Complex Processes and Social Systems:
A Synergy of Perspectives

David Large, Northumbria University, Newcastle, UK

Petia Sice, Northumbria University, Newcastle, UK

Robert Geyer, Lancaster University, Newcastle, UK

Geoff O'Brien, Northumbria University, Newcastle, UK

Safwat Mansi, Northumbria University, Newcastle, UK

ABSTRACT

In this paper the authors consider two contrasting viewpoints; Complex responsive processes which deal with interactions in the present, and complex adaptive systems which focus on learning through the production of what are called mental models. The paper shows that rather than being contradictory, these viewpoints are – at least in some respects - complementary. From the resulting perspective we are able to identify qualitative synergies between the two approaches. Complex responsive processes involve reflections on interactions that take place in time. But you cannot stop time so these present reflections always refer back to a present now gone. Complex adaptive systems are analytic tools. They are not explicitly in the present or in time at all, but they shape our thoughts and actions which are in the present. They shape how people behave, respond and think in a context. In this way people can combine, or reorganise, the approach to complex responsive processes and complex adaptive systems to show how humans address the complex notions of our world.

Keywords: Autopoiesis, Complex Adaptive Systems, Complex Responsive Processes, Complexity, Social Systems

INTRODUCTION

The starting point of complexity is interactions and what emerges from those interactions. This approach defines complexity as 'emergence from interactions'. This open definition allows complexity to apply to different domains (Stacey, 2005).

In this paper we consider two contrasting viewpoints; Complex responsive processes and complex adaptive systems. Complex responsive processes deal with interactions in the present and involve reflections on interactions that take place in time (Stacey, 2011). You cannot, however, stop time so these present reflections always refer back to a present now gone.

Complex adaptive systems focus on learning through the production of what are called mental models (Johnson-Laird, 1983; Johnson-Laird and Byrne, 1995). Complex adaptive systems are analytic tools. They are not explicitly in the present or in time at all. However, they shape our thoughts and actions which are in the present.

The paper shows that rather than being contradictory, these viewpoints are complementary for both complex responsive processes and complex adaptive systems address how we behave, respond and think in a context. This means that rather than focussing on the differences between the two approaches we here seek to identify and explore the strengths and similarities of both approaches.

To begin we will clarify our assumptions about cognition and language in a social context. This will show the need to avoid separating the act of knowing from the content of our knowledge.

Cognition and Language

The traditional view of cognition and language is based on the metaphor of inside - outside. The outside world, or real world is considered to be the source of information, and the inside of the brain, is considered to be an intelligent processor of this information, with the mind embedded within it. In this metaphor our observations are merely representations of the outside that are thought to represent the truth and the brain, and the mind within, is the machine that works on these observations to extract knowledge.

In the area of operational systems research, John Mingers has stated that a large proportion of the cognitive science is based on the assumption that the human mind works by "manipulating objective representations of the environment" (Mingers, 1989). By extending this we can see that language is used to describe an objective world. Words stand for real things that exist as a true reality independent of the individual observer.

In contrast, more modern views of cognition such as those of autopoiesis have moved away from this distinction between inside and outside (Sice, Mosekilde, & French, 2008). Cognition is held to be conditional on embodiment, and the ability of an individual to distinguish between different states is thought to be a consequence of that individual's specific embodied structure.

However, since the observer is a living entity, a 'true' insight into the domain of knowledge, requires an understanding of cognition that takes into consideration the phenomenon of living and is also mindful of the observer's role within it.

The theory of the living developed by the Chilean biologists Humberto Maturana and Francisco Varela, also known as autopoiesis (self-creation), defines a living entity as a network of processes of production of components that produces the components that: 1) through their interaction and transformations continuously regenerate the network of processes that produced them; and 2) constitute the entity as a concrete unity in the space by specifying the topological domain of its realisation as such a network (Maturana & Varela, 1980).

Autopoiesis is basic to the living individual. What happens to the individual is subservient to its autopoietic organisation for, as long as it exists, the autopoietic organisation remains invariant (Maturana & Varela, 1987). What this means is that its identity, and therefore its emergent global properties, are generated through a process of self-organisation, within its network of components. However, we must also realise that this process of self-organisation is conditioned by a two-way process of local-to-global and global-to-local causation (Figure 1).

First, there is the local-to-global determination ('upward' causation) through which the entity, with its properties, emerges. Secondly, there is global-to-local determination ('downward' causation), where global characteristics constrain or direct local interactions between the components. Thus, the internal dynamics of the components (such as neuronal nets and metabolic nets) generate and sustain the global properties of the autopoietic entity. At the same time the global properties (such as body, consciousness, mind and emotion)

7 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/article/complex-processes-and-social-systems/123440

Related Content

Human Factors: An Authentic Learning Mobile Application Design Project in a Higher Education and Industry Context
Emily Cooney, Nicole Martonik, Lauren Kolber, Emalee Sekelyand William J. Gibbs (2021). *Human Factors Issues and the Impact of Technology on Society (pp. 48-77).*
www.irma-international.org/chapter/human-factors/281748

Using an Ethical Framework to Examine Linkages Between "Going Green" in Research Practices and Information and Communication Technologies
Maliha Zaman, Claire A. Simmersand Murugan Anandarajan (2011). *International Journal of Social and Organizational Dynamics in IT (pp. 26-45).*
www.irma-international.org/article/using-ethical-framework-examine-linkages/53824

eHealth and Ethics: Theory, Teaching, and Practice
Diane Whitehouseand Penny Duquenoy (2011). *Information and Communication Technologies, Society and Human Beings: Theory and Framework (Festschrift in honor of Gunilla Bradley) (pp. 454-465).*
www.irma-international.org/chapter/ehealth-ethics-theory-teaching-practice/45313

Waking Up the Neighborhood: Partnerships with Local Businesses and Art Communities
Catherine Hakala-Ausperk (2012). *Partnerships and Collaborations in Public Library Communities: Resources and Solutions (pp. 15-23).*
www.irma-international.org/chapter/waking-neighborhood-partnerships-local-businesses/62321

En Plein Air: A Mobile Learning Approach for Sustainability Education in the Wild
Leonardo Giusti, Alessandro Pollini, Liselott Brunnbergand Federico Casalegno (2012). *International Journal of Mobile Human Computer Interaction (pp. 44-58).*
www.irma-international.org/article/plein-air-mobile-learning-approach/65860