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Back to the future: A critique of Demetis and Lee's "Crafting theory to satisfy the requirements of systems science"

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ABSTRACT

Demetis and Lee's paper outlines criteria for constructing theory in accordance with systems science. This is a laudable aim but in this comment I suggest that their view of systems thinking is both narrow and somewhat dated. Demetis and Lee equate systems science with only one aspect of it – General Systems Thinking (GST) – and they discuss in detail only one theorist – Niklas Luhmann. I draw attention to a range of other systems approaches including system dynamics, soft systems methodology, complexity theory, critical systems thinking, critical realism and multimethodology. I conclude with tentative guidelines of my own.

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1. Introduction

The idea of taking a major research approach such as positivism or interpretivism and then asking what implications does this approach have for crafting theory is a good one (Lee, Briggs, & Dennis, 2014; Lee & Hovorka, 2015) and can yield insightful and useful papers. The current paper attempts this task for systems theory but is too narrow and rather old-fashioned for it to successfully do justice to such a rich and vibrant field

The first problem is that the field of systems is so broad as to defy any sort of succinct definition or description as this paper attempts. We immediately face this in the title which refers to "systems science". This already points to a particular, and one-sided, view of systems as opposed to "systems thinking", "the systems approach" or "systems theory". This is confirmed in Section 2 where it is stated that "Systems science is also known as 'General Systems Theory' (GST)" (page ?) so, in reality, the paper is actually only about one fairly small and arguably outdated facet of the very rich world of systems thinking.

The second problem is that even this area is dealt with in a rather cursory manner. In terms of any detail, it covers only a single theorist – Niklas Luhmann – who is rather marginal, highly abstract and complex, and is not really a representative of GST as it was originally defined by the likes of von Bertalanffy (1971), Boulding (1956) and Rapoport (1986).

2. A partial history of systems thinking

To give a more rounded picture, I will give a brief, and rather partial, history of systems thinking — for a detailed overview of the origins of systems ideas right back to the Greeks see Checkland (1981) and for a more recent review of applications of systems thinking across the management field see Mingers and White (2010).

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2.1. Stage 1: First order cybernetics/hard systems thinking

The fundamental concepts of systems thinking were developed (in modern times) in the early part of the 20th century across a range of disciplines, particularly those such as organismic biology, ecology and gestalt psychology (Capra, 1997; Capra & Luisi, 2016). Cybernetics developed as a new discipline concerned with processes of information, communication and feedback control (Ashby, 1952, 1956; Capra, 1997; Capra & Luisi, 2016; Weiner, 1948, 1950). As a minimum, the basic systems concepts included: parts/wholes/sub-systems, system/boundary/environment, structure/process, emergent properties, hierarchy of systems, positive and negative feedback, information and control, open systems, holism, and the observer.[1] Most of these concepts are discussed by Demetis and Lee (2016) except, interestingly, emergence. They mention holism and hierarchy but it could be argued that in fact emergence is the most fundamental systemic concept since it is the emergence of new properties and behaviors at higher levels of organization which is the essence of holism and the bulwark against reductionism.

The application of these concepts across many disciplines was recognized by von Bertalanffy (1950) and called General Systems Theory (GST). These ideas were taken up in management and information systems as management cybernetics (Beer, 1967), system dynamics (Forrester, 1961), systems engineering (Hall, 1962) and what we might generally call the systems approach (Churchman, 1968; Klir, 1969; Weinberg, 1975).

2.2. Stage 2: second order cybernetics/soft systems methodology

Cybernetics (meaning the study of self-governing mechanisms) is a particular branch of systems theory developed originally in the 1940s (Heims, 1993; Pickering, 2002) by scientists such as Weiner (1948), Ashby (1956) and Bateson (1973). It studied the way that systems could control themselves autonomously through the transmission of information within error-controlled feedback loops. This enabled cyberneticians to explain both the particular nature of living systems and also explore how the brain and our cognitive processes worked. In studying, for example, the nature of perception it became clear that what we perceive is not a passive reflection of the external world but rather a very active construction of the human nervous system.

Thus we have to recognize that, in principle, the observer is always part of the system being observed. This insight developed into what became known as “second-order cybernetics”. First-order cybernetics studies the mechanisms of the external world while second-order cybernetics studies the process of observing itself. As Von Foerster put it in the titles of two of his major books, it is the *Cybernetics of Cybernetics* (Von Foerster, 1975) or the study of *Observing Systems* (Von Foerster, 1984), where “Observing” is to be read as both a noun and a verb. It reached its most developed form in the work of Maturana and Varela (Maturana & Varela, 1980, 1987) on “autopoietic” systems — systems, primarily living systems, that produce or construct themselves (Mingers, 1995). Autopoiesis is the characteristic organization that distinguishes living from non-living systems. The concept of autopoiesis has been influential in a range of disciplines (Mingers, 1995) and is invoked by Luhmann in his sociological theory as discussed by D&L. However, what they do not mention is that Luhmann's use of autopoiesis is very questionable (Mingers, 2002) and Maturana himself did not agree with its use beyond the biological level. Stemming from, but separate to, autopoiesis, Maturana and particularly Varela developed a theory of mind that was much more phenomenological than computational, conceptualizing cognition as non-representational and embodied (Varela et al., 1991).

At the same time, similar developments were occurring in another area of systems — applied systems thinking or systems engineering. The systems approach was successfully being used in the design of complex engineering projects such as oil refineries, and methodologies for tackling these problems had emerged (Hall, 1962). However, when these methodologies were applied to problems in human organizations they were not found to work well. The issue is that human beings are significantly different to machines and buildings. People, through self-consciousness and language, have the ability to conceptualize themselves and the systems that they are part of — they exist in a world of meaning and signification. This means that we cannot just take for granted, from the outside, the nature of a particular social system or social interaction but have to engage with the participants and become active observers. This is indeed the essence of the interpretive or phenomenological position.

This led to the development of an alternative systemic approach to problem-solving in organizations — what became known as “soft systems thinking” as opposed to the “hard systems thinking” of traditional systems engineering. This represents a similar paradigm shift to second-order cybernetics — problematizing the role of the observer/participant in systems analysis. It was most fully articulated by Checkland (Checkland, 1999; Checkland & Holwell, 1998; Checkland & Poulter, 2006; Checkland & Scholes, 1990) in a practical intervention approach called Soft Systems Methodology (SSM) which, he argued, was underpinned by a phenomenological social theory (Husserl, 1964).

2.3. Stage 3: more recent developments

At the present moment, systems thinking has burgeoned in many directions — system dynamics, complexity theory, critical systems thinking, critical realism, and the mechanisms view of causality. All of these are highly relevant for information systems research.[2]

[1] The seminal point of these early developments were the Macy Conferences on Cybernetics (Pias, 2016) bringing together such luminaries as Weiner, von Neumann, Bateson, Ashby, Lewin, Mead, McCulloch, Shannon and von Foerster.

[2] On the IS front, there was a special issue of MIS Quarterly, a major IS journal, on critical realism in 2013 (Mingers, Mutch, & Willcocks, 2013).

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