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Dynamical systems approaches to emotional development

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Abstract

Within the last 20 years, transitions in the conceptualization of emotion and its development have given rise to calls for an explanatory framework that captures emotional development in all its organizational complexity and variability. Recent attempts have been made to couch emotional development in terms of a dynamical systems approach through utilization of principles like self-organization and emergence. In this article, we review and evaluate these attempts, both at the level of theoretical framework and empirical instantiation. We trace the dynamic systems approach to emotional development from theoretical origins in the work of Fogel and Wolff to the more recent framework of Lewis. We also chart its empirical applications from the standpoint of research strategy specific to the approach. We also explore the challenges this approach faces in promoting its framework as both unique and beneficial to the study of stability and change in emotion.

Keywords: Emotion; Dynamic system; Development; Infacts; Children

The past two decades have witnessed a growing dissatisfaction with theoretical models that have dominated the field of psychology since the demise of traditional behaviorism in the late 1960s and early 1970s. This dissatisfaction provides the background for psychologists' emerging interest in dynamical systems perspectives on emotional development, the topic of this review. Parallel developments in several subdisciplines within psychology have led to the search for alternative models that provide solutions to a related set of problems

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that have been identified across these subdisciplines. We will begin by briefly outlining this background to the emergence of the dynamical systems perspective in the area of emotional development.

Shifting paradigms in psychological science

Around 1970, in reaction to behaviorism's radical injunction against positing unobservable variables, cognitive psychology arose to return the focus of investigators to internal mechanisms of thought that may (or may not) result in a behavioral response but—more important—were of interest in their own right. At the same time, within the domain of physiological science, researchers were having considerable apparent success in mapping the brain, i.e., identifying specific cortical and subcortical sites corresponding to memories, sensations, language capacities, and production of simple and complex motor responses (including emotional reactions such as "sham rage"). Together these findings suggested the presence of internal mechanisms that mediated the relationship between stimulus input and behavioral output and in fact might themselves determine the very nature of the behavioral output that was produced. Only occasionally were reservations voiced regarding one potentially troubling implication of such internal mechanism models: What controlled the controlling mechanisms? Was there a hidden ghost in the cognitive and behavioral machine?

Within the field of developmental psychology, a parallel history can be roughly delineated albeit accompanied by some important differences. Piagetian psychology arose out of dissatisfaction with behaviorist models that gave no role to internal cognitive developmental processes and furthermore failed to distinguish development from learning. In contrast, Piaget proposed a set of internal structures that directed logical thinking and operated consistently within a stage on any material that was fed into the cognitive system. Within the Piagetian structuralist model, intra-individual variability was expected to be minimal, acknowledged by the concept of decalage and then dismissed as error. Developmentalists "of a certain age" will remember the many heroic efforts by researchers to reconcile findings of substantial intra-individual variability in cognitive functioning with the prevailing Piagetian model. Eventually, these efforts gave way to an acknowledgement of the limitations of Piagetian theory and this has led to what many now call the post-Piagetian era.

At the same time, a revolutionary new approach to describing the organization of complex systems was being developed outside psychology and applied in the area of movement science. This approach grew in part out of attempts to solve "Bernstein's problem," another difficulty associated with assumptions of a central agent controlling the output of any complex system (Bernstein, 1967). Movement scientists had long noted that motoric action involves the continuous regulation of a myriad of muscle movements in response to fine-grained features of the action environment (e.g., the classic example of walking over slightly uneven ground). Because the orchestration of such a complex set of fine-grained responses would overburden any central controlling mechanism, Bernstein and others (e.g., Kelso, 1995; Schoner & Kelso, 1988; Turvey, 1990) adopted a dynamical systems perspective in which muscles are posited as being organized into ensembles (i.e., coordinative motor structures) and may operate as a group. Furthermore, activation of one member of the ensemble may recruit the activation of other members without the necessity of a specific command from a higher-order command agent. Thus the burden of control is distributed between higher and lower control processes. In more radical versions of this perspective, the central control agent may be completely eliminated. In either case, motor