

ONTOLOGICAL SUPPORT FOR MULTIPARADIGM MULTIMETHODOLOGIES: ISOMORPHIC PROCESS–STRUCTURES AND THE CRITICAL MOMENT

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ABSTRACT

Because it still lacks adequate theory needed to ground its multiparadigm multimethodologies, critical systems practice has been derisively called “theoretically-contradictory eclecticism”. This paper is an introduction to and overview of the author’s forthcoming Ph.D. dissertation which offers a new framework for research in critical systems thinking and proposes a new approach for the practice of critical systemic intervention. To underpin this framework an ontology of process–structure isomorphies is designed as a metaphysical interface through an abstraction called the critical moment to each of the conventional paradigms of critical systems thinking (functionalist, interpretivist, emancipatory and postmodern). The ontology is realised by a new epistemology (its *raison d’être*) that respects paradigm incommensurability and yet exploits all the advantages to be had from a multiparadigmatic perspectivity. The new methodology, (wherein each of the paradigmatic approaches is critically ‘deployed’) then operationalises and completes the new framework. This new approach calls for and directs the systemist’s critically reflexive, axiologically transparent, multiparadigmatic appreciation of, and multimethodological engagement with, the problem situation and flux. The philosophy necessarily lays out the framework’s foundational motives, rationale, intents and purposes and acts as a guide for its use. The principal advantage of this new approach is derived from its critically-grounded multiparadigmatic perspectivity and the consequent leveraging of the full gamut of existing systemic methodologies and best practices.

Keywords: multiparadigm; multimethodology; systemic intervention; systems theory; critical systems; incommensurability.

INTRODUCTION

The impetus for this author’s Ph.D. dissertation (in progress) is to make significant contributions toward completion of the theoretical foundations of critical systems thinking and practice—specifically, lacunæ which manifest as epistemological inconsistencies, logical paradoxes, non sequiturs, etc. and preclude the grounding of multiparadigm multimethodologies—with respect to the long-standing problem of paradigm incommensurability.

Were such a framework to be adopted by Systems in general—an open-ended philosophy inclusive of and informed by the entire spectrum of systemic methodologies—doing so might catalyse an immigration into the Systems community, attracting researchers and

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practitioners invested in various and specialised fields such as operational research, organisational learning, organisation development and management science; as well as those who specifically identify with any of the variety of systemic approaches. It should become more widely recognised that Systems (and only Systems) as a discipline is purpose-built to appreciate and deal with truly complex situations. So too might the membership in systems societies increase. If they advocated an explicitly inclusive framework, fostered interdisciplinarity, eg. hosting group exercises involving naturally complex problem situations where members from various disciplines discover for themselves that they must come together in order to succeed, they might take away a greater realisation of the value of interdisciplinarity.

The introduction of Burrell and Morgan's groundbreaking *Sociological Paradigms and Organisational Analysis* (1979) and its concept of social 'paradigms' as groupings of theoretical approaches with similar onto-epistemological foundations inspired the Systems theorists in the mid-1980s. It advanced the custom of thinking about general systems as either 'hard' (quantitative) or 'soft' (qualitative) and enabled a more perspicacious appreciation of our ways of understanding and working with them as paradigmatically 'functionalist' or 'interpretive'. The 'postmodernist' and 'emancipatory' emerged in the literature soon thereafter as distinct paradigms of their own.

Aligning with a paradigm each of the dozens of systems methodologies thus became complete theoretically (i.e. having an explicit ontology + epistemology + methodology) and a great proportion of their philosophical underpinnings were exposed. Systems methodologies thus became more readily learned and accessible, and Systems as a field is itself simplified and more organised. The following table of paradigms (groupings of like- onto-epistemological assumptions) and methodologies is an illustration.

Table 1. Paradigm→Methodology (from Jackson 2000, updated).

- **Functionalist:**

- Organizations as Systems:
 - Barnard's Systems Theory
 - Contingency Theory
 - Socio-Technical Systems Theory
- Hard Systems Thinking:
 - Operational Research (OR)
 - Systems Analysis
 - Systems Engineering
- System Dynamics:
 - System Dynamics
 - Senge's Fifth Discipline
- Organizational Cybernetics:
 - Beer's Viable Systems Model (VSM)
 - Organizational Cybernetics
- Living Systems Theory:
 - Miller's Living Systems Theory
 - Tracy's Living Organization
- Autopoiesis
- Complexity Theory
- Critical Realism

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- **Interpretivist:**
 - Warfield’s Interactive Management
 - Warfield’s Interpretive Structural Modelling
 - Ackoff’s Interactive Planning
 - Ackoff’s Social Systems Sciences (S³)
 - Churchman’s Social Systems Design
 - Mason & Mitroff’s Strategic Assumption Surfacing & Testing (SAST)
 - Checkland’s Soft Systems Methodology (SSM)
 - Senge’s Soft Systems Thinking
 - Soft Operational Research
 - Soft System Dynamics
 - Soft Cybernetics
 - Eden & Ackerman’s Strategic Options Development & Analysis (SODA)
 - Drama Theory
 - Strategic Choice
 - Robustness Analysis
- **Emancipatory:**
 - Emancipation as Liberation:
 - Critical Operational Research/Management Science (OR/MS)
 - MacIntyre & the Moral Community
 - Fuenmayor’s Interpretive Systemology
 - Freire’s Critical Pedagogy
 - Habermas & the Critical Systems Approach
 - Community OR
 - Capra’s Ecological Sustainability
 - Emancipation Through Discursive Rationality:
 - Beer’s Team Syntegrity
 - Ulrich’s Critical Systems Heuristics
- **Postmodern:**
 - Taket & White’s Pragmatic Pluralism (PANDA)
 - Critical Pragmatism
 - Flood’s Local Systemic Intervention
 - Flood’s Creative Design of Methods

But methodologies which call for the use of other methodologies, the multimethodologies, or meta-methodologies, cannot adopt a paradigm if the methodologies called for are from different paradigms. These are the multiparadigm multimethodologies and the problem is paradigm incommensurability. The debate is long over except for a few holdouts—paradigms *are* incommensurable (Laszlo, 1973; Phillips, 1975; Burrell and Morgan, 1979; Jackson and Carter, 1991; Gregory, 1992; Gigch, 1993; Jackson and Carter, 1993; Gregory, 1996; Goles and Hirschheim, 2000; Jackson, 2003). This problem has left the multiparadigm multimethodologies ‘orphaned’, i.e. without proper theoretical grounding for their use as proper frameworks, or approaches to research and practice, resulting in the condition Midgley (2003) calls “theoretically-contradictory eclecticism”. The dissertation explores the body of literature concerned with the incommensurability issue and the serious attempts made to get beyond it and

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shows how each ultimately disappoints in one way or another. None as yet have survived scrutiny to become generally accepted or widely adopted.

This research project proposes another way forward. Its ultimate objective is to advance theory which leads in a practical way to improved outcomes of systemic interventions in contexts such as those which threaten the sustainability or viability of businesses and organisations. Systemic thinking acknowledges the complexity, turbulence and diversity of organisational contexts but lacks the proper theory to ground a naturally multiparadigmatic, multimethodological approach and praxis. The real-world implications are:

- Constraints upon the grasp the practitioner may have of significant aspects of the problem situation and context, especially with respect to the variety of those which would present themselves only from within alternative paradigmatic viewpoints.
- Limitations in the variety of methods which may be deployed to affect the ongoing intervention, especially with respect to methodologies aligned with the alternative paradigms.
- Effectiveness suffers a lack of informed guidance from proper theory and a coherent multimethodological approach to naturally multiparadigmatic problem situations.

Contemporary, or so-called ‘critical’ systems thinking and practice has been liberated from the ‘hard’ or positivist/functionalist approaches to everything for all occasions advanced by earlier, ‘general’ systems theories. Modern systemic thought is neither bound to any other forms of ‘imperialism’ or ‘isolationism’. In fact, the word ‘critical’ itself signifies an ethical commitment to critical self-reflection and to ideological critique (Gregory, 1992). And unlike pragmatism—even critical pragmatism—critical systems thinking is built upon a solid foundation of theory.¹

It describes four, generally accepted conceptual paradigms which were both adapted from and developed alongside developments in social theories, most importantly Burrell and Morgan’s social paradigms (1979), updated by Morgan and Smircich (1980): functionalist, interpretivist, emancipatory and postmodernist (Jackson, 1987, 1989, 1990; Flood and Jackson, 1991a, b, c; Jackson, 1991a, b, c).

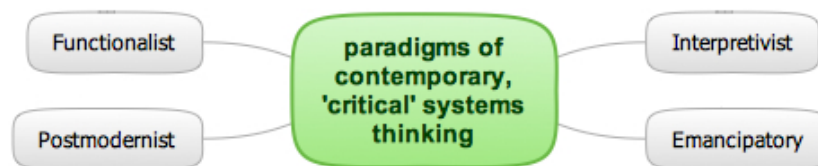


Figure 1. Four paradigms in contemporary systems thinking.

Paradigms are simply groupings of like onto-epistemological ‘approaches’ or ‘traditions’ in research and practice. Each onto-epistemological grouping advantages a unique world

¹ Excepting the lacunae which is the focus of this research.

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outlook and assumes distinctive approaches to shared universal concepts. They are compatible points of view about their world's constitution and its structure; its values, concerns, conventions and assumptions; its 'truths' and traditional ways of working within the world. What is nice is that each paradigmatic view is known to be valid and each offers a world of rich insights unavailable from the others. The functionalist paradigm, for example, is the world of the objective modernist scientist: of logical proofs and deductions, verifiable facts and hypotheses, exact measurements, certainty and universal truths. The interpretivist paradigm takes care to point out that each of us sees the world subjectively and understands it in a unique way recognising individuality and personal differences, the social world and aesthetics, and it accepts that we are unpredictable. Reasoning is more often inductive and situated. The postmodernist paradigm I like to think holds to a unique appreciation of the limitations of human understanding. It 'knows' little more than that there is an unfathomable depth and complexity to the world and that 'truths' are relative. In it, our biases are unavoidable and we must reflexively question the very bases of our assumptions. The emancipatory paradigm sees power and control in effect everywhere, cautions us to consider our (in)actions and their possible effects, and to look for opportunities for liberation and, as systemists, to participate in the greater cause to further human fulfillment.

The central disadvantage of having these different paradigms is that each represents an exclusive, self-contained world view complete in itself. More precisely:

- Their basic construction and internal concepts are so different that they cannot be combined.
- There is no common basis for comparison of one paradigm from within another.
- There is no neutral platform on which to stand for any comparison between them—any such point of view would necessarily be paradigmatic.

It follows then that:

- One cannot be well understood from the point of view of any other.
- Each is valid in itself and well understood only from within it.

which is why paradigms are said to be 'incommensurable'.

Their variety suggests, though, that the employment of multiple paradigmatic views would afford the practitioner a greater appreciation of the so-called 'problem situation' than any one could by itself. That is, the more paradigms utilised the more comprehensively the problem situation may be understood. Also, as each theoretical perspective brings with it its own packaged set of practical methodologies, this widening of 'perspectivity' increases the number and widens the variety of methods which can potentially be brought to bear in an investigation or intervention.

Contemporary theories which capitalise on the idea of multiparadigm multimethodologies hold great promise but yet, as we know, paradigms are incommensurable. There is currently no proper unifying theory which completely supports, describes, explains and

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operates in a world in which multiple paradigms coexist and could co-operate or coordinate between and amongst themselves; a place where pluralism emerges naturally to inform the generation of a truly vast number methods.

Pragmatism makes an end run around the problem. It is an approach which de-emphasises the role of theory, focusing instead on producing practical results. Its practitioners may settle for a form of pragmatism kept up-to-date with contemporary experiences, but even this pseudo-‘critical’ pragmatism remains a hit-or-miss, trial-and-error, ‘let’s just do what worked last time’ strategy. Systemic interventions enacted without grounded theory are not suitable for complex situations, when the risks are high, the costs of failure too dear, or especially when other people’s lives would be effected. As opposed to merely rationalising past performances retrospectively, “the practical importance of theory is that it can transform practice... by exposing and correcting cognitive errors implicit in that practice” (Collier, 1994). And, because it is explicit, a theory itself can be transformed so that it always informs and remains relevant. “The proper test of theory,” said Whitehead (1929), “is not that of finality, but of progress.”

It is said that the paradox of paradigm incommensurability (*vis* multimethodology) must be acknowledged and that “we must learn to accept a degree of incommensurability” (Jackson, 1997b). “Unless we abandon the idea of ‘paradigm’ altogether” says Zhu (2009), “it [incommensurability] will not go away and it cannot just be ignored.” The premise of the thesis is that if a proper multiparadigmatic approach could be developed (without distorting the very meaning of ‘paradigm’) which would account for the functionalist, interpretivist, emancipatory and postmodernist paradigms (whole and valid as they are in their own terms), then it would no longer be impossible to build a proper theoretical framework (ontology, axiology, epistemology, and methodology) where the methodology is a multiparadigm multimethodology such as those which already exist.

THE STATE OF MULTIPARADIGMATIC SYSTEMS THEORY

One imagines the modern taxonomic ‘family tree’ of systems philosophy beginning at the trunk with Bertalanffy’s General System Theory (Bertalanffy, 1950) off of which branch (at least) the four paradigmatic ‘world views’ and methods of critical systemic theory: functionalist, interpretivist, emancipatory, and postmodern. The paradigmatic branches fork into each of the various systems theories and then each of them into its methodologies, the leaves. Before the idea of paradigm, other ways to order and organise systems and approaches were devised: Boulding’s (1956) nine categories of systems complexity, Beer’s (1967) systems classes according to their susceptibility to control, Checkland’s (1971) systems map of the universe in five classes, Jordan’s (1981) taxonomy of eight cells from three dimensions, others related to their discipline (e.g. zoology, botany).

With “A System of Systems Methodologies” (SSM), Jackson and Keys (1984) took the first steps towards multimethodology with a theory establishing methodological pluralism in the systems sciences. They developed a scheme to classify assumptions made about systems by the methodologies themselves in two dimensions, (1) the decision makers’ agreement upon goals—unitary or pluralist and later, coercive (Jackson, 1987); and (2)

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the relative complexity of the system itself—mechanical or systemic. Into the four (then six) combinations, or ‘problem contexts’ they organised the contemporary methodologies according to these assumptions which constituted their ‘domain of appropriateness’. Each methodology should only be judged, they said, within its own domain. More importantly, as ‘methodological complementarism’ it informs the interventionist’s decision to choose from among them all which one methodology to employ in a given situation. ‘Theoretical complementarism’ and the critical approach emerged in its next generation, ‘total systems intervention’ (TSI) (Flood and Jackson, 1991a).

The following table tracks the introduction of several theories leading toward multiparadigm multimethodology:

Table 2. Development of Multiparadigm Systemic Theory

1984	Jackson & Keys’ <i>A System of Systems Methodologies</i> (SSM) (1984)
1985	Fuenmayor’s <i>Interpretive Systemology</i> (1989a, b)
1990	Midgley’s <i>Creative Design of Methods</i> (1990, 1997b)
1990	Flood’s “Towards an Adequate Epistemology for Systems Practice” (2000)
1991	Flood & Jackson’s <i>Total Systems Intervention</i> (TSI) (Flood and Jackson, 1991a; Flood, 1995b, c, a)
1991	Jackson’s <i>Critical Systems Thinking</i> (CST) (1991b, c)
1992	Gregory’s <i>Critical Appreciation / Discordant Pluralism</i> (1992, 1996)
1995	Flood (and later Flood & Romm’s) <i>Diversity Management / Triple Loop Learning</i> (TLL, TSI 2) (Flood, 1990; Flood and Romm, 1996b)
1996	Taket & White (postmodern) <i>Pragmatic Pluralism</i> (1996)
1996	Mingers’ <i>Critical Pluralism</i> (1996, 1997a, b)
1996	Brocklesby & Cummings’ Foucault as underpinning CST (1996)
1997	Midgley’s <i>Systemic Intervention</i> (1997a, 2000)
1997	Jackson’s <i>Critical Systems Practice</i> (of TSI) (1997a, b)

The dissertation includes an examination of the strengths and weaknesses of each one and concludes that none offer a satisfactory framework to ground a multiparadigm multimethodology. This sets the stage for a new way forward. The following graphic shows the evolution of these theories from a philosophical perspective.

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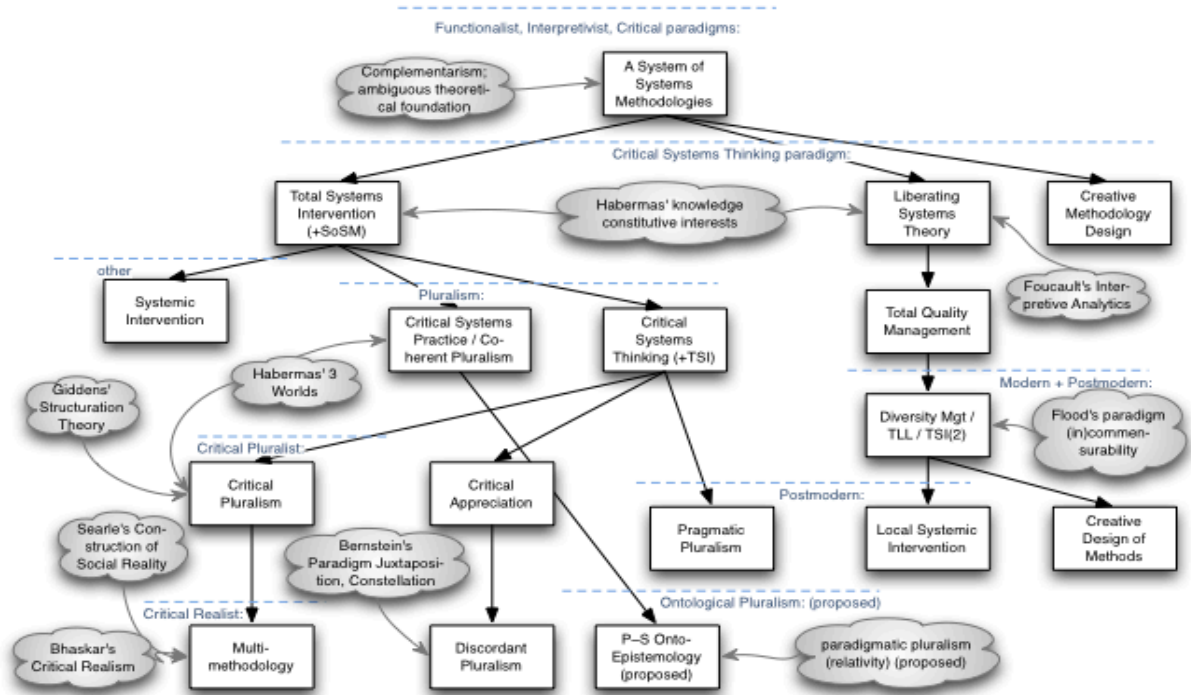


Figure 2. Philosophical Foundations of Multiparadigm Systems Theories

A NEW THEORETICAL FRAMEWORK

A theoretical framework, or approach to research and practice like this one aimed at the systemist-interventionist is a logically- and philosophically-coherent linked set of ontology, axiology, epistemology, and methodology. Addressing the issue of *beingness* and *becomingness*, the new framework defines a simple ontology of process–structure in ‘physical’ and ‘abstract’ ontic types (see the preceding section).

Ontology as concerns human understanding can only be artificially separated from epistemology because, as previously noted, the brain/mind requires meaningful associations; what something is is integrated with its meaning. It would make no sense to us to simply accept the statement “ontology is process–structure in two ontic types” without knowing what those terms mean and why we believe that it is so. The reason for granting ontological status to process–structures is explained by the needs of the framework’s epistemology which deals with meanings and associations. Why not simply declare that the world is made of cheese? Because epistemology has to make sense of the world specified by the ontology (and there is only so much you can do with cheese). Here, an epistemology is developed to explain how the process–structure ontology works to support our (the systemists’) internal and external worlds (previously stated), and as in all other paradigms what in these worlds concerns us, what is of value, and how do we understand what we discover in them:

We accept the validity as well as the utility of having four traditional systems paradigms. We know that there is no standpoint of human understanding which is entirely *a-*

paradigmatic; that is, without onto-epistemological assumptions. Everyone, in fact has a 'world view' (including the pragmatist), even if we are unaware of it. We recognise and respect these paradigms as incommensurable world views. The critical systems thinker must be educated in this regard, able to question the relative appropriateness of his or her own habitual world view at any time and to adopt another as need be. Further, this approach expects the systemist to 'immerse' himself or herself in other paradigms and perform a thorough investigation whilst in each one as directed by its own epistemology and best practices. The new epistemology will state our understanding that the problem situation itself and any information about it is only available to us paradigmatically. In this framework, those paradigms are the functionalist, interpretivist, emancipatory and postmodern. It understands that each of the four paradigms offer distinct and indeed very different worlds to behold varying in ways such as in their different concepts and configurations of 'the system' itself and its boundaries, membership and environment; and different understandings of the state and inertia of the system, its embeddedness, etc.

THE ONTOLOGY



Ontology in the sense we mean here is a branch of metaphysics which operates at the fundamental base or root level of a complete theoretical framework for research and practice which also includes an axiology, epistemology, and methodology. Ontological statements concern the essence of being. An ontological theory addresses the basic issues of existence and of reality itself, asking questions such as, "What entities exist or can be said to exist?" and "How are such entities naturally categorised or grouped?" The ontology we wish to establish here is intended for inclusion in a brain-based framework designed for the needs of the human systemist, systems practitioner, systemic interventionist or researcher. It will not support an 'objective' theory, a theory of everything or for everyone, or to subsume or hierarchically dominate other such frameworks, theories or paradigms. It respectfully leaves to the other paradigms that which is theirs. Rather than being a theory of everything, it is intentionally minimalist.

The systems ("complexes of elements standing in interaction" (Bertalanffy, 1956)) or so-called 'problems' of concern for our research, planning or intervention purposes are or regard complex, or 'messy' phenomena; are typically peopled systems of organisations or groups which are usually (though not always) spoken of as though they have an existence of their own, independent of the systemist.

Systemists may not agree on what is 'out there' in the 'real' world, but we do believe that there *is* some external (*vis* the mind) world. It is our environment and within it we are born, live and are engaged, are effected by and affect. That the external world includes entities having an independent, so-called 'objective' or 'real' existence as-they-are-in-themselves is also taken as fact and rarely seriously disputed. However, confusion has been generated by obtuse quotes such as "various types of constructivism, interpretive or post-modern stances... to a greater or lesser extent deny the possibility of an observer-independent reality..." (Mingers, 2000). Such a statement should have been more

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carefully considered. A deeper read exposes a personal frustration with the conclusion that it is impossible for humans to ‘know’ external reality as-it-is-in-itself (*which does exist*). Sometimes ‘reality’ is denied as in the postmodernist sense—because the term itself is a label too overloaded with human bias to be of any practical use. In extreme subjectivism it is questioned “whether there exists an external world *worthy of study*” [emphasis added] (Burrell and Morgan, 1979). Critical realists most cleverly say that if an independent reality did not exist then we would have to invent it.

We also acknowledge a second domain of existence, an intra-personal (mentally internal) ‘world’ of consciousness; each one’s own internal, experiential or ‘subjective’ world. Ontologically speaking, one can only access one’s own. This world is ignored by the functionalist paradigm except to stress its requirement that the researcher be ‘objective’. (More about subjectivity follows.)

The situation gets a bit more complicated when we consider human (social) and person-to-person (intersubjective) relationships. Here our theory must acknowledge onto-epistemological relativism between the non-functionalist paradigms. The epistemologies, each depending upon their own philosophical and methodological concerns, declares whether or not a social realm exists and, if so, whether it is in whole or in part *of* the external world (i.e., it is pre-existing and into which one is subsumed) or exists in whole or in part within the internal world (i.e., it is contrived, of one’s own making). The same applies to the intersubjective—a realm of negotiated understanding between ourselves. This framework defers to the conventional paradigms as to the ontological status of both.

Because each paradigm is self contained, each requires its own definitions for concepts such as ‘reality’ and ‘world’, and in so doing each assigns more or less importance to either of the two sides of the ontological partition between an ‘inner world’ and an ‘external world’. Each approach declares, assumes or implies its own ontological memberships and the epistemological significance of the objective and subjective worlds (and, if they should exist, the social and intersubjective realms within either of them). In relative terms it could be said that the ontological partition moves back and forth depending upon the epistemology. Of course there are many ways to consider being, existence and meaning, and the management of any divisions between them, but this interpretation does furnish some justification of the need to define and populate our ontology with two basic ontic types:

- Type 1: Of the physical, natural, tangible or ‘real’ world in the sense of its being as-it-is-in-itself. The transcendental characteristic of entities of an ‘external world’, independent of an observer.
- Type 2: Of and dependent upon one’s mind. The transcendental characteristic of mental phenomena and disposition (conscious, pre- or post-conscious, subconscious, or unconscious).
- Both definitions apply to the base disaggregates of their constituents having only extrinsic (human-given) macro-attributes such as: meaning, function or purpose, structure or form, type or name, association or membership.

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Ontology is not a science but a branch of metaphysical philosophy. To ‘start up’ an ontological theory, claims are made of the *a priori* existence of elementals (such as those described by the ontic types defined above). Statements of or inferences to fundamental ‘first causes’ are permitted, too, and then taken for granted thereafter.

Although “we can, if we take the trouble, use language to make infinitely refined distinctions in context” (Collier, 1994), it is generally too tedious and difficult to do. Everyday language is replete with reifications, or what Bhaskar (1986) describes as an epistemic fallacy followed by an ontic fallacy. That is, a projection of the external world onto one’s subjective, phenomenal map followed by a projection of the subjective onto the external world. This behaviour is possibly (and I propose it is) owing to the physio-electro-chemical workings of the brain and its structures; consequently embodied in the mind and reflecting in the structural limitations of discourse. Simply put, perhaps it is physically impossible for the brain/mind combination to accommodate subjects without meaning and association so that reification and projection are necessary and natural functions of human thought and its internal dialectic processes. This brain/mind relationship is of central importance to the ontology. It has determined the requirement of our two ontic types and sets their definitional characteristics (which, by the way, will be adjusted as the theory matures).

Rejecting classical realist assumptions that our faculties of observation afford us direct and correct knowledge of the world, it is more likely as Kant said in the 18th Century that human experience of things consists of how they appear to us (Kant, 1956). (Think of how five witnesses are likely to give five different accounts of the same crime.) Systems researchers Maturana and Varela (1992) describe a brain-based evolutionary model of human sense and experience. Basically, as their well-accepted theory goes, the nervous system evolved over many successive generations as a perceiving faculty in the Darwinian sense—it improved survivability and reproduction. As the brain developed the mind emerged as a complex sense-making system. Also with Darwinian roots are emotions which accompany the senses and make up the embodied ‘sensations’. Although we are not typically conscious of it, our perceptual data is severely limited by the body’s five particular senses: sight, sound, taste, smell and touch. Our ability to affect the world is also limited by other constraints of the body such as size, speed, strength and life span. Unfortunately these constraints largely determine how we come to ‘know’, ‘see’ and ‘act’ in the world. This is a fundamental concept for understanding the new framework so it is important to explore it further.

It is the brain’s job, moment to moment, to make sense of sensations and to infer a great deal more from our past experiences and learned constructs. It seems to do this by constructing mental ‘scenes’ of an ongoing ‘drama’ that correlates—however weakly—to an external world which can be only partially sensed; all the while maintaining a sense of self and continuity, filling gaps with assumptions and compensating as learning occurs. It is from this loose association with an external world that our inescapable confusion of what is ‘real’ with what is ‘mental’ with associations comes (Bhaskar, 1989; Collier, 1994). This transitory ‘mess’ is what we call ‘reality’. Differing assertions as to what is, what is external and what is internal, or what is objective and what is subjective distinguish the paradigmatic onto-epistemologies and sets them apart from each other.

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The dissertation derives these thoughts from the systems and OR/MS literature, and aspects of phenomenology (Hegel and Baillie, 1931; Merleau-Ponty, 1962), transcendental idealism (Ingarden, 1975; Allison, 1983), radical constructivism (Glaserfeld, 1995, 1999), critical realism (Bhaskar, 1986, 1989; Collier, 1994; Mingers, 2000), post-structuralism (Dreyfus and Rabinow, 1982; Tilley, 1990), postmodernism (White and Taket, 1994, 1996) and process ontological theory (Wood, 2005).

The new ontology designed to support these concepts consists of just one elemental member called ‘process–structure’—a dualism of process and structure that is isomorphic across its ontic manifestations—physical and abstract—as above. Later, the theory’s epistemology explains why such an ontology is both necessary and sufficient and how, in practical terms, it serves the systemists’ endeavours. Here is a list of identifying features and functions of process–structure:

- Process–Structures (PS’s) are dynamic, can contain other ps’s recursively, combine, separate and interact amongst themselves in networks and hierarchies which are capable of generating emergent properties. PS’s ontologically populate our various so-called ‘worlds’. Troncale (2006) has shown that certain conceptual configurations (of what I call ps’s) are used repeatedly throughout nature, isomorphically. Consequently, a recognised configuration of structure (e.g., a feedback loop) can be indicative of its process, and vice versa.²
- Process–Structure, as the name suggests, is a duality in and of itself. ‘Process’ and ‘structure’ are affects or aspects of the same inseparable unity. In relative terms, ‘structure’ is slow ‘process’ and ‘process’ is fast ‘structure’ (Troncale, 2004–2007). Note: in our everyday discourse we often ignore (or fail to see) this duality and speak naively of just one aspect or the other.
- PS’s are coupled transforms—as structure changes, process changes and *vice versa* (ibid.). In a system, the disposition of a ps is codetermined by other ps’s.
- There are two types of ps’s: ‘physical’ ps’s manifestations of the ‘physical’ ontic type, and ‘abstract’ ps’s are phenomena of the ‘abstract’ ontic type (as above). We say that the former exists only externally, the latter, only internally (with respect to the mind).
- ‘Physical’ type ps’s exist in space/time, independent of an observer. We say that they are the ultimate constituents of matter, energy, gravity, etc., and, as such, are thought to have origins in the ‘big bang’ and explained by the laws of physics³. Generally, configurations in the size scales encountered by the systemist are well understood in terms of mathematics and engineering.
- ‘Abstract’ type ps’s are the ultimate non-physical constituents of active mental ??constructs. They are emergent, generated from physio-electro-chemical (physical)

² References to “*the ps*” or “*a ps*” imply the outermost ps of concern.

³ Einstein showed that matter and energy are transforms—matter is ‘slow’ energy and energy is ‘fast’ matter. ‘Forces,’ including gravity are extra-dimensional affects of matter/energy. Thermodynamics (and entropy) apply.

ps's of the brain. They are known to compel structural changes to the brain, as well—a necessary reciprocity between mind and brain that is not well understood. This may be considered a cycle in 'physical' terms coupled (somehow) with a more or less continuous process in experiential or 'abstract' terms.

- To the mind, 'abstract' ps's are emergent experiences in the present 'moment'—*becoming*, within the context of the subjective moment passing. The future cannot be experienced but can be anticipated; the past merely recalled (Wood, 2005).
- The two types do not combine, mix or interact in any direct or deterministic fashion, but dubious phenomenological *associations* between them made by the workings of the brain are unavoidable (Maturana, 1988). Reification, as previously mentioned, *confuses* the 'abstract' type with the 'physical' type (Wood, 2005); indeed, the brain/mind may be built for this and handles it quite easily. Bhaskar's two epistemic fallacies (above) involve both types of ps's as well. Other 'loose' associations between 'physical' and 'abstract' types include wilful motion, communication, and the learning process accompanying structural changes in the brain.⁴

Conceptually, 'process–structure' is meant to be isomorphic over the two ontic types. A 'physical'-to-'abstract'-to-'physical' isomorphism is exemplified in the brain-to-mind-to-brain coupling (described above) where 'physical' ps's involving neurons somehow evoke the emergence of 'abstract' ps's (thoughts), and those 'abstract' ps's somehow induce physical changes in the brain. For the practitioner, the concept of isomorphism is also useful as a tool to facilitate an appreciation of the mental 'shifts' and changes of perspective that have to happen when an intentional change of paradigm is made or if we are to reflexively follow, question, project, imagine or reflect upon the 'dubious' associations, unavoidable reifications and projections we ourselves continually make.

What this ontology is *not* is important, also. (Insofar as what has already been stated about the mind making associations, unsuitable assumptions about it can be pruned this way.) (1) It takes a distinctive stand on the debate as to whether reality is objective or subjective—it is *both* and they are of different ontic types. External existence as-it-is-in-itself is objectively real but unknowable as-it-is-in-itself to the human. Internal existence is a different type of existence, virtually independent but perhaps loosely associated with the external, as a subjective experience. (2) Process–structure ontology cannot be called 'yet another' participant in the structure versus agency debate. Here, neither structure or process is separable from its dual aspect. Moreover, ps's operate only in the ontology and (as we shall see later) are unknowable as-they-are-in-themselves to the epistemology.

Also distinctive is that the concept of process–structure is explicitly isomorphic over its two ontic types (physical and abstract) just as the mind is fluidly relativistic in what it considers to be 'real' and external and what it considers to be 'real' and internal. This 'ontological feature' is key.

⁴ The term 'loose' is used to indicate that these mechanisms are not direct, perfect or deterministic.

RELATING TO THE TRADITIONAL PARADIGMS

The onto-epistemological assumptions held by the four traditional paradigms of critical systemic theory (functionalist, interpretivist, emancipatory and postmodern) position them somewhere between *objectivism* and *subjectivism* which can be seen as a continuum (Burrell and Morgan, 1979; Morgan and Smircich, 1980). This is not the only metric with which to compare theoretical approaches, but it is certainly the one most widely accepted (Deetz, 1996).

Objectivism, at one end of the scale, incorporates ontological *realism* and epistemological *positivism* which see reality as external. The philosophy gets its name from its axiology, which separates the researcher from the researched so that ‘objective’ results are obtained ‘independently’. Positivism—the epistemological meaning-making investigation of that reality—is, however, a mental enquiry. Therefore, in terms of process–structure, objectivism may focus on the ‘physical’, but in practice requires both ‘physical’ (type 1) and ‘abstract’ (type 2) ontic types to satisfy its onto-epistemological requirements.

At the continuum’s other end, subjectivism’s ontology, *nominalism*, sees reality as an internal product of the mind. A mind, however defined, implies the existence of a physical brain. Then in our terms the practice of subjectivism also requires both ontic types.

The other two paradigms take intermediate positions on the objectivism–subjectivism continuum. The emancipatory paradigm is concerned with power relationships and their effects on human action. This implies that both physical and abstract ontic types exist. The postmodern paradigm views external and internal ‘realities’ so complex and interrelated as to be unknowable and questions the validity of even the terms ‘reality’ and ‘truth’. The terms ‘internal’ and ‘external’ imply the need for both ontic types.

Altogether, this means that any paradigmatic theory, if it can be positioned somewhere along the objective–subjective continuum, makes onto-epistemological, axiological and methodological assumptions which employ and rely upon *both* the ‘physical’ and ‘abstract’ ontic types. The argument, therefore, is that process-structure’s two types are necessary... but are they sufficient?

Critical systemic thinking holds that its four paradigms (which I call the ‘traditional’ or ‘conventional’ paradigms) are each valid and that they are complementary in their comprehensiveness. No one paradigm subsumes another (nor could it, says paradigm incommensurability). There is no hierarchy among them. Since their domains are separated, it is illogical to accept that any paradigm could legitimately prohibit the existence of another. It follows, then, that no *ontology* may legitimately prohibit another’s. Since, it is proposed, we use paradigms to better understand various different aspects of what is roughly the same ‘problem situation’, their ontologies must be considered relative; that is, alternative references of some kind to some same-inclusive reality-as-it-is-in-itself ‘problem situation space’ having the potential to support alternate ontologies.

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Viewing these traditional ontologies as each referring somehow to some relative pool of the ‘stuff’ of the problem situation space as-it-is-in-itself supports this basic assumption: that reality as-it-is-in-itself is capable, somehow, of supporting the emergence of the ontological memberships of each of the traditional paradigms. Then, in terms of the ontology of this new framework and to fulfill the greater promise of its design, one more stipulation is necessary to complete its ontological definition: the ‘pool’ of ‘stuff’ in the problem space consists of process–structures.

Referring once again to the objective–subjective continuum, the dissertation will support arguments about both ends, that: by emphasising the *structural* qualities of the ‘physical’ type of process–structure, (1) a deconstruction of ontological realism can be made which lends support to the idea of process–structure as an ultimate ontology; and inversely, (2) that realism can be considered an emergent property of an indeterminate configuration of process–structures. In a similar manner but by emphasising the *processual* qualities of the ‘abstract’ type of process–structure (3) ontological nominalism can be deconstructed to lend support to the idea of process–structure as an ultimate ontology; and inversely, that (4) nominalism can be considered an emergent property of an indeterminate configuration of process–structures. Finally, because process–structure is holistically constituted from both aspects of both types, this covers the area between the extremes. Altogether, what these ideas yield is shown here in table form where the diagonal represents the objective–subjective continuum.

Table 3. map of ontologies onto aspects of process–structure

Process–Structure’s	structure aspect	duality	process aspect
‘physical’ type	objective ontologies		
both types		partially objective, partially subjective ontologies	
‘abstract’ type			subjective ontologies

Other onto-epistemological dimensions can be explored as well, such as regulation vs. change (Burrell and Morgan, 1979) and local/emergent vs. elite/a priori (Deetz, 1996) to determine their fit and feasibility with the philosophy of the new ontology.

The Epistemology

Process–structure is proposed as a new ontology into which, working backwards, the membership of the four conventional paradigmatic ontologies can be deconstructed. In practice, though, the operation is constructive. Ontological members of one of the traditional ontologies emerge from the ‘formlessness’ of process–structures into their familiar in-paradigmatic forms. I call this constructive process the ‘critical moment of becoming’. In the positive direction, ‘becoming’ is an indeterminate process of

emergence⁵. It is an epistemological conceptualisation of an event positioned between process–structure and another ontology. The critical moment of becoming is the philosophical ‘glue’ which adapts process–structure to the onto-epistemologies of the conventional paradigms. It can be understood as a mechanism of ‘translation’ between them yet it remains separate and apart from both ontologies and affects no change to either. Again, ontologies are metaphysical theories about what simply *is*. The critical moment of becoming is an epistemological tool to help us conceive of one in terms of the other.

To visualise this metaphorically we could perhaps imagine what appears to be a snowstorm shown on a computer screen. Very close up, though, we see only tiny, colourful dots—too many to count—blinking and moving around every which way. We imagine we are then given a pair of glasses with red lenses. Looking again at the screen we see, in various shades of red and grey, what is easily recognised as some sort of clockworks. We could call this “a paradigmatic view through the moment-of-becoming lenses in the functionalist colour”. The other paradigms would similarly offer their views through different-coloured lenses, but ideas as to what would be seen through them become absurd as the interpretive, emancipatory and postmodernist paradigms are ever-more abstract—less about things and more about concepts. A coherent and meaningful view through the moment of becoming lenses—a paradigmatic view—is simplistic to us. This thesis asserts that that is how the mind/brain must have it. Without the lenses, though, the natural, uninterpreted view of process–structure is much more simplistic *unto itself*. It is what it *is*.

Process–structure is in fact designed so that, out of the infinite number of possibilities (a-paradigmatically) which *could* be ascribed to ‘reality’ at any one time (paradigmatically), no one form or aspect is nor may be privileged over any other. ‘Reality’ here is meant to be reality-as-it-is-in-itself—either infinitely determinate from God’s eye view, or indeterminate from the point of view of man, whichever term you prefer would be correct. The process–structure ontology is designed to prevent us from imposing associations or reifying anything within it. At the same time, it provides us with a mechanism we can retreat to, to re-imagine the ‘reality space’ of a problem situation. When we look at the onto-epistemological assumptions made by a variety of theories it appears that what is epistemological to one theory is ontological to another. For example, compare both functionalism, which considers reality to be ‘external’ and structural functionalism, which considers social structures to be real... with interpretivism, which sees reality as a product of the mind. ‘Systems’, in turn, are either “in the world or [as in SSM] a process of enquiry into the world” (Checkland and Scholes, 1990). It depends on the paradigm. Consider now how traditional thinking differs from that of Roy Bhaskar’s critical realism:

⁵ $cm_i(ps) \equiv O(i)$ where i is an onto-epistemology. That is, the result of the critical moment of becoming of an onto-epistemology upon process–structure is equivalent to the function of Ontology (i.e. membership) over that onto-epistemology.

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Critical realism demonstrates that ideas, concepts, meanings and categories... exist in the world, independent of human beings,... are equally as real as physical objects. They are emergent from, but irreducible to, the physical world, and have causal effect both on the physical world (eg in the generation of technology) and the social and ideational world. ... Ideas once expressed are no longer wholly subjective—they become intransitive and available for investigation, debate and judgement by others. (Mingers, 2000).

Bhaskar's epistemology, unlike ours, would represent a third epistemological break in systems thinking. But we acknowledge and allow there to be true relativism between ontological and epistemological membership from theory to theory. An epistemic fallacy in one may be perfectly consistent in another. One can also find the same kind of relativism between process and structure. Effectively, this is an acknowledgement and acceptance of paradigm incommensurability, but it reflects the human disposition and would allow each established paradigm to remain whole and useful. What is needed is a minimalist epistemology, one that does no more than say, as we do, that we already have four epistemologies that are proven and well understood. Refer to them for that. Leave to them that which is theirs. How that is done in this framework is the subject of its methodology.

In this framework, different paradigms are respected as to what is understood within them to be real and 'internal' vs. 'external'. Its epistemology accepts the paradigmatic relativism of knowledge and the contextual dependencies of their methodologies. Substantial aspects of conventional epistemologies and methodologies are intentionally absent from this framework because (a) they are not essential to the complete elaboration of this paradigm (built as it is to independently employ the four conventional critical systems' paradigms) and (b) they are well-supported and properly used only in context, whilst immersed in it. There should be no call to refer to this framework as relativist as in-paradigmatic processes are consistent within their self-containment.

THE METHODOLOGY

Methodologies are a product of their epistemology used to put philosophy into action in the world. Methods are the actual actions to be taken *in situ*. Referring to its methodology, the framework directs a multiparadigmatic investigative procedure, reflectively compiles and organises what is discovered and, in accordance with its axiology, makes a critically-reflexive assessment of the knowledge pooled from those paradigmatic views in the manner of best practice.

The methodology prescribes an investigation which entails 'deploying' the various paradigms in a serial manner for the purpose of exploring and appreciating the 'world' and the embedded historical situation as it is revealed to the systemist whilst immersed in each.

In conjunction with the critical oversight functions, described above, a critically-reflexive evaluation of the collective 'big picture' is otherwise ongoing. It leads to deliberations

and decision making guided in spirit by ethical and aesthetic considerations (transparently disclosed as part of the oversight function for a critique-and-improvement discourse). Regardless of the choice of multimethodology, before a method can be deployed the methodology directs a reflective, paradigmatic look back to ensure it remains true to its theoretical heritage.

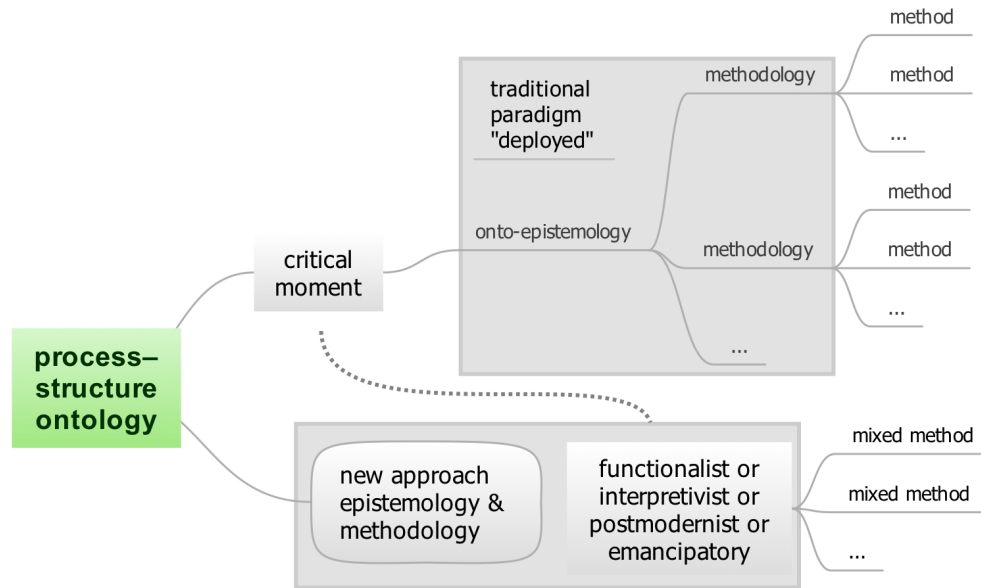


Figure 3. Proposed framework for multiparadigm multimethodology in action

The overall philosophy will take a fresh look at the notion of a critical systems paradigm. It envisions a theoretically cohesive approach to critical systems thinking and practice combining a multiparadigmatic investigation and a general multimethodology which uses—in their proper theoretical contexts—the dozens of epistemologically-specific systemic methodologies developed over the past fifty plus years. Jackson and Keys (Jackson and Keys, 1984) took the first step with their system of systems methodologies where the problem context (later, paradigm) rightly became the driving force for considering which would be appropriate choices for the methodology to be used in a particular situation (Jackson and Keys, 1984; Flood and Jackson, 1991a; Jackson, 1997a, b). Multimethodology, or methodological pluralism supports a more sophisticated understanding of the problem situation and allows for the deployment of more than one method in a single intervention; multiparadigmatic multimethodologies are those which, in addition, make use of methodological thoughts from across the paradigms (Flood, 1990; Gregory, 1992; Flood and Romm, 1996a; Gregory, 1996; Taket and White, 1996; Jackson, 1997a; Mingers, 1997b; Jackson, 1999; Midgley, 2000).

CONCLUSION

As the proposed framework does not replace, subsume or co-opt philosophical positions held by the traditional paradigms (functionalist, interpretivist, emancipatory, and postmodernist) and since this theory holds that there is no a-paradigmatic standpoint in

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terms of human understanding, it must then either stand as its own paradigm or be ascribed to another within which its onto-epistemology is compatible. The systems community might decide to call this framework yet another attempt to establish a critical systems paradigm. As a whole (albeit incomplete) framework of theory for research and practice it will stand on its own—separate and apart from the conventional paradigms. Its relationship as ‘yet another paradigm’ among paradigms is a pragmatic positioning. We simply wish to take a critically-systemic approach (still underdeveloped) which, by deferring to the other paradigms’ onto-epistemological approaches (in their own terms), we leverage comprehensiveness with the perspectivity made available via their deployment; and, by deferring to their episte-methodologies, leverage our effectiveness in the intervention or design process. The methodology will call on the systemist to readily detach from this, the current paradigmatic stand, and transition to another. ‘Deploying the paradigm’ means assuming (taking upon oneself) the paradigm’s concepts of internal and external realities, knowledge, ethics, aesthetics, methods, etc. to conduct some part of the research. As we have said, the mind is already accustomed to the relative nature of being and knowledge and is well versed in making internal and external reifications. With some initial coaching and practice, paradigm shifting skills should readily develop. We then return to this, the critical paradigm, for a critical evaluation of the information gathered from each deployment—or debriefing, if you will—reflecting upon our in-paradigmatic experiences. Actions to be taken to intervene are decisions also reflectively considered in the same way.

Multimethodological approaches (like this one) which would employ more than one methodology from more than one paradigm in the same intervention have been orphaned from the collection of proper, widely accepted approaches to research and practice ever since the concept of ‘paradigm’ was first adopted by systems theory. This new theory (a Ph.D. dissertation in process) accepts incommensurability and defines an ontology of process–structure which is shown to support an epistemology and methodology calling for the deployment of each of the established critical systems’ paradigms and engagement with their ‘world’ views for a critical, reflexive evaluation of the insights gained and the subsequent employment of any of their methodologies. By engaging process–structure in the moment of becoming with each of the four traditional systems ontologies, the practitioner allows each paradigm to complement or compete with the others in terms of ontological, as well as epistemological and methodological relativism—a relativism dependent upon facets of the specific problem situation of concern. In this way, p–s and its framework extend the concepts of complementarism, critical appreciation and pluralism beyond methodologies to paradigms.

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