

On Complex Theories, Social Networking, and Learning

JOHN ST. JULIEN
Independent (Lafayette, Louisiana, USA)

Gilstrap's intriguing article takes as a point of departure the burgeoning use of online courseware and social networking sites. He leverages those to suggest that these networked phenomena—networked both in the sense of technology and sociality—challenge education and especially curriculum theory to focus on social networking as a basis for future growth saying:

The future of curriculum theory will rely on the co-evolution of ontologies and epistemologies which highlight the robustness of social networks.

Those social networks, on Gilstrap's account, are best understood within the conceptual outline of modern network frameworks of complexity and chaos theories:

As a result of the increasing use of networked technology in teaching and learning, these emerging phenomena exhibit characteristics of chaos and complex systems.

The author proposes a name for this analytical mode: "human ecological complexity" but declines to:

define human ecological complexity specifically or attempt to propose a prescription for its further development in educational theory within the confines of this article

My basic response is to agree with the author's fundamental insight—education would be well-served by incorporating the insights underpinning complexity theories—while reserving the right to quibble with his some of his stances and examples, to claim

that the new analytical framework he proposes has a much wider ambit, and to, finally, accept the task he lays out in his final sentence:

... it is anticipated that further discussion of these concepts among Complicity scholars will lead to extended dialogues among educational researchers and practitioners in general on the roles of human ecological complexity in future research.

Quibbles

My quibbles are, of course, mine...the reader should be advised that they address issues that seem to stand in the way of a consistent expansion of Gilstrap's ideas in a direction I will propose.

Do we need ontology?

Gilstrap repeatedly refers to the need to establish both an ontology and an epistemology but is an ontology really necessary? Classically at least, ontology has referred to establishing the unquestionable building blocks of reality—what unifies ontological positions is that they are all foundational. But conceptually, and practically, networks don't typically rely on foundations. Instead they are 'fundamentally' relational—groundless in the traditional sense. Consider, for instance, the contrast between the grounding of classical chemistry with its reliance on the uniform qualities of atoms and the explanatory framework of ecology. The one built up its framework from the (then) certain basis of atoms in which each element (e.g. iron) is both unique and all instantiations of each element are identical. Classical chemistry doesn't make sense without these foundational, unchanging, clearly defined, separable and interchangeable elements. Ecological explanations, in contrast, have no reliance on self-identical, unchanging elements; instead it glories in multiple levels of patterns of relationship whose change over time is driven by the uniqueness, instability, and inseparability of its constituent parts.

The impulse to refer to education to an "ecological" model is well founded; educational analysis is much more like ecological analyses than those that emerge from classical science. No responsible educator acts on the belief that students can safely be regarded as interchangeable elements in a rigid explanatory schema. Appending "human" and "complexity" to that framework as Gilstrap does when proposing a "human ecological complexity" underscores that difference. Humans are notoriously unique and unstable; complexity theories, largely, are formal way of explaining how unique and unstable islands of order might arise and give rise to larger emergent areas of order.

Epistemologies, in contrast, do seem to play a major role in the exploration of dynamic systems; agreeing on how and what we know remains a central part of any practical action, but it is much harder to see the necessity for committing to any agreed-upon ontology as a necessary part of the project of building an understanding of human ecological complexity. Indeed, we don't want to feel obliged to abandon theoretical frameworks that seem to hold promise for more adequately fleshing out an complexity-

framed approach to the distinctively human discipline of education but which more or less explicitly reject a fundamentalist approach to knowledge—for example, John Dewey’s historically productive pragmatic framework of learning and knowledge.

Are online social networks remarkably complex?

Gilstrap’s argument as played out in the current article rhetorically relies on online social networks such as facebook or courseware being so obviously complex as to motivate educators to adopt complexity-based explanations of their action. But it is not clear that such networks exhibit any greater complexity than the purely face-to-face friendship circles or the classes that they supplement. Indeed it could be argued that they interestingly simplify the inherent complexity of face-to-face interaction when trading the bandwidth density of unmediated human interaction for larger quantities of simpler interactions.

What such technically mediated networks inarguably do is make formalizing and tracking complex networks of interactions much easier. That, in turn, makes it easier to show educators that changing the parameters of networked interactions have a demonstrable effect upon learning that is not captured in simpler causal or stochastic models. Further research by complexity-oriented scholars is surely in order. But that research needs to account for the full range of complex phenomena and not just technologically-mediated version, however attractive they might be for methodological reasons.

A Claim

Both my quibbles go to a central concern that may be restated as a claim: we need to be fully aware of just how complete a challenge the analytic represented by complexity theories poses and that we need to get about the business of building a new intellectual framework within which to position educational research and practice.

The style of reasoning associated with ecological analysis puts into question nearly every verity we are used to assuming. Just as ecological studies cast doubt upon the very concept of species that was the atomic basis of biology from Lamarck until recently so too does such a framework bring into question the Enlightenment’s assumption of the radically independent individual—an assumption that never had more organizing power than it has had in the field of education. In a networked world relationality, not atoms, is the core organizing principle. Individuals emerge as dense nodes of relationships whose independence from its history and context can never be assumed—even more: an individual’s very being is formed by the constantly changing set of relationships within communities of varying importance and extent. Similarly, serious doubt has arisen regarding the simple unity of the self—a doubt motivated by findings in the diverse fields of economics, social psychology, psychology, neurology, and neurochemistry.

The sovereignty of the individual so central the educational enterprise has been pulled apart from both within and without and in its place we are left with a series of

conceptually discrete “parts and pieces.” Complexity theories offer a path toward integrating these diverse frameworks and this reintegration is, perhaps, education’s central task in our day.

Gilstrap is, in my judgment, wise in using all the three words in his phrase: “human ecological complexity.” But he may not have fully realized the distance the words ‘human’ and ‘ecological’ open up between the analytic framework he so passionately seeks and the sorts of complex theorization to which educational researchers using complexity theories have often referred. The complexity theories that emerged from chemistry and physics, such as the works of Prigogine (Prigogine and Stengers 1984) and Bak (Bak 1996) that Gilstrap cites, have been inspirational. Such work is inspirational mainly in that it shows the immense range and power of the burgeoning patterns of relational explanation. That the key fields of physics and chemistry—the foundational fields of a foundationalist viewpoint—prove so receptive to analyses that point out phenomena that are inarguably complex and emergent is surprising. But these analyses have only gone part of the way down the path networked, relational frameworks offer: they remain organized around “atomic simples” related to each other by “simple rules.” But human and ecological life is not simple at its core in the way that Prigogine’s or Bak’s fields are. These examples show just how powerful the analytic of networked analyses and their complex products can be but they do not exhaust the full range of such analyses. It seems quite likely that analyses of human ecological complexity will draw from broader fields than those that brought complexity into prominence within education.

Whether we take the publication of Bill Doll’s publication of *A post-modern perspective on curriculum* as a seed helping begin the approach or the establishment of the AERA SIG in complexity in 1996 as the moment when an unabashed complexity theory framework entered the educational discourse it has been more than 15 years since educators began this exploration. It is time to move on to establishing not simply an affiliation with complexity theories but also extending those frameworks in ways that better serve the field of education, its “complex complexity,” and its unique purposes.

One path toward usefully extending educational complexity is to acknowledge that the rise of complexity theory is part of an older and broader change that has been underway for sometime within the enlightenment project. As Gilstrap readily acknowledges, networks are not new:

“Certainly human networks emerged during the socialization of clan dynamics in pre-historic life and will continue into the future (White & Johansen, 2005). And human technological networks have existed since the first tools were used to communicate ideas and exchanges across time and space.”

But what is new is the pervasive legitimacy of the analytical framework that offers explanations involving patterns of complex webs, feedback loops, and levels of relationships with likely consequences rather than atomic facts, simple, linear causation and certain results. For a long time a networked style of explanation—with its detailed descriptions, intricate relationships, and probabilistic rather than certain outcomes—was limited to the marginalized realms of history and literature. Within the last century and

half the social sciences have advanced such patterns of reason at the edges of a broader scientific framework—no reductionist models of human mind or interaction were successful. More recently, and tellingly, evolutionary and ecological explanations have proved superior frameworks for understanding the emergence of new species and the evidence for complex co-dependent patterns of relationships between environment and sets of species with a predictable development trajectory. Today the reductionist project is in disarray across the disciplines; the atomic model itself has decomposed into a myriad of complexly interacting, ever smaller particles. (see, for instance: McCoppin 2011)

The Task

In the face of pervasive failure of the larger ‘atomic’ project it seems unproductive to further belabor its inappropriateness for our specific educational project. What remains, as Gilstrap implies in his final paragraph, is to take up the task of constructing a more useful framework for educational research and practice.

Traditionally such a rethinking would imply a search for new foundations from which to build up a comprehensive new framework. In education, and the human sciences more generally, this has too often meant introducing a principled division of human understanding and interaction from the physical sciences and starting anew with the fundamental principles that justified the field’s division from the larger reductionist project. But we do not need to go to such extremes—without the need to seek a new ontological basis we are free to select a pastiche of theoretical frameworks that are stitched together by a roughly coherent epistemological consistency. We need only agree on how to agree about what counts as well enough know to shape further joint action. No single over-riding principle nor any single methodological framework need be required for all cases. What such a pastiche does require is a way of thinking about both ‘levels’ and ‘purposes’—we will find ourselves differing in what theories and frameworks we choose to array depending upon what level of complexity we are focused upon and upon what we conceive our purposes to be at the onset of inquiry. Some researchers are focused on societal issues (poverty, race, gender, ethnic culture), others on the institutional levels (the school, the district), others on group interaction (the classroom, small group learning), others still on the individual (learning, identity), and even on lower level processes (such as the neurological and chemical bases for learning).

What is clear is that it is no longer credible to believe that any of these levels of analysis can be usefully studied in isolation. The conversation that Gilstrap alludes to, and which I too believe we must engage, is about how together a new framework, a new unifying story that will allow us to make progress in the study of education and its practice.

What follows is a my initial “turn” in that conversation.

A Suggestion

Complexity, understood as a family of approaches to complex phenomena, seems most suited to offering methodology, and a common fund of concepts rather than being the core of a new approach to education in and of itself. My claim (above) is that complexity has been associated with essentially uniform 'atoms' and simple rule-based relations that yield (surprisingly) complex outcomes but which cannot be relied upon to themselves handle the complexity-piled-upon-complexity of complex human interaction within complex communities. Ideas borrowed from frameworks are immensely useful beginning with a rigorous understanding of complexity itself. Also concepts like emergence, collapse, hysteresis, far from equilibrium, stability, dynamics, constraint satisfaction, history, and path dependence have been given invigorated meanings in the context of complexity research which have immediate application in educational situations.

History and literature are the traditional tools of students of human complexity and retelling our own history and story is one of the early projects of a reconceptualized education. Evolutionary theory marked the injection of history into mainstream science and reincorporating history and story-telling with their attention to detail, motivations, contingent outcomes, and 'realistic' constraints on action into educational research is a worthwhile project. The clearest path in this regard is a renewed emphasis on case studies and telling our individual stories as a way of beginning to recognize the common dynamics found across instances.

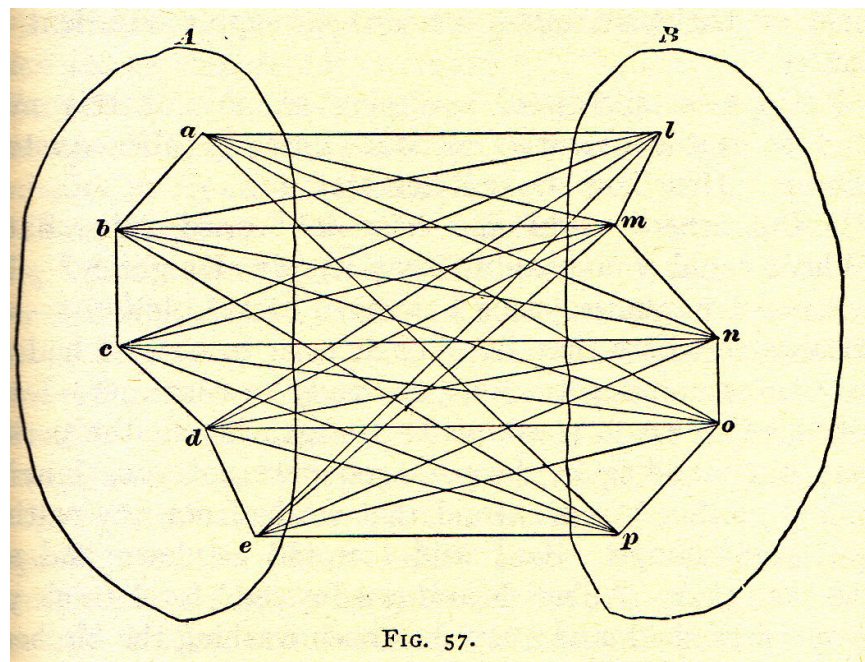


Figure 1. James' networked rendition of associative recall (James *Psychology* 1892, p. 127)

The classical pragmatism of Dewey, Mead, and James offers another suggestive prospect for recovery. Dewey's "Reflex Arc" paper, (Dewey 1896) for instance, arguably introduces the concepts of feedback and historically conditioned response to psychology; his version of the reflex is a dynamic, shifting, system. Dewey's famous antipathy to dualism is in that early paper clearly motivated by the rejection of the simple cause and effect model that then served as the foundational 'atom' of psychology. Similarly the Deweyian insistence on action and activity that lie at the core of his educational influence is a result of a refusal to split the world and the actor that is motivated by what we would today call a commitment to systemic or networked world view. Very similar lines could be drawn to Mead's social psychology and sociology (e.g. Mead 1938) and to James's associationist theory of learning. (James 1961) Collectively the three offer access to philosophical, educational, sociological, social-psychological, and psychological schools founded on their common pragmatic approach. Pragmatism itself points to a framework in which prior ontological commitments are unnecessary: the central maxim of pragmatism holds that the truth of a belief is found by examination of the consequences of acting on that belief, not on certain and secure first principles. That, in itself, is a useful precept for anyone engaged in the construction of a pastiche.

Aside from the broader factors of methodological complexity and the recovery of historic insights suppressed during the reductionist era it could be helpful to point to the contributions of some of the newer disciplines which discard atomic assumptions and embrace complex relationships between complexly composed entities. Many of the most interesting of the newer approaches blur the boundaries between entities, the contexts in which they act, and their composition. Andy Clark's exploration of the mind (Clark 1989, 2008) in one example, chronicles the increasing interpenetration of advanced work in neurology, psychology, computational science, and social psychology. His basic insight is that, as these fields become more and more emeshed in frameworks that posit networks of coupled feedback loops and level-crossing interactions, it becomes more and more difficult to talk about "learning" without grasping important implications of both neurology and social psychology or to talk about "thought" without talking about associations below the level of ideas and the material manifestations of thoughts in culturally constrained objects such as notes or computer programs. The mind does not begin with ideas nor end at the skin.

There is something breathtakingly different—and deeply complex—about thinking of educational research, curriculum, or practice from within such a radically reconfigured, network-centric point of view. Teaching the concept of "birds" is not a definitional matter (that's taught late in instruction if at all)—the focus instead turns to the eventual context of use and the neural and cultural tools to be used to shape "birdness" for use in practice. Similarly, inquiry about technically mediated networks shifts from a focus on the effects of participation on grades or attention issues and to understanding how such networks differ in their effects on learning, self, and identity from older, non-technically mediated groups and communication circles. The purpose of the inquiry is, again, of guiding importance: a researcher might wonder how the new network of a larger audience for each utterance, the links to references in a large

proportion of posts, the shorter chains of turns in conversations, and the use of multimedia effect how we engage in civic conversation—and what tools it opens up for civic education.

What I suggest here is but one set of tools—a set that I believe could be welded into a powerful framework for both understanding and acting in the educational realm. There are surely other patterns that could also be explored—research derived from the Vygotskian tradition, (e.g. Rogoff 1990) or Goffman's work (Goffman 1959) on self and identity should also prove relatively easy to work into a loose pastiche of mutually supportive ideas and tools.

As we move into a world in which the way we reason about sequences of events is increasingly shaped by research and understandings which assume an interrelated, complex, evolving set of constraints to be satisfied we move into a world which is ripe with potential for educational practice and research. Complexity theories and what we are here calling “human ecological complexity” are seeds that can find fertile soil in education. Gilstrap's call for dialogues around how that hope might be realized is well considered.

Let us turn to that conversation.

References

- Bak, P. 1996. *How Nature Works: the Science of Self-Organized Criticality*. New York: Copernicus.
- Clark, A. 1989 *Microcognition: Philosophy, Cognitive Science, and Parallel Distributed Processing*. Boston: MIT Press.
- . 2008. *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*. New York: Oxford University Press.
- Dewey, J. 1896. "The Reflex Arc Concept in Psychology." in *The Mead Project*.
http://www.brocku.ca/MeadProject/Dewey/Dewey_1896.html.
- Goffman, E. 1959. *The Presentation of Self in Everyday Life*. New York: Anchor Books.
- James, W. 1892. "Chapter 7: Association." In *Psychology: The Briefer Course*, by William James, 120-146. New York: Henry Holt.
- McCoppin, R. 2011. "Fermi closes in on elusive God Particle." July 27.
http://articles.chicagotribune.com/2011-07-27/news/ct-met-god-particle-20110727_1_higgs-boson-tevatron-fermilab-scientists (accessed July 31, 2011).
- Mead, G. H. 1938. *The Philosophy of the Act*. Edited by Charles W. Morris. Chicago: University of Chicago Press.
- Prigogine, I. & Stengers, I. 1984. *Order Out of Chaos: Man's New Dialog with Nature*. New York: Bantam Books.
- Rogoff, B. 1990. *Apprenticeship in thinking: Cognitive development in social context*. New York: Oxford University Press.

About the Author

John St. Julien is an independent scholar, community technology activist, and educational consultant living and working in Lafayette, LA, USA. His interests include family, curriculum theory, complexity, learning theory, social practices, interface design, and information infrastructures. Current projects involve curriculum design and the provision of technical support and infrastructure for a French

language focused collaboration between classrooms in Africa, South America, and North America, and interface design for a mapping app. He's currently fascinated by the potential for perceptual learning offered by new touch interfaces on mobile devices and hopes to be able to turn his attention to design in that area soon. John can be reached via email at john@lafayettecommons.org

© Copyright 2011. The author, JOHN ST. JULIEN, assigns to the University of Alberta and other educational and non-profit institutions a non-exclusive license to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The author also grants a non-exclusive license to the University of Alberta to publish this document in full on the World Wide Web, and for the document to be published on mirrors on the World Wide Web. Any other usage is prohibited without the express permission of the authors.