Introduction

Carol M. Worthman and Constance A. Cummings

Anyone who cares for the interests of the young faces a vexing paradox: Dramatically escalating challenges threaten their future even as our knowledge about human development exponentially expands. Global trends including rapid societal changes in family formation, schooling and paid labor participation, escalating refugeeism and migration, and rising rates of AIDS- or conflict-related orphanhood have transformed early rearing environments. Concurrently, advances in the developmental sciences have identified critical elements and mechanisms involved in social and emotional development in humans. Recent molecular research on epigenetics, for instance, not only documents gene-environment interactions that play crucial roles in this process, but also illuminates the significance of the particular context in which a person's early experience unfolds. Both clinical and animal research play leading roles in these advances, by respectively providing in-depth clinical pictures of how development goes awry or is mended, and comparative or experimental material about how the process works. Reciprocally, anthropological studies probe the range of cultural practices, meanings, and ecologies that shape both contexts and experiences.

These key intellectual insights have transformed how we think about development, about culture, and about biology in ways also relevant to policy, prevention, and treatment. Essentially, we have learned that human nature is innately nurtured: Without the social world and its animating culture, we cannot become human. Although how we depend on nurturance is peculiar to humans, such reliance turns out to be widespread among animals. Developmental biology is being revealed as pervasively context-expectant, designed to use typical experience – such as maternal licking in

rats or exposure to language in humans – as stimuli that drive the process. Who would have suspected that maternal licking behavior in rats would organize stress reactivity in their offspring, or that there would be analogs to this effect in humans?

Similar findings from across the academic spectrum are altering concepts about parents and parenting practices, and can inform action at the community and clinical levels. Learning that child perception of financial distress predicts psychopathological insult more strongly than does objective poverty casts new light on globalizing material culture and the sources of youth distress. Detailed evidence on the cascading neurodevelopmental, psychobehavioral, and multi-systemic (immune, endocrine, and metabolic) effects of early trauma literally flesh out the sources of health disparity when we learn of the extraordinary rates of trauma reported by clients at a public hospital in Atlanta. Finally, evidence that play is important for learning reciprocity and other social skills gives pause when we notice the relative inattention to play, by both science and society. The rather rudimentary state of knowledge about the developmental effects of play, contrasted with that of trauma, for example, further highlights social conditions and priorities that are mirrored in science.

FORMATIVE EXPERIENCES: WHY, WHAT, HOW

The view of human nature as nurtured has sharpened attention to changing contexts for child development and highlighted that such contexts comprise evolutionary, historical, cultural, familial, proximal, and genetic dimensions. A consistent motif across these domains is that successful development means becoming competent in the world as it is. From this perspective, there is no single ideal developmental outcome; rather, the process must balance plasticity with resilience to suit the person for the contexts in which s/he needs to function across the life course. With that insight in view, this volume brings to bear a multidisciplinary approach to understanding how early experiences shape human development. Its purpose is to engage development of whole mind/brain/body systems while avoiding "black holism," which includes everything and explains nothing. The contents and organization aim to communicate a working picture of the key insights, conceptual and empirical models, thorny problems, and future prospects of a multidimensional developmental science and practice that is committed to supporting and learning from real-world settings – in clinics, homes, communities, or organizations.

In line with such orientations, some of the particular cross-cutting questions about early experiences that the editors – a biological anthropologist,

a developmental psychobiologist, a clinical neuroscientist/child psychiatrist, and a linguist – wanted the book to address include:

- What are the key mechanisms for plasticity and individual differences in early life as experiences start to accrue over time and across cultures?
- What are the key parent-offspring dynamics that shape behavior with long-term – including cross-generational – consequences?
- How do different social and cultural conceptions of childhood – as well as the particular behavioral patterns and roles that children are enjoined to perform in any given society – shape psychobiological development?
- What kinds of social behaviors push the envelope of what is considered normative in a given context?
- What sort of feedback effects do challenging but common experiences such as fear, aggressive behavior, or play fighting have on development?
- How do particular cultural and social ecologies, such as endemically violent societies, psychotropic medication of children, or media exposure guide developmental trajectories?
- How do insights into plasticity and variation inform practices and policy decisions within and across populations?

TOWARD INTEGRATED MODELS OF DEVELOPMENT

The book reflects an expanding movement, with deep roots in developmental research and practice, to resolve antinomies in western thought commonly captured by mind-body, nature-nurture, and individual-collective distinctions. Through a focus on early experience, the book examines evidence regarding key developmental processes, such as epigenesis, organization of biological stress response systems, or emotion regulation, and traces their formation through multiple levels of analysis, including molecular, systemic, psychobehavioral, familial, and societal. That all these levels occur in concert must somehow be represented in conceptual frameworks that are comprehensive yet realistic. Certainly, treatment of the individual as the unit of analysis has given way to a growing appreciation that a complete understanding of human development is not possible without a consideration of its contexts, including evolutionary history and design, social dynamics and relationships, and cultural settings and ecologies. Chapters provide extended discussion of the evidence and current ideas around these key issues at different levels of analysis, from neuroarchitecture and sensitive periods to cultural differences and social upheavals. As outlined in Table 1, the chapters systematically span a comprehensive range in scale, from molecular to global. We also have encouraged contributors to rifle their drawers of unpublished observations to add

Table 1 *Formative Experiences Contributor Map: Chapters*

Chapters	Developmental Psychobiology			Clinical Neuroscience	Clinical & Cultural Devel. Psychology	Anthropology	History	Policy	Global Health
	Genetics & epigenesis	Molecular, cellular	Animal studies	Imaging, evaluation, therapies	Theory, treatment	Evolution, ecology, culture, society	History of anthropology, psychiatry, policy	US, non-US	WHO/agencies, epidemiology
	perinatal programming, intergen. transmission, genes: 5-HTT & FKB5	*language, intergen. trans., sexual dev., sensitive periods, learning, plasticity*	*sensitive periods, early life stress, early abuse, emotion, play*	*trauma, substance abuse, intergenerational transmission*	*cog. dev., aggression, violence, neighborhood, community dynamics, cross-cult. comparison*	*parental care, gender, adolescence*	*human development, political conflict, globalization, equality, restitution*	*child health care systems*	*poverty, heath disparities, maternal care, syndemics*
Szyf (3)									
Nowakowski (5)									
Wiedenmayer (4)									
Zitzer-Comfort (6)									
Pellis (16)									
Panksepp (18)									
Seraphin (12)									
Bornstein (2)									
Herdt (14)									
LeVine (1)									
Richter (20)									
Halfon (19)									
Requejo (21)									

valuable material not available elsewhere. Panksepp and Jaak, for example, moved beyond reviewing his years of work on the developmental psychobiology of emotion regulation to consider the causes and consequences of widespread psychotropic medication of children diagnosed with attention disorders.

CASE STUDIES AND COMMENTARIES

Given our central objectives of interdisciplinary communication and practical applicability, we seek to make the contributions accessible and useful to researchers across disciplines. That goal may be best achieved by the case study and response format, which solicits and integrates different interpretations of the same phenomena by experts from developmental neurobiology, clinical sciences, psychology, and cultural, psychological, and biological anthropology. Specific cases and observations can stimulate focused discussion to yield a richly layered analysis when commentators interpret and attempt to explain the same phenomena through very different conceptual and empirical lenses.

Case studies (see Table 2) were selected to span a range of settings and levels of analysis that refract aspects of common issues. These include infant maltreatment in macaques as well as preventive and palliative care for maltreatment and early trauma in humans; conditioned defeat in hamsters as well as the impact of bullying and stigma in Indonesia; contrasting forms of traditional childrearing practices as well as the developmental impact of globalization. Comments about case studies were solicited from scientists, clinicians, or agents who engage development with quite different disciplinary paradigms to build a composite multidimensional picture of the cases. The process reveals synergies as well as gaps in the explanatory frames juxtaposed from diverse lines of research. Similarly, it discovers where and how knowledge can be applied to address suffering, prevent harm, and promote welfare.

GLOBAL REALITIES, LOCAL APPLICATIONS

At the beginning of this introduction, we noted the irony of escalating risk to children even as understanding development swiftly advances. A logical prescription for that tension is to become more creative and effective in applying what we know about development toward realizing human potential. Of course, it is not that simple. Aforementioned advances in the understanding of gene-environment interactions, for example, do not

Table 2 *Formative Experiences Contributor Map: Case Studies*

readily translate into international policy. Translational work is required, not only from scientists to practitioners, but also from cells to societies, from the experimental to the everyday. The study of development contributes fresh insight into what matters and how things work. New information can help establish priorities and identify whether and how change is possible. With the aim to bridge the gap between scientific progress and real-world challenges, we incorporate case study and policy perspectives that orient academic developments toward pragmatic concerns for addressing the welfare of children, particularly in adverse environments.

There are important reasons for studying development and attempting to apply its lessons under as many conditions as possible. First, there is the matter of equity: The bulk of research on development occurs in western and/or post-industrial societies that represent only a small, privileged fraction of humanity. Second, there is the problem of provincialism. The recognized importance of context and early formative experiences impugns models of human development that are founded on so narrow a sample of human societies and conditions. Expanding the range of inquiry and inclusion necessarily will both test existing assumptions and views, and expose trajectories or mechanisms that were opaque in other settings. Third, differences within populations commonly are found to exceed those among them; comparison of pathways to and consequences of diversity within populations may illuminate sources of difficulty and distress as well as forces for resilience and well-being. Attempts to apply insights from such comparisons can contribute to the urgent necessity to recognize and accommodate diversity, both within and among populations.

The final section deals directly with building contexts that promote child flourishing and health, in domestic, community, state, and global contexts. International leaders in child health, welfare, and policy consider how state-of-the-art knowledge and concepts can be marshaled to address the needs of children around the globe. But such applications will need to be made organically and self-critically in light of local conditions and awareness of likely limitations in the state of the art itself.

The book in its entirety is organized as follows. Section I leads with historical and contemporary overviews of cross-cultural, developmental research on plasticity and variation. This segues into the four core sections (II-V) that anchor the book. The chapters in Section 2 describe in detail how experience interacts with biological development at the molecular, behavioral, social – emotional, and cultural levels. Section 3, "Formative Relationships Within and Across Generations," is entirely comprised of case studies with commentaries from experts in different fields, which

capture the complexities of the topic more succinctly and evocatively than do abstract scholarly treatments. Sections IV ("Social and Cultural Contexts of Childhood Development: Normative Settings, Practices, and Consequences") and V ("Fear, Fun, and the Boundaries of Social Experience") interleave case studies and full-length chapters that cover such topics as teasing and emotional regulation, trauma and psychopathology, gender identity, bullying, social defeat, spiritual growth, and play. The concluding Section VI ("Public Health, Education, and Policy Implications") translates current multidisciplinary perspectives reflected in the four core sections into potential pragmatic applications, particularly domestic and global public health and policy. International leaders in child welfare and policy comment briefly on these prospects.

PROSPECTS

This is a time when the hopeful vision to globalize conditions for human flourishing faces powerful challenges on ecological, political, sociostructural, and existential fronts. The concurrent great advances in understanding development also rest on shaky ground, being limited to a narrow range of human variation that constrains their generalizability. These challenges call on capacities for creativity and collaboration to imagine and enact a more nurturant and responsible world, writ large and small, where formative experiences foster positive human development and diversity. Emerging dialogues and pluralisms – disciplinary, cultural, methodological, and geographical – appear to nurture these capacities. Through such engagements, unexpected changes in perspective are catalyzed, new possibilities and sympathies open, and minds are literally changed. We close with a metaphor of shifts in perspective, regarding how differently societies may view the "past" and the "future." We tend to treat time as a journey advancing into a future that spreads out ahead while the past recedes behind. But imagine thinking of time through a metaphor of the visible, where the past accumulates before us while the invisible future moves up behind us. This possibility conjures a different relationship to experience and urges speculation about what other concepts of time might exist. Metaphors matter: Objectively we know that the future is neither ahead nor behind us, but how we think about it defines our experience and action. By analogy, the perspectives we hold on development exert similar effects, with profound implications for tomorrow's children. We hope that the ideas, models and data presented and debated in this book promote fresh views of development that benefit us all.

SECTION ONE

HISTORICAL, CROSS-CULTURAL, AND DEVELOPMENTAL SCIENCE PERSPECTIVES

ONE

Plasticity and Variation

Cultural Influences on Parenting and Early Child Development Within and Across Populations

Robert A. LeVine

This chapter examines two moments in the twentieth century when anthropology made a major contribution to developmental research or was in a position to do so. I seek to clarify what progress has been made up to now and discern what can be done to find a way forward.

The question of whether anthropology can make a central contribution to our understanding of human development has been asked – and answered affirmatively – at least since Margaret Mead (1928, 1930, 1931) raised it in the first third of the 20th century, and numerous times since then by the Whitings (e.g., J. Whiting, 1954; Whiting & Whiting, 1960) and others, including several contributors to this volume. Forceful arguments, vivid illustrations, and empirical evidence have been assembled – repeatedly, recently as well as in the past, and in interdisciplinary forums – to argue the necessity of cross-cultural research on childhood environments and development for a science of human child development and, more specifically, for developmental psychology and psychiatry. Is there any need to make this case again?

Apparently so. All the evidence I am aware of suggests that even in this first decade of the 21st century, with the exception of nutritional science, anthropological, and other cross-cultural studies remain marginal to and of minor significance in the mainstreams of the research disciplines investigating child development (developmental psychology, child psychiatry, pediatrics, and education). This is not to say that there has been no progress in the awareness of cultural factors and the acceptance of comparative evidence in these fields, but such progress is often without implications for the setting of research agendas. Take, for example, *From Neurons to Neighborhoods: The Science of Early Childhood Development* (Shonkoff & Phillips,

2000), the final report of the National Academy of Sciences (NAS) committee on "integrating the science of early childhood development." In Chapter 3, "The Challenge of Studying Culture," although the authors say,

> Cultural practices related to early childrearing are highly variable and lead to different developmental outcomes. . . . Sound scientific thinking asks how and why cultural practices differ and assesses their differential developmental consequences, in both the short and long term. It is therefore essential that the full range of possible effects of contrasting childrearing practices be evaluated objectively. (p. 62)

they also reveal,

> [T]he committee began its work with a strong conviction about the importance of culture as a highly salient influence on early childhood development. As our examination of the knowledge base progressed, we became increasingly appreciative of its complexity. In part, this complexity is related to the interdisciplinary nature of the field and its reliance on a wide array of qualitative and quantitative methods. Beyond methodological diversity, however, the committee was struck by the extent to which much of the research on the role of culture in child development is tied to values and personal beliefs.
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> Thus, the task of assessing the science of culture was exceedingly more complicated than assessing the neurobiology of brain development. . . . Consequently, this report presents a more bounded analysis of culture than it does of neuroscience. It is important that this discrepancy not be interpreted as an indication of the relative importance of these two domains of study. Quite the contrary, it should be viewed as a strong message both about the significant challenges that face those who investigate the role of culture in early childhood development and the critical need for ongoing methodologically rigorous research in this area. (p. 58)

In effect, their endorsement of cultural research is vitiated by indirect criticisms of it as biased, methodologically deficient, and exceptionally "challenging" and "complicated," in comparison with other lines of research. As complex as cultures may be, however, it is hard to accept that they are more so than the human brain, or that it would have seemed so had there been a cultural anthropologist on the committee. And the abovementioned "critical need" for research "in this area" is mentioned neither in the next chapter's discussion of research strategies for investigating causal influences of child rearing on development under the ethical restraints on experiments with humans – although this has always been one of the prime reasons for cross-cultural research on child rearing – nor

in the recommendations of the last chapter. Research in diverse cultures does not find a place on the committee's agenda for future work.

My intention in this paper is not to complain about or explain the child development field's attitude toward anthropological research. The National Academy of Sciences committee's ambivalence will have to stand as emblematic of attitudes prevalent in that field as a whole. My point here is simply that the moment for making a case for anthropological research on child development, and particularly for comparative research that can help identify the boundaries between normal and pathological development, has not yet passed.

Rather than repeating familiar arguments and evidence, I shall examine two episodes in the history of anthropology that opened doors to developmental research and pointed to potential advances, only some of which have been realized: Franz Boas's research on physical growth beginning in 1908 and William Caudill's comparison of Japanese and Americans beginning in 1960.

FRANZ BOAS AND CHILD DEVELOPMENT

We do not usually think of Franz Boas (1859–1942), a founder of academic anthropology in the United States, as involved with child development except through his students of the 1920s, Margaret Mead and Ruth Benedict. But Boas actually had interests and experience of his own in this field, dating back at least to 1888, when he was hired by G. Stanley Hall, founder of American child psychology, to teach in the Psychology Department at Clark University and conduct a study of physical growth of the immigrant children in Worcester, Massachusetts. This was Boas's first academic position in America. He taught at Clark for three years, from 1889 to 1892, and left as the result of an administrative dispute with Hall in which a majority of faculty members resigned. Years later, however, Boas remembered Hall and the atmosphere of interest in child development at Clark as having stimulated his work on "the influences of environment upon growth" (quoted in Stocking, 1968, p. 165). He published a short paper on the value of anthropometric measures of physical growth in the second issue (1891) of Hall's journal of child study, *The Pedagogical Seminary*, and initiated a longitudinal study of the immigrant children in Worcester, which was discontinued when he left Clark. The following year he published an article, "The Growth of Children," in *Science* (Boas, 1892).

Boas initiated later anthropometric research in Toronto and in Oakland, California. Then in 1908, he undertook an anthropometric study of more

than 17,000 European immigrants in New York City, seeking to detect the effects of childhood environments on physical growth. This study stirred controversy when it was published in 1911–1912 and has recently received attention from biological anthropologists, who have reanalyzed the dataset Boas made available in 1928 (Sparks & Jantz, 2002; Gravlee, Bernard, & Leonard, 2003), and even from the *New Yorker* magazine (Pierpont, 2004).

Boas was trained in anthropometric methods by Rudolf Virchow in Berlin in 1883. Virchow, known in medicine as the founder of cellular pathology, was also a leader of German physical anthropology. Boas greatly admired his scientific attitude, radical empiricism, and his liberal political orientation; he was also influenced by Virchow's concept of plasticity or mutability as a basic biological principle that was directly applicable to the physical growth of humans. Boas's exposition of Virchow's ideas in his obituary in *Science* is virtually a charter for his own research on immigrants:

> Cells, in the course of their lives, may change their forms according to age and according to the influences to which they are subjected. Such changes take place both in the healthy and the sick organism, and often it is impossible to draw a sharp line between normal physiological, and abnormal or pathological, changes. . . . [I]n reality there is no distinct line of demarcation between physiological and pathological processes, that the latter are only physiological processes which take place under difficult conditions.
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> [H]is position rests on the general scientific principles that it is dangerous to classify data that are imperfectly known under the point of view of general theories, and that the sound progress of science requires us to be clear at every moment, what elements in the system of science are hypothetical and what are the limits of that knowledge which is obtained by exact observation. (Boas, 1902, reprinted in Stocking, 1974, pp. 38–40)

In other words, human bodies change in response to differing environmental conditions; apparent pathological variations may be normal responses to differing conditions; and the scientist should distinguish what he knows from what he guesses.

In the immigrant studies, Boas was particularly interested in proving that the concept of fixed racial subdivisions among European peoples – based on skeletal, particularly cranial, measurements and held by most physical anthropologists at the time – was inconsistent with the evidence that skeletal dimensions changed with migration. By the time of the New York study in 1908 he was aware that such changes had been shown to occur with rural-urban migration in Europe; thus it seemed predictable that there would be further changes in head form when Europeans came

to the United States, as they had been doing in large numbers. Despite his high level of statistical sophistication for 1910 (Tanner, 1959), Boas's New York data required methods of statistical inference that were not yet available. Without computers or even calculators, and with improvised statistical methods, he did as well as he could and came up with restrained descriptions of the evidence and with the conclusion that children of the several ethnic groups changed in cephalic index in migrating to New York, although not in the same direction. He did not attempt to explain which aspects of the environment caused the changes. Boas nevertheless claimed that the data showed that the cephalic indices of children change in a new environment, thereby challenging the doctrine that they were fixed by racial inheritance and setting off a controversy that went on for years.

The recent controversy over Boas's data, however, is not over whether there are fixed racial types based on cranial form that are impervious to environmental influence – no one believes that any more – but rather whether Boas "got it right" in his interpretations of the ambiguous evidence from his study. Using contemporary statistical methods to analyze the corpus of data Boas made publicly available in 1928, one group (Gravlee et al., 2003) concluded that Boas did get it right, whereas another (Sparks & Jantz, 2002) concluded that he did not. They used different analytic methods, but their findings are actually not far apart.

Both groups found that the differences in cephalic index between children born in Europe and those born in New York are small. Gravlee et al. emphasize that these differences are statistically significant (unlikely to occur by chance), whereas Sparks and Jantz emphasize that the differences by birthplace account for a minuscule amount of the variance in cranial measurements (roughly 1 per cent, according to Gravlee et al.). Thus when Sparks and Jantz assess heritability in the data (a measure based on variance), they are able to show that almost all of the variance in cranial form is from genetic rather than environmental factors. But Gravlee et al. find that the parent-child correlations in cephalic index of the foreign-born children average .64, whereas those for the American-born children average only .43, indicating a drop in parent-child similarity because of immigration to the United States and the associated environmental changes in the conditions of early childhood.

I agree with Gravlee et al. that there are unmistakable, perhaps indisputable, signs of environmental influence in these data, but I also agree with Sparks and Jantz that it is remarkable how weak the environmental influence is, particularly given the historic status of this study as definitively falsifying racial types in physical anthropology.

Boas was interested in more than cranial measurements. But because the cephalic index was the criterion for classifying individuals into what he regarded as entirely fictitious racial types that, according to the dominant theory of the time, included cultural and psychological attributes, he publicized the cephalic index data from the New York immigrant study as demonstrating that such types lacked the stability the theory posited. In the published report and in *American Anthropologist* (Boas, 1912a, 1912b) he hedged his claims, qualified his conclusions, and had little to say about the kinds of environmental factors that might make a difference. But he never hesitated to interpret the findings as falsifying racial types. In any event, the U.S. Immigration Commission, which had funded the study without great enthusiasm, ultimately provided "forty volumes of justification for immigration restriction legislation," (Stocking, 1974, p. 190).

In retrospect, Boas would have been on firmer ground scientifically had he focused on the height measurements taken of the children. These showed the kinds of differences he predicted and pointed the way to future research that has since produced not only unambiguous evidence of environmental influence but also a deeper understanding of the processes through which environmental factors work. His desire to challenge racial theories led him to give primary attention to the cephalic index; yet he was already thinking about larger issues concerning environmental factors in physical growth. In 1911 he presented a paper (Boas, 1912c, reprinted in Stocking, 1974, pp. 214–218), "The Instability of Human Types," in which he made the following statements:

> Observations on growth have shown that the amount of growth of the whole body depends upon more or less favorable conditions which prevail during the period of development. Unfavorable conditions retard growth; exceptionally favorable conditions accelerate it. A more detailed study of the phenomena of growth has shown that the development of different parts of the body does not proceed by any means at the same rate at a given period. . . . [I]f an individual is retarded by unfavorable conditions after a certain organ has obtained nearly its full development, while other organs are still in the process of rapid evolution, the former cannot be much influenced, while the latter may bear evidence of the unfavorable conditions which were controlling during a certain period of life.
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> It is a well-known fact that the central nervous system continues to develop in structure longer perhaps than any other part of the body, and may therefore be apt to show the most far-reaching influences of environment.