The preceding sections established that gestures and signs function as continuous phrases or trajectories whose apparent components dissolve under increased analytical resolution. That is, they are not composed of semantic units. Semantic values result from the dynamical activity of thread-paths and interactive navigation. We now demonstrate how this high-definition approach resolves specific empirical puzzles that have resisted morphemic analysis. Two cases illustrate the general pattern: clas-

 doi:10.20944/preprints202511.1801.v1

sifier predicates in sign languages, where forced morphemic decomposition generates "Frankenstein" analyses universally recognized as inadequate, and personal indexicality, where systematic formal variability reveals trajectorial navigation rather than morphological alternation.

3.1. Classifier Predicates: When Decomposition Fails

Classifier predicates in sign languages present a persistent analytical challenge. A signer depicting a vehicle moving along a winding road produces a continuous articulatory arc: a specific handshape maintained throughout movement, a path traced through three-dimensional space, orientation shifts tracking imagined terrain, and speed modulations indicating manner. Traditional morphemic analysis attempts to decompose this continuous production into discrete units: handshape morpheme (vehicle type), movement morpheme (path), location morpheme (spatial position), orientation morpheme (facing direction). The result is a cumbersome, brick-like, colored characterization—forced segmentation that dismembers a gestural trajectory into componential parts that have no empirical ground but instead respond solely to an arbitrary taxonomic tradition.

The analytical impulse is understandable. At coarse observational resolution, these trajectories *appear* segmented. The handshape remains relatively stable while the hand moves through space, creating the perceptual impression of separable units: "this part (handshape) represents the vehicle; this part (movement) represents the path." But increase the resolution—attend to the microstructure of production—and the supposed boundaries evaporate. Handshape is not maintained identically throughout; subtle configurational adjustments occur continuously as the hand navigates. Movement is not independent of handshape; the specific articulation emerges from their integrated execution. Orientation shifts are not additive features but constitutive aspects of the navigational arc.

The morphemic approach faces an impossible dilemma. If handshape, movement, and location are genuinely independent morphemes, they should exhibit the combinatorial logic characteristic of morphological systems: any handshape should combine freely with any movement pattern at any location. But classifier predicates resist such predictions. Certain handshapes strongly constrain possible movement patterns; certain movements require specific orientations; spatial positions interact with manner specifications. The system exhibits *holistic coherence* rather than combinatorial productivity.

Attempts to resolve this through increasingly complex morphological rules—co-occurrence restrictions, feature hierarchies, obligatory agreement mechanisms—only compound the problem. Each additional constraint undermines the fundamental premise that these are independent, combinable units. Furthermore, they ignore entirely situated conditions, that is, the real forms and interactions in which these expressions manifest. If vehicle-handshapes systematically co-occur with path-movements and manner-modulations, in what sense do they constitute separate morphemes? Is the depicting verb you are describing stable in its form, or do you have to resort to the speaker's "creativity", predicting our reaction when we try to attest your analysis in a real conversation?

The Trajectorial Alternative: Navigation, Not Assembly

The trajectorial alternative dissolves the puzzle by rejecting the premise. Classifier predicates are not assembled from morphemic atoms—they are not assembled, period—instead, they manifest **navigational dynamics through informational space** where form and meaning are identical.

Consider the vehicle-depicting classifier in detail. What morphemic analysis parses as discrete components (VEHICLE handshape + PATH movement + MANNER modulation) reveals itself under T&T analysis as a unified navigational arc through informational topology. The signer navigates not "articulatory positions" but **saturated representational threads**—filaments of consolidated trace densities that guide the trajectory's unfolding.

The apparent stability of the "handshape" corresponds to what gesture dynamics has long recognized: a **sweet spot** or informational peak where representational saturation reaches asymptotic stability. This is not a "hold" of an articulatory configuration but a **thread saturation point** where multiple informational filaments converge—embodied sensorimotor traces, conventionalized cultural patterns, intersubjective coordination anchors—achieving momentary coherence. The onset exhibits

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characteristic acceleration toward this attractor (rapid thread recruitment), while the offset shows extended dissipation (gradual thread release), following thermodynamic principles of informational entropy.

What appears as "movement" is the trajectory's navigation between thread saturation points (see Radial Analysis [8] for a detailed account on *temporal trajectories*). The specific path emerges not from the linear or hierarchical combination of a movement morpheme with other elements, but from the **real-time weaving of available threads**. For didactic purposes—awaiting an in-depth analytical formalization—we could say that the vehicular thread (culturally saturated hand configuration), the spatial thread (path through signing space), the manner thread (velocity and tension modulations), and the perspectival thread (signer's embodied viewpoint) *weave* together. These threads are not independent components but **co-saturating filaments** whose mutual reinforcement produces the trajectory's specific actualization.

Critically, this navigation exhibits the **Markovian dynamics** that McNeill (2016) identifies in gesture orchestration: each momentary configuration probabilistically constrains subsequent possibilities, not through morphological rules but through the informational topology of available threads. A vehicle-hand configuration entering curved-path space naturally recruits manner modulations appropriate to that curvature—not because morphemes "agree" but because threads co-saturate, creating **informational gradients** that guide the trajectory's continuation.

This analysis explains phenomena that morphemic approaches cannot accommodate:

1. **Gradient iconicity:** The trajectory can exhibit continuously variable degrees of vehicular specificity (car vs. truck vs. bus) without switching between discrete morphemes, because thread saturation operates continuously—more detailed vehicles recruit more specific thread configurations.
2. **Context-dependent variability:** The same conceptual content ("vehicle moving") actualizes differently across productions because available threads vary with discourse context, articulatory momentum, interlocutor familiarity—the trajectory navigates the specific informational landscape present at that moment.
3. **Simultaneous stability and flexibility:** High-saturation threads (conventionalized handshapes) provide navigational anchors while allowing continuous modulation along less-saturated dimensions, explaining why classifiers feel both "lexical" and "gestural" simultaneously.

The mathematical formalization follows naturally. Thread saturation exhibits power-law distributions (frequent threads achieve deep saturation, rare threads remain shallow), phase transitions (threads suddenly consolidate at critical saturation thresholds), and attractor dynamics (trajectories gravitate toward high-saturation configurations). These are not metaphors but measurable properties of the informational dynamics, demonstrable through motion capture, statistical analysis, and computational modeling.

On "Iconicity" in Trajectorial Semantics

The matter of iconicity in linguistics is, ultimately, a residue—an artifact of an artificially established duality, namely the motivated/unmotivated, arbitrary/non-arbitrary distinction, which presupposes that the form of the sign has no relation to meaning beyond arbitrary convention. In Trace & Trajectory semantics, insofar as one of the foundational premises is that there exists no distinction between form and meaning—since everything is representational manifestation of trajectories, and different filaments or trace saturations define the properties of trajectorial manifestation over informational space—there is consequently no need to associate signifier and signified. We need not locate meanings in localist geometries, whether in conceptual, structural, or abstract terms.

Therefore, what we may continue to call "iconicity"—a term we should soon recognize as obsolete—refers to those cases that, in a meta-analysis of the linguistic literature and particularly the cognitive linguistics literature, have been highlighted as exemplary instances of the rupture of the form-meaning dualism. These include gestuality, sound symbolism, indexicality, and particularly

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those conventionalized manifestations in sign languages that gesture studies have properly called iconic or metaphoric gestures.

This perspective clarifies that trajectorial semantics is not simply a rehabilitation of iconicity within traditional frameworks. It is not an argument that "more" linguistic structure is iconic than previously recognized, nor that iconicity constitutes a special type of form-meaning mapping. Rather, trajectorial dynamics dissolve the very question that iconicity was meant to address. When form and meaning are not separable dimensions requiring mapping, iconicity ceases to be a theoretical problem requiring explanation and becomes instead a descriptive label for cases where the illusion of form-meaning duality has been most difficult to sustain.

What Trajectorial Dynamics Is Not

Before proceeding, crucial clarifications are necessary. The trajectorial account of classifier predicates is **not** Articulatory Phonology or gestural phonology [2,3] That framework transforms static phonological features into dynamic articulatory gestures—replacing binary feature switches [+/-voice] with continuous temporal coordination of articulatory targets. While this represents a significant advance beyond strictly discrete representations, it remains fundamentally combinatorial: gestures are units that overlap, coordinate, and combine according to gestural scores. The ontological architecture remains assembly-based, merely operating with continuous rather than discrete primitives.

Trajectorial dynamics rejects this combinatorial foundation entirely. Threads are not articulatory units that combine; they are pre-representational traces whose saturation patterns guide navigation through informational space. The appearance of combination—multiple "aspects" manifesting simultaneously—reflects co-saturation dynamics, not assembly operations. Thread recruitment follows informational topology (what traces are available, how densely they have been consolidated, what navigational affordances they present), not combinatorial rules specifying which units can co-occur.

Similarly, trajectorial semantics should not be mistaken for a straightforward application of Dynamic Systems Theory to language [7]. While closer to our framework in recognizing continuous dynamics and emergent structure, complexity approaches to language typically retain representationalist assumptions: meanings are attractors in cognitive space, forms are dynamical trajectories through production systems, and the two domains require coordination through some mapping architecture. Trajectorial semantics goes further: there is no mapping because there are no separate domains to map between. Informational navigation generates what we retrospectively parse as "form" and "meaning" through the same dynamics.

The key distinction is ontological, not merely methodological. Complexity approaches still ask "How do meanings emerge from form?" Trajectorial semantics asks instead "How does trajectorial navigation through pre-representational informational configurations generate the phenomenological impression of language?" The first question presupposes the very duality we reject; the second investigates its emergence as an analytical phenomenon.

3.2. Personal Indexicality: Trajectorial Scope Without Morphemes

Personal indexical pointing in sign languages (IX-1, IX-2, IX-3) presents a second domain where morphemic analysis generates puzzles that dissolve under trajectorial reframing. Traditional treatments analyze pointing signs as pronominal systems: IX-1 = first person, IX-2 = second person, IX-3 = third person. This grammatical categorization presupposes that each "form" constitutes a discrete morphological unit with a stable referential function. But empirical investigation reveals systematic formal variability that resists such categorization.

In LSM (Mexican Sign Language), comprehensive corpus analysis reveals that around 46.8% of IX tokens exhibit the canonical configuration (extended index finger). The remaining 53.2% show various non-standard forms: hand configurations assimilating to adjacent signs, palm-based pointing, non-extended finger articulations, and contextually emergent variants [10]. This pattern is not unique to LSM. Johnston (2013) reported approximately 30% non-standard configurations in AUSLAN (Australian Sign Language) corpus data, while Bayley et al. (2002) documented that 81% of first-person IX

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tokens in ASL (American Sign Language) did not employ index finger configuration, using instead fist-to-chest, thumb-pointing, or other articulatory variants.

The morphemic response attempts to preserve categorical stability by invoking phonological processes. IX-1 adopts the handshape of an adjacent sign through "assimilation": progressive assimilation if anticipating the following sign's configuration, regressive assimilation if perseverating from the preceding sign. For example, in the sequence EDAD IX-1 EJERCICIO ("at my age, I exercise"), IX-1 appears between two signs articulated with E-handshape (thumb extended, fingers curved). The IX-1 token may adopt this E-configuration while retaining its referential function (first-person singular). The morphological analysis treats this as allomorphic variation governed by phonological rules, analogous to how Spanish /n/ assimilates to the place of articulation of following consonants.

But this explanation encounters immediate difficulties. Unlike phonological assimilation in spoken languages, which exhibits law-like regularity (Spanish /n/ *always* assimilates before bilabials), handshape variability in IX shows no such systematicity. The same signer may produce IX-1 with index-finger configuration in one utterance and E-handshape configuration in the next, both occurring in identical phonological environments. The variation is not predictable from adjacent forms but reflects something more fundamental about the nature of IX itself.

Moreover, the assimilation explanation becomes strained when IX-1 appears adjacent to signs with open-palm handshapes, such as CASA ("house"). In sequences like IX-1 QUERER CASA ("I want a house"), IX-1 may adopt the open-palm configuration of CASA. At this point, the notion that IX-1 has a "basic form" from which variants are derived through phonological processes loses coherence. An open-palm articulation toward the chest is not an "allomorph" of index-finger pointing; it is a qualitatively different gestural trajectory. Yet signers deploy it interchangeably with canonical IX-1, maintaining clear first-person reference without categorical instability.

Navigation Through Differentially Saturated Thread Configurations

The trajectorial analysis recognizes this variability as inherent rather than derivative. IX-1 is not a stored morphological form that undergoes phonological modification but a **navigational trajectory through differentially saturated thread configurations**. The specific articulation emerges from real-time recruitment of available threads—**body-anchored spatial threads** (toward chest region), **configurational threads** (extended finger, open palm, fist), **kinetic threads** (movement velocity and arc)—whose **co-saturation dynamics** produce the actualized form without retrieving a base morpheme. When a signer produces IX-1 QUERER CASA with open-palm configuration, they are not retrieving "first person pronoun" and then applying assimilation rules. They are navigating a trajectory that establishes first-person reference through movement toward the body, with hand configuration emerging as one recruited thread among others rather than as a definitional criterion.

This reframing explains patterns that morphemic approaches treat as problematic. The fact that IX-1 shows greater formal variability than IX-2 or IX-3 (Bayley et al.'s [1] 81% non-canonical forms for first person versus lower rates for other persons) reflects not morphological irregularity but differential **trace density** in navigational space. First-person reference anchors at the signer's body—a region of **high trace density** where repeated navigation has saturated multiple thread configurations. This **informational overdetermination** allows trajectories toward this region to exhibit greater formal variability while maintaining referential coherence: the destination (self) is established through **convergent thread saturation** rather than configurational specification. Second- and third-person reference project trajectories outward into shared space, where **lower baseline trace density** requires tighter configurational constraints for establishing referential targets. The formal "stability" of IX-2 and IX-3 reflects not morphological canonicity but **narrower thread recruitment windows** when navigating less-saturated informational regions.

Similarly, the observation that IX-1 plural forms exhibit systematic directional variation [1,14]—arc-sweeps for inclusive we, multiple distinct points for exclusive we, body-anchored circular movements for group reference—dissolves the morphological puzzle of "person-number agreement." These are not different morphological forms of a first-person plural morpheme but **distinct navigational**

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arcs recruiting different thread configurations. An inclusive-plural trajectory **saturates both signer-region and addressee-region threads** through arc-sweep motion—the trajectory literally traverses the informational space connecting both positions. An exclusive-plural trajectory **recruits distributed positional threads sequentially**, marking off individual positions through repeated pointing that saturates discrete spatial anchors. A group-referential trajectory **centers on high-density signer threads** while recruiting radial or circular motion threads that indicate surrounding presence without discrete positional specification. Same referential category ("we"), different navigational dynamics—exactly what trajectorial semantics predicts and what morphological analysis struggles to accommodate within a unified paradigm.

From Morphemic Features to Radial Dimensions

The critical observation is that these "variants" do not reduce to a common underlying form. There is no abstract first-person-plural morpheme that gets "realized" differently in different contexts. Instead, signers navigate trajectories appropriate to the specific intersubjective configuration they are establishing. What morphemic approaches parse as **indexical features**—person (1st/2nd/3rd), number (singular/plural), proximity (proximal/distal), specificity (definite/indefinite)—trajectorial semantics reconceptualizes as **navigable dimensions within radial informational topology**.

Radial Analysis formalizes this architecture. The experiential baseline (Θ, theta) anchors each agent's navigational space—the zero-point from which indexical trajectories originate. Movement outward from Θ along concentric rings (X_1, X_2, X_3) corresponds not to morphological distance but to **informational distance**: how far the trajectory must navigate from baseline experiential immediacy. First-person indexicality operates at minimal distance from Θ (inner ring, high trace density). Second-person indexicality requires moderate outward navigation (middle ring, recruiting addressee-oriented threads). Third-person indexicality extends furthest from Θ (outer rings, lower trace density, requiring explicit spatial or contextual anchoring).

Critically, the radial structure is not simply metaphorical distance but **isomorphic to navigational topology**. What traditional grammar calls "proximity" (proximal vs. distal demonstratives) maps onto ring distance: trajectories recruiting threads at X_1 versus X_3 naturally yield phenomenological differences in experiential immediacy without requiring discrete [+/-proximal] features. What grammar calls "person" maps onto primary coordinate axes (Q, R, S) that structure sectors within the radial space: the personal/impersonal axis (Q), the singular/plural axis (R), the specific/generic axis (S). A trajectory navigating toward the Q-axis personal sector while remaining at inner ring X_1 naturally yields first-person singular indexicality. A trajectory sweeping along the R-axis plural sector at middle ring X_2 naturally yields inclusive plural reference. These are not feature specifications but **positional coordinates in informational space**—where the trajectory navigates determines what phenomenological properties emerge.

This topological reconceptualization explains why IX exhibits continuous rather than discrete variation. Traditional features impose binary distinctions ([+/-plural], [+/-proximal]) that force categorical boundaries onto gradient phenomena. Radial navigation operates continuously: a trajectory can position anywhere along the ring continuum (not just discretely at X_1 or X_3), can sweep partial arcs along plural sectors (not just binary singular/plural), can modulate density of thread recruitment (yielding gradient specificity without [+/-definite] switches). The "coarse pixelation" of morphemic models segments this continuous topology into discrete categories because those categories are the units visible at low analytical granularity. High-definition analysis reveals the underlying navigational space where what appears as "feature alternation" is actually **continuous positional variation within structured informational topology**.

Role-Play and Multimodal Positioning: The Limits of Monomorphemic Analysis

The inadequacy of morphemic approaches becomes particularly evident in phenomena like role-play, constructed action, and referential shift—pervasive in sign language discourse but systematically undertheorized in morphological frameworks. When a signer narrates a story and produces IX-1 while

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enacting a character, the morphemic analysis confronts an impossible question: does IX-1 refer to the signer (first person in ground space) or to the character (protagonist in constructed space)? Mental Spaces Theory [11] distinguishes the **ground space** (deictic center where actual speaker resides) from **constructed spaces** (projected mental spaces for narratives, hypotheticals, reported speech). Standard morphological analysis presupposes that IX-1 always anchors to ground space first person. But in role-play, IX-1 clearly refers to the character, not the narrator.

The morphemic response attempts to resolve this through "referential shift" mechanisms: a grammatical operation that reassigns deictic anchoring from ground space to constructed space. But this merely relocates the problem. If IX-1 is a first-person morpheme, what licenses its referential reassignment? If reassignment is grammaticalized (a syntactic operation), why does it show continuous gradient variation—partial shifts, ambiguous anchoring, blended perspectives? If reassignment is pragmatic (context-dependent interpretation), why does it exhibit systematic formal correlates—eye gaze shifts, body orientation, prosodic modulation?

Trajectorial analysis dissolves this puzzle by recognizing that **there is no monomorphemic IX-1 anchored to a fixed deictic center**. Instead, the signer navigates trajectories through informational space where **multiple positional configurations can be simultaneously accessible**. In ground space narration without role-play, the trajectory recruits threads saturated at the signer's Θ baseline—body-anchored spatial threads, kinesthetically immediate configurational threads. In role-play, however, the trajectory expands its scope: the signer projects an alternate character position (X_{alter}) and then navigates back through that projected perspective to manifest first-person reference. The basic trajectory becomes $\Theta \rightarrow X_{\text{alter}} \rightarrow X_1$, where X_{alter} represents the assumed character's viewpoint and X_1 emerges as *pointing to the self* from within that projected frame. Under full radial formalization at λ_{meta}, we could even display the definition of alter-positions and their projected θ spaces. But to keep the analysis tractable, we can simply say: the signer navigates to an alternate position (X_{alter}) and projects it back to X_1, which manifests through specific configurational threads as self-directed pointing. This mechanism makes transparent the explanatory adequacy of trajectorial length (overt phrasal structure), informational cost differentials, and even partially confirms previously isolated insights like *blended spaces*—all without invoking morphemic assembly.

This capacity extends naturally to phenomena that morphemic approaches treat as marginal or exceptional: demonstratives exhibiting continuous proximity gradients, possessives varying with kinship distance, reflexives showing gradient locality effects, honorifics modulating social distance. All of these reflect the same underlying architecture: trajectories navigating through radial space where informational distance, thread saturation density, and positional coordinates generate the phenomenological properties that grammar retrospectively parses as discrete morphological categories. The "gestures are phrases" thesis applies fully to indexicality: pointing is not word-retrieval but **complete navigational arc through intersubjective space**, irreducible to combinable morphemic atoms.

3.3. Discussion: Resolution Through Increased Definition

Both cases exhibit the same fundamental pattern. What morphemic analysis treats as componential structure (handshape + movement + location; person + number + case) dissolves under increased analytical resolution into continuous trajectorial dynamics. The apparent "units" are observational artifacts generated by coarse-grained analysis, not ontological primitives discovered in the data. Refining the analytical toolkit—developing epistemic resources capable of tracking gradient variation, contextual modulation, production microstructure—reveals that meaning emerges through navigation rather than through the combination of discrete representational atoms.

The morphemic approach operates like coarse pixel rendering: it segments continuous phenomena into discrete blocks because those blocks are the units visible at coarse analytical resolution—i.e., semantic properties accessible within the model's conceptual framework. Each "pixel" (morpheme or feature) appears as a minimal unit that can be combined with others to create complex images (utterances). But just as increasing the resolution of a digital image eventually reveals that pixels

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are arbitrary impositions rather than natural boundaries, improving the analytical resolution of the theoretical model shows that morphemes are analytical conveniences rather than semiotic primitives. The high-definition metaphor refers to the model's epistemic capacities, not to perceptual attunement: we need theoretical tools capable of tracking trajectorial dynamics at finer informational granularity.

This does not mean that analysis disappears. Trajectories exhibit internal differentiation: phases of greater or lesser configurational stability, regions of dense versus sparse informational elaboration, patterns of recurrent navigation that constitute conventionalized pathways through semiotic space. These manifestations are real and analytically tractable. But they are properties of *continuous dynamics*—emergent specializations where traces have saturated into navigational anchors—not assemblages of discrete units with pre-given properties. The analyst can describe phases where informational density enables coordination—recognizing them as thread saturation points rather than primitive atoms—just as a physicist can describe phases of projectile motion without claiming that acceleration and deceleration are separate objects combined to produce flight.

The high-definition approach thus resolves empirical puzzles not by providing better morphemic analyses but by dissolving the morphemic framework itself. Classifier predicates are not problematic assemblages of poorly-defined morphemes but unified trajectories whose continuous character resists artificial segmentation. Personal indexicals are not morphological paradigms with phonological variants but navigational patterns whose formal variability reflects trajectorial scope and contextual dynamics. The puzzles vanish because the questions that generated them—"How many morphemes?" "What are the combination rules?"—presupposed an inappropriate analytical framework.

This reframing extends naturally beyond the visual-gestural modality. The same dynamic operates in spoken interaction, where prosodic contours, articulatory gestures, postural adjustments, and facial expressions form integrated trajectories rather than separable channels. What writing systems present as discrete lexical atoms separated by spaces are abstractions from continuous navigational dynamics—conventionalized trajectories through informational space that *appear* discrete when observed at the coarse resolution imposed by orthographic representation. A complete trajectorial linguistics would recognize that all meaning-making operates through navigation, with conventionalization producing stereotyped pathways that analysts mistake for combinable atoms when observational resolution remains insufficient to track continuous dynamics.

The implications ripple across linguistic subfields. Morphological theory must reckon with the possibility that morphemes are analytical artifacts rather than psychological realities. Syntactic theory must consider whether hierarchical structure reflects combinatorial operations or emergent patterns in trajectorial navigation. Phonological theory must examine whether distinctive features are ontological primitives or descriptive conveniences for characterizing continuous articulatory dynamics. Semantic theory must confront whether meaning consists of conceptual representations or emerges from navigational processes through pre-representational informational configurations.

These are not merely terminological shifts. They represent a fundamental reorientation from a linguistics of combination (assembling meaning from discrete units) to a linguistics of navigation (producing meaning through continuous dynamics). Gestures and signs, precisely because they resist the orthographic illusion of atomicity, reveal this navigational character with particular clarity. But the insight applies universally: wherever analysts impose segmentation on continuous phenomena to force them into morphemic categories, increased analytical resolution will reveal trajectories navigating informational space—phrases all the way down.

4. Toward a Trajectorial Linguistics

This paper has argued that gestures and signs function as continuous phrasal expressions rather than assembled lexical atoms because meaning-making operates through trajectorial navigation rather than morphemic combination. This claim synthesizes empirical insights that have been accumulating across gesture studies and sign linguistics for decades—Kendon's documentation of gesture phrases as complete utterances, McNeill's characterization of gestures as global-synthetic imagery, Liddell's

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analysis of depicting constructions as unified predicative structures. Our contribution is not the discovery of phrasal character in visual-gestural communication but the provision of formal tools capable of explaining *why* such communication is so and the extent to which it is like that.

Traditional frameworks—whether morphemic, constructional, or cognitive-linguistic—have struggled to accommodate the holistic character of gestures and signs because they operate within representationalist architectures that assume meaning consists of content encoded in expressive forms. When forced to choose between treating classifier predicates as morphologically complex (generating "Frankenstein" decompositions) or morphologically simple (obscuring evident internal structure), analysts face a false dilemma generated by the representationalist premise itself. The trajectorial alternative dissolves this dilemma by rejecting the foundational assumption. Meaning does not consist of represented content retrieved from storage and combined through grammatical operations. It emerges through navigational dynamics—continuous movement through pre-representational informational configurations that saturate threads (defined by traces), enabling subsequent coordination without encoding fixed semantic values.

The high-definition metaphor captures the epistemic shift required. Morphemic analysis operates at the analytical resolution where continuous trajectories *must be* segmented into discrete units—the "coarse pixel" level where boundaries imposed by the model's conceptual thresholds are mistaken for ontological structure. High definition refers not to perceptual refinement but to **analytical granularity**: theoretical tools capable of tracking continuous dynamics without imposing artificial segmentation. Increasing the model's analytical resolution—its capacity to characterize informational dynamics at finer granularity—reveals that continuous trajectories exhibit discrete informational structure (thread saturation points, navigational landmarks, conventionalized pathways). Still, these are **emergent specializations**—regions where repeated navigation has saturated traces into stable attractors—not combinable atoms with pre-given properties. Morphemic frameworks misidentify these emergent specializations as primitive units. This is not merely a descriptive preference but reflects opposed ontological commitments: combination versus navigation, storage versus enactment, representation versus trajectorial emergence.

The formal apparatus developed in this paper—traces as pre-representational residue, threads as conventionalized pathways, trajectories as navigational arcs through informational space—provides the analytical infrastructure necessary for tracking continuous dynamics without imposing artificial segmentation.

Gesture research must abandon the search for gestural lexicons—inventories of stable forms with fixed meanings retrievable as units. The impulse to catalog gesture types (iconics, deictics, metaphorics, beats) and specify their semantic content treats gestures as if they were words awaiting systematization. But if gestures are trajectories, not lexemes, then typologies must shift from form-meaning correspondences to navigational patterns. Rather than asking "What does this gesture mean?" the analyst asks "How does this trajectory coordinate intersubjective access to informational configurations?" The question is not eliminated but transformed: from static mapping to dynamic process.

Sign language research faces an analogous reorientation. The persistent attempt to map sign language structure onto spoken language categories—identifying morphemes, establishing syntactic hierarchies, specifying compositional rules—reflects the dominance of models developed for spoken languages rather than properties inherent to visual-gestural communication. Classifier predicates are not exceptional or problematic structures requiring special morphological treatment; they reveal the fundamentally trajectorial character that operates throughout signed languages but becomes particularly visible in productive spatial constructions where continuous dynamic is overt.

The lexical/productive distinction that dominates sign linguistics—stable frozen forms versus generative spatial constructions—dissolves under trajectorial analysis. All signs are trajectorial, differing only in conventionalization (how stereotyped the navigational pathway has become through repeated use) and semiotic stabilization patterns (the quality of its threads) or conceptual profiling:

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things, processes, relations. What grammarians call "lexical signs" are highly conventionalized trajectories whose specific articulatory forms have stabilized through communicative coordination. What grammarians call "productive constructions" are less conventionalized trajectories where articulatory details remain accessible because they demand a clearer intent from the speaker, as these forms are not entirely pre-packed from their representational density. The speaker is, so to speak, "doing more cognitively" when he "puts together" that expression.

This perspective transforms our understanding of iconicity in sign languages. Iconicity is not a representational property—a mapping between form and depicted content—but emerges from the continuous character of trajectorial navigation itself in a particular granularity; closer to the sensoriomotor representational threads (i.e. embodied language). When a signer depicts a vehicle moving along a winding path, the iconic relationship between articulation and depicted event reflects the fact that both are continuous trajectories through multidimensional space (articulatory space for the sign, physical space for the event). The "resemblance" is not between two static representations but a function of attentional convergences in intersubjective communication. To realize this, it should be enough to try to answer "for whom is this resemblance happening?".

Perhaps the real question is not whether gestures are phrases but whether "words" exist at all outside the peculiar technology of writing. Orthography creates discrete visible units separated by spaces, and this spatial segmentation structures our intuitions about linguistic structure. But speech is continuous sound; signing is constant movement; co-speech gesture is continuous articulation.

Gestures and signs, precisely because they resist orthographic reification, reveal this trajectorial character with particular clarity. They are not exceptional but foundational. They show us what all meaning-making looks like when we adjust our analytical resolution sufficiently to track continuous dynamics rather than imposing discrete segmentation. The phrasal character of gesture is not a puzzle requiring explanation but a window into the fundamental nature of signification itself.

The invitation, then, is not merely to recognize that gestures are phrases. It is to realize that phrases are trajectories, that trajectories are navigation through informational space, and that this navigation operates across all modalities of human meaning-making. Writing created the illusion of atoms; gesture studies dissolve it. The future of linguistics may lie not in better morphological analyses but in relinquishing the morphemic framework entirely—learning to track trajectories through high-dimensional semiotic space and discovering that meaning has been navigational all along, waiting for us to adjust our observational resolution and see what was always already there: phrases navigating informational configurations, all the way down.

Acknowledgments: This work builds upon the foundational insights of Adam Kendon, David McNeill, and Scott Liddell, reinterpreting their empirical contributions through the lens of Trace & Trajectory Semantics. The author also acknowledges the theoretical and philosophical insights of Donald Hoffman and Bernardo Kastrup.

Conflicts of Interest: The author declares no conflicts of interest.

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