ARCS OF IMPACT
RELATING SYSTEMS THINKING & DESIGN
RSD14 | OCTOBER 2025

Pacing Changes, Appreciating Approaches to Systems and Designing

David Ing

Designers involved with "systems changes" may be challenged to define what such an initiative may involve. What's the difference between a "change" and "systems changes"? With many complementary (and contrasting) theories and methods, which systems approaches might be considered authentic?

The systems approach comes from a heritage of openness, so there isn't a single best way towards solving (or dissolving) problems (or problematic messes).

Through a multiparadigm interplay inquiry, the variety of approaches to systems and designing is explored. Mainstream systems perspectives from the 20th century that were well-developed are reviewed. These are positioned and extended with new approaches under study since 2019 by the Systems Changes Learning Circle, based in Toronto.

Current directions on progressing Pacing Changes methods in 2025 are outlined.

KEYWORDS: systemic design, systems thinking, systems change, methodology, systems theory, philosophy.

RSD TOPIC(S): Learning & Education, Methods & Methodology, Socioecological Design

1.0 Introduction: Are systems designed for changes, or with changes?

The conception of *systems changes* has different meanings for different people. One way of pre-empting debate is to leave the term undefined (Birney & Riddell, 2018). This can lead to confusion about what are "systems changes", and what aren't "systems changes". Founded in 2019 as an espoused 10-year journey, this question has been at the core of an ongoing inquiry (Ing, 2022). Practices of designing systems can be grounded in underlying theories (Ing, 2023). Deepening an appreciation of systems thinking to a philosophical level, one branch follows a lineage through American pragmatism (Ing & Metcalf, 2023). The exposition that follows clarifies some mainstream perspectives on "systems" and "systems changes", and then describes some lesser-known approaches.

2.0 Method: Multiparadigm Inquiry on Social Systems Theory and General Systems Theory

Design initiatives are more clearly scoped through the definition of systems(s) of interest. Is the primary interest for designing a technology (e.g. smartphone device, as hardware and/or software)? Or just human systems (e.g. communications, psychology and/or sociology)? Perhaps a coordination of socio-technical systems (e.g. work organization complemented by machines)? Does the scope include the natural world (in an era of the Anthropocene), across living systems (animals, plants) and manmade artifacts?

In a book edited by Open University professors that extracts 30 systems thinkers into short chapters, authors are grouped into seven categories: (i) early cybernetics, (ii) general systems theory, (iii) system dynamics, (iv) soft and critical systems, (v) later cybernetics, (vi) complexity theory, and (vii) learning systems (Ramage & Shipp, 2009, 2020). Our interests trace the philosophical roots of researchers centered on (a) social systems theory (in the categories of (iv) soft and critical systems, and (vii) learning systems), and (b) general systems theory (i.e. category ii). These researchers were most active in the Society for General Systems Research founded in 1954, which was renamed the International Society for the Systems Sciences in 1988. A broader inquiry

might take on all seven categories. Implicit or explicit choices associated with designing are compared through multiparadigm inquiry (Gioia & Pitre, 1990). In particular, *multiparadigm interplay* that enables one theoretical lineage to learn from another is less ambitious than *multiparadigm synthesis* (Lewis & Kelemen, 2002).

Social System Theory focuses on human systems, largely through psychological and sociological perspectives. A seminal work on sociological paradigms develops social theory in a framework along two dimensions: (i) order vs. conflict; and (ii) regulation vs. radical change. This leads to four sociological paradigms, of (i) functionalist, (ii) interpretivist, (iii) radical humanist, and (iv) radical structuralist (Burrell & Morgan, 1979; Goles & Hirschheim, 2000). Following this stream problem-solving methodologies were classified in a six-cell matrix, along two dimensions: (a) systems as (i) mechanical or (ii) systemic; and (b) participation as (i) unitary, (ii) pluralist, or (iii) coercive (Jackson, 1991). Further development of Critical Systems Theory has expanded the scope across the systems sciences and into systems practices (Jackson, 2019).

General Systems Theory, as a pursuit seeking a unity of science across disciplines (e.g. physics, chemistry, biology, sociology, etc.), recognizes Ludwig von Bertalanffy as a godfather (Drack, 2009; Hammond, 2019; von Bertalanffy, 1950). Careful research sees this quest not as a "theory of everything", but as a "skeleton of science" (Boulding, 1956).

Through the pragmatic foundations of World Hypotheses by Stephen C. Pepper, the streams of systems theories can be clarified and positioned for development. The Society for General Systems Research was founded with a purpose to "to encourage the development of theoretical systems which are applicable to more than one of the traditional departments of knowledge".

Tracing back to the popularization of "Systems Thinking" (Emery, 1969), an important and under-appreciated work on World Hypotheses (Berry, 1984; Harrell, 2004; Pepper, 1942) based on Root Metaphor Theory extends research from the sciences into the philosophy of science.

3.0 Systems Approaches as based on a variety of foundations

Much of mainstream systems thinking is anchored in 20th century research. Phenomena such as the Internet and the Anthropocene have encouraged a rethinking

of foundations of system thinking itself (Ing, 2013). Under a premise that most espoused systems professionals are interested in systems only to the extent that they change, a range of systems approaches can be developed. The following list is non-exhaustive, and covers primarily the threads from social systems theory and general systems theory.

3.1 Structural Changes: (re)designing part-part relations, as reforming

Structure is an arrangement in space (Gharajedaghi, 2011; Ing, 2013). In an example of a mobile telecommunications system, replacing a mobile phone device or a network switch involves a structural restoration or upgrade.

A completely modular design enables replacing a part with a copy or replica of the original. The behaviour of the whole does not necessarily change. Multiple parts might be clustered as an assembly, serving as a subsystem that can replaced, while the whole retains its features and properties. That act of taking the whole into parts, making changes, and reassembling into a whole, is reforming.

3.2 Functional Changes: (re)designing part-whole relations, as transforming

Function is the contribution of a part to a whole (Gharajedaghi, 2011; Ing, 2013). The word “function” is used generally, with “role” more common for social relations. In a mobile telecommunications system example, replacing a landline with smartphone extends voice functionality with text and image interactivity.

Redesigning the contribution of one or more parts may or may not change the whole. Early releases of a technology are often “over-engineered”, with subsequent versions rationalized to redistribute primary contributions from some parts to others. Human systems are composed of individuals who can serve multiple functions, with greater or lesser degrees of expertise. Roles on a team can be redesigned with individuals taking on different functions, either reforming or transforming the whole.

3.3 Behavioural Changes: (re)designing interactions of a whole to the world

Behaviours include (i) reactions, as system events deterministically caused by another event; (ii) responses, as system events for which the system itself is a coproducer; and (iii) acts, as self-determined autonomous changes (Ackoff, 1971).

Redesigning reactive systems involves increasing or reducing the set of alternatives to changes in the world. In a mobile telecommunication system, enabling or disabling voicemail or call screening features expands the set of results automated when a connection is initiated.

Redesigning responsive systems involves a greater appreciation of conditions. An interactive voice response system may start with "how can I help you", leading to a tree of alternative paths, with the intelligence to break out to a human agent when the situation is assessed as too complicated.

Autonomous systems should readily handle "most probable" situations, with concerns about control with edge cases. For autonomous vehicles, the trolley problem is well known: choosing between (i) altering course to avoid multiple persons endangered on the current path, against (ii) imperilling a single bystander. Animate creatures are autonomous, and may or may not appreciate training or being tamed.

The ability to design behavioural changes is often approached with a goal orientation, examining reasons for reactions, responses and acts. In social organizations, individuals may or may be motivated to concur with the direction of an organizational whole, at the risk of separation or ostracization.

3.4 Ecological Changes: (re)designing whole-whole relations, as shifting regimes

Ecological thinking arose in the 1970s as a counterpart to behavioural thinking, largely in association with the theory of affordances (Gibson, 1979). While a behavioural approach to psychology takes a perspective of "what's inside your head", an ecological approach asks "what your head is inside of" (Mace, 1977). More broadly, an ecological epistemology in systems approaches was posthumously credited to Gregory Bateson (Carvalho, 2016; Harries-Jones, 1995). Organizations facing rapid changes in transnational economies reoriented their attention less on socio-technical systems concerns, a more towards socio-ecological systems issues (Emery & Trist, 1973).

Ecological changes are reflected in the relations of wholes with wholes. In studying the perceptions of military pilots landing on aircraft carriers, a behavioural approach looking inwardly into the mind was insufficient. A successful landing relied on the judgement of the pilot out onto the aircraft moving forward, as the ship yawing, pitching and rolling on the open seas.

Wholes live in larger and smaller scales. Wholes may be typed in hierarchies (Ahl & Allen, 1996; Allen, 2008; Allen et al., 1984/2018). Rates of change can be described as layers (Brand, 1994; Brand & Runice, 1997).

Regime shifts have become a focus for flips in stable states in natural ecosystems (Folke et al., 2004; Rocha et al., 2015). A clear water lake with a thriving fish population that becomes flooded with pollutants can settle into an algae-dominated state with fish struggling with oxygen deprivation.

Ecological shifts can be contrasted to normal evolutionary paths. A threshold, or tipping point, sees the transition from one stable state of living beings in balance with their environments, into an alternative stable state. A panarchy of smaller-faster states and larger-slower states can be stable (Holling et al., 2002).

3.5 Processual Changes: (re)designing sequences

Process is an arrangement in time (Gharajedaghi, 2011). Philosophically, process precedes structure, as structure can be seen as a slower changing process. Mortal human beings may perceive a mountain as structure, but the mountain does change over time. Western philosophy from the ancient Greeks (Aristotle) through the Enlightenment (Descartes) has largely been premised on substances (Robinson & Weir, 2024). This premise leads to thinking of changes as unfreezing-moving-refreezing, often attributed in organizational change theory to Kurt Lewin (Cummings et al., 2016). Process philosophy deemphasizes being in favour of becoming (Seibt, 2024). Foregrounding processes ahead of objects reorients methodological approaches (e.g. in systems engineering, Object Process Methodology starts firstly with processes firstly, and secondly with objects) (Dori, 2016).

Sequence matters, in a processual approach. In telecommunications use, a preferred ordering of routing calls is associated both with the end point instrument and the practices of the receiver. A phone number may be associated with a landline instrument, a TTY device for the hearing-impaired, a fax machine, a pager, or a mobile device. There's a sequence for routing preferences, e.g. after the desired number of rings, no-answer-transfer specifies an answering machine, or another device to be called. The elderly tend to prefer voice calls, falling back to answering machines where calls can be screened. High school and college students formed by the isolation of

COVID-19 pandemic shutdowns often first check video snippets and photos on social media streams, and then respond with emoji or short messages. Mobile telephony did not initially exist for born in the 1950s and 1960s, echoing Alan Kay saying "technology is anything invented after you were born". When a party from one generation is poorly connected with a party from another generation, the sequence in which the communications medium is chosen makes a difference.

3.6 Textural Changes: (re)designing weaves in time

Texture has a meaning that is unrelated to "text". Contexture can then be disambiguated from context. As a noun and verb from medieval Latin into 17th century France and Italy, there's a sense of "action or process of weaving together or intertwining; the fact of being woven together; the manner in which this is done, texture" (OED, 1989). The act of weaving brings together threads or strands. Active engagement with threads over time is a "*meshwork* of entangled lines of life, growth and movement". We live through a web of time, "not a network of connected points, but a meshwork of interwoven lines" (Ingold, 2011, p. 64). A meshwork better describes collections of knots created by weavers, rather than joints made by carpenters. Prioritizing a more temporal view, "the necessity of the knot is not a brittle one that allows for freedom only in the spaces left between, but a supple necessity that admits to movement as both its condition and its consequence" (Ingold, 2015a, p. 230).

Textural changes recognize the lived history of threads in times past. Living systems embody their experiences. We can each be seen as living on individuated threads, as lifelines, with occasions where we meet each other, in person, to tie a knot. Childhood friends have historically deep intertwinings not apparent to new acquaintances. Close friends often re-engage with a sense of picking up from where they left off, where a conversation from years ago can be continued as if it was from yesterday.

Changes in texture, represented by threads in time coming together in knots, dissolve distinctions between a system and its boundary. If a boundary is to be considered, it could be a boundary in time. Wholes co-respond with wholes (Ingold, 2015b, 2017). A knot might be projected at some time in the future, but may be subject to a larger texture. Textures in time may be tightly woven or loosely coupled.

3.7 Rhythmic Changes: (re)designing cyclical oscillations

Rhythm is associated with cycles, and can be better appreciated from a philosophical grounded in process rather than in substance. Living systems experience rhythms as regularly repeating patterns. *Kairos* is qualitative duration as felt time with opportune and inopportune moments, as compared to *chronos* which is quantitative clock time. More formally, "Chronos is 'the chronological, serial time of succession, … time measured by the chronometer not by purpose'. Kairos is 'the human and living time of intentions and goals … the time not of measurement but of human activity, of opportunity'" (Orlikowski & Yates, 2002, p. 686).

Since rhythms have a regularity, it's rhythmic changes that are noticed. Heartbeats are measured while a patient is resting, and faster pulses are expected while exercising. Breathing is natural, as inhaling and exhaling, with discomfort elevating to panic oxygen levels get low. The autonomic nervous system controls involuntary bodily functions, largely unconsciously, to regulate internal processes.

Rhythmic changes might be depicted as sine waves that become more compressed or stretched. Rhythms come with a sense of anticipation, with histories setting expectations of patterns that have been previously experienced. Drawing a straight line as a general trend through a rhythm may be informative, at the risk of losing richness on amplitude and frequency. Efforts to dramatically change rhythms from patterns felt as natural or comfortable may be resisted.

3.8 Polyrhythmic Changes: (re)designing synchronic tempo

Polyrhythms are exhibited as strands in a weave of time. Coordination has commonly synchronized by clocks since the 15th century, and in standard time as established by railways in the mid 19th century. Still, we are accustomed to individuals and/or cultures that run habitually late, or early.

A polyrhythmic ontology comes from body movements with Rudolf Bode (expressive gymnastics, circa 1920) and Rudolf Laban (expressionist dance, circa 1922) (Laban, 2014). Ur-rhythm (as original or primitive rhythm) is expressed in terms of *Eu-rhythm* (as good, well, or pleasing rhythm) or *Kako-rhythm* (as bad, wrong, or evil rhythm). An individual has the option to harmonize or connect his or her personal rhythm [*Eigenrhythmus*] by (i) hedging to exclude the kakorhythmic relative to their skills; or (ii)

increase their skills to the ultimate, to experience as eurhythmic an all-encompassing rhythm [*Allrhythmus*]. Studies of urban spaces and their inhabitants on the production of social practices were published as rhythmanalysis (Lefebrve, 2004).

Polyrhythmic changes are common in music, where bands aim to swing rather than play in robotic meters. "Rhythmic play as the confluence of rhythm, motion and cognition appears early in human development" (Hesselink, 2014, p. 69). Musicians playing together as a band, without a conductor, mutually sense sections where the tempo is faster, and sections when the tempo is slower. Further, band members don't necessarily play on the beat. The song "Roxanne", by The Police, originated from bassist Sting as a "bossa nova", became a "hybrid tango" through guitarist Andy Summers, with "reggae in style" played by drummer Andy Summers. Together, the band did not play a reggae rhythm: "the guitar is playing staccato chords that fall *on* rather than off the beat", and "the bass plays a jabbing repeated-note riff that accents the second beat of the bar, in tandem with the bass drum" (Spicer, 2010, p. 134). In the chorus, the style changes from reggae to punk.

Polyrhythmic changes may be tough for the 3% of the population that has beat deafness (Hawthorn, 2023). On the piano, 90% of right-handed people may be challenged to carry a count of two in the left hand, against three in the right hand. Relatively few people can attain four-limb freedom on a drum kit. In an American study of students 2009-2013, 24% of the class of 2013 enrolled in at least one year of a course in band, choir or orchestra (Elpus & Abril, 2019). Across all schools, 75% offer the opportunity to take a music course. As part of a well-rounded curriculum, "Education in the arts promotes habits of mind and ways of thinking that enhance the student experience of school and the outcomes of schooling (Elpus, 2022, p. 50). Skill with polyrhythms can be developed through arts education.

3.9 (Con)textural Dyadic Changes: (re)designing diachronic pacing

(Con)textural Dyadic thinking extends the research into the philosophical foundations of Classical Chinese Medicine (CCM) (Lee, 2017b). While the practical application of classical Chinese science personalizes treatments for individual patients, foundations trace back to the Yinyang School of philosophy (770 – 221 BCE), one of six lineages in the Warring States period described by Sima Tan (Feng, 1948; Peng, 2024). In a

constructionist philosophical approach (Littlejohn, 2022) applying root metaphor theory (Pepper, 1942; Duncan, 1982), (Con)textural Dyadic thinking has been proposed as a fifth World Hypothesis (Ing & Metcalf, 2023; Ing & Nousala, 2025).

Classical Chinese philosophy is inherently processual. In a philosophy of body, change occurs primarily through internal conditions, and secondarily through external causes.

Internal conditions, in a system of interest (e.g. a body), are expressed with yinyang as two coupled processes: yin qi and yang qi are opposites that are interdependent, and mutually consuming in the intertransformation of one to the other. "Change takes place only when the internal conditions are ripe" (Maciocia, 2015, p. 8). An egg turns into a chick with the application of heat, because a fertilized egg has the capacity for that transformation.

External conditions can also be expressed as yinyang. The seasons of the year are ecologically imprinted into trees as rings, that dendrochronologist can infer weather as too wet or too dry (Lee, 2017c, p. 139). The dyads of yin and yang are commonly multiplied into a seasonality of four, and can be extended in the eight trigrams (i.e. ba gua) of the Yijing (I Ching, Book of Changes).

One way of understanding yin and yang is as emptying and filling. The processes occur concurrently, e.g. food empties in our stomaches, between meals when we fill our stomaches. Maximum yin occurs when qi is fully released (i.e. qi san 气散 qi-in dissipating mode). Maximum yang occurs when qi is fully material (i.e. qi ju 气聚 qi-in concentrating mode) (Lee, 2017a).

Emergence shows up as properties of a whole that are not exhibited in its parts. While modern Western philosophy tends to think about parts in spaces (as structures), we can carefully consider parts in time (as processes). Synchonic emergence focuses on the properties of objects at a higher level at a point in time, that aren't at lower levels, independent of historical factors. As an example, the property of wetness is in water, not in its constituent hydrogen and oxygen. A synchronic approach is static, e.g. a

photographic snapshot. Diachronic emergence focuses on new phenomena that appear through time, rooted in historical processes and evolutionary trajectories.[1]

4.0 What+Why or When+Where?

The non-exhaustive nine systems approaches listed above are non-exclusive. Systems changes of interest may be described may have been the result of changes in conditions, or conscious interventions. The ordering of the list been sequenced roughly from most space-dominant (i.e. spacetime) to most time-dominant (i.e. timespace). Most oriented towards the synchronic putting objects into the foreground are: (i) structural changes; (ii) functional changes; (iii) behavioural changes; and (iv) ecological changes. Turning towards the diachronic putting progressions in the foreground are: (v) processual changes; (vi) textual changes; (vii) rhythmic changes; (viii) polyrhythmic changes; and (ix) (con)textural dyadic changes.

With objects changing in a synchronic grounding, asking "what" (ontology) and "why" (epistemology) is practical. We commonly establish names for objects, so we don't get confused about what we're talking about. Objects are normally assumed to remain static or maintain momentum, unless conditions with an effect have arisen.

With progressions occurring in a diachronic grounding, asking "when" and "where" phenomena occur or are observed makes sense. A living system may be appreciated at a thread in time. That thread crosses another thread to tie a knot at a time and place, and then might again at one or more points on a later occasion. Each knot, as an event, becomes embedded in the experiences of all involved. Attempts to replicate an event may produce a facsimile of the phenomena, but the experience is probably not the

[1] More formally, the distinctions of synchronic and diachronic can be clarified:

> … emergence can be characterized by its synchronous (synchronic emergence) and diachronic (processual or dynamical emergence) dimensions. In the first case, we capture the emergent at a given moment, as relatively independent and considered a-temporally, by studying, e.g., the dependencies between it and its base. In the second, we characterize the emergent by describing its evolution, so we are interested in the very process of emergence. Emergence occurs between the point in time (t_1) when the conditions for its occurrence appear, and the subsequent point (t_2), in which the emergent is already formed (which, of course, does not exclude further changes). In this case, it is best to define emergence as a process in order to clearly distinguish this type of description from the abovementioned static (synchronous) description (Dombrowski, 2024, p. 442).

same. A live concert attended by a teenager may be recorded, but that reproduction is a second-best artifact of being there. Further, while that concert may live in the memory years later in a mature adult, those same musicians or their songs may not be appreciated in the same way.

A 2023 survey of 29,565 respondents across 31 countries found 78% feeling "the world is changing too quickly for me" (Stewart, 2024). The volatility and uncertain has led to anxiety about a polycrisis of simultaneous challenges in politics, society, technology, economics and/or environment. The premise that the world might return to some stability suggests that we might reconsider our approaches to systems. Rather than framing synchrony "at time" as a series of points, we might reframe diachrony "through time" with change as omnipresent.

5.0 Resequencing Systems Thinking → Pacing Changes

The mainstream way to (re)design a system is to idealize a future state, analyze the current state, and then find ways to bridge the gap. This leads to unfreeze-move-refreeze thinking, that might alternatively be described as disassembling-rearrranging-resynchronizing. Pacing Changes approaches line up systems changes in a diachronic style. Reframing the world in this way can present challenges.

Introducing a *Processual Changes* approach of (re)designing sequences can be a relatively minor adjustment. After major structural changes have been introduced, reordering a few operational steps to improve functionality seems commonsense.

Appreciating a *Textural Changes* approach or (re)designing weaves in time recognizes complexity across a variety of individuals and activities. Acknowledging the history of timelines or lifelines with prior compatibilities or conflicts improves cooperation in planned and unanticipated junctures to come.

Taking a *Rhythmic Changes* approach or (re)designing cyclic oscillations acknowledges that living beings don't follow the absolute regularity of machines. Performance on some days will be better than others. When a period of heavy exertion is required, preparatory rest and post-recovery is reasonably expected.

Orchestrating *Polyrhythmic Changes* as (re)designing synchronic tempo shortens or elongates periodic waves across multiple timelines towards aligning peak swells, and

avoiding coinciding troughs. Coordination may occur with rhythms in nature, e.g. lunar or solar cycles.

Enacting *(Con)textural Dyadic Changes* as redesigning diachronic pacing draws on an advanced understanding of yinyang in the system, and in associated textures. Living systems have bodies that are continuously emptying (dissipating) and filling (concentrating).

Reframing towards a Pacing Changes approach involves three reorientations:

- From Control → Propensity: Deprecating forceful regulation through action → Elevating the concurrence with natural predispositions
- From Causality → Rhythmic Texture: Deprecating bias-for action → Elevating situational timing for auspicious conditions
- From Teleology → Dyadic Shifts: Deprecating pursuits of ends (ideals, objectives, goals) → Elevating ((yin qi) ∝ 1/(yang qi)) wayfaring in unfolding wanwu [concentrating ⇌ dissipating] transformations

Designers may consider whether a change initiative at hand might be portrayed not as a forced step change, but instead as transitions that occur under more natural conditions. The Western philosophical style on causality directs yǒuwèi (willful action) with force. A classical Chinese style on efficacy prefers wúwèi (non-intrusive action) via propensity.

The most extreme reorientation on systems changes towards (Con)texturalism Dyadicism is difficult. Western foundations tend to reduce towards objects as singletons (i.e. ones). A yinyang foundation requires always thinking of dyads (i.e. twos) in dyads (twos). This challenge is reflected in two maxims:

> "The test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function" (Fitzgerald, 1936; Martin, 2009)
>
> "Nous sommes des adultes et peut compter jusqu'à deux" (André Glucksmann (1937-2015, France). "Grown-ups should know how to count to two" (Gopnik, 2024)

Pacing Changes approaches call for new practices and methods, based on newly developed theory and philosophy

References

Ackoff, R. L. (1971). Towards a system of systems concepts. *Management Science*, *17*(11), 661–671. https://doi.org/10.1287/mnsc.17.11.661

Ahl, V., & Allen, T. F. H. (1996). *Hierarchy Theory: A Vision, Vocabulary, and Epistemology*. Columbia University Press. https://cup.columbia.edu/book/hierarchy-theory/9780231084802/

Allen, T. F. H. (2008). Hierarchy Theory in Ecology. In *Encyclopedia of Ecology*. Academic Press. http://dx.doi.org/10.1016/B978-008045405-4.00692-3

Allen, T. F. H., O"Neill, R. V., & Hoekstra, T. W. (2018). Interlevel Relations in Ecological Research and Management: Some Working Principles from Hierarchy Theory. In C. G. Curtin & T. F. H. Allen (Eds.), *Complex Ecology: Foundational Perspectives on Dynamic Approaches to Ecology and Conservation* (pp. 34–45). Cambridge University Press. https://doi.org/10.1017/9781108235754.003 (Original work published 1984)

Berry, F. M. (1984). An introduction to Stephen C. Pepper's philosophical system via World Hypotheses: A Study in Evidence. *Bulletin of the Psychonomic Society*, *22*(5), 446–448. https://doi.org/10.3758/BF03333873

Birney, A., & Riddell, D. (2018). *Systems Change: A field building convening*. McConnell Foundation, Forum for the Future. https://www.forumforthefuture.org/systems-change-field-building-convening

Boulding, K. E. (1956). General Systems Theory—The Skeleton of Science. *Management Science*, *2*(3), 197–208. https://doi.org/10.1287/mnsc.2.3.197

Brand, S. (1994). *How buildings learn: What happens after they're built*. Viking.

Brand, S., & Runice, J. (Directors). (1997). *Shearing Layers* (Vol. 6) [Video recording]. BBC. https://www.youtube.com/watch?v=HTSbtM12IZw

Burrell, G., & Morgan, G. (1979). *Sociological paradigms and organisational analysis: Elements of the sociology of corporate life*. Ashgate. https://doi.org//10.4324/9781315242804

Carvalho, I. (2016). Ecological Epistemology (EE). In H. Gooren (Ed.), *Encyclopedia of Latin American Religions* (pp. 1–3). Springer. https://doi.org/10.1007/978-3-319-08956-0_19-1

Cummings, S., Bridgman, T., & Brown, K. G. (2016). Unfreezing change as three steps: Rethinking Kurt Lewin's legacy for change management. *Human Relations*, *69*(1), 33–60. https://doi.org/10.1177/0018726715577707

Dori, D. (2016). Things: Objects and Processes. In *Model-Based Systems Engineering with OPM and SysML* (pp. 97–121). Springer, New York, NY. http://dx.doi.org/10.1007/978-1-4939-3295-5_10

Drack, M. (2009). Ludwig von Bertalanffy's early system approach. *Systems Research and Behavioral Science*, *26*(5), 563–572. https://doi.org/10.1002/sres.992

Duncan, E. H. (1982). Toward Root Metaphor: Pepper's Writings in the "University of California Publications in Philosophy." *The Journal of Mind and Behavior*, *3*(4), 375–380. https://jmb-online.com/vol/1982.php

Elpus, K. (2022). Access to arts education in America: The availability of visual art, music, dance, and theater courses in U.S. high schools. *Arts Education Policy Review*, *123*(2), 50–69. https://doi.org/10.1080/10632913.2020.1773365

Elpus, K., & Abril, C. R. (2019). Who Enrolls in High School Music? A National Profile of U.S. Students, 2009–2013. *Journal of Research in Music Education*, *67*(3), 323–338. https://doi.org/10.1177/0022429419862837

Emery, F. E. (1969). Introduction. In F. E. Emery (Ed.), *Systems Thinking: Selected Readings* (1st ed., Vol. 1, pp. 7–13). Penguin. https://archive.org/details/systemsthinkings00emerrich

Emery, F. E., & Trist, E. L. (1973). *Towards a social ecology: Contextual appreciation of the future in the present*. Plenum Press. https://doi.org/10.1007/978-1-4615-8082-9

Feng, Y.-L. (1948). The Yin-Yang School and Early Chinese Cosmology. In D. Bodde (Ed.), *A Short History of Chinese Philosophy* (Free Press 1966 edition, pp. 129–142). Macmillan. https://archive.org/details/in.ernet.dli.2015.260423

Fitzgerald, F. S. (1936, February 1). The Crack-Up. *Esquire*. https://classic.esquire.com/article/share/97a6b0a8-ba1c-4b7b-aa64-0d08dd9fb952

Folke, C., Carpenter, S., Walker, B., Scheffer, M., Elmqvist, T., Gunderson, L. H., & Holling, C. S. (2004). Regime Shifts, Resilience, and Biodiversity in Ecosystem Management. *Annual Review of Ecology, Evolution, and Systematics*, *35*(1), 557–581. https://doi.org/10.1146/annurev.ecolsys.35.021103.105711

Gharajedaghi, J. (2011). Systems Principles. In *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture* (pp. 29–55). Elsevier. https://www.elsevier.com/books/systems-thinking/gharajedaghi/978-0-12-385915-0

Gibson, J. J. (1979). The Theory of Affordances. In *The Ecological Approach to Visual Perception* (pp. 127–143). Houghton Mifflin. https://doi.org/10.4324/9781315740218

Gioia, D. A., & Pitre, E. (1990). Multiparadigm Perspectives on Theory Building. *The Academy of Management Review*, *15*(4), 584–602. https://doi.org/10.5465/AMR.1990.4310758

Goles, T., & Hirschheim, R. (2000). The paradigm is dead, the paradigm is dead...long live the paradigm: The legacy of Burrell and Morgan. *Omega*, *28*(3), 249–268. https://doi.org/10.1016/S0305-0483(99)00042-0

Gopnik, A. (2024, October 5). The tragedy of our time is that antisemitism rises equally from the left and right. *The Globe and Mail*. https://www.theglobeandmail.com/opinion/article-the-tragedy-of-our-time-is-that-antisemitism-rises-equally-from-the/

Hammond, D. (2019). The legacy of Ludwig von Bertalanffy and its relevance for our time. *Systems Research and Behavioral Science*, *36*(3), 301–307. https://doi.org/10.1002/sres.2598

Harrell, B. J. (2004). *Five World Hypotheses: A Primer on Stephen C. Pepper's Epistemological System With Illustrations from the Arts, Humanities, Social, and Natural Sciences* [Internet Archive]. https://web.archive.org/web/20041110053845/http://people.sunyit.edu:80/~harrell/Pepper/bjh_pep01.htm

Harries-Jones, P. (1995). *A Recursive Vision: Ecological Understanding and Gregory Bateson*. University of Toronto Press. https://doi.org/10.3138/9781442670440

Hawthorn, A. (2023, March 22). Why Some People Just Have No Rhythm [Psychology Today]. *The Sensory Revolution*. https://www.psychologytoday.com/ca/blog/the-sensory-revolution/202003/dont-got-rhythm-what-it-means-to-be-beat-deaf

Hesselink, N. (2014). Rhythmic play, compositional intent and communication in rock music. *Popular Music*, *33*(01), 69–90. https://doi.org/10.1017/S0261143013000536

Holling, C. S., Gunderson, L. H., & Ludwig, D. (2002). In Quest of a Theory of Adaptive Change. In L. H. Gunderson & C. S. Holling (Eds.), *Panarchy: Understanding transformations in human and natural systems* (pp. 3–22). Island Press. https://islandpress.org/books/panarchy-synopsis

Ing, D. (2013). Rethinking Systems Thinking: Learning and Coevolving with the World. *Systems Research and Behavioral Science*, *30*(5), 527–547. https://doi.org/10.1002/sres.2229

Ing, D. (2022). Systems Changes Learning: Recasting and reifying rhythmic shifts for doing, alongside thinking and making. *Journal of Systemics, Cybernetics and Informatics*, *20*(7), 11–73. https://doi.org/10.54808/JSCI.20.07.11

Ing, D. (2023). Appreciating Systems Changes via Multiparadigm Inquiry: Architectural Design, Ecological Anthropology, Classical Chinese Medicine, Systems Rhythms. *Systems Research and Behavioral Science*, *40*(5), 787–797. https://doi.org/10.1002/sres.2973

Ing, D., & Metcalf, G. (2023). Reframing Systems Thinking for Systems Changes: Sciencing and Philosophizing from Pragmatism towards Processes as Rhythms. *Journal of the International Society for the Systems Sciences*, *67*. https://journals.isss.org/index.php/jisss/article/view/4154

Ing, D., & Nousala, S. (2025). Rethinking work, with the pandemic disruption: Metatheorizing with world hypotheses and systems changes. *International Journal of Organization Theory & Behavior*, *earlycite*(ijotb–02–2023–0036). https://doi.org/10.1108/IJOTB-02-2023-0036

Ingold, T. (2011). The Meshwork. In *Being Alive: Essays on Movement, Knowledge and Description* (pp. 63–65). Routledge. https://doi.org/10.4324/9780203818336

Ingold, T. (2015a). Of knots and joints. In *The Life of Lines* (pp. 22–26). Routledge. https://doi.org/10.4324/9781315727240

Ingold, T. (2015b). The correspondence of lines. In *The Life of Lines* (pp. 154–158). Routledge. https://doi.org/10.4324/9781315727240

Ingold, T. (2017). On human correspondence. *Journal of the Royal Anthropological Institute*, *23*(1), 9–27. https://doi.org/10.1111/1467-9655.12541

Jackson, M. C. (1991). *Systems Methodology for the Management Sciences*. Springer US. https://doi.org/10.1007/978-1-4899-2632-6

Jackson, M. C. (2019). *Critical Systems Thinking and the Management of Complexity*. John Wiley & Sons. https://www.wiley.com/en-ca/Critical+Systems+Thinking+and+the+Management+of+Complexity-p-9781119118398

Laban, R. (2014). Eurhythmy and Kakorhythmy in Art and Education (P. Crespi, Trans.). *Body & Society*, *20*(3–4), 75–78. https://doi.org/10.1177/1357034X14546497

Lee, K. (2017a). Ontology: Qi and Its Role in the Lattice of Inter-weaving Key Concepts. In *The Philosophical Foundations of Classical Chinese Medicine: Philosophy, Methodology, Science* (pp. 185–216). Lexington Books. https://rowman.com/ISBN/9781498538886/The-Philosophical-Foundations-of-Classical-Chinese-Medicine-Philosophy-Methodology-Science

Lee, K. (2017b). *The Philosophical Foundations of Classical Chinese Medicine: Philosophy, Methodology, Science*. Lexington Books.

https://rowman.com/ISBN/9781498538886/The-Philosophical-Foundations-of-Classical-Chinese-Medicine-Philosophy-Methodology-Science

Lee, K. (2017c). The Yi: Yin Qi, Yang Qi, Yinyang, and the Yao-gua Model. In *The Philosophical Foundations of Classical Chinese Medicine: Philosophy, Methodology, Science* (pp. 131–151). Lexington Books. https://rowman.com/ISBN/9781498538886/The-Philosophical-Foundations-of-Classical-Chinese-Medicine-Philosophy-Methodology-Science

Lefebrve, H. (2004). *Elements of Rhythmanalysis: An Introduction to the Understanding of Rhythm* (S. Elden & G. Moore, Trans.). Continuum.

Lewis, M. W., & Kelemen, M. L. (2002). Multiparadigm inquiry: Exploring organizational pluralism and paradox. *Human Relations*, *55*(2), 251–275. https://doi.org/10.1177/0018726702055002185

Littlejohn, R. (2022). Three Paradigms for Studying Chinese Philosophy. In S. Hua (Ed.), *Paradigm Shifts in Chinese Studies* (pp. 149–172). Palgrave Macmillan. https://doi.org/10.1007/978-981-16-8032-8_7

Mace, W. M. (1977). James J. Gibson's strategy for perceiving: Ask not what's inside your head, but what your head's inside of. In R. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing: Toward an Ecological Psychology* (pp. 43–65). Lawrence Erlbaum Associates.

Maciocia, G. (2015). Yin-Yang. In *The Foundations of Chinese Medicine: A Comprehensive Text* (pp. 3–17). Elsevier Health Sciences.

Martin, R. (2009). *The Opposable Mind: Winning Through Integrative Thinking*. Harvard Business School Press. https://hbsp.harvard.edu/product/13050-PDF-ENG

OED. (1989). Contexture. In *Oxford English Dictionary* (2nd ed.). Oxford University Press.

Orlikowski, W. J., & Yates, J. (2002). It's About Time: Temporal Structuring in Organizations. *Organization Science*, *13*(6), 684–700. https://doi.org/10.1287/orsc.13.6.684.501

Peng, J. (Director). (2024, August 25). *The Yin-Yang School and Cosmology* (Vol. 12) [Web Video]. https://www.youtube.com/watch?v=epDIKOeAWXc

Pepper, S. C. (1942). Root Metaphors. In *World Hypotheses: A Study in Evidence* (pp. 84–114). University of California Press. https://doi.org/10.1525/9780520341869

Ramage, M., & Shipp, K. (2009). Introduction. In *Systems Thinkers* (pp. 1–8). Springer London. http://dx.doi.org/10.1007/978-1-84882-525-3

Ramage, M., & Shipp, K. (2020). Introduction to the Second Edition. In M. Ramage & K. Shipp (Eds.), *Systems Thinkers* (pp. xx–xxiv). Springer London. https://doi.org/10.1007/978-1-4471-7475-2

Robinson, H., & Weir, R. (2024). Substance. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy* (Summer 2024). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/sum2024/entries/substance/

Rocha, J. C., Peterson, G. D., & Biggs, R. (2015). Regime Shifts in the Anthropocene: Drivers, Risks, and Resilience. *PLoS ONE*. https://doi.org/10.1371/journal.pone.0134639

Seibt, J. (2024). Process Philosophy. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy* (Spring 2024). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/spr2024/entries/process-philosophy/

Spicer, M. (2010). Reggatta de Blanc: Analyzing Style in the Music of the Police. In M. Spicer & J. Covach (Eds.), *Sounding Out Pop: Analytical Essays in Popular Music* (pp. 124–153). University of Michigan Press. https://works.hcommons.org/records/8qy81-nx428

Stewart, B. (2024, January 25). People Feel Overwhelmed by Pace of Change in the World. *GlobeScan | Know Your World. Lead the Future.* https://globescan.com/2024/01/25/insight-of-the-week-people-feel-overwhelmed-by-pace-of-change-in-the-world/

von Bertalanffy, L. (1950). An Outline of General System Theory. *The British Journal for the Philosophy of Science*, *1*(2), 134–165. https://doi.org/10.1093/bjps/I.2.134

Author

David Ing, Adjunct Professor, OCADU University School of Graduate Studies and Research Fellow, Creative Systemic Research Platform Institute

coevolving@gmail.com