

Book Review

A review of *Dynamics in Action: Intentional Behavior as a Complex System*, by Alicia Juarrero, 2002. Cambridge, MA: The MIT Press, 300pp. ISBN: 0262600471. \$27.00 USD.

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In *Dynamics in Action*, philosopher Alicia Juarrero asks, “What is the difference between a wink and a blink?” The wink, of course, is intentional, and the blink is not. And this is what her book is about, a contribution to action theory, which is a branch of philosophy that investigates the difference between action and non-action, intentional and unintentional behavior. Such distinctions are crucial in courts of law and have import in interpreting everyday encounters. Juarrero states that modern action theories are grounded in an inadequate understanding of cause and explanation. To remedy this defect, she proposes that action theories take a dynamical approach and consider intentional behavior as a complex system.

Juarrero’s book consists of three parts. In Part 1, she reviews different perspectives on action to show their flawed foundations of cause and explanation. In Part 2, she explores how findings in complexity theory can lead to a new understanding of cause, and in Part 3, she turns to hermeneutics as a lens for explanation.

In Part I, Juarrero attacks our modern understanding of cause and explanation. Tracing its development from Aristotle’s four causes (formal, final, efficient, and material) and his prohibition against self-cause (the axiom that nothing can move itself), she shows that philosophers and action theorists—by keeping the dictum against self-cause and reducing the four

causes to one, efficient cause—have reduced our understanding of cause to a mechanistic perspective. Moreover, she demonstrates how action theory, influenced by Hume and behaviorism, adopted the covering-law method of explanation in which the particular is subsumed as an instantiation of a universal law. Thus, the only explanations that count are those that include prediction on the basis of a universal law.

With such an understanding of cause and explanation firmly rooted in place, an atomistic and mechanistic perspective of intentional action became the norm: Behavior was reduced to law-like patterns divorced from their history, context, and environment. Such perspectives created difficulties, at least for philosophers, in understanding behavior—how it was intended, initiated, and sustained—and disregarded the anomalies, uniqueness, and intentions in behavior that are apparent in everyday life.

At the end of Part I, Juarrero makes her first move away from an efficient cause understanding of behavior and explanation. She reframes intention as a trajectory and source of information. In addition, she uses information theory's concepts of information flow, noise, and equivocation to determine whether the flow of information is compromised by calculating the presence of noise and equivocation. If it is compromised, then intention is not present, and so action does not occur. Thus, instead of a discrete event due to efficient cause, action can be considered to be an unequivocal trajectory from intention to behavior. In this way, Juarrero resolves action theory's problems with cause and explanation. However, as she notes, information theory has its own weaknesses of handling meaning and alternative possibilities of action. To overcome those weaknesses and to further develop her treatment of action, she turns to theories of complex adaptive systems.

In Part II, Juarrero reviews characteristics of complex adaptive systems (CAS) and uses CAS as a theory-constitutive metaphor for intentional causality, asserting that "intentions and actions should be taken to be facultative, self-organized dynamical systems" (p. 112). By providing a dynamical basis for intention and behavior, she is able to underscore modern action theory's inadequacies, to account for the self-cause seen in complex systems, and to move toward a new understanding of intentional behavior.

By viewing intentional behavior as a characteristic found in self-organization dynamics, Juarrero shows that the covering-law model cannot explain these systems because 1) the properties at one stage of self-organization are not equal to the sum of the properties of the earlier stage, and 2) direct links (i.e., efficiently causal links) do not necessarily exist because properties emerge from the interactions of the parts.

This "interactions of parts" framework allows Juarrero to tackle the problem of self-cause. Self-cause, she posits, originates from a top-down

interlevel causality, which in turn arises from constraints. These constraints cause not efficiently “but by making things interdependent” (p. 150). Interestingly, constraints can “open up as well as close off options” (p. 133). Juarrero gives the example of language in which particular combinations of sounds are possible in any particular language but others are not. Without such constraints, communication could not take place, or would at least “be limited to a few grunts, shouts, wails, and so forth” (p. 138).

Redefining actions as “behavioral trajectories constrained top-down by an intention” (p. 151) and framing patterns of trajectories as attractors constraining future actions, Juarrero posits that meaning is embodied in a self-organizing neural topology. Re-organizing the neural landscape constructs new relationships and, therefore, new meanings, which, along with intentions, emerge uniquely in contexts influenced by the history of interaction between an individual’s “own dynamics” and “the variation, nature, and sequence of the stimuli” (p. 174) in the environment. Thus, for Juarrero, the notion of intention and meaning as a self-organizing landscape remedies the lack of meaning and of alternatives in information theory.

Moreover, in the process of self-organizing, new interdependencies are entrained via reciprocal interactions and ongoing feedback between internal dynamics and the driving environment. These interdependencies cause in a way different from the modern perspective of efficient causes involving “independent and disconnectable items” (p. 194) like billiard balls governed only by Newtonian laws of force. Rather, having a context and history located in time and space, they cause by constraining future behaviors, so that to move from one established attractor to another one requires disequilibrium. The complexity of establishing such interdependencies and attractors means that explanation needs to “tell the whole story” (p. 213).

In Part III, Juarrero returns to the concept of explanation, asserting that we need “to enlarge our views of what counts as a rational explanation” (p. 218) with respect to human action. Covering-law explanations may work for phenomena that can be decontextualized and limited to efficient causes. However, for human action—a phenomenon embedded in historical, contextual dynamical systems attendant with complex attractors and coupled to the environment—understanding must reconstruct the processes and interrelationships of the system, accounting for regularity and anomaly. Thus, what is needed is a genetic, historical narrative of explanation, a hermeneutics that “provide[s] insight into and understanding of how something happened, that is, into its dynamics, background, and context” (p. 240). In short, we need stories.

Stories are not new. They have transmitted heritages and values from before the time of the Hellenic epics, the *Iliad* and the *Odyssey*; nowadays, they may be the basis of curricula (e.g., “Socratic Arts” founded by Roger

Shank), and they may aid managers in making decisions (e.g., Shell International's Global Scenarios). What is new is Juarrero's complexity approach to explaining how stories work: "myths and tales explain because they recreate the open, nonlinear dynamics of the real processes they purport to explain" (p. 241).

Stories are one important educational implication I drew from Juarrero's work. Juarrero looks at stories, or narrative, primarily as a hermeneutic tool. However, they also have the potential "to promote flexibility and resilience" (p. 253), to push one's conceptual landscapes far from equilibrium, in children and in adults. Not all stories. Most simply reproduce social expectations and indoctrination. For stories to develop flexibility and resilience in children, they need to provide some element of surprise via juxtaposing concepts in unexpected ways. For an example, consider *The Farmer's Wife* (Shah, 1998).

In this children's story, a farmer's wife drops her apple, which rolls into a hole. Unable to get it out, she asks a series of animals and objects (bird, cat, dog, bee, beekeeper, rope, fire, water, and cow) to help her. However, each one in turn refuses and is called "naughty." Finally, she asks the bird to peck the cow, an action in accordance with its "naughty" nature. Agreeing, the bird sets off a cascade of actions in reverse order of animals and objects, returning to the bird again, building up to the point at which it is expected that the last (and first) animal, the bird, will retrieve the apple. Instead, at the last second, a wind blows the apple out of the hole, "And everyone lived happily ever after." This short story juxtaposes 1) asking according to *one's own interest* with asking according to the *recipient's interest* (or *nature*), 2) allegedly *naughty beings* (and the *good farmer's wife*) with *living happily ever after*, and 3) an *expected outcome* from a linear cascade of causes with *unexpected chance*.

There are other concepts with educational and research implications presented in Juarrero's text: interlevel causality, interdependencies, enabling constraints, and so on. What is the role of intention in education? What relationships exist between intention and focused attention? Juarrero wonders "whether and to what extent we can teach children to focus and channel their internal dynamics" (p. 251). I wonder if it is sufficient simply to provide activities that promote *flow*, "the state in which people are so involved in an activity that nothing else seems to matter" (Csikszentmihalyi, 1990, p. 4). Flow experiences develop the complexity of a person by increasing levels of both differentiation and integration (Csikszentmihalyi, 1990), which parallels Juarrero's point of "an earlier state space [transforming] into a more differentiated and complex set of options" (p. 180). Juarrero's book is pregnant with concepts and questions for re-examining old lines of educational research and opening up new ones.

Dynamics in Action is dense. To understand its philosophical underpinnings requires careful re-readings. It is also speculative. Juarrero is using, as she says, complex adaptive systems as a theory-constitutive metaphor. However, it is insightful speculation, and it is a story worth re-reading.

References

- Csikszentmihalyi, M. 1990. *Flow: The psychology of optimal experience*. New York: Harper & Row.
- Shah, I. 1998. *The farmer's wife*. Cambridge, MA: Hoopoe Books.

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