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978-0-521-88197-5 - Human Development in the Twenty-First Century: Visionary Ideas from Systems Scientists

Edited by Alan Fogel, Barbara J. King, and Stuart G. Shanker

Excerpt

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Introduction: Why a dynamic systems approach to fostering human development?

Alan Fogel, Barbara J. King, and Stuart G. Shanker

The dynamic systems approach is an emerging interdisciplinary set of principles used by a diverse collection of scientists to help understand the complex world in which we live. The main insight that unites these scientists, despite wide differences in methods and concepts, is a focus on connections and relationships. A relationship between a particular parent and child, for example, is distinguished by the expressions and gestures as well as the words by which they understand each other. A parent's raised eyebrow might mean "pay attention," or "be careful" to their child. This small and subtle gesture has meaning to both parent and child because they have worked it out together by repeatedly learning how to understand each other, negotiating their mutual needs and goals. The raised eyebrow represents that whole history of the growth of the relationship. The relationship is a dynamic system because it changes over time (it is dynamic) and because the mutually understood gestures are the result of both people working together to create something that is more than either one of them alone (it is a relationship system). A dynamic system is a relationship that grows over time, has a history, and is more than the simple sum of its parts.

A more traditional approach to understanding the world treats the parent and child as separate entities, each of which affects the other. The parent's eyebrow raise can be understood, in this approach, to affect the child's behavior, causing the child to pay attention or be careful. This so-called "linear" or "sequential" approach to understanding the world easily leads to principles and policies that assume either the parent or the child is the cause of particular outcomes. Parental behavior is seen in this way to cause children to grow up psychologically well- or mal-adjusted. Or, the blame is placed on the child for being unruly or uncooperative. Policies and public monies are allocated to correct the problems by treating the parent or the child.

These policies and programs can't and don't work out well for anyone, neither the families they intend to help nor the society they were meant

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to improve. Why? Because the source of the strength or weakness is not in the parent or the child: it lies in their relationship and how it grew. Effective policies and programs, mindful that a problem child usually arises from a series of mis-coordinations and misunderstandings in a parent-child or teacher-child relationship, can harness an understanding of how relationships grow over time to change the course of that growth toward more adaptive patterns. A dynamic systems approach gives us a toolkit of methods and concepts that are relationship-based, oriented toward understanding and enhancing the ties that bind us together.

The dynamic systems approach takes many forms, depending upon the background and training of the scientist. Because this approach originated in physics and mathematics, many scientists strive to find mathematical models that describe complex systems and their changes over time. Mathematical spin-offs of dynamic systems approaches include chaos theory, catastrophe theory, dynamic equations of motion, and fractal geometry. These mathematical approaches are well suited to situations in which concrete measurements can be made of things like time, distance, or speed.

Dynamic systems ideas have also been applied in the biological and social sciences where such precise measurements cannot be made. In these cases, the focus is on the qualitative, rather than the quantitative aspects of the interpersonal relationships that comprise the dynamic social system. Of particular interest to these scientists is the way in which people co-create and when necessary repair mutual understandings in long-term relationships, such as in the example of the parent and child, above. At present less typical, but we hope on the increase, are approaches in the physical and social sciences that bring together quantitative and qualitative analyses of a single relationship system. Such a complementary approach may be particularly apt in attempts to measure and describe change over time in human development.

This book is a collection of essays written primarily by non-mathematical biological and social scientists explaining how their own unique interpretation of the dynamic systems approach constitutes a new way of thinking in their field, and how it contrasts with older methods and concepts. Although we could not include all approaches to applying systems thinking, we strove to collect essays from many different disciplines including psychology, biology, anthropology, primatology, education, and sociology. We, the editors, requested that the authors articulate their use of dynamic systems and relationship principles in non-technical language.

Some of the authors of the chapters in this book endeavor to incorporate explicitly some of the concepts of dynamic systems theory.

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For these chapters, the authors explain and apply the concepts in clear and simple language. For other chapters, authors take a more general “relationship” perspective. They show how human development occurs in the context of social systems in which all participants affect each other and in which simple cause-and-effect reasoning is insufficient to comprehend the complexity of the social processes under investigation.

Our main goal in this book is to bring a dynamic systems perspective to the issue of how to enhance and foster human development throughout the life course. It is our hope that these chapters will bring about a novel way of thinking about and solving some of the major hindrances to human development in the world today: including poverty, violence, neglect, and disease. We are also particularly interested in the early years, as the child’s experiences during this period may have a large impact on the possibilities for future development. We thus asked each of the authors to think about how their own work may lead to implications for policies and practices related to enhancing and fostering human development.

The book is divided into four main sections

Part I (Dynamic Relationships between Genetics and Environments) focuses on a new understanding of the complex relationships between genes and environments. Genes cannot be considered to determine physical characteristics or behavior in the absence of their relationships with particular types of supporting environments. If those environments are not present, the genetic potential will not be realized. Dynamic systems thinking helps us to understand the ways in which physical characteristics and behaviors can change over time or remain the same, depending upon feedback transactions in the gene–environment relationship and the way genes manufacture proteins in the cells. The chapters in this section help us to appreciate how changes in the relationship with the environment – in factors related to how the organism responds to diet, education, family communication, and the like – play an essential role in managing genetic disorders and optimizing genetic potentials. They show how no single factor acting in isolation can be held responsible for a developmental outcome.

Part II (The Dynamic System of the Child in the Family) reveals some of the subtle interchanges between children and their families that either promote or restrict healthy development. Dynamic systems thinking – with its focus on change and transformation in relationships – helps us understand how unhealthy and unproductive patterns get

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stabilized in family relationships, and how they may be changed for the better. The chapters in this section reveal how the emotions, long neglected in people's thinking about what influences healthy development, are a fundamental part of the complex system of inter-individual communication for humans, and also for their closest living relatives, the apes. These chapters also make clear that – just as behavior and thinking does not develop in isolation from the emotions – individuals do not develop in isolation from others in their families. In fact, dynamic systems thinking makes clear that the “individual” is not a useful concept when thinking about creating healthy and nurturing environments. Parents and children co-create their relationships, each influencing the other in a complex system of evolving personal meanings.

Part III (The Dynamic System of the Child in Social and Physical Environment) takes this essential point even farther to include not only relationships in the family but also with the society, culture, and the natural world in which the child is raised. Children become valued and productive members of a society through a complex series of transactions that involve observing the world around them, taking initiatives and receiving feedback, and constructing a view of themselves that is inseparable from the fabric of the social world in which they were raised. The dynamic systems approach shows that it is not possible predictably to change child development outcomes by simply dictating a policy change in the family, school, or any other social institution. The chapters in this section demonstrate that interventions must take account of the complex series of transactions between children and their environments, each affecting the other, and the complex transactions between policies and practices within society.

Part IV (Dynamic Systems Approaches to Mental Health) shows how this theme of complex transaction in the relationship between child and society can be applied to treatment programs that foster child and family mental health. The chapters in this section propose relationship-based interventions that take account of the transactions between children and those around them. Treatment is not focused on fixing the individual but rather on teaching people to communicate more effectively about what is most important to their lives. The dynamic systems approach applied to clinical practice suggests ways to intervene that support not only the child but *also* the social environment in which the child lives day-to-day. Without such whole systems support, interventions are less likely to succeed in the long run.

The book concludes with an introduction to the basic methodological principles of a dynamic systems approach, written in non-technical language. This chapter conveys how keenly we, the editors, believe in

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the potential for dynamic systems research to shift the ways in which people think about human development. This chapter promises a new approach to scientific research that takes account of the whole system of complex relationships in which the individual is embedded, and how that system changes over time. We currently possess all the necessary scientific tools to carry out such a program of research. Agencies responsible for promoting and planning research can play a crucial role in shaping a more systemic approach to the study of the important questions and challenges facing optimal human development in nurturing environments.

We expect this book to have impact in a number of ways. First, we intend to open a dialogue with policy-makers and to create a platform for future policy-planning debates in such areas as early child development, education, and therapeutic interventions for children and adults. All of the chapters in this book contain ideas relevant for creating policies that are rooted in a dynamic systems perspective on human development. Policy-related ideas involve a wide range of arenas, including clinical practices, making laws that are informed by a broad systems understanding of development, and decision-making about how to allocate funds for research on human development.

Second, we hope this book will serve as a resource for students and scholars around the world who are laboring to master the powerful tools afforded by a dynamic systems approach. For those who want to foster nurturing care and human development in the real world, we offer support for a holistic, dynamic approach and provide a host of new ideas both theoretically and methodologically. Further, each chapter is followed by a list of readings allowing in-depth further exploration of dynamic-systems ideas.

Finally, we hope that this book will make a vital contribution to the study of human development. There is now substantial research establishing the importance of early childhood experiences for the healthy development of the mind and body. What has hitherto been missing, however, is a detailed understanding of what sorts of conditions promote psychological and neurobiological development, and more fundamentally, how these processes operate. The dynamic systems approach provides us with the conceptual and methodological tools necessary to address these critical questions. The better we understand these processes, the better we will be able to understand the diversity of ways that people develop in relation with others around the world, and design social and education policies, and intervention protocols where appropriate, that will enhance the development of all people and better equip them to deal with the formidable challenges of the twenty-first century.

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The editors and many of the authors of this book are members of the Council of Human Development, an international group of biological and social scientists who take a systems orientation. The members of the Council believe that research and applied work, as well as policies affecting peoples around the world, need to be informed by the broadest possible dynamic understanding of how human beings develop and function in relationship to the human and natural world. This includes developmental processes that build on the relationships between biological, familial, cultural, and environmental factors.

The Council is guided by the principle that early childhood is the most important time in a human being's development. Growth in these years establishes the foundations for intellectual, emotional, and moral growth; education and intervention regarding nurturing care in these early years can establish long-lasting practices that maintain physical and mental health and prevent unnecessary suffering.

Primary goals of the Council are:

- *To promote a "dynamic systems" view of development*, a new science of development that has not yet received widespread attention.
- *To recognize and aid the diverse ways in which people around the world may achieve nurturing interactions and develop safe, caring communities for the future of children.*
- *To initiate and maintain a public education campaign* involving leaders from all public arenas to support a public ethic on the importance of nurturing interactions and safe, caring communities that thrive through a caring relationship with the natural world.
- *To support strategic research and service programs* to further the knowledge base and create the "nurturing infrastructure" to translate these concepts into care for every individual and family.

Eight working groups, each led by a member of the Organizing Sub-Committee, comprise the Council: Anthropology of Human Development, headed by Christina Toren; Biology and Development, headed by Robert Lickliter; Ecology of Human Development, headed by Alan Fogel; Evolutionary Perspectives, headed by Barb Smuts; Geo-Political Contexts of Development, headed by Stuart Shanker and Stanley Greenspan; Mental Health and Development, headed by Stanley Greenspan and Stuart Shanker; Social Developmental Neuroscience, headed by Marc Lewis; and the Latin American Initiative, which is headed by Pedro Reygadas. In addition, the Council co-sponsors publication of the *Journal of Developmental Processes*, edited by Barbara J. King. Please visit the Council's website at www.councilhd.ca

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for announcements, new research publications, and new journal issues as they appear.

We are grateful to the many scientists exploring systems ideas in different disciplines that have inspired and informed so much of the thinking presented in this book. We are also grateful to the Harris Steel Foundation, which provided critical support for the creation of the Council and for the meetings that led up to the publication of this book. Finally, we wish to honor the memory of Gilbert Gottlieb, one of the contributors to this book, who did not live to see it published.

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Part I

Dynamic relationships between
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1 Developmental dynamics: the new view from the life sciences

Robert Lickliter

James is an eleven-year-old boy who is tall for his age, has blond hair and blue eyes, loves to play baseball, and is the best right-handed pitcher on his little league team. James is easy going, popular among his classmates at school, and excels in math and science classes. What is the source of such traits as athletic ability, temperament, and intelligence? Why are some children outgoing and socially skilled, while others appear introverted and avoid unfamiliar social situations? Why do some children find puzzles of logic interesting and challenging, while others don't seem interested or willing to apply themselves to such mental tasks?

In the first half of the twentieth century, many biologists and psychologists thought that major aspects of behavioral development progressed in an orderly and preordained sequence under the direct control of genes. From this view, genes were seen to guide the nervous system to mature in a predetermined fashion, giving rise to so-called "innate" or "instinctive" behavior. Likewise, human characteristics like temperament, intelligence, or athletic ability were thought to be genetically based and to be relatively unaffected by experience or environment. Thanks in large part to more than half a century of comparative and developmental research, most biologists and psychologists now appreciate that behavior does not simply unfold from some predetermined genetic blueprint or template. Assumptions of genetically determined "innate" or "hard-wired" behavior have gradually given way to the realization that genes cannot, in and of themselves, produce behavioral or psychological traits or characteristics.

This more dynamic view of behavioral development, in which an individual's interests and behavior are no longer seen to be independent of his or her activity, experience, or context, has not, however, been widely extended to other levels of development. While many scientists now appreciate that it is not accurate to speak about genes directly determining psychological characteristics like intelligence or personality, most continue to view the development of an individual's physical traits

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through the old lens of genetic determinism. Physical characteristics like hair color, eye color, height, or body type are examples of traits that continue to be attributed solely to genetic factors, thought to be directly caused by genes inherited from one's parents. Thus, James's blond hair, blue eyes, right-handedness, and tall stature are thought by many to be caused by the genes he inherited from his mother and father. This view of trait development is both simplistic and misleading, but continues to have a firm hold in the minds of many people.

We now know that all traits, be they behavioral or physical, require the necessary contributions of both genetic and non-genetic factors. Developmental biologists have repeatedly demonstrated that the development of any trait or character is the consequence of a unique web of interactions among an individual's genes, complex molecular interactions within and across cells, and the nature and sequence of the physical, biological, and social environments through which the individual passes during its development. These developmental dynamics must be included in any plausible account of how traits develop and change over the course of infancy, childhood, or adulthood. This shift in thinking requires moving beyond the mistaken idea that genes determine traits and actively exploring *how* traits emerge from genetic and non-genetic factors co-acting over the course of development. This process-oriented approach is often referred to as a "developmental systems perspective" and represents a new way of thinking about human development and behavior that is not yet widely known or appreciated beyond specialists working in the developmental sciences.

An example of the dividends of the emphasis on *how* questions in the developmental systems approach to human behavior is useful here. A common trait widely held to be genetically determined is handedness, an individual's preference to use either the right or left hand to perform such skilled behaviors as using a fork, writing with a pen, or throwing a ball. This assumption probably results from the observation that left-handedness seems to run in families and from the fact that there are no obvious environmental or experiential factors that seem to influence whether an infant or toddler will consistently prefer to use his/her right or left hand to reach for a toy or whether a child will choose to draw or write with his/her right or left hand. Such patterns of cerebral lateralization (in which the left and right sides of the brain specialize in the physical and behavioral functions they support) that result in James throwing a baseball with his right hand have long been attributed to genetic factors, with little concern for how extra-genetic factors, including the specific experiences of the developing individual, might affect such motor preferences.