Scientific Research Publishing

Advances in Applied Sociology, 2026, 16(9), 617-643
https://www.scirp.org/journal/aasoci
ISSN Online: 2165-4336
ISSN Print: 2165-4328

Cvolution: A Recursive Meta-Theoretical Framework for Development across Disciplines

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How to cite this paper: Masi, M. (2026). Cvolution: A Recursive Meta-Theoretical Framework for Development across Disciplines. *Advances in Applied Sociology, 16,* 617-643.
https://doi.org/10.4236/aasoci.2026.169037

Received: July 25, 2026
Accepted: September 4, 2026
Published: September 7, 2026

Abstract

Development has traditionally been investigated within separate disciplinary traditions, producing influential theories of biological evolution, cognitive development, systems organisation, human capability, civilisational change, and self-organisation. While these theories provide robust explanations within their respective domains, there remains no widely accepted conceptual framework that explains how the recurring operational processes underlying development relate across disciplines. This paper introduces Cvolution, an original recursive meta-theoretical framework developed through comparative conceptual synthesis of eight influential theories associated with Aristotle, Darwin, Piaget, Bertalanffy, Sen, Toynbee, Prigogine, and Spencer. Cvolution identifies a recurring five-stage operational architecture comprising Conditions, Organisation, Capability, Adaptation, and Evolution, in which evolutionary outcomes recursively generate the conditions for subsequent developmental cycles. Rather than replacing established theories, the framework integrates their complementary insights into a coherent higher-order structure while preserving their domain-specific explanatory strengths. The framework is illustrated through organisational development to demonstrate its interpretive applicability beyond the domains from which it was derived. Its conceptual contribution, falsifiability, limitations, and potential for empirical operationalisation are discussed. Cvolution is presented as a conceptual framework and research programme rather than an empirically validated theory.

Keywords

Development Theory, Systems Theory, Meta-Theory, Recursive Systems, Interdisciplinary Research, Conceptual Framework, Organisational Development

1. Introduction

Development is one of the most fundamental processes investigated across sci-

ence. Yet despite more than two centuries of theoretical progress, there remains no generally accepted framework explaining how the diverse mechanisms of development identified across disciplines relate within a common operational architecture. Biology explains development through evolution by natural selection (Darwin, 1859); psychology explains it through cognitive restructuring (Piaget, 1952); systems science explains it through the organisation of open systems (von Bertalanffy, 1968); economics and political philosophy increasingly explain it through the expansion of human capability and freedom (Sen, 1999); history explains civilisational development through challenge and response (Toynbee, 1946); and non-equilibrium thermodynamics explains the spontaneous emergence of order through dissipative self-organisation (Prigogine & Stengers, 1984). Aristotle's (1998) account of potentiality and actuality, and Spencer's (1896) attempt at a universal theory of evolution through differentiation and integration, provide still earlier philosophical foundations.

Development has become fragmented across disciplines largely because theoretical traditions emerged in response to different disciplinary questions—how species diversify, how children reason, how physical systems order themselves—with little incentive or occasion to ask whether those accounts share an underlying structure. This fragmentation is a genuine problem, and not merely an inconvenience for scholars who prefer tidy taxonomies. It means that when a researcher in one field encounters a developmental pattern that resembles one already understood in another—organisational resilience that behaves like ecological adaptation, for instance, or institutional learning that behaves like cognitive accommodation—there is no principled way to establish whether the resemblance reflects a shared underlying mechanism or is merely a loose metaphor. Existing theories do not resolve this problem because each is built to explain a specific mechanism within a specific domain—Darwin explains biological adaptation, Piaget explains cognitive development, Sen explains capability, Bertalanffy explains systems organisation, Prigogine explains self-organisation—and none of them addresses how these mechanisms occupy consistent positions within a wider developmental process. This is precisely the gap Cvolution is intended to close: not by proposing a new mechanism to sit alongside the existing ones, but by identifying the operational architecture that connects them.

This paper addresses that gap by introducing Cvolution: a recursive meta-theoretical framework of development. The framework was developed through systematic comparative analysis of eight influential developmental traditions referenced above. Rather than comparing these traditions by terminology, the analysis searched for the operational function each concept performs—the question of what role it plays in a developmental process rather than what it is called—and from this search five recurring operational stages were identified: Conditions, Organisation, Capability, Adaptation, and Evolution, linked in a continuous recursive cycle in which evolutionary outcomes generate the conditions for subsequent development. The originality of Cvolution lies neither in introducing new devel-

opmental mechanisms nor in redefining existing theories, but in identifying that diverse developmental mechanisms occupy recurrent operational positions within a single recursive architecture. Cvolution is not presented as a replacement for existing disciplinary theories, nor as an empirically validated law. It is presented as an original conceptual synthesis and operational architecture—a higher-order structure within which the complementary insights of established theories may be organised, compared, and related to one another within a single explicit recursive architecture.

The motivation for this synthesis is not simply theoretical economy. Fields that study human and organisational systems increasingly confront problems—climate adaptation, technological disruption, institutional reform, public health—that do not respect disciplinary boundaries. A researcher studying organisational resilience has good reason to ask what evolutionary biology or cognitive psychology can teach about adaptation under uncertainty, but existing theories offer no common vocabulary through which such comparisons can be made rigorously rather than metaphorically. Attempts at general theories of development are not new: Spencer's (1896) evolutionary sociology and, later, General Systems Theory itself (von Bertalanffy, 1968) were both explicitly framed as unifying projects. Cvolution differs from these antecedents primarily in scope of synthesis—it is constructed from, and explicitly cross-referenced against, eight traditions spanning philosophy, biology, psychology, systems science, economics, history, sociology, and thermodynamics, rather than extending outward from a single disciplinary base.

The paper proceeds as follows. Section 2 sets out the comparative method; Section 3 reviews the source literature and identifies the gap that motivates the framework; Section 4 develops the Cvolution framework in full; Section 5 illustrates its interpretive reach across biological, cognitive, and societal development before applying it in operational depth to organisational development; and Sections 6 and 7 address falsifiability, limitations, and the framework's contribution.

2. Method

This paper reports a conceptual synthesis rather than an empirical study, and its method should be evaluated by the standards appropriate to theory-building research (Dubin, 1978; Gregor, 2006; Lynham, 2002) rather than by standards developed for hypothesis-testing research. Conceptual articles of this kind are an established and legitimate mode of scholarly contribution, particularly suited to identifying and integrating patterns across a literature too fragmented for any single empirical study to address directly (Jaakkola, 2020; Gilson & Goldberg, 2015).

The eight theories reviewed in Section 3 were selected because each is widely recognised as a foundational account of development within its discipline, and collectively they span philosophy, biology, psychology, systems science, economics, history, sociology, and thermodynamics—the range of disciplinary perspec-

tives necessary to test whether a common operational structure exists at all, rather than being an artefact of a narrower selection. Each theory was analysed individually, in its own disciplinary context, before being compared against the others using a consistent set of analytical dimensions: the form of development addressed, the conditions assumed necessary for development, the account given of organisation, the functional capabilities identified, the mechanism of adaptation proposed, and the account given of long-term or evolutionary change. Concepts were compared by operational function rather than by surface terminology, though this comparison requires a precise qualification in the case of adaptation specifically. Darwin's biological adaptation operates through natural selection: the differential survival and reproduction of existing hereditary variants across generations of a population, not the modification of any single organism within its own lifetime. Piaget's accommodation and Toynbee's civilisational response describe a different kind of process—change within a persisting system, an individual mind or a civilisation, over a single lifespan or historical period. These are not the same mechanism, and the paper does not treat them as such. What licenses their comparison is a narrower claim: each names the process by which a system—a population across generations, an individual within a lifetime, a civilisation within a historical period—modifies its functioning in response to a changed environment, whether that modification operates through selection among variants, cognitive restructuring, or institutional and cultural response. Cvolution's Adaptation stage is defined at this more abstract operational level; the framework does not assume population-level selection and within-system behavioural adjustment are the same kind of process, only that both occupy the same position in the developmental architecture.

The five-stage structure presented in Section 4 was not specified prior to this analysis and then fitted to the literature; it emerged from the comparison itself, as the recurring pattern common to all eight theories despite their independent disciplinary origins. This inductive derivation is intended to reduce, though it cannot eliminate, the risk that the framework simply reflects the analyst's prior assumptions rather than a genuine pattern in the source material—a limitation addressed further in Section 6.

One boundary of this method should be stated explicitly. The eight theories were chosen for their disciplinary breadth and foundational status, not through a systematic or exhaustive literature search; a reviewer applying different selection criteria—for example, restricting the review to a single discipline, or extending it to include contemporary complexity science and developmental systems theory—might identify a different or more elaborated structure, and this possibility is treated in Section 6 as a limitation rather than dismissed. The complete theory-by-theory coding against the six analytical dimensions, omitted from the main text for reasons of length, is reported in full in Appendix A so that the claim made below—that the five-stage structure emerged consistently across all eight theories—can be independently audited rather than taken on the author's

assertion.

3. Existing Theories of Development: A Comparative Synthesis

Aristotle's distinction between potentiality (dunamis) and actuality (energeia) offers the earliest systematic account of development as the realisation of an inherent capacity under appropriate conditions. Although developed within a teleological framework that modern science has largely abandoned, the underlying insight—that development requires both latent capacity and enabling circumstances—recurs throughout the later theories considered here.

Darwin (1859) explained biological development through variation, inheritance, and natural selection: organisms whose characteristics better suit their environment survive and reproduce disproportionately, producing cumulative adaptive change across generations. The mechanism is explanatory and well evidenced, but it is specific to biological populations and does not by itself address how organisation or functional capability first arises. Subsequent developments in genetics and molecular biology have substantially deepened the mechanism without altering its essential logic, and it is this logic—variation and selection acting on an existing population of organised, capable entities—that Cvolution treats as one operational stage among several, rather than as development in its entirety.

Piaget (1952) explained cognitive development through the interaction of assimilation, accommodation, and equilibration, whereby a child's cognitive structures are progressively reorganised through interaction with experience. The theory is a powerful account of capability development and adaptation within a single domain—individual cognition—without addressing development at other levels of organisation. Later psychological work, including Vygotsky's sociocultural theory and Erikson's psychosocial stages, extended Piaget's account in directions consistent with, but not identical to, the operational sequence proposed here.

von Bertalanffy (1968) argued that living and social systems are open systems that exchange matter, energy, and information with their environment, and that organisation—rather than any single component—is the defining property of complex systems. General Systems Theory explains how organisation emerges and is maintained, but offers comparatively little on how organisation translates into functional capability or adaptive behaviour over time, a gap later addressed, within specific domains, by capability theory and organisational adaptation research (Checkland, 1999; Mingers, 2014).

Sen (1999) reframed development in economics and political philosophy around the expansion of human capability and substantive freedom, rather than income or output alone. The Capability Approach is not silent on context, and it would be inaccurate to treat it as though it were: Sen's own framework distinguishes resources or commodities from the personal, social, and environmental "conversion factors"—institutions, infrastructure, discrimination, individual cir-

cumstance—that determine how effectively those resources translate into actual capability, and this apparatus already performs some of the explanatory work that Cvolution assigns to Conditions and Organisation. Cvolution's contribution at this stage is accordingly not to introduce a distinction Sen's theory lacks, but to reposition it: where Sen analyses conversion factors together as inputs to capability within a single theoretical unit, Cvolution separates the enabling circumstances themselves (Conditions), the structures through which those circumstances become an operating system (Organisation), and the resulting functional capacity (Capability) into three sequential stages. The justification for this separation is that a system can possess favourable conditions without yet organising them effectively, and can be organised without yet possessing functional capability—a distinction Sen's treatment of conversion does not need to draw, because his framework is not concerned with the operational sequence connecting capability to the further stages of adaptation and evolutionary change that Cvolution addresses. Its enduring influence—including its role in the design of the United Nations Human Development Index (United Nations Development Programme, 2015)—reflects the practical value of treating capability as a distinct developmental variable, which Cvolution incorporates directly as its third stage.

Toynbee (1946) explained the rise and fall of civilisations through challenge and response: societies that develop creative responses to internal and external challenges continue to develop, while those that fail to respond stagnate or collapse. The theory is a historical account of adaptation at the civilisational level, situated within a specific and contested historiographic tradition, and its reliance on comparative historical narrative rather than systematic data has drawn sustained methodological criticism. Nonetheless, its central mechanism—a system's capacity to respond adaptively to disruption as the determinant of its continued development—is structurally identical to the adaptation mechanisms identified independently in biology and psychology.

Prigogine & Stengers (1984) demonstrated that order can emerge spontaneously within non-equilibrium physical systems through dissipative self-organisation, as fluctuations are amplified past a critical threshold and the system reorganises into a new, more complex state. This account of self-organisation in physical systems parallels the organisational stage identified independently in Bertalanffy's systems theory and in Aristotle's account of the actualisation of form. Its significance for the present framework is that it demonstrates the organisational stage is not confined to living or social systems, but is observable in far-from-equilibrium physical systems governed by no biological or cognitive mechanism at all.

Spencer (1896) proposed one of the earliest general theories of evolution, arguing that development across physical, biological, and social systems proceeds through increasing differentiation and integration. The theory anticipates the ambition of the present framework, but its specific evolutionary mechanism has not been sustained by subsequent science, and it predates the twentieth-century the-

ories of organisation, capability, and self-organisation reviewed above.

3.1. Shared Themes across the Eight Theories

Read together, these theories exhibit substantial thematic overlap despite their disparate origins. First, each treats development as directional, cumulative change rather than static existence: Aristotle's movement from potentiality to actuality, Darwin's evolutionary change, Piaget's cognitive restructuring, and Spencer's progression toward complexity all reject static conceptions of the systems they describe. Second, each identifies interaction with an environment as a necessary condition for development: Darwin's selection pressures, Piaget's assimilation of external experience, Bertalanffy's open-system exchange, and Toynbee's external challenges are all relational rather than purely internal mechanisms. Third, each recognises organisation, in some form, as a precondition for function—explicit in Bertalanffy and Prigogine, implicit in Aristotle's actualisation of form and in the increasingly organised biological structures that Darwinian selection favours. Fourth, each identifies adaptation—whether biological, cognitive, civilisational, or physical—as the mechanism through which systems remain viable under changing conditions.

3.2. Key Differences

The theories differ, however, in three important respects. They differ in disciplinary scope: Aristotle addresses metaphysical development, Darwin biological evolution, Piaget individual cognition, Bertalanffy organised systems generally, Sen human capability, Toynbee civilisations, Prigogine physical systems, and Spencer evolution in the most general sense his era permitted. They differ in principal mechanism: actualisation, natural selection, cognitive equilibration, systemic organisation, capability expansion, challenge and response, dissipative self-organisation, and differentiation are not interchangeable explanations, even where they describe structurally similar processes. And they differ in level of analysis, ranging from individual cognition (Piaget) to biological populations (Darwin), physical systems (Prigogine), and entire civilisations (Toynbee), with few of the theories explicitly addressing how developmental principles might operate consistently across these different levels.

The critical gap is that none of the reviewed theories presents a complete operational sequence explaining how these recurring elements relate to one another. Each identifies an important developmental mechanism—actualisation, natural selection, cognitive equilibration, systemic organisation, capability expansion, challenge and response, self-organisation, or differentiation—but these mechanisms are presented as freestanding explanations rather than interconnected stages of a single developmental process. The literature therefore explains many components of development without explaining how favourable conditions give rise to organisation, how organisation enables capability, how capability supports adaptation, or how adaptation accumulates into evolutionary change that in turn reshapes the

conditions for further development. Stated precisely: to the author's knowledge, there is currently no recursive operational meta-theoretical framework that integrates recurring developmental mechanisms across multiple disciplines while preserving the explanatory integrity of the constituent theories. This is not a claim that integration has never been attempted. Spencer's (1896) evolutionary sociology and von Bertalanffy's (1968) General Systems Theory were both explicitly conceived as unifying projects, and each identified genuine cross-domain regularities. What distinguishes the gap addressed here is that these and other prior attempts have generally remained tied to a single disciplinary starting point—sociology in Spencer's case, systems engineering and biology in Bertalanffy's—extending outward from that base rather than being constructed from a comparative synthesis across disciplines, and none specifies a recursive operational sequence spanning the specific stages identified here.

This gap has two further, related dimensions. The first is limited cross-domain applicability: most of the theories reviewed remain closely tied to the domain in which they originated, and where they have been extended beyond that domain—evolutionary metaphors in organisational theory, for instance, or systems-theoretic language in psychology—the extension has typically relied on analogy rather than a common operational structure with consistent, cross-domain definitions. The second is an imbalance between structural and functional explanation: Bertalanffy and Prigogine emphasise structural organisation, while Darwin, Piaget, Sen, and Toynbee emphasise functional processes such as adaptation, learning, and capability, with comparatively little attention given to how structural organisation and functional capability interact within a single account. This is the composite gap—disciplinary fragmentation, absence of an operational sequence, limited cross-domain applicability, and the structure-function imbalance—that the Cvolution framework, presented in the following section, is intended to address.

3.3. Positioning Relative to Complexity Science and Developmental Systems Theory

The ambition to explain development or organisation in general, rather than within a single domain, did not end with Spencer or Bertalanffy. Complexity science has produced a substantial body of work on how adaptive systems behave across domains: Holland's (1992) account of complex adaptive systems shows how simple local rules generate emergent, adaptive, population-level behaviour in contexts ranging from immune systems to economies; Simon's (1996) account of hierarchical organisation in "the sciences of the artificial" explains why complex systems across domains tend toward nested, modular structures; and Meadows (2008) and Senge (2006) have each shown, in systems-dynamics and organisational-learning contexts respectively, how feedback loops generate the kind of self-reinforcing or self-correcting behaviour that Cvolution formalises as the recursive link between Evolution and Conditions. In biology and philosophy of science, developmental systems theory (Oyama et al., 2001) has argued against treat-

ing any single factor—genetic or environmental—as developmentally privileged, proposing instead that development emerges from the entire system of interacting resources across generations. Unlike Developmental Systems Theory, which explains development through the interaction of developmental resources, Cvolution is concerned with the operational sequence through which developmental processes are organised; the two accounts address different questions and are compatible rather than competing.

Cvolution is closely related to, but distinct from, this literature. Complexity science and developmental systems theory are principally concerned with characterising the general properties of complex or developmental systems—emergence, feedback, non-linearity, distributed causation—rather than with specifying a sequence of operational stages through which a system's development can be tracked and diagnosed. Cvolution shares the underlying commitment to feedback and cross-domain applicability found in this literature, and is best understood as compatible with it: where complexity science explains why adaptive systems behave as they do in general, Cvolution proposes a specific, falsifiable operational architecture—five ordered stages linked recursively—through which that general behaviour can be located and examined in a particular case. The relationship between the two is therefore complementary rather than competing, and future work relating the five-stage structure explicitly to complex adaptive systems theory is identified as a priority in Section 7.

4. The Cvolution Framework

Cvolution is a recursive, interdisciplinary, meta-theoretical framework of development in which organised systems emerge, function, and transform through the continuous interaction of five operational stages: Conditions, Organisation, Capability, Adaptation, and Evolution. Through each cycle of development, evolutionary outcomes create new conditions that initiate further development, allowing the process to continue recursively across physical, biological, cognitive, organisational, technological, and societal systems. The framework was developed inductively, through repeated comparative analysis of the theories reviewed in Section 3, rather than specified in advance and fitted to the literature afterwards; its five stages represent the recurring structure that emerged from that comparison.

> *Definition. Cvolution is a recursive operational meta-theoretical framework proposing that persistent developmental processes are organised through the interaction of Conditions, Organisation, Capability, Adaptation, and Evolution, whereby evolutionary outcomes recursively generate the conditions governing subsequent developmental cycles.*

The ordering of the five stages is not arbitrary, and each transition can be justified independently of the comparative evidence in Section 3. Organisation logically precedes Capability because functional capacity cannot exist independently

of an organised system capable of exercising it: a capability is, by definition, a capability of some entity, and that entity must possess at least minimal organisation before any capability can be attributed to it. The same logic holds at each transition. Conditions precede Organisation because organisation is a transformation of potential into structure, which requires something to organise before organisation can occur. Capability precedes Adaptation because adaptation is defined here as the modification of existing capability in response to a changed environment, which presupposes that capability already exists to be modified. Adaptation precedes Evolution because Evolution, in this framework, denotes the cumulative record of repeated successful adaptation rather than a separate process running alongside it.

A related question is why the framework specifies five stages rather than four or six. The comparative method described in Section 2 tested whether adjacent stages could be collapsed without loss of explanatory content, and found in each case that they could not. Organisation and Capability, for instance, are often discussed together in the literature, but collapsing them would obscure a well-documented and diagnostically important case: a system that is highly organised yet functionally incapable, such as a bureaucracy with elaborate structure but little operational capacity. Treating organisation and capability as distinct stages preserves this as a specific, diagnosable condition rather than an internal contradiction. Equally, no additional stage was identified that performs a function not already accounted for by the five: every developmental process considered in Sections 3 and 5 could be described fully using this structure without theoretical remainder. The five-stage count is accordingly an outcome of the comparative method rather than a stipulated design choice, though, as Section 6 acknowledges, it remains one defensible interpretation open to revision by future comparative work.

4.1. Conditions

Conditions are the internal and external circumstances that establish the potential for development without determining its outcome. In biological systems, conditions include energy, nutrients, and genetic material; in cognitive development, they include neurological maturity and environmental stimulation; in organisations, they include market demand, resources, and regulatory context. Favourable conditions are necessary but not sufficient for development: they create opportunity, which subsequent stages must realise.

The same logic extends to technological and societal development. A new technology requires prior scientific knowledge, funding, and infrastructure before it can be built; a society's development is conditioned by its geography, resources, and institutional inheritance before any policy or reform can act. In each case, conditions set the boundary of what development is possible without determining whether that possibility is realised—a distinction the framework treats as analytically important, since collapsing conditions and outcomes together obscures why systems with similar starting conditions can develop very differently.

4.2. Organisation

Organisation is the structured arrangement of components and relationships that transforms potential into a coherent, functioning system. This stage corresponds most directly to von Bertalanffy's (1968) account of open systems and to Prigogine's account of self-organising physical systems, and is implicit in Aristotle's account of the actualisation of form. Organisation produces emergent properties that its individual components do not possess in isolation.

In biological systems, organisation ranges from macromolecules to cells, tissues, and organisms; in social systems, it takes the form of governance structures, institutions, and communication networks. What is common across these otherwise dissimilar cases is that organisation is neither automatic nor guaranteed by favourable conditions—a point on which Prigogine's demonstration that self-organisation requires specific non-equilibrium conditions is instructive: organisation is itself a transition that can fail to occur even where the raw materials for it are present. Organisation is necessary because conditions alone do not confer function: raw materials, capital, or environmental stimulation produce nothing until arranged into a working structure, and it is only once that structure exists that the system can be said to possess capability, the stage examined next.

4.3. Capability

Capability is the functional capacity of an organised system to act, respond, and perform: to metabolise and reproduce in biological systems, to reason and communicate in cognitive development, or to innovate and deliver services in organisations. This stage corresponds most directly to Sen's (1999) Capability Approach. Within Cvolution, capability is treated as one operational stage among five, rather than as the totality of development.

Two systems that are organised in structurally similar ways can nonetheless differ substantially in what they are capable of doing—two comparably staffed organisations may differ sharply in innovation capacity, just as two organisms with comparable ecological niches may differ in physiological resilience. This distinction between organisation and capability is one of the clearer respects in which the five-stage decomposition adds analytical precision beyond treating 'development' as a single undifferentiated variable. Capability is necessary because organisation on its own is static: an organised system that cannot act, respond, or perform has not yet demonstrated functional capacity, and it is that functional capacity which is tested, and potentially found wanting, once conditions change—the point at which adaptation, the following stage, becomes decisive.

4.4. Adaptation

Adaptation is the continuous process through which an organised, capable system modifies its structure or behaviour in response to changing internal or external conditions. This stage draws on Darwin's (1859) account of adaptation through natural selection, Piaget's (1952) account of assimilation and accommodation, and

Toynbee's (1946) account of civilisational response to challenge—three domain-specific accounts of what Cvolution treats as a single operational mechanism.

Adaptation operates at different timescales and levels across domains: genetic adaptation operates across generations, cognitive adaptation within a single lifespan, and organisational adaptation over months or years, yet in each case the same underlying logic applies—capability that was previously adequate becomes insufficient as conditions change, and the system's continued viability depends on whether it can adjust before that inadequacy becomes terminal. Adaptation is necessary because capability, once established, is not self-maintaining: it degrades in relative terms as conditions shift, and only repeated, successful adaptation accumulates into the durable transformation identified as the fifth and final stage, evolution.

4.5. Evolution

Evolution is the cumulative, enduring transformation that results from repeated successful adaptation. It is not a discrete event but an accumulated outcome—of natural selection across generations, of sustained learning across a lifespan, or of institutional change across decades. Critically, the outcomes of evolution alter the environment or system in ways that establish new conditions, from which a further developmental cycle begins. This recursive closure—evolution generating new conditions—is the feature that most clearly distinguishes Cvolution from a simple linear stage model, and is illustrated in Figure 1.

A speciation event alters the ecological conditions faced by other species; an organisation's accumulated learning and reputation become part of the conditions shaping its next strategic cycle; a civilisation's institutional development reshapes the conditions faced by the next generation. In each case, evolution is not an endpoint but a transition back into Conditions, which is why the framework is represented as a cycle in Figure 1 rather than as a terminating sequence.

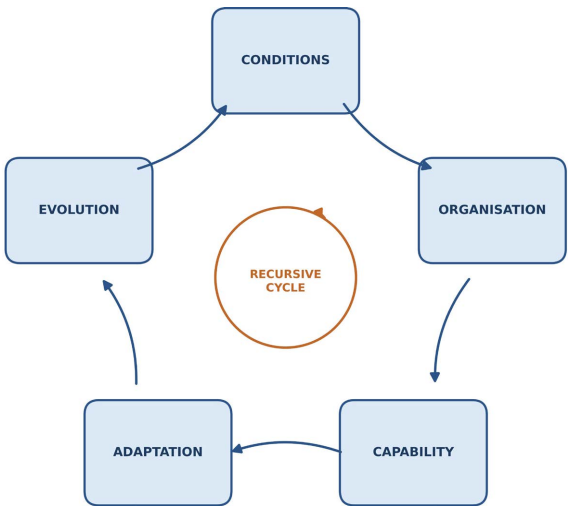

Figure 1. The Cvolution recursive cycle. The five operational stages proceed around the cycle while evolutionary outcomes recursively regenerate the conditions for the next developmental cycle, closing the sequence rather than terminating it.

4.6. Relationship to Existing Theories

Cvolution is explicitly a synthesis rather than a substitute for the reviewed theories above. Aristotle's account of potentiality corresponds most directly to the Conditions stage; Bertalanffy's and Prigogine's accounts of organisation and self-organisation correspond most directly to the Organisation stage; Sen's account of capability corresponds most directly to the Capability stage; Darwin's, Piaget's, and Toynbee's accounts of adaptation correspond most directly to the Adaptation stage; and Spencer's account of differentiation and increasing complexity corresponds most directly to the Evolution stage. These are each theory's single strongest correspondence, not its only one: the coding reported in Appendix A shows that most of the eight theories also address other stages substantively, even where that stage is not their central concern. Figure 2 reports both: each theory's primary correspondence and every other stage its coding treats as substantive, drawn directly from Appendix A rather than assessed separately.

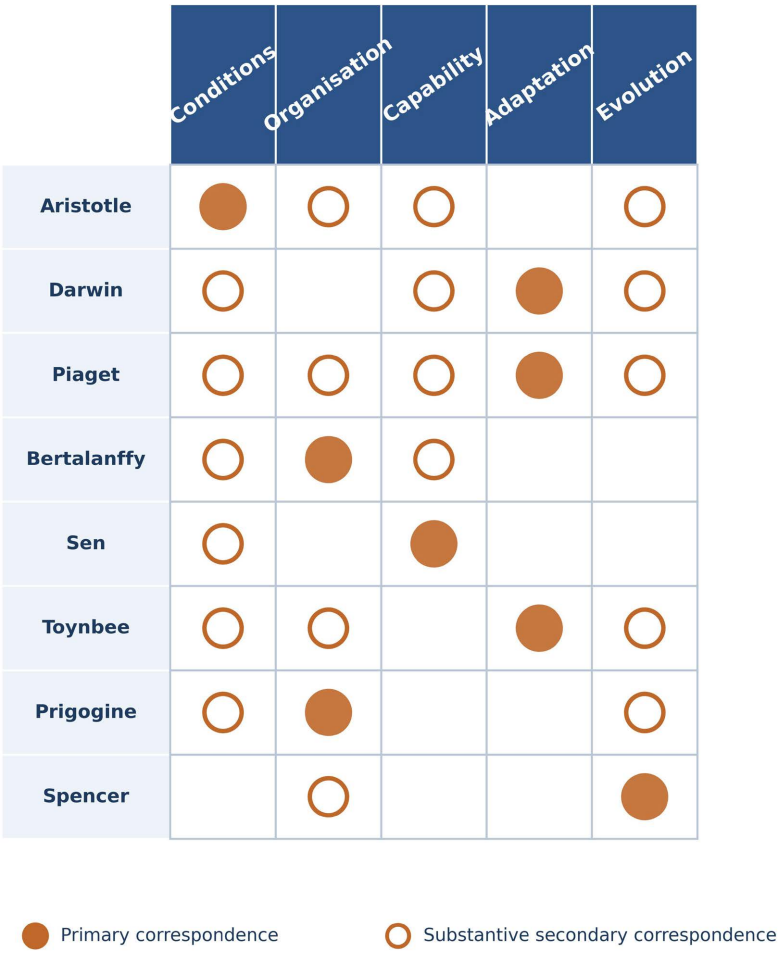

Figure 2. Correspondence between the eight reviewed theoretical traditions and the five Cvolution stages. Filled markers indicate each theory's primary correspondence; open markers indicate other stages the Appendix A coding treats as substantive for that theory. A blank cell indicates Appendix A explicitly codes that dimension as not a central concern for that theory.

It is worth being precise about the level at which this correspondence operates, since it is the basis of the paper's central claim to an original conceptual synthesis and operational architecture. Each of the eight source theories explains a mechanism: Darwin explains biological adaptation, Piaget explains cognitive development, Sen explains capability, Bertalanffy explains systems organisation, Prigogine explains self-organisation. None of them, individually or collectively, explains how these mechanisms occupy consistent positions within a single recursive developmental process—that is, none specifies the operational architecture connecting them. This is the paper's principal contribution: not a new mechanism to add to the existing eight, but the operational architecture itself, within which those eight mechanisms are shown to occupy structurally equivalent positions. Each source theory retains full explanatory authority within its own domain; Cvolution's claim operates at a different level of abstraction, concerning how the domains relate to one another rather than how any one of them works in detail.

4.7. Analytical Value

One practical implication of decomposing development into five stages is diagnostic. Because developmental failure can, in principle, be traced to a deficit at a specific stage—inadequate conditions despite strong organisation, weak organisation despite favourable conditions, insufficient capability despite sound organisation, ineffective adaptation despite strong capability, or limited evolutionary progress despite repeated adaptation—the framework offers a structure for locating where a developmental process is breaking down, rather than only describing that it has. This diagnostic use is proposed here as a direction for future operationalisation (see Section 6) rather than as an established analytical tool.

5. Illustrative Applications across Developmental Domains

This section illustrates the framework's interpretive reach in two complementary ways. Sections 5.1 to 5.3 apply the five-stage structure briefly across three domains already represented among the source theories—biology, cognition, and societal development—to show that the operational architecture identified in Section 4 is visible not only in the abstract but in the specific empirical literatures from which it was derived. Section 5.4 then applies the framework in operational depth to a domain touched only indirectly by the reviewed theories—organisational development—as a more demanding test of whether the structure has genuine interpretive reach beyond its source material, rather than merely restating the theory from which it was most directly derived. Section 5.5 draws the four applications together.

5.1. Biological Development

Biology provides the most direct illustration of the framework, since it is among the domains from which Cvolution was derived. Organisms exist within ecological, climatic, and resource conditions that constrain and enable survival. Those

conditions support the emergence and maintenance of organised biological structures, from cellular processes to complex physiologies. Organisation gives rise to functional capabilities—metabolism, reproduction, locomotion—that determine what an organism or population can do. Environmental pressure then selects for adaptive variation, and across successive generations this adaptive change accumulates into evolutionary transformation (Darwin, 1859; Futuyma, 2009). Critically, that transformation alters the ecological relationships among species, generating new conditions—new predators, competitors, or niches—for further evolutionary cycles. Cvolution does not modify or compete with the explanatory mechanism of natural selection; it identifies the operational position that mechanism occupies within a wider recursive architecture that recurs, in different mechanistic form, in the domains below.

5.2. Cognitive Development

A comparable pattern appears in individual cognitive development. Children develop within social, cultural, and educational conditions that shape the opportunities available for learning (Vygotsky, 1978). These conditions support the formation of increasingly coherent cognitive structures, which in turn generate capabilities—reasoning, problem-solving, language—that determine what a child can understand or accomplish at a given stage. When existing capability proves insufficient for a new experience, accommodation adapts cognitive structure to it (Piaget, 1952). Repeated accommodation produces enduring developmental change—a more sophisticated conceptual repertoire—that reshapes the conditions for subsequent learning: what a ten-year-old can be taught depends directly on what a seven-year-old has already come to understand. As with biology, Piaget's theory explains the mechanism of cognitive adaptation; Cvolution explains the operational position that mechanism occupies relative to conditions, organisation, capability, and evolution.

5.3. Societal and Institutional Development

Societal development follows the same architecture on a larger scale. Geographic, environmental, and historical conditions shape the emergence of institutions and systems of governance (North, 1990). Organised institutions generate collective capabilities—economic production, education, legal order, public administration—that determine what a society can achieve. External challenges and internal pressures require continual institutional adaptation, whether through reform, innovation, or renegotiation of political settlement; Toynbee (1946) reads civilisational development specifically through this cycle of challenge and response. Where adaptation succeeds repeatedly, institutional change accumulates into lasting transformation in governance, economic structure, or civic culture, which becomes part of the historical conditions confronting the next generation (Acemoglu & Robinson, 2012). Civilisations, on this reading, do not simply respond to their circumstances; their responses become the circumstances the next cycle of devel-

opment must address.

5.4. Organisational Development: A Worked Application

The three illustrations above draw on domains already represented among the eight source theories. Organisational development provides a more demanding test, since none of the eight theories addresses organisations directly—Bertalanffy's systems theory treats organisations only as one instance of open systems in general—and an organisational reading of Cvolution therefore constitutes a genuine extension of the framework rather than a restatement of it. This section develops that application in operational depth. Table 1 summarises the mapping.

Table 1. Application of the cvolution framework to organisational development.

Cvolution Stage	Organisational Development Example
Conditions	Market demand, regulation, finance, leadership, available resources
Organisation	Governance structures, reporting lines, communication systems, culture
Capability	Leadership quality, innovation capacity, operational efficiency, expertise
Adaptation	Restructuring, digital transformation, strategic change in response to competition
Evolution	Organisational learning and institutional growth, which reshape the conditions (market position, reputation, resources) for the next developmental cycle

An organisation's development can be read through this sequence. Favourable conditions—capital, demand, permissive regulation—create the opportunity for a venture to form, but do not guarantee its survival. Organisation converts that opportunity into a functioning entity through governance, structure, and culture. Capability determines what the organised entity can actually do: innovate, compete, deliver. Adaptation determines whether the organisation can adjust its capability as its environment changes—through restructuring, digital transformation, or strategic pivots. Where adaptation is repeatedly successful, the organisation evolves: it accumulates learning, reputation, and institutional capacity that become part of the conditions shaping its next developmental cycle, whether that is expansion, diversification, or renewed competitive pressure.

This reading is compatible with, rather than a replacement for, established organisational theories such as the Resource-Based View, dynamic capabilities theory (Teece, Pisano, & Shuen, 1997), evolutionary theories of the firm (Nelson & Winter, 1982), and accounts of structural inertia in organisational change (Hannan & Freeman, 1984), each of which explains particular stages of this sequence—principally capability and adaptation—in greater empirical depth than Cvolution attempts here. The framework's contribution at this level of application is integra-

tive: it situates capability and adaptation within a wider sequence that also accounts for the conditions from which organisations emerge and the organisational structures through which capability becomes possible in the first place. Like the comparative synthesis in Section 3, this application demonstrates internal coherence rather than empirical validation; systematic testing against case-based or longitudinal data is beyond the scope of this paper and is addressed as a research priority in Section 6.

The diagnostic value proposed in Section 4.7 can be illustrated briefly by contrast. Two organisations with comparable conditions and organisational structure may diverge sharply in outcome if one develops adaptive capability—for instance, the capacity to reorganise in response to a new competitor or technology—and the other does not. Under a single undifferentiated conception of "organisational development", both cases would simply be recorded as differing outcomes. Under the five-stage decomposition, the difference is localised specifically to the adaptation stage, which is, in principle, a more useful diagnostic result: it directs attention to the mechanism responsible for divergence rather than only to the fact that divergence occurred. Whether this added precision holds up under systematic empirical testing, rather than the single illustrative contrast offered here, is precisely the kind of question the propositions in Section 6 are intended to make testable.

5.5. Cross-Domain Synthesis

Read together, the four applications above illustrate a property of the framework that no single domain can demonstrate alone: the underlying organising logic remains stable while its constituent mechanisms vary substantially. Natural selection, cognitive accommodation, institutional reform, and organisational restructuring are not the same mechanism in different clothing—each remains specific to, and best explained within, its own discipline. What recurs across all four is not the mechanism but the operational role each mechanism performs: each domain exhibits enabling conditions, structural organisation, functional capability, adaptive response, and cumulative transformation that regenerates the conditions for what follows. This is the sense in which Cvolution offers conceptual integration without disciplinary reduction: it neither reduces organisational change to biology nor treats institutional reform as a metaphorical extension of cognitive development, but identifies the structural position each occupies within a shared recursive process. The organisational case in Section 5.4 additionally shows that this correspondence is not confined to the domains from which the framework was derived, which is the more demanding claim on which the paper's contribution ultimately rests.

6. Falsifiability, Testable Propositions, and Limitations

Before the propositions below can be evaluated, it is necessary to specify what counts as one developmental cycle and over what timescale it is bounded. The unit

of analysis is a bounded developmental episode within a defined system: a generation-to-generation transition in a population, a strategic cycle in an organisation (for example, from the identification of a market opportunity to the point at which the resulting capability has been tested against a competitive challenge), or a reform cycle in an institution. The boundary of one cycle is set empirically by the point at which an identifiable evolutionary outcome—a stable change in trait frequency, an institutionalised capability, a settled policy—becomes part of the conditions for a subsequent cycle; where no such outcome can be identified, the framework does not claim a completed cycle has occurred. This also bears on cases where organisation, capability, and adaptation appear to co-occur, or where feedback operates at a shorter timescale than the cycle itself. The framework treats such cases as nested or overlapping cycles operating at different temporal scales rather than as evidence against the sequence: a single strategic cycle in an organisation may contain many shorter adaptive adjustments, each itself a smaller developmental cycle with its own conditions, organisation, capability, adaptation, and evolutionary outcome. Distinguishing genuine co-occurrence from nested cycles at different timescales is an empirical question for the case-based research. The propositions below are intended to motivate, but none of these conceptual paper can resolve in advance.

A framework that cannot in principle be shown to be wrong has limited scientific value. Cvolution generates several propositions that are, in principle, open to empirical investigation, each stated below together with the kind of evidence that would support or count against it.

P1. Across a given developmental process, the five stages should be identifiable in a consistent sequence (conditions preceding organisation, organisation preceding capability, and so on), rather than in arbitrary order. Evidence would take the form of process-tracing or archival case analysis in which each stage is coded from independent indicators—resource and regulatory data for conditions, governance records for organisation, performance metrics for capability, documented restructuring events for adaptation, and measurable outcome change for evolution—with the coded sequence found to follow the predicted order across independently sampled cases. Stages appearing in reversed or arbitrary order across a representative sample would count against the proposition.

P2. Developmental failure should be traceable to a deficit in a specific stage (for example, strong organisation with inadequate capability) rather than occurring independently of the stage structure. Evidence would consist of comparative case analysis in which failing and succeeding systems, matched on other stages, are shown to diverge specifically at one identifiable stage, as illustrated in Section 5.4. Failure distributed evenly across stages, or unrelated to any of the five, would count against the proposition.

P3. Evolutionary outcomes at the end of one developmental cycle should be empirically traceable as inputs to the conditions of a subsequent cycle, evidencing the recursive structure rather than a simple linear endpoint. Evidence would take

the form of longitudinal or panel data linking a measured evolutionary outcome at time T to a measurable feature of the conditions at the start of the subsequent cycle at time T + 1. An absence of any traceable link would count against the proposition.

P4. The five-stage structure should be identifiable using consistent operational definitions across at least two structurally different domains (for example, biological and organisational systems), rather than requiring domain-specific redefinition of the stages themselves. Evidence would require independent coders, applying the same operational definitions used in one domain, to reliably identify the same five stages in a second domain without redefining them. Low inter-coder reliability, or the need for substantial domain-specific redefinition, would count against the proposition.

Each proposition is falsifiable in principle. If systematic case analysis found that developmental processes routinely skip stages, fail in ways unrelated to any identifiable stage, or show no traceable link between evolutionary outcomes and subsequent conditions, the framework's central claims would be undermined. No such testing has yet been conducted; the propositions above define a programme for future empirical research rather than results already obtained.

It is worth being explicit about what would count as evidence against the framework, since a central criticism of broad, cross-domain theories is that they can be rendered compatible with almost any observation after the fact. Cvolution would be weakened, specifically, by findings that: (a) organisation reliably precedes rather than follows favourable conditions in a statistically meaningful sample of cases; (b) capability and adaptation cannot be operationally distinguished from one another in practice, collapsing two of the five stages into one; or (c) case studies of developmental failure show no association between the failure and any specific stage, implying the five-stage decomposition adds no explanatory information beyond describing that development did not occur. None of these outcomes is ruled out in advance by the framework as presented here, which is itself part of what distinguishes it from an unfalsifiable claim.

The framework's limitations should be stated plainly, since a paper proposing a broad interdisciplinary claim carries a particular obligation to be explicit about what it has not shown.

First, the research underlying it is conceptual: it proceeds through comparative literature analysis and synthesis, not through the collection of new empirical data, and its claims of cross-domain applicability are interpretive rather than demonstrated.

Second, the literature reviewed, while spanning eight influential theories across multiple disciplines and, in Section 3.3, situating the framework relative to complexity science and developmental systems theory, remains necessarily selective; other relevant work, including evolutionary economics and specific strands of complex adaptive systems research not covered in Section 3.3, is not addressed here and may support, qualify, or challenge the framework.

Third, the framework operates at a high level of abstraction, which gives it broad applicability but limits its precision relative to domain-specific theories; users of the framework should not treat its stages as a substitute for the detailed mechanisms established within each discipline.

Fourth, the mapping of any specific domain onto the five stages, as in Section 5, involves interpretive judgement, and different researchers might reasonably categorise particular phenomena differently.

Fifth, the identification of five operational stages necessarily involves abstraction, and the particular boundaries drawn here are one theoretically justified interpretation rather than the only possible one. Alternative conceptual syntheses might identify additional stages, merge existing ones—for example, treating organisation and capability as a single structural-functional stage—or draw the boundaries between stages differently. Cvolution's five-stage structure should accordingly be read as a defensible synthesis derived from the specific comparative analysis reported in Section 2, not as a uniquely correct decomposition of development as such.

Sixth, a natural objection is that Cvolution simply relabels existing concepts under new names without adding explanatory content. This objection has force against any synthesis that stops at relabelling, and it is addressed directly rather than dismissed: the paper's response is that the claimed contribution is not the five labels themselves but the specific, falsifiable claims made about their relationship—that they occupy a consistent sequence (Proposition 1), that failure is localisable to a specific stage (Proposition 2), and that the sequence closes recursively (Proposition 3). A relabelling exercise would not generate testable claims of this kind; whether Cvolution's claims survive testing is a separate question, addressed by the propositions above, but the claims themselves are not reducible to relabelling.

7. Discussion and Conclusion

The principal contribution of this paper is not the introduction of new developmental mechanisms, but the demonstration that recurring mechanisms already established across several influential and otherwise disconnected theories can be integrated into a single recursive operational sequence. This addresses a specific, identifiable gap: the absence, in the existing literature, of an account of how conditions, organisation, capability, adaptation, and evolutionary change relate to one another as stages of one process, rather than as separate domain-specific phenomena.

Recursion is the feature of the framework that carries the most theoretical weight, and it is worth stating explicitly why. A purely linear stage model—conditions leading to organisation leading to capability, and so on to a terminal state of evolution—would describe development as a process with an endpoint, which is inconsistent with how every domain examined in Section 5 and the source theories in Section 3 actually behaves: biological populations continue evolving after

speciation, organisations continue developing after successful adaptation, and civilisations continue changing after any given crisis is resolved. By specifying that evolutionary outcomes become the conditions for a subsequent cycle, Cvolution treats this continuation as a structural feature of the framework itself rather than as an awkward exception requiring separate explanation. This is also what most clearly distinguishes Cvolution from prior general systems accounts: General Systems Theory (von Bertalanffy, 1968) establishes organisation as a general property of open systems but does not specify a recursive sequence linking organisation to capability, adaptation, and evolution in turn; Cvolution's contribution is precisely that further specification, closing the sequence into a cycle rather than leaving it as an open-ended property of systems in general.

The same distinction separates Cvolution from the complexity-science and developmental-systems literature discussed in Section 3.3. Holland's (1992) complex adaptive systems and Meadows's (2008) systems archetypes explain how emergent, adaptive behaviour arises from local interaction and feedback, and developmental systems theory (Oyama et al., 2001) explains why no single factor should be treated as developmentally privileged; neither literature, however, proposes a specific, named sequence of stages through which conditions become organisation, organisation becomes capability, and so on, or specifies how that sequence recursively regenerates its own starting point. Cvolution's contribution to interdisciplinary theory-building is therefore not that it discovered complexity or emergence—both are well established—but that it converts general principles of complex, adaptive, self-organising behaviour into an operational sequence specific enough to be applied, and potentially falsified, in a given domain. In this sense the framework is best understood as sitting between the highly general claims of complexity science and the highly specific claims of any one domain theory, offering a middle-range structure that neither currently supplies.

These implications should be read alongside the paper's central limitation, noted in Section 6: the framework has not yet been tested against primary data, and its current standing is that of a well-specified, falsifiable conceptual proposal rather than a corroborated theory. This is not a minor caveat. The history of general or unifying theories—from Spencer's own evolutionary sociology to more recent attempts at grand synthesis across the natural and social sciences—shows that internal coherence and broad applicability are comparatively easy to achieve, while empirical corroboration across genuinely independent domains is not. Cvolution should be judged on the latter, harder standard, and the propositions in Section 6 are offered as the means by which that judgement can eventually be made.

The framework has direct implications for future research. It suggests comparative cross-disciplinary studies designed explicitly to test whether the five-stage structure holds with consistent operational definitions across domains (Proposition 4 above); it suggests longitudinal or case-based studies capable of testing the recursive link between evolutionary outcomes and subsequent conditions (Proposition 3); and it suggests that the framework could be operationalised as a diag-

nostic tool for identifying which stage is limiting development in a specific case, whether in organisational, educational, or policy contexts.

The framework also invites a methodological caution specific to its own construction. Because Cvolution was derived from comparative analysis of existing theories rather than from new primary data, there is an inherent risk that its five-stage structure reflects the particular set of theories chosen for comparison rather than a genuine feature of development itself. This risk is mitigated, but not eliminated, by the breadth of the theories reviewed—spanning eight distinct disciplines and two and a half millennia of thought—and by the fact that the same five-element structure recurred consistently across independent theoretical traditions that had little or no direct influence on one another (Aristotle and Prigogine, for example, share no citation lineage). Nonetheless, this remains a limitation to be addressed through the empirical testing programme outlined above, rather than one that can be resolved through further conceptual argument alone.

Beyond the research agenda outlined above, three more immediate and modest next steps follow directly from this paper. The first is extending the illustrative applications in Section 5 from conceptual mappings to documented case histories—beginning with the organisational case in Section 5.4, which was deliberately developed in the greatest operational depth—coded independently against the five stages, to establish whether the mapping can be applied consistently by researchers other than the author. The second is a comparable exercise in a domain not yet addressed even illustratively here—for instance, technological adoption or public health intervention—since a framework's cross-domain claim is only meaningfully tested once it has been applied by independent hands to more than one type of system. The third is formal engagement with reviewers and researchers in systems theory, philosophy of science, and the individual disciplines represented in Section 3, whose critical scrutiny is the appropriate mechanism for establishing whether the propositions in Section 6 survive contact with evidence and expert judgement.

Cvolution does not claim to replace Darwinian evolution, Piagetian cognitive development, General Systems Theory, the Capability Approach, or any of the other theories synthesised here. Each retains its explanatory power within its own domain, supported by evidence this paper does not attempt to replicate or supersede. What the framework offers is a higher-order structure within which these theories' insights can be related to one another—and a set of falsifiable propositions through which that structure can itself be tested, refined, or rejected by future research. This paper should accordingly be read as the opening statement of a research programme, not its conclusion.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix A. Theory-by-Theory Coding Matrix

This appendix reports the coding referenced in Section 2: each of the eight source theories analysed against the six analytical dimensions used to derive the five-stage structure (form of development addressed; conditions assumed necessary; account of organisation; functional capabilities identified; mechanism of adaptation; account of long-term or evolutionary change). The coding is necessarily condensed relative to the full source texts, and a different coder might reasonably word individual cells differently; the purpose of reporting it here is to allow readers to audit whether the five-stage structure summarised in Section 4.6 and Figure 2 follows from this coding, rather than to claim the coding itself is beyond dispute.

Aristotle (Metaphysics)

Analytical Dimension	Coding
Form of development addressed	Metaphysical development: the actualisation of potential (dunamis) into actuality (energeia) in a substance.
Conditions assumed necessary	An unrealised potential and a substrate capable of receiving form.
Account of organisation	Actualisation of form: matter organised toward a telos, or final cause.
Functional capabilities identified	Capacity (dunamis) treated as functional readiness prior to actualisation.
Mechanism of adaptation	Not a central category; change toward actuality is treated as gradual realisation rather than environmental response.
Long-term/evolutionary change	Entelecheia: the completed, self-sustaining state a thing attains.

Darwin (On the Origin of Species)

Analytical Dimension	Coding
Form of development addressed	Biological evolution of species through descent with modification.
Conditions assumed necessary	Heritable variation within a population and finite resources producing competition.
Account of organisation	Not a central category; population structure emerges from selection rather than being separately theorised.
Functional capabilities identified	Traits and fitness-relevant characteristics.
Mechanism of adaptation	Natural selection: differential survival and reproduction of existing variants across generations.
Long-term/ evolutionary change	Cumulative change in trait frequency across generations; speciation.

Piaget (Cognitive Development)

Analytical Dimension	Coding
Form of development addressed	Individual cognitive development across the lifespan.
Conditions assumed necessary	Neurological maturity, environmental stimulation, and existing schemas.
Account of organisation	Cognitive structures (schemas) as organised mental representations.
Functional capabilities identified	Operational competencies characteristic of a given stage (sensorimotor, concrete, formal).
Mechanism of adaptation	Accommodation: restructuring of schemas in response to disequilibrium with experience.
Long-term/ evolutionary change	Progression through developmental stages toward more complex schemas.

Bertalanffy (General System Theory)

Analytical Dimension	Coding
Form of development addressed	Organisation of open systems in general, across biological, mechanical, and social systems.
Conditions assumed necessary	Openness: exchange of energy, matter, or information with an environment.
Account of organisation	Hierarchical, interdependent organisation of system components—the theory's central category.
Functional capabilities identified	Emergent system-level properties not reducible to individual components.
Mechanism of adaptation	Not systematically theorised; addressed indirectly through steady-state adjustment.
Long-term/ evolutionary change	Not a central concern; the theory is principally synchronic rather than developmental.

Sen (Capability Approach)

Analytical Dimension	Coding
Form of development addressed	Human development as the expansion of capability and substantive freedom.
Conditions assumed necessary	Resources or commodities together with personal, social, and environmental conversion factors.
Account of organisation	Not separately theorised as a distinct stage; conversion factors partly perform this role.
Functional capabilities identified	Capabilities (real opportunities) and functionings (achieved states)—the theory's central category.
Mechanism of adaptation	Not a central concern; individual agency and choice are addressed, but not as a response to environmental change.
Long-term/ evolutionary change	Not systematically modelled; expansion of capability over time is implied rather than specified.

Toynbee (A Study of History)

Analytical Dimension	Coding
Form of development addressed	Rise, growth, and disintegration of civilisations.
Conditions assumed necessary	Environmental and historical circumstance presenting a "challenge" to a civilisation.
Account of organisation	Institutional and cultural structures through which a civilisation is organised.
Functional capabilities identified	Not separately theorised; civilisational capacity is implicit in the concept of "response".
Mechanism of adaptation	Response to challenge: creative institutional and cultural adaptation by a "creative minority".
Long-term/ evolutionary change	Growth, breakdown, or disintegration of civilisations across historical time.

Prigogine (Dissipative Structures)

Analytical Dimension	Coding
Form of development addressed	Physical self-organisation in far-from-equilibrium systems.
Conditions assumed necessary	Non-equilibrium conditions and sufficient throughput of energy or matter.
Account of organisation	Spontaneous emergence of ordered dissipative structures—the theory's central category.
Functional capabilities identified	Not a central concern; structural stability implies functional capacity without separate theorisation.
Mechanism of adaptation	Not systematically theorised; addressed via system response to fluctuation near a threshold.
Long-term/ evolutionary change	Bifurcation to new, more complex ordered states beyond a critical threshold.

Spencer (Principles of Sociology)

Analytical Dimension	Coding
Form of development addressed	Social and cosmic evolution across physical, biological, and social systems.
Conditions assumed necessary	Not separately theorised; an initial state of relative homogeneity is assumed as a starting point.
Account of organisation	Differentiation of structure from initial homogeneity into heterogeneous, specialised parts.
Functional capabilities identified	Not a central concern.
Mechanism of adaptation	Not a central concern; change is driven by the process of differentiation itself.
Long-term/ evolutionary change	Progressive differentiation and integration—the theory's central category.