

The Asymptotic Boundary of O-Theory

Why $1/1 \neq 1$

Mark Klein

@mdk68911986@gmail.com

ABSTRACT: O-Theory has shown that the Distinctions, Systems, Relationships, and Perspectives (DSRP) patterns provide a universal structural grammar for distinguishable phenomena in the observable universe [1]. Within this domain, Mental Models (M) and Reality (R) are shown to be structurally composed of Information (I) and Organization (O), expressed as $M = IO$ and $R = IO$ [1]. While this relational grammar appears to yield a highly robust map of observable reality, a boundary condition emerges at the limit of its application. Grounded in formal mereology and the logic of self-reference, this paper suggests that a complete structural identity between a model and reality ($M = R$) may be logically impossible. By exploring why the operational syntax of the fraction $1/1$ cannot semiotically equate to the conceptual value of the integer 1 (distinguishing structural syntax from quantitative output), this paper offers an interpretation of the asymptotic boundary condition present in O-Theory. This interpretation localizes uncertainty to the boundary itself, while preserving the validity of DSRP throughout the observable domain and highlighting potential psychological and epistemological implications of the asymptotic limit.

KEYWORDS: DSRP | Asymptotic Boundary | Mereology | Mental Models | O-Theory | Non-duality | Markov Blanket | Free-Energy Principle | Predictive Processing | General Semantics

Cite this paper: Klein, M. (2026) The asymptotic boundary of o-theory: Why $1/1 \neq 1$. *Journal of Systems Thinking*, 6(1), 1–8. <https://doi.org/10.54120/jost.v26i1.1b5297p4>

1. The Observable Domain and Scientific Universality

O-Theory advances the premise that DSRP provides the functional organizational patterns governing distinguishable reality [1]. Across the overwhelming majority of the observable universe, this grammar appears to chart the precise interplay of organized information effectively. Whether analyzing biological systems or cognitive behavioral patterns, applying the relational syntax yields models that are hypothesized to be predictive and consistent.

Scientific universality does not require philosophical certainty or absolute ontological finality, rather, it requires consistency across conditions, robust predictive power, and survival under repeated attempts at falsification. DSRP appears to meet these criteria throughout the observable and modelable domain.

However, O-Theory's own mathematics implicitly point toward a rigorous conceptual limit. The framework defines "Oneness" as the theoretical alignment of mental models with reality, expressed mathematically as $\lim(t \rightarrow \infty) (M/R) = 1$ [1]. A rigorous examination of this asymptote suggests it is not a flaw in the theory but a fundamental scientific and mereological necessity. The asymptotic boundary discussed here should therefore not be interpreted as weakening the theory's ontological validity, but as identifying a limit condition already implied by its structure.

2. The Scientific Necessity of the Asymptote

To establish why the asymptote exists, we must recognize the structural relationship between a cognitive model and the universe it maps. Because epistemology arises within an ontological field, any cognitive model (M) exists as a physically and conceptually nested subset within Reality (R) [1]. If this nested relationship holds, then perfect identity between model and reality may be structurally impossible in principle [6]. The asymptotic formulation of O-Theory can therefore be interpreted not as a limitation of the theory, but as a consequence of the mereological relationship between parts and wholes [6]. Rather than indicating structural incapacity, this localized nesting is consistent with Leonard and Goodman's mereology, because there is no null element, discrete models remain inextricably bound to the continuous totality they attempt to map [6].

Furthermore, Alfred Korzybski noted, the objective levels of reality, which include events, ordinary objects, processes, and immediate feelings, represent "un-speakable" levels; they are not words [5]. Therefore, whatever we might say a happening 'is', it is not [5]. Put another way, if a model were to achieve perfect identity with reality ($M = R$), it would theoretically require the nested subset to encompass the whole. Instead, parallel structure appears as the only possible link between the objective, un-speakable levels and the verbal levels [5]. The impossibility lies not just in the sheer scale of the subset absorbing the whole, but in the fact that the very act of conceptualization structurally and semiotically fractures the continuous value of 1 into the operational syntax of 1/1 [1,7]. Therefore, the $\lim(t \rightarrow \infty) (M/R) = 1$ boundary condition defines the maximum possible alignment between a structural map and the unmodellable territory it navigates.

3. Syntax and Totality: The Dual Nested in the Non-Dual

Because a cognitive map cannot ontologically become the ground, attempting to formally indicate an undivided totality generates a necessary syntactical division. Mathematician G. Spencer-Brown famously noted, the mere act of pointing to or indicating "the universe" requires a conceptual boundary, instantly generating a syntactical plurality [7].

It is here that a subtle boundary condition appears between the unitary value 1 and the operational expression 1/1¹. While a mathematician would correctly state they are arithmetically equivalent, structurally and semiotically they are fundamentally different states of the same reality. The conceptual

¹ It is important to note that while arithmetic evaluates 1/1 and 1 to the same quantitative value, structurally they are entirely distinct. The integer 1 represents a continuous, unified state, whereas the expression 1/1 is a relational operation. This paper evaluates 1/1 not by its resolved output, but by its operational syntax, treating the fraction itself as the formal record of a boundary-drawing operation.

value 1 operates as a continuous substrate devoid of structural cleft. To experience it purely would require an absolute absence of perspective or distinction [7]. Conversely, the expression 1/1, is a relational operation. The dividing bar functions as the conceptual boundary separating these variables and provides the structural contrast required to make the 1 intelligible. It is no longer enough to say the map is not the territory. We must embrace the paradox: the very syntax required to share our understanding of reality must actively fracture the unbroken territory in order to make itself communicable.

Fortunately, O-Theory does not place the dual (1/1) and the non-dual (1) in adversarial tension. Instead, the theory's dynamic of enclosure suggests they are nested [1]. To draw a boundary is to instantly create an inside and an outside. Therefore, the dual appears inherently contained within, and contextualized by, the non-dual. The framework reveals that the mere act of drawing a boundary inherently creates a structural plurality, noting that "Any identity-other Distinction is also... [a] System with parts: D," a relationship of negation and existence and the possibility of two perspectives (**i**, **o**). By enclosing any concept, we instantly and unavoidably bring all co-implicative coupled oscillators into being, binding them together in a relational fractal [1].

This profound point is often lost when considering DSRP's elemental pairs ($i \rightleftharpoons o$, $p \rightleftharpoons w$, $a \rightleftharpoons r$, $v \rightleftharpoons p$). The theory's principle of Co-implication states that these elements always appear together, mutually containing and creating one another instantly (**e+**, **e-**) [1]. These pairings instantiate a localized structural expression of the inseparable **1** limit. The dual contextualized and expressed within the non-dual. From this perspective, DSRP and non-duality need not be viewed as competing descriptions of reality. Rather, the organized structures described by DSRP may be understood as localized expressions of a broader continuity. These pairs are perfectly opposed functionally, yet in every instance they exist within a single system of balance. Much like a 2D holographic surface containing a fully 3D image, our relational models are entirely encoded within the undivided totality. This is the functional dual contained within the non-dual. We cannot observe the unmodellable **1**, but we observe its fractal reflection in the universe: elements that are functionally distinct, yet entirely incapable of existing apart [1]. The asymptotic limit does not negate distinction; it contextualizes it.

The formal necessity of this nesting is illuminated by Leonard and Goodman's Calculus of Individuals, which governs the mereological relationship between parts and wholes [6]. A defining feature of this calculus is its refusal to postulate a "null element", the mathematical notion of absolute absence. Because there is no absolute void, syntactical divisions cannot fracture reality into isolated fragments. When the cognitive boundary (the 1/1 syntax) creates discrete models, it generates parts that appear physically or conceptually separated. However, under Leonard and Goodman's mereology, these parts are never fundamentally severed [6].

Instead, their calculus demonstrates that distinct, non-overlapping elements can always be aggregated through heterogeneous fusion into a single, definable whole, even if those parts are spatially or conceptually discontinuous [6]. Because all such fusions ultimately sum into the "universal element (U)" representing the total universe of discourse the discrete objects mapped by the 1/1 syntax remain inescapably bound to the continuous, **1** [6]. Therefore, the boundaries expressed in DSRP and mereology do not break reality, they merely subdivide a universal reality that remains structurally intact. Because the physical universe lacks the absolute voids required to completely sever a system from its environment,

any localized entity cannot isolate itself behind absolute ontological walls, instead, it must maintain its internal organization through dynamic, semi-permeable boundaries that continuously negotiate an unbroken continuum.

4. The Psychological Payload

In the same way that mereology demonstrates that discrete parts cannot be fundamentally severed from the universal whole, a biological system cannot isolate itself entirely from its environment in any absolute way [4,6]. Instead, it must maintain its structural 'part-ness' through dynamic, semi-permeable boundaries, which function as statistical partitions rather than fixed physical edges [4]. This organizational requirement is captured by the concept of the Markov blanket: a statistical partitioning that separates a system's internal states from its external milieu [4].

This boundary is not merely physical; it is an active, functional necessity for an agent to exist as a coherent entity [4]. As O-Theory highlights, 'cognition evolved inside the very structures it later came to model' [1]. It follows that these conceptual boundaries and models are not merely passive representations; they manifest as biological imperatives to resist entropy and maintain autonomy [1,4]. By correctly modeling the environment, the system successfully parametrizes the consequences of its actions, thereby minimizing free energy and preserving its structural integrity against the drift toward disorder [1,4]. This statistical horizon mirrors the DSRP Distinction pattern, which separates an internal Identity (i) from an external Other (o) [1]. When this 'Other' is misidentified as a true void, an impenetrable barrier, or an adversary, rather than the co-implicated remainder of the whole, an observer commits a structural error in model-world alignment [1].

Similarly, when a biological system misidentifies its statistical boundary as an absolute separator from reality, it begins to view the environment as something to be defended against rather than something to be navigated [4]. This fosters a profound epistemological error: the system stops 'parametrizing' its environment through accurate active inference and instead enters a state of defensive over-weighting [2,4]. As established in predictive processing, the impact of matching sensory signals with top-down predictions is 'precision-mediated,' meaning the system's confidence in a signal dictates how it drives learning [2]. When a system treats the 'Other' as adversarial, it creates disturbances in this hierarchical Bayesian framework, causing prediction errors to be falsely generated and highly weighted [3]. Driven by dysregulated neuromodulators, the system accords 'undue salience' to these errors, effectively locking itself into a feedback loop of defensive misinterpretation [3]. Consequently, true autonomy which requires the system to parametrize beliefs about the consequences of action is forfeited, as the agent is no longer engaging in flexible navigation, but is instead trapped in a state of high-salience, error-driven reactivity [2,3]. In O-Theory, this is characterized as Reality Bias: the dangerous tendency to mistake the structural map for the world itself [1].

This rigidification carries a heavy functional cost, as the system's perceptual model loses agency and ceases to adapt to the complexity of the world [2,4]. Because an organism cannot simply 'shut down' sensory channels to avoid surprise, it is forced into a state of pathological rigidity [2]. It must then rely entirely on action to physically force the external world to match its internal map, effectively ensuring its predictions become a self-fulfilling prophecy [3]. In doing so, the agent commits what Korzybski

identified as the false 'is' of identity, treating multi-dimensional, complex reality as a dangerously one-valued, construct [1,5].

If an agent attempts to completely reject its environment, it conjures a fictional boundary, behaving as though it can strictly sever the inside from the outside [1,7]. We hypothesize that if this forced action takes the form of actively excluding or resisting a complementary variable to secure the system's Identity, it may trigger a theoretical dynamic proposed here as the 'Recursive Amplification Loop.' Operating on the premise that Identity and Other are logically co-emergent [1], the attentional “gain” required to systematically exclude a variable would theoretically necessitate its continuous tracking [2]. By dedicating its energy to eliminating the outside state, the system causes its foundational boundary to cycle back on itself in an infinite, self-referential loop [7]. Much like the famous paradox 'This statement is false,' the system creates a condition where the value it seeks must be continuously put back into the very expression from which it seeks it [7]. According to Spencer-Brown, mathematically, this effort does not resolve the boundary but instead generates an 'echelon without limit' [7]. The mathematical effort to escape the other side of the distinction paradoxically ensures it is continuously processed in time [7]. As Spencer-Brown illustrates, a system attempting to capture or escape itself creates an unavoidable loop where 'the snake eats itself, the dog chases its tail' [7]. Ultimately, because the system's existence relies entirely on the distinction it is trying to eliminate, it can never 'escape the form' [7].

A practical example of this dynamic can be observed in the psychological mechanisms of anxiety suppression. When an individual attempts to eliminate an unwanted cognitive state (such as panic or anxiety), the cognitive effort required to suppress the state acts as a “precision-weighting mechanism”, granting the anxiety signal “undue salience”, resulting in heightened prediction error signals [2]. As predictive processing models suggest, when such errors are weighted highly, they cause false inferences to "spiral and feed back upon themselves" [2]. The system's models become entrenched, forming an "epistemically insulated self-confirming cycle"[2]. We propose that the ongoing effort to escape the anxiety paradoxically binds the biological system to it, creating a lived psychological equivalent of this cycle: the Recursive Amplification Loop.

Extrapolating this dynamic to its absolute logical limit introduces a thought experiment this paper terms 'Saturation Collapse.' This proposed conceptual framework suggests that if a state were to achieve absolute saturation through the mathematical elimination of its complement, structural contrast would theoretically be entirely removed. Attempting to eliminate prediction error by entirely negating the other (o) would necessitate a mereological impossibility: the creation of a null set [6]. Forcing the external variable to zero (i/0) does not secure the identity, it inherently dissolves the structural contrast required to sustain it [1].

This systemic failure is mirrored in Alfred Korzybski's semantic critique of infinite velocity [5]. Velocity is inherently a relational structure defined as $v = s/t$. Korzybski points out that if an observer attempts to collapse this relationship by assuming time is zero ($t = 0$) to achieve an infinite velocity, the expression lacks a fundamental factor of its definition [5]. It ceases to define anything physical, becoming instead a symbol for a "semantic disturbance" [5]. Whether dealing with physical velocity or cognitive boundary mapping, growing one side of a relational structure to eradicate its necessary complement does not achieve absolute stability, it triggers its own dissolution, disintegrating into meaningless noise. By mathematically trying to eliminate the co-containing variable, the observer abolishes the structural order

of the model, resulting in delusional evaluation rather than adaptive cognition [1,4]. Like flooding an entire page with black ink destroys the contrast needed to see the words on the page, a system that attempts to completely eliminate its complement removes the structural boundary necessary to sustain its identity.

To maintain the continuity of an Identity, the system must logically preserve the structural category of the Other as the necessary field upon which the Identity operates. Acknowledging the necessity of systemic relation and the mereological impossibility of the null set allows a distinction to express itself as both a point of separation and a point of connection. Recognizing the asymptotic limit and its implications allows the observer to reframe the boundary as a connective membrane. Instead of an adversarial wall, the boundary becomes a site of dynamic and adaptive integration.

Considering the asymptotic nature of model-world alignment may therefore have implications beyond epistemology. If all distinctions ultimately exist within a larger continuity, local distinctions remain important without becoming absolute. Such a perspective may support psychological flexibility, curiosity, reduced attachment to certainty, and a greater capacity to engage reality as an ongoing process of learning rather than a completed state of knowing.

It must be emphasized that while logically consistent within the paradigms of active inference, Laws of Form, and O-Theory, mechanisms such as the Recursive Amplification Loop and Saturation Collapse remain proposed conceptual frameworks. Subsequent empirical research is required to validate how, and to what extent, these dynamics manifest in observable biological systems.

5. Synthesis: From Arrival to Synchronization

If our cognitive models cannot fully equal reality, our biological mandate theoretically shifts from seeking a final, objective arrival to engaging in active, continual synchronization with an inexhaustible territory. Having established the psychological distress inherent in demanding rigid, one-valued certainty, we can now attempt to reframe the structural gap between the map and the territory. Embracing the asymptote and its implications reveals that this gap is not a cognitive failure, but the exact engine of cognition itself.

In practice, this shift has the potential to release the system from cognitive rigidity. Because perception is an ongoing process of "iterative estimation" rather than a final destination [2], prediction errors can be processed not as systemic threats, but as necessary dialogue required to continuously update generative models. As neural representations encode "probability density distributions" rather than absolute facts [2], internalizing this imprecision can theoretically reduce ego and cognitive attachment. If all models are inherently asymptotic, our respective cognitive maps profoundly matter, but none can claim absolute ownership of objective truth. Perhaps by accepting that we can never perfectly capture reality, we can free ourselves from feeling captured by it, learning instead to dance with the boundary.

If the act of drawing a cognitive boundary requires structural and biological energy (what Spencer-Brown might characterize as the movement away from the unmarked state), then the subjective experience of psychological relief could theoretically emerge from the momentary suspension of this labor [2,3,4,7]. Within this framework, this is not conceptualized as an attempt to force the mind into a mereologically

impossible 'void' or 'null state' [6]. Rather, it can be understood as the intentional shifting of perspective toward the continuous background, the contextual 'Other' (o), without a biological imperative to identify or define it [1]. We hypothesize that by resting in the structural space between distinctions, the biological agent may momentarily drop the predictive load of boundary maintenance. Experiencing this 'space' does not negate the structures of reality; instead, it theoretically allows the observer to consciously rest in a local refraction of the undivided totality (the 1) before the operational syntax of division (the 1/1) is required. Determining how to reliably induce this state of temporary cognitive suspension, and measuring its practical efficacy in alleviating stress and modulating predictive processing, presents a compelling avenue for future empirical study.

Furthermore, this outlook recontextualizes curiosity and playfulness as fundamental biological strategies rather than mere psychological traits. If an organism's ultimate goal were to permanently eliminate all prediction errors (i.e., achieving a static state where the model perfectly equals reality), it would theoretically retreat to an unchanging, "darkened room" [2]. However, because the objective levels of reality are dynamic processes [5], biological agents expect to deploy "complex itinerant strategies" to forage and navigate [2]. Recognizing the multiordinality of our cognitive structures provides an "enormous flexibility of language" [5] that activates our deepest biological mandate to explore. If cognitive boundaries are real but not absolute, this mereological flexibility grants us the perspectival freedom to chop up language and models into whatever functional subdivisions we need without structurally severing the underlying continuum [6]. Surrendering the need for absolute certainty, the boundary shifts from a rigid, adversarial wall to a site of exploratory play, revealing that the space that separates us is also what connects us.

Ultimately, we hypothesize that the internalization of the asymptotic limit and its implications can potentially allow the observer to reframe the cognitive boundary as a connective, semi-permeable membrane. This shift may free the biological agent from the distress of paradoxical, one-valued logic, hypothetically allowing them to participate in the continuous, playful process of synchronizing with a universe that can be functionally modeled, but never entirely captured.

Moving from theoretical models to lived experience, the practical implications of this shift also potentially presents compelling avenues for future research. While positing increased psychological resilience as a direct outcome of this framework currently serves as a synthesized hypothesis, it outlines a clear roadmap for applied study. Because cognitive boundaries operate as structural variables rather than absolute realities, they are theoretically susceptible to targeted structural inquiry. The development of structured reflection frameworks designed to systematically map and re-integrate "excluded" complements presents a practical frontier for testing how rigid boundary conditions can be transformed. If an observer can be guided to actively reconceptualize an adversarial wall as a dynamic meeting point, their cognitive imperative may evolve: shifting away from the need to permanently conquer a territory, and toward the capacity to continuously engage it.

Implications of the Boundary Condition

The functional distinction between the expression 1/1 and the value 1 results in the following interpretation of O-Theory's asymptotic boundary condition:

Foundational Postulate of Asymptotic Alignment: Perfect ontological identity between a structural model (M) and reality (R) is definitionally impossible. If a model achieves perfect alignment with reality ($M = R$), it ceases to be a representation and simply *becomes* the reality it was meant to model.

DSRP appears to provide a highly robust and scientifically universal structural grammar for distinguishable phenomena (the relational syntax of 1/1). However, this asymptotic boundary condition, conceptually expressed as $\lim(t \rightarrow \infty) (M/R) = 1$, suggests a formal limit beyond which structural representation is no longer possible. The maximum possible alignment remains a continuous asymptote, preserving the fundamental syntactic duality of the model so it does not collapse into the reality it describes.

This limit does not weaken the ontological validity of DSRP throughout the observable domain, rather, it localizes uncertainty strictly to the boundary itself. Within the observable world, operational relations function predictively, while the conceptual integer 1 acts as a multiordinal boundary condition pointing toward an undivided totality. Syntactically, the expression 1/1 asymptotically approaches but can never structurally or definitionally equate to that pure totality.

By contextualizing rather than undermining O-Theory and DSRP, this asymptote reminds us that every distinction exists within a larger continuity. It clarifies exactly where scientific description ends, without diminishing the vast domain of distinguishable phenomena where these theories successfully apply. Ultimately, this interpretation preserves O-Theory's scientific rigor while establishing a structural foundation for both psychological and scientific humility.

References

1. Cabrera, D., & Cabrera, L. (2025). O-Theory: The Science of Organization. *Journal of Systems Thinking*, 5(1), 1-12.
2. Clark, A. (2013). Whatever next? Predictive brains, situated agents, and the future of cognitive science. *Behavioral and Brain Sciences*, 36(3), 181-253.
3. Friston, K. (2009). The free-energy principle: a rough guide to the brain? *Trends in Cognitive Sciences*, 13(7), 293-301.
4. Kirchhoff, M., Parr, T., Palacios, E., Friston, K., & Kiverstein, J. (2018). The Markov blankets of life: autonomy, active inference and the free energy principle. *Journal of The Royal Society Interface*, 15(138), 20170792.
5. Korzybski, A. (1931). Supplement III: A Non-Aristotelian System and its Necessity for Rigour in Mathematics and Physics. Paper presented before the American Mathematical Society at the New Orleans, Louisiana, Meeting of the A.A.A.S. (pp. 747-761).
6. Leonard, H. S., & Goodman, N. (1940). The Calculus of Individuals and Its Uses. *The Journal of Symbolic Logic*, 5(2), 45-55.
7. Spencer-Brown, G. (1969). *Laws of Form*. George Allen and Unwin.