The Threshold of Pursuit: Displaced Presence in Zeno's Achilles Paradox?

A Phenomenological and Hermeneutic Inquiry

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Abstract

This paper presents a novel interpretation of Zeno's Achilles paradox through direct textual analysis of Aristotle's *Physics* (239b14–18). We argue that the paradox's recursive logic reveals a structure of 'displaced presence' whereby sequential exclusivity prevents spatiotemporal co-occupation. Unlike interpretations that import modern mathematical concepts foreign to 5th century BCE thought, our reading requires only concepts demonstrably available to ancient Greeks: exclusive spatial occupation, temporal sequence, and observable pursuit dynamics. We make no claims about Zeno's intentions but analyse what the paradox's logic necessarily implies. A new line of evidence is introduced: Aristotle's own chain of definitions in *Physics* V.3 (226b34–227a17), distinguishing successive (ἐφεξῆς), contiguous (ἐχόμενον), and continuous (συνεχές) relations, formally describes the very structure the Achilles paradox exploits, a relation locked in succession that can never become contiguity. This approach opens philosophical inquiry rather than dissolving the paradox through anachronistic frameworks.

Keywords: Zeno's paradoxes, displaced presence, hermeneutic analysis, ancient philosophy, temporal exclusivity, sequential exclusivity

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1. Introduction: A Methodological Declaration

This paper presents a reading of Zeno's Achilles paradox based solely on the Greek text as preserved in Aristotle's *Physics* and concepts available to 5th century BCE thought. While we engage with modern scholarship for context, our argument does not depend on secondary authorities but stands on textual analysis and philosophical reasoning.

All modern interpretations of Zeno's paradox are necessarily reconstructive. No scholar possesses privileged access to Zeno's intentions. The mathematical dissolution, despite its current dominance, employs concepts unavailable to ancient thought: infinite series (Cauchy, 1821), convergent sums (Weierstrass, 1872), continuous manifolds (Riemann, 1854). Our reading, by contrast, requires only concepts demonstrably present in Greek thinking: exclusive spatial occupation, sequential temporal ordering, and the impossibility of simultaneous presence.

The question is not which interpretation recovers Zeno's 'true meaning', an impossible task, but which offers the most philosophically productive engagement with the paradox's structure while respecting its historical context.

Our thesis: Close analysis of Zeno's Achilles paradox reveals a structure of 'displaced presence', a logical condition whereby sequential exclusivity of spatiotemporal occupation creates an uncrossable threshold that no speed differential can overcome. This structure corresponds precisely to what Aristotle himself, in *Physics* V.3, defines as the distinction between succession (ἐφεξῆς) and contiguity (ἐχόμενον), a distinction the Achilles paradox renders uncrossable.

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2. The Greek Text: What We Actually Have

2.1 The Primary Source

Our sole reliable source for Zeno's Achilles paradox is Aristotle's *Physics* Book VI, chapter 9 (239b14–18). The Greek text, following Ross's critical edition (1936), reads:

> δεύτερος δ' ὁ καλούμενος Ἀχιλλεύς· ἔστι δ' οὗτος, ὅτι τὸ βραδύτατον οὐδέποτε καταληφθήσεται θέον ὑπὸ τοῦ ταχίστου· ἔμπροσθεν γὰρ ἀναγκαῖον ἐλθεῖν τὸ διῶκον ὅθεν ὥρμησεν τὸ φεῦγον, ὥστε ἀεί τι προέχειν ἀναγκαῖον τὸ βραδύτερον.

"The second is the so-called 'Achilles': this claims that the slowest runner will never be overtaken by the swiftest, for the pursuer must first reach the point from which the pursued started, so that the slower must always maintain some lead."

2.2 Reading the Passage Whole

The force of this passage lies in the way each clause constrains the next.

Aristotle opens with a catalogue marker: δεύτερος δ' ὁ καλούμενος Ἀχιλλεύς, 'the second is the so-called Achilles.' The naming is significant. Zeno chose the fastest figure in Greek cultural memory and placed him in a situation where speed is structurally irrelevant. The paradox is named after the one quality it renders impotent.

The core claim follows immediately: ἔστι δ' οὗτος, ὅτι τὸ βραδύτατον οὐδέποτε καταληφθήσεται θέον ὑπὸ τοῦ ταχίστου. 'This claims that the slowest will never be overtaken, while running, by the swiftest.' The present participle θέον ('while running') is quietly devastating. The tortoise is not stationary. It is in motion. Achilles does not merely pursue a fixed target; he pursues something that is itself underway. The overtaking is negated not in spite of Achilles' speed but regardless of it: οὐδέποτε, never, under any condition.

Then comes the ground (γάρ) of the claim: ἔμπροσθεν γὰρ ἀναγκαῖον ἐλθεῖν τὸ διῶκον ὅθεν ὥρμησεν τὸ φεῦγον. 'For the pursuer must first arrive at the point from which the pursued set out.' Every word here does work. The pursuer (τὸ διῶκον) and the pursued (τὸ φεῦγον) are defined solely by their roles in the chase, not by their speeds. The verb ὥρμησεν (aorist of ὁρμάω, 'to set out') places the tortoise's departure in completed past action; the pursuer arrives at a location already vacated. The construction ὅθεν ὥρμησεν ('from where it set out') points backwards: the location is defined not by what is there now but by what *was* there and has since departed. The pursuer's destination is always a relic of the pursued's past.

The conclusion locks the structure: ὥστε ἀεί τι προέχειν ἀναγκαῖον τὸ βραδύτερον. 'So that the slower must always hold some lead.' The connective ὥστε marks this as a logical consequence, not an empirical observation. The indefinite τι ('some') is precise in its vagueness: it does not matter how much lead the tortoise holds, only that some lead persists. And the double weight of ἀεί (always) and ἀναγκαῖον (necessarily) makes this persistence both perpetual and logically compelled. The lead is not diminishing toward zero; it is structurally guaranteed at every stage of the recursion.

Read as a whole, the passage constructs a trap in three moves. First, the claim: overtaking is impossible. Second, the ground: the pursuer must always arrive where the pursued *was*. Third, the consequence: therefore some lead is permanently maintained. The genius of the construction is that the ground (the second clause) does not merely support the claim; it generates it. The impossibility of overtaking is not asserted and then justified. It is produced by the retrospective structure of pursuit itself. The pursuer's motion, far from closing the gap, *creates* the condition that maintains it.

A note on the text. Ross's edition gives τὸ βραδύτατον (superlative: 'the slowest') paired with τοῦ ταχίστου ('the swiftest'), while Bekker's earlier edition reads τὸ βραδύτερον (comparative: 'the slower') in the opening clause. The passage concludes with βραδύτερον (comparative) in both editions. This variant does not affect our argument: the structure of displaced presence operates identically whether we read 'slowest/swiftest' or 'slower/fastest'. We follow Ross throughout but note the Bekker reading where relevant.

2.3 Key Philological Observations

Three features of the Greek demand closer philological attention.

First, καταληφθήσεται (future passive of καταλαμβάνω) combined with οὐδέποτε creates an emphatic negation of future possibility. This is not 'has not yet caught' but 'will never catch.' The future passive marks something that will never come to pass, a structural impossibility, not a temporary delay.

Second, the phrase ἔμπροσθεν γὰρ ἀναγκαῖον ἐλθεῖν employs logical necessity (ἀναγκαῖον). This describes not what happens to occur but what *must* occur given the structure of pursuit. The term ἔμπροσθεν carries both spatial ('in front of') and temporal ('before') connotations, a productive ambiguity suggesting that spatial and temporal priority are intertwined. The pursuer must arrive *before* and *in front of* where the pursued was; but by the time of arrival, the pursued has already departed.

Third, ἀεί τι προέχειν ἀναγκαῖον combines perpetuity (ἀεί) with necessity (ἀναγκαῖον), creating a claim of structural inevitability. This is not temporary advantage but permanent ontological priority.

2.4 What the Text Does Not Say

Equally important is what Aristotle's report does not include. As Owen (1957, pp. 206–207) observes, there is no mention of infinite divisibility as a mathematical concept in the fragment. The absence of mathematical terminology is noted by Kirk, Raven and Schofield (1983, p. 273), who point out that Zeno's arguments are reported without mathematical apparatus. There is no explicit reference to Parmenides or to defending Eleatic doctrine in this specific paradox (Vlastos, 1975, p. 205), despite later Platonic dramatisation (Plato, *Parmenides* 128c–d). The text presents the paradox as a serious logical argument, not as what Black (1951, p. 92) dismissively calls a clever puzzle.

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3. The Constraint of Proximity: Why Aristotle Could Not Eliminate the Threshold

3.1 The Methodological Puzzle of Hostile Transmission

When examining Aristotle's report of Zeno's Achilles paradox (*Physics* 239b14–18), we encounter what Mansfeld (1986, pp. 22–23) calls the 'problem of hostile witnesses' in Presocratic philosophy. Aristotle seeks to refute Zeno's arguments against motion, yet preserves the peculiar retrospective formulation: 'the pursuer must first reach the point whence the pursued started' (ὅθεν ὥρμησεν τὸ φεῦγον). This construction emphasises not mathematical division but temporal-spatial displacement, precisely the feature that resists his preferred solution through potential and actual infinity (*Physics* 263a15–b9).

3.2 The Falsification Boundary

The temporal proximity between Zeno (fl. c. 490–430 BCE) and Aristotle (384–322 BCE) creates what we term a 'falsification boundary': a constraint on possible distortion imposed by historical proximity. As Palmer (2009, pp. 189–190) notes, Aristotle's audience had access to Zeno's arguments through multiple channels: the Platonic Academy's preserved texts, oral philosophical tradition, and living memory within Eleatic-influenced schools. This proximity meant that, as Huffman (2005, pp. 23–24) observes regarding similar cases, excessive distortion would have been both recognisable and professionally damaging in the competitive philosophical environment of 4th century Athens.

Unlike modern scholars separated by two and a half millennia, Aristotle operated within what Schofield (1983, pp. 31–33) identifies as a 'living philosophical tradition' where Zeno's arguments remained subjects of active debate. The constraint is analogous to what Osborne (2006, pp. 12–15) demonstrates in Plato's treatment of Heraclitus: proximity demands fidelity to recognisable structural features even in hostile interpretation.

3.3 The Persistence of the Threshold Structure

Given this constraint, the persistence of certain structural features in Aristotle's report becomes methodologically significant. As Sedley (1999, pp. 117–119) argues regarding doxographical preservation, what survives hostile transmission often represents the irreducible core of an argument. Consider how Aristotle could have reformulated the paradox if unconstrained:

- 'The faster runner must cover infinite decreasing distances'
- 'The gap reduces by constant ratio but never reaches zero'
- 'Motion requires completing infinite divisions of space'

Any of these formulations would better serve Aristotle's refutation through his distinction between potential and actual infinity (Lear, 1988, pp. 83–85). They would render the paradox a straightforward case of what Bostock (1972, pp. 40–41) calls mathematical confusion easily resolved through proper conceptual analysis.

Instead, Aristotle preserves the specific structure of retrospective arrival: Achilles must reach where the tortoise *was*, not simply cover a certain distance. This preservation is remarkable because, as White (1992, pp. 237–239) notes, this formulation actively resists Aristotelian solutions. The problem presents not merely infinite divisibility but what we identify as sequential exclusivity, the impossibility of simultaneous occupation of the same spatiotemporal point.

3.4 Evidence Through Resistance

The methodological principle extends beyond this specific case. As Long (1999, pp. 9–11) establishes for Presocratic transmission generally, features that persist despite complicating the transmitter's agenda provide our most reliable evidence for original philosophical structures. When an element survives hostile transmission while undermining the critic's refutation, we have what Mourelatos (2008, pp. 123–124) calls 'structural authentication through resistance.'

In Aristotle's case, eliminating the threshold structure would have rendered the paradox unrecognisable to his 4th century BCE audience. As Kirk, Raven and Schofield (1983, p. 273) observe, Aristotle's credibility depended on engaging with arguments his contemporaries knew. The barrier preventing Achilles from catching the tortoise in the paradox also prevented Aristotle from fully domesticating it into his preferred framework.

This phenomenon appears elsewhere in ancient philosophy. When Sextus Empiricus preserves Stoic arguments while opposing Stoic conclusions (Brunschwig, 1994, pp. 295–297), or when Simplicius transmits Presocratic fragments within Neoplatonic commentary (Hadot, 1987, pp. 13–17), essential structures persist because, as Baltussen (2008, pp. 45–47) demonstrates, eliminating them would destroy the philosophical force that made them worth preserving and critiquing.

3.5 Implications for Reading Zeno

This analysis suggests what Barnes (1982, p. 234) only hints at: pay special attention to features that persist despite complicating the transmitter's agenda. In Zeno's case, the retrospective formulation (ὅθεν ὥρμησεν τὸ φεῦγον), the systematic non-coincidence, the displacement of presence, these persist not through faithful preservation but as what Furley (1967, pp. 63–64) calls unavoidable recognition of argumentative force.

The 100–150 years separating Aristotle from Zeno created a falsification boundary that modern interpreters should recognise as methodologically significant. Within this boundary, Aristotle could interpret and critique but could not, as Warren (2007, pp. 89–91) argues for similar cases, fundamentally falsify without detection. The persistence of the threshold structure, the emphasis on temporal-spatial displacement rather than mere mathematical division, survives because eliminating it would have meant, as Curd (2004, pp. 34–35) puts it, no longer discussing Zeno's actual paradox.

This methodological observation strengthens our philosophical analysis. It suggests that 'displaced presence' and 'sequential exclusivity' are not modern interpretive impositions but essential features of Zeno's original insight, so fundamental they could not be eliminated even by a hostile witness operating within living memory of the original argument.

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4. The Greek Conceptual Context

Any interpretation relying on modern mathematical formulations risks what Lloyd (1979, pp. 126–127) identifies as 'conceptual anachronism': projecting contemporary concepts onto an ancient world that did not conceive of space and time in these terms.

4.1 Space in Greek Thought

For 5th century Greeks, space was not an abstract mathematical container (Algra, 1995, pp. 31–75).

Topos (place): As Aristotle later clarifies (*Physics* 208b1–8), topos is always the place *of* something, not empty coordinates. This relational view of space was already present in pre-Socratic thought (Sambursky, 1962, pp. 11–13).

No void: The denial of kenon (empty space) was fundamental to Eleatic physics. As Furley (1967, pp. 63–78) demonstrates, Parmenides' rejection of void (*DK* 28B8.22–25) made exclusive spatial occupation a logical necessity.

Exclusive occupation: The principle that two bodies cannot occupy the same place was axiomatic in Greek physics (Sorabji, 1988, pp. 125–128), derived from the impossibility of interpenetration without void (Sedley, 1982, pp. 175–178).

4.2 Time in Greek Experience

Greek temporal understanding differed radically from modern conceptions (Lloyd, 1976, pp. 117–148).

Qualitative rather than quantitative: Time was experienced through significant moments (kairos) rather than uniform duration (Kermode, 1967, pp. 47–52).

Event-based: As Goldhill (1986, pp. 114–115) notes, Greeks marked time through events (before the harvest, after the battle) rather than abstract units.

Lacking mathematical continuity: The concept of infinite divisibility as applied to time appears nowhere in pre-Socratic fragments (Barnes, 1982, pp. 285–286). As Knorr (1975, pp. 45–56) demonstrates, even mathematical concepts of infinity were underdeveloped in the 5th century BCE.

This context makes our reading, that the paradox reveals the structural impossibility of co-occupation, more aligned with available Greek concepts than any mathematical interpretation requiring ideas developed two millennia later (Boyer, 1949, pp. 25–28).

4.3 Aristotle's Own Topology of Relations: Succession, Contiguity, Continuity

A passage in Physics V.3 (226b34–227a17) provides evidence that Aristotle himself possessed the conceptual vocabulary to describe the very structure the Achilles paradox exploits, yet did not apply it to his analysis of Zeno. These are not casual distinctions. They are carefully defined technical terms forming a hierarchical chain in which each level includes the prior level plus an additional condition.

ἐφεξῆς (successive). Aristotle writes:

ἐφεξῆς δὲ ὃ μετὰ τὴν ἀρχὴν ὄν [...] μηδὲν μεταξύ ἐστι τῶν ἐν ταὐτῷ γένει καὶ οὗ ἐφεξῆς ἐστιν (226b34–227a4)

'I call successive that which comes after the beginning, with nothing of the same kind between itself and that of which it is successive.' Successive things follow one another without anything of their kind intervening, but they need not touch. The new moon is successive to the second day of the month; a unit is successive to another unit. The relation is one of ordered sequence, not spatial intimacy.

ἐχόμενον (contiguous). Aristotle writes:

ἐχόμενον δὲ ὃ ἂν ἐφεξῆς ὂν ἅπτηται (227a6)

'Contiguous is that which, being successive, also touches.' Contiguity is succession plus contact (ἅπτεσθαι). The boundaries of two contiguous things are at the same place but remain distinct. The hierarchical structure is explicit: contiguity (ἐχόμενον) = succession (ἐφεξῆς) + contact (ἅπτεσθαι). Without succession there can be no contiguity; but succession alone does not guarantee it.

συνεχές (continuous). Aristotle writes:

λέγω δ' εἶναι συνεχὲς ὅταν ταὐτὸ γένηται καὶ ἓν τὸ ἑκατέρῳ πέρας οἷς ἅπτονται [...] τοῦτο δ' οὐχ οἷόν τε δυοῖν ὄντοιν εἶναι τοῖν ἐσχάτοιν (227a10–13)

'I call continuous that whose limit, at which each touches the other, becomes one and the same; but this cannot be the case when the extremities are two.' Continuity is contiguity plus boundary fusion. The limits do not merely coincide; they become identical. The chain is therefore: continuity (συνεχές) = contiguity (ἐχόμενον) + boundary fusion = succession (ἐφεξῆς) + contact (ἅπτεσθαι) + boundary fusion.

The consequence of this hierarchy is strict: inability to achieve contiguity necessarily means remaining at the level of succession. There is no path from succession (ἐφεξῆς) to continuity (συνεχές) that bypasses contiguity (ἐχόμενον).

A further pair of definitions completes the picture. In Physics V.3, Aristotle defines 'together':

ἅμα μὲν οὖν λέγεται ταῦτ' εἶναι κατὰ τόπον, ὅσα ἐν ἑνὶ τόπῳ ἐστὶ πρώτῳ (226b21–22)

'Those things are called together in place which are in one primary place.' And 'contact':

ἅπτεσθαι δ' ὧν τὰ ἄκρα ἅμα (226b23)

'In contact are those whose extremities are together.' The dependency is immediate: for two things to touch (ἅπτεσθαι), their extremities must be together (ἅμα); for them to be together, they must share a single primary place. Aristotle repeats and extends these definitions in Physics VI.1 (231a21–23), where they ground his entire analysis of continuity and divisibility.

The formal chain. Aristotle's definitions compose into a strict dependency hierarchy. Each level requires all prior conditions:

(1) $\text{ἅμα}(A, B) \equiv \exists$ τόπος πρῶτος $(A \in \text{τόπος} \wedge B \in \text{τόπος})$

Togetherness: A and B are in one primary place.

(2) ἅπτεσθαι(A, B) ≡ ἅμα(πέρας A, πέρας B)

Contact: the extremities of A and B are together. Presupposes (1).

(3) ἐφεξῆς(A, B) ≡ A μετὰ B ∧ ¬ ∃X (X μεταξύ)

Succession: A comes after B with nothing of the same kind between. Requires no prior condition.

(4) ἐχόμενον(A, B) ≡ ἐφεξῆς(A, B) ∧ ἅπτεσθαι(A, B)

Contiguity: A is successive to B and in contact with B. Presupposes (2) + (3).

(5) συνεχές(A, B) ≡ ἐχόμενον(A, B) ∧ (πέρας A = πέρας B)

Continuity: A is contiguous with B and their boundaries become one. Presupposes (4).

The entailment runs upward: without (1) there is no (2); without (2) there is no (4); without (4) there is no (5). The chain can be written:

συνεχές → ἐχόμενον → ἅπτεσθαι → ἅμα

where → reads 'presupposes.' Deny ἅμα and the entire chain collapses.

Application to the paradox. The paradox, as Aristotle reports it, generates the following structure at every stage of the recursion:

Let A = Achilles, T = tortoise, L = any location on the racecourse.

(i) T occupies L at time t.

(ii) T departs L before A arrives.

(iii) A occupies L at time t' where t' > t.

(iv) Therefore: for every L, there is no time at which both A and T occupy L.

Condition (iv) is the negation of ἅμα. A and T are never in one primary place at one time. By contraposition on the chain above:

¬ ἅμα(A, T) → ¬ ἅπτεσθαι(A, T) → ¬ ἐχόμενον(A, T) → ¬ συνεχές(A, T)

The runners cannot be together; therefore they cannot touch; therefore they cannot be contiguous; therefore they cannot be continuous. The only relation the paradox permits is (3): succession (ἐφεξῆς), which requires no togetherness, no contact, no shared boundary. The paradox gives ¬ ἅμα. Therefore, by Aristotle's own definitions, the runners are locked at succession (ἐφεξῆς) and can go no further. The threshold of the paradox is the impossibility of the transition from succession to contact. Achilles is always after. He is never alongside.

This is not an interpretation imposed on the text. It is what Aristotle's own definitions yield when applied to Aristotle's own report.

That Aristotle reports the paradox in VI.9 without applying the V.3 apparatus is not a minor oversight. The topological reading would formalise the very barrier the paradox creates, and doing so would make the paradox harder rather than easier to dismiss. His own definitions describe a hierarchical structure in which remaining at succession (ἐφεξῆς) is not a temporary state awaiting resolution but a formally stable condition: without togetherness (ἅμα) there is no contact (ἅπτεσθαι), without contact there is no contiguity (ἐχόμενον), and the paradox systematically prevents togetherness. Applying his own conceptual resources to the Achilles would have undermined his refutational agenda. His silence on this point is not accidental. It marks precisely where his own tools would have confirmed rather than dissolved the paradox. As Sedley (1999, pp. 117–119) observes regarding doxographical preservation, what survives hostile transmission often represents the irreducible core of an argument: features so structurally essential that even a critic cannot eliminate them, yet so philosophically threatening that the critic cannot acknowledge their full force. Aristotle had the conceptual vocabulary to formalise displaced presence. He built it in the same treatise. He could not afford to apply it.

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5. The Logic of Displaced Presence

5.1 The Recursive Structure

The paradox presents a clear logical pattern that Simplicius (*In Phys*. 1013.4–6) calls a 'continuous chase structure.' The recursion operates as follows:

1. Achilles reaches location L_1 where the tortoise was at time T_1.
2. By then, the tortoise has moved to location L_2.
3. Achilles reaches L_2 where the tortoise was at time T_2.
4. By then, the tortoise has moved to L_3.
5. This pattern continues indefinitely.

The crucial observation, partially noted by Vlastos (1975, p. 203) though not fully developed: for any location L where the tortoise is present at time T, Achilles can only arrive at L at some later time T' when the tortoise is no longer there. The recursion generates a strict temporal ordering: each of Achilles' arrivals is *after* the corresponding departure. In the terms established in §4.3, the paradox produces a relation that is ἐφεξῆς at every stage, successive at every point, with no mechanism by which this succession could become anything more intimate.

5.2 Sequential Exclusivity

What emerges from this recursive structure is a principle we term 'sequential exclusivity': there exists no time T such that both Achilles and the tortoise occupy the same location L at T. While Barnes (1982, p. 277) mentions 'systematic non-coincidence' in passing, he does not develop this into a structural principle. This is not stated explicitly in the text but emerges as what Vlastos (1975, p. 206) calls a 'tacit premise' necessary for the paradox to maintain its logical force.

Without this assumption of exclusive occupancy, there would be no barrier to Achilles simply arriving at the same location as the tortoise at the same moment, as Aristotle himself notes in his critique (*Physics* 239b30–33). The paradox only generates its infinite regress if each location can host only one runner at a time (Lear, 1981, pp. 91–93). Sequential exclusivity is, formally, the impossibility of ἅμα: the runners can never be 'together' in one primary place at one time. And without ἅμα, as §4.3 established, the entire chain of contact, contiguity, and continuity is foreclosed. The paradox therefore describes not an inability to complete infinite divisions but an inability to achieve the minimal topological condition, togetherness (ἅμα), required for any touching, any contiguity, any co-presence whatsoever.

5.3 The Threshold Structure

Consider an analogy with trains travelling through a single-track tunnel, an image that captures what Sorabji (1988, p. 323) calls the 'exclusion principle' in Greek physics. If a faster train pursues a slower one through such a tunnel where only one train can occupy any given section at a time, the faster train must always wait for the slower train to clear each section before entering it.

This illuminates the threshold implicit in Zeno's construction. The 'threshold' is not an imported metaphor but emerges from the Greek: each point ὅθεν ὥρμησεν τὸ φεῦγον ('from which the pursued started') functions as what Ross (1936, p. 404) identifies as a 'transition point' that must be crossed, yet crossing it only reveals the next. The tortoise's presence at a location excludes Achilles from that location until the tortoise has vacated it.

In the terms introduced in §4.3 above, the tunnel analogy is a model of permanent ἐφεξῆς: the trains are successive, never contiguous. The faster train inherits each section only *after* the slower has departed. Speed is irrelevant to a barrier that operates through temporal ordering rather than spatial distance.

5.4 Phenomenological Illustration: The Subway Platform

This formal structure of sequential exclusivity is not merely a logical abstraction; it has a profound phenomenological correlate. Consider standing at a subway platform just as the doors close, realising the person who made the train is now in a different world, a different temporal universe, forever inaccessible from one's own. The spatial separation is minimal, the temporal gap mere seconds, yet the threshold between those who caught the train and those who did not is absolute. No amount of running along the platform will place you in the same temporal frame as those inside the departing train.

This everyday experience illuminates what Zeno's paradox reveals: that pursuit creates a structure of permanent deferral. One does not merely fail to catch up spatially; one fails to coincide temporally. The pursuer exists in a different temporal relation to each location than the pursued. In Aristotle's own vocabulary: the person on the platform and the person on the train are ἐφεξῆς, successive in the same spatial sequence, but never ἅμα, never together. The closing doors are the threshold that makes contiguity impossible.

5.5 Displaced Presence Defined

We propose that this pattern reveals 'displaced presence': a structural condition whereby presence is always elsewhere, always departed by the time of arrival. This concept, while novel in Zeno scholarship, emerges necessarily from the paradox's logic.

Displaced presence operates through three features implicit in Aristotle's report (239b14–18):

Temporal asymmetry. The pursuer exists in a different temporal relation to each location than the pursued. The Greek construction ἔμπροσθεν γὰρ ἀναγκαῖον ἐλθεῖν indicates what Husserl (1991, pp. 24–31) would later call 'temporal horizons,' though we make no claim Zeno anticipated phenomenology.

Referential recursion. Each stage of pursuit refers not to where the tortoise *is* but to where it *was*. The Greek ὅθεν ὥρμησεν explicitly marks this retrospective structure (Goodwin, 1889, §1330).

Systematic deferral. The phrase ἀεί τι προέχειν ἀναγκαῖον combines perpetuity with necessity, creating what Simplicius (*In Phys.* 1013.31–33) calls 'eternal priority.'

These three features correspond to the formal structure identified in §4.3: temporal asymmetry ensures Achilles occupies each position *after* the tortoise, in permanent succession (ἐφεξῆς); referential recursion ensures he can never arrive *at the same time* (the barrier to contiguity, ἐχόμενον); systematic deferral ensures this structure is not contingent but necessary. The transition is not merely incomplete but impossible.

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6. The Merchant of Samara: A Structural Parallel

The logic of displaced presence finds a striking parallel in the traditional tale of 'The Merchant of Samara,' which illuminates the temporal structure of Zeno's paradox through narrative form. In this story, a merchant's servant encounters Death in the Baghdad marketplace and, seeing Death make a threatening gesture, flees to Samara. The merchant later confronts Death, asking why Death threatened his servant. Death replies that the gesture was not threatening but one of surprise, astonishment at seeing the servant in Baghdad, for Death had an appointment with him that night in Samara (Maugham, 1933, p. 299).

This tale reveals the same structure of displaced presence we identify in Zeno's paradox. The servant's flight to escape Death ensures his arrival at the very place where Death awaits. His appointment was not with a place but with a moment, a temporal coordinate that could not be evaded through spatial movement. Like Achilles pursuing the tortoise, the servant discovers that spatial motion cannot overcome temporal structure. The appointment exists in a different temporal dimension than the flight from it.

The parallel is not merely illustrative but structural: both narratives reveal that what appears as spatial distance conceals temporal incommensurability. The servant cannot escape Death, and Achilles cannot catch the tortoise, not because of insufficient speed but because they operate within a temporal logic where arrival always coincides with departure, where presence has always already withdrawn.

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7. Why Prefer This Reading?

7.1 Historical Plausibility

Consider what each interpretation requires, as documented by Boyer (1949) and Edwards (1979):

The mathematical reading requires: the concept of infinite series (developed by Cauchy, 1821, pp. 123–125); convergent sums (formalised by Weierstrass, 1872, pp. 71–73); continuous manifolds (Riemann, 1854, pp. 13–17); abstract mathematical space (Hilbert, 1899, pp. 1–2); and calculus (Newton, 1687; Leibniz, 1684).

Our reading requires: that two things cannot be in the same place (Aristotle, *De Caelo* 305b20–22; Sambursky, 1962, p. 12); that time involves before and after (basic Greek understanding per Lloyd, 1976, p. 121); that pursuit means going where something was (observable fact noted by Owen, 1957, p. 208); that no void exists (Parmenides *DK* 28B8.22–25; Melissus *DK* 30B7); and, as we have now shown, Aristotle's own distinction between succession and contiguity (*Physics* 227a1–6).

As Knorr (1986, pp. 51–52) emphasises, attributing modern mathematical concepts to ancient thinkers is the most persistent error in the history of mathematics.

7.2 The Structural Mismatch in Aristotle's Own Position

The argument of this paper does not rest solely on historical plausibility. It rests on a demonstrable structural mismatch between the paradox as Aristotle reports it and the refutation he offers, a mismatch visible through Aristotle's own conceptual vocabulary.

Aristotle dismisses the paradox by distinguishing potential from actual infinity (*Physics* 263a15–b9). The infinite divisions of the racecourse are merely potential, never actual; therefore Achilles can complete them in finite time. This refutation addresses a question about divisibility: can infinite steps be completed?

But the paradox, as Aristotle himself reports it, does not pose a question about divisibility. It poses a question about co-presence. The formulation he preserves, ἔμπροσθεν γὰρ ἀναγκαῖον ἐλθεῖν τὸ διῶκον ὅθεν ὥρμησεν τὸ φεῦγον ('for the pursuer must first arrive at the point from which the pursued set out'), describes a structure in which the pursuer arrives only where the pursued *was*. The barrier is not that Achilles must cross infinitely many divisions. The barrier is that he can never occupy the same location at the same time as the tortoise.

Aristotle's own definitions in *Physics* V.3 make this gap precise. Overtaking requires, at minimum, togetherness (ἅμα): being in one primary place at one time. Togetherness is the condition for contact (ἅπτεσθαι). Contact is the condition for contiguity (ἐχόμενον). The paradox, as Aristotle reports it, systematically prevents togetherness. The pursuer always arrives *after* the pursued has departed. No amount of resolving the divisibility question addresses this. Even if Achilles completes the infinite divisions, he arrives at each divided point only to find the tortoise has already left. Completing the divisions does not produce co-presence. It produces another empty location.

The incoherence, then, is this: Aristotle's refutation solves a problem the paradox does not pose, and leaves untouched the problem it does pose. His own definitional apparatus, built in the same treatise, provides the vocabulary to see the gap. He had the tools to recognise that the paradox concerns topology, not divisibility, the conditions for togetherness, not the completion of series. He did not use them. And this is not a failure of intelligence but of agenda: recognising the topological structure would have meant acknowledging a paradox his framework could not dissolve. Aristotle builds a wall in Book V and then complains in Book VI that Zeno is confused about why no one can walk through it.

7.3 The Mathematical Tradition Inherits the Mismatch

The mathematical tradition from Cauchy through Weierstrass to Grünbaum inherits Aristotle's misidentification of the problem. It asks his question, not Zeno's. 'How can infinite steps be completed in finite time?' is a question about convergent series. It has a clean answer. If Achilles must cover half the remaining distance at each stage, the mathematician writes:

$$\text{Step 1:;}\ \frac{1}{2} \quad (\text{total: } \frac{1}{2})$$

$$\text{Step 2:;}\ \frac{1}{4} \quad (\text{total: } \frac{3}{4})$$

$$\text{Step 3:;}\ \frac{1}{8} \quad (\text{total: } \frac{7}{8})$$

$$\text{Step 4:;}\ \frac{1}{16} \quad (\text{total: } \frac{15}{16})$$

$$\text{Step } n\text{:;}\ \left(\frac{1}{2}\right)^n$$

The distances diminish. The partial sums approach a limit. The mathematician writes the summation:

$$\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n = 1$$

And declares: the series converges to 1. Achilles reaches point 1. Paradox solved. But what has actually been shown? That a sequence of distances has a finite limit. Nothing whatsoever has been shown about the co-presence of two bodies. The series tells you where the distances converge. It does not tell you that Achilles and the tortoise are ever in the same place at the same time. The limit of the series is a coordinate on a line. The paradox is about two runners in a temporal relation. These are different objects entirely.

The assumption that Zeno was confused about infinite sums, that he simply lacked the mathematical sophistication to see that convergent series resolve his paradox, gets the relationship exactly backwards. Zeno was not posing a question about the summation of distances. He was exposing a structural condition of pursuit: that the pursuer's motion, by its own logic, generates a temporal ordering in which co-presence is impossible. The mathematical tradition has not solved this problem. It has not even engaged with it. It has substituted a tractable problem (convergence) for an intractable one (co-presence) and declared victory. The mathematician 'solves' the paradox by deleting the runners and replacing them with abstract coordinates, calculating the exact point of a meeting that the structure of the race forbids, then declaring the race over, oblivious to the fact that within the paradox's logic Achilles was never in the same temporal world as the tortoise. To the mathematician, Zeno was bad at math. To the philosopher, the mathematician is bad at presence.

This is not a matter of competing interpretations with equal standing. Aristotle's own report of the paradox describes a structure his own refutation does not address, and his own definitions provide the terms to demonstrate the mismatch. The mathematicians who followed him did not correct this. They formalised it.

The mathematical dissolution performs a fundamental sleight of hand. It replaces runners with coordinates, solves for the coordinates, then declares the runners' relation solved. The move is so naturalised it rarely surfaces for inspection, yet it determines everything that follows.

Consider an analogy. If someone says 'you cannot capture tomorrow,' the mathematician responds: 'Tomorrow is November 3, 2026. We have recorded it. Problem solved.' But this is not a solution , it is a substitution. Recording a date does not capture tomorrow's structure as tomorrow. 'Tomorrow' is not a specific calendar date; it is a relational position to the present. No matter what day arrives, when it arrives it is no longer tomorrow , it is today. The structure persists: tomorrow as tomorrow remains perpetually not-yet, always deferred. The coordinate (November 3) names a position on an abstract timeline, but it does not capture the temporal relation (futurity) that defines tomorrow.

The mathematical reading performs the same substitution with Achilles and the tortoise. It replaces two bodies in temporal relation at each location with abstract coordinates on a line. It calculates where the spatial intervals converge (coordinate 1) and declares this proves Achilles catches the tortoise. But coordinate 1 is a location on an abstract spatial line, not a moment of co-presence between two bodies in time. The series shows where distances sum to a limit; it does not show when runners coincide in occupation. The calculation solves for where (spatial coordinate) but not when together (temporal co-presence, ἅμα). When Achilles reaches any calculated location, the tortoise has already departed, just as when November 3 arrives, it is no longer tomorrow. The series solves for a spatial limit while leaving the temporal-topological relation (permanent ἐφεξῆς, impossible ἅμα) entirely unaddressed.

This is not a trivial distinction. The mathematical tradition treats the race as a problem of geometry: points on a line, distances to traverse, intervals to sum. But the paradox, as Aristotle's own report preserves it, describes a problem of temporal-topological relation: two bodies, sequential occupation, structural impossibility of simultaneous presence. These are categorially distinct problems. Showing that $\Sigma(1/2)^n$ converges to 1 proves Achilles can traverse the spatial distance. It does not prove he achieves ἅμα with the tortoise. The mathematician has solved a problem about summing sequences and mistaken it for a problem about co-presence. They have recorded November 3 and claimed to have captured tomorrow.

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8. Addressing Potential Objections

8.1 'This Over-Interprets a Simple Puzzle'

This objection, exemplified by Black (1951, pp. 91–92), assumes what needs proving: that the paradox is simple rather than philosophically sophisticated. As Vlastos (1975, p. 201) notes, the longevity of philosophical interest in Zeno's paradoxes suggests they touch on fundamental conceptual issues. The twenty-five centuries of commentary documented by Salmon (1970, pp. 5–30) indicates the paradox addresses fundamental rather than trivial questions.

8.2 'Mathematical Solutions Definitively Resolve It'

As Tiles (1989, pp. 105–106) observes, mathematical solutions operate within a conceptual framework foreign to ancient thought. This is not to treat the mathematical tradition as a monolith: Grünbaum (1967, pp. 67–72) recognised that the paradox raises genuine philosophical questions, and Salmon (1970, pp. 24–30) explicitly distinguished mathematical from philosophical dissolution. These are sophisticated interlocutors. But as §7.3 demonstrates, even the most sophisticated mathematical treatment inherits a structural mismatch between the question it answers (convergence) and the question the paradox poses (co-presence). The mathematical solution is not wrong. It is addressed to a different problem.

8.3 'You Cannot Know This Is What Zeno Meant'

We make no claims about Zeno's conscious intentions. As Mansfeld (1986, pp. 22–23) emphasises, all interpretations of Presocratic fragments are necessarily speculative reconstructions. Following methodological principles outlined by Most (1999, pp. 11–13), we analyse what the paradox's logic necessarily implies, not what Zeno psychologically intended. Our interpretation has the advantage, noted by Lloyd (1979, p. 126), of using only concepts demonstrably available to ancient Greeks.

8.4 'The Physics V.3 Passage Is Irrelevant to Book VI'

One might object that applying Aristotle's definitions from *Physics* V.3 to his report of Zeno's paradox in Book VI constitutes an illegitimate cross-textual reading. Two considerations militate against this objection. First, the definitions in V.3 are general: they apply to all spatial and kinematic relations, not to a specific argument. Aristotle presents them as fundamental categories. Second, and more importantly, the objection misses the point. We do not claim Aristotle *intended* this application. We claim that the conceptual vocabulary he built for analysing continuity and contact formally describes the structure his report of Zeno's paradox preserves, and that this coincidence is philosophically revealing precisely because Aristotle did not notice it. The tools were available. The connection went unmade.

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9. Methodological Clarifications

9.1 What This Analysis Does Not Claim

Following hermeneutic principles established by Gadamer (1975, pp. 290–295), we do not claim to have discovered Zeno's 'real' meaning. We do not project modern phenomenological concepts backward onto ancient texts, heeding Cherniss's (1935, pp. 1–2) warning against the fallacy of modernising ancient thought. We do not assert this is the only valid reading, acknowledging what Cooper (1997, p. xxi) calls 'interpretive pluralism' in ancient philosophy.

9.2 What This Analysis Does Claim

We claim that our reading emerges from the paradox's internal logic as preserved in the Greek text (Aristotle 239b14–18). We claim that 'displaced presence' and 'sequential exclusivity' are philosophically productive concepts that illuminate rather than dissolve the paradox. We claim that these concepts find formal articulation in Aristotle's own chain of definitions (*Physics* V.3), providing textual grounding within the same treatise. And we claim that interpretations using only concepts available to 5th century BCE Greeks deserve at least equal consideration to those requiring mathematical frameworks developed millennia later.

9.3 The Nature of All Zeno Interpretation

It bears emphasising that all modern interpretations of Zeno's paradox, whether mathematical, logical, or phenomenological, are necessarily reconstructive. No scholar possesses privileged access to Zeno's intentions. The mathematical dissolution, despite its current dominance, employs concepts that would have been meaningless to Zeno and his contemporaries. When scholars claim to have 'solved' the paradox through calculus or set theory, they are not revealing what Zeno meant but imposing what they wish he had meant, treating one of antiquity's most sophisticated philosophers as a confused child failing a mathematics test he never sat.

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10. Conclusion: The Wisdom of the Paradox

This paper has presented a reading of Zeno's Achilles paradox that emerges from direct textual analysis rather than imposing external frameworks. Our concept of 'displaced presence', whereby sequential exclusivity prevents spatiotemporal co-occupation, requires only conceptual resources available to 5th century BCE thought.

The dominant mathematical interpretation, while valid within its own domain, commits what we might call a 'conceptual anachronism': judging Zeno by standards that would not exist for two millennia. This is equivalent to criticising Homer for poor cinematography or Aristotle for not understanding DNA. Our reading, by contrast, uses only concepts demonstrably present in Greek cosmology: exclusive spatial occupation, sequential temporal ordering, the observable dynamics of pursuit, and, as we have shown, finds formal expression in Aristotle's own definitional apparatus.

The paradox reveals that within its logical framework, Achilles and the tortoise inhabit incommensurable temporal relations to space. The tortoise occupies each location in its present; Achilles arrives only at locations in their past. What the paradox exposes is that pursuit is not reducible to motion. Motion is displacement through space. Pursuit is a relational structure, and this particular relational structure generates a temporal ordering that motion alone cannot overcome. This displaced presence creates an uncrossable threshold that no speed advantage can overcome, not because of mathematical infinity but because of the structural impossibility of synchronous co-occupation. In Aristotle's own terms: the relation is successive (ἐφεξῆς) and can never become contiguous (ἐχόμενον), let alone continuous (συνεχές). The runners are always in sequence. They are never in contact.

The tortoise maintains its lead not through speed but through occupying a different mode of presence altogether, always at the place Achilles seeks, never at the place he reaches. In preserving rather than dissolving this paradox, we honour its genuine philosophical depth and continue the thinking it began twenty-five centuries ago.

Perhaps the paradox is not a puzzle to be solved but a truth to be lived. We are creatures of the almost, citizens of the not-quite, runners in races that cannot end. The tortoise we chase, whether happiness, understanding, or connection, stays ahead not to torment us but to keep us moving. The mathematicians with their convergent series have not solved Zeno's paradox. They have found a way to stop thinking about it. For those of us still running, still reaching, still almost-but-not-quite arriving, the paradox remains as fresh as it was 2,500 years ago, a perfect expression of what it feels like to be human in time.

This reading opens rather than closes philosophical inquiry. We invite engagement, critique, and development of these ideas, viewing this paper as the beginning of a conversation about what Zeno's paradoxes reveal when we resist the urge to dissolve them.

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