

The Handbook of  
**Culture and  
Biology**

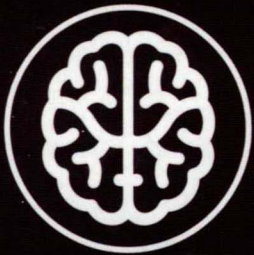
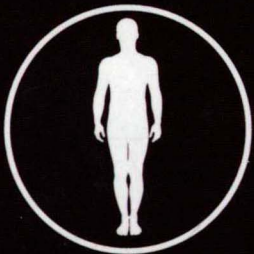
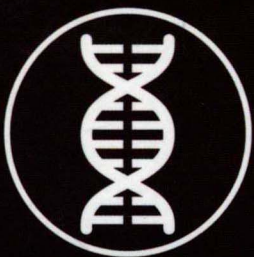
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## A comprehensive guide to empirical and theoretical research advances in culture and biology interplay

Culture and biology are considered as two domains of equal importance and constant coevolution, although they have traditionally been studied in isolation. *The Handbook of Culture and Biology* is a comprehensive resource that focuses on theory and research in culture and biology interplay. This emerging field centers on how these two processes have evolved together, how culture, biology, and environment influence each other, and how they shape behavior, cognition, and development among humans and animals across multiple levels, types, timeframes, and domains of analysis.

The text provides an overview of current empirical and theoretical advances in culture and biology interplay research through the work of some of the most influential scholars in the field. Harnessing insights from a range of disciplines (e.g., biology, neuroscience, primatology, psychology) and research methods (experiments, genetic epidemiology, naturalistic observations, neuroimaging), it explores diverse topics including animal culture, cultural genomics, and neurobiology of cultural experiences. The authors also advance the field by discussing key challenges and limitations in current research.

Written for scholars in the field, this handbook brings together related areas of research and theory that have traditionally been disjointed into the single, cohesive field of culture and biology interplay.

**José M. Causadias** is Assistant Professor of Psychology at Arizona State University. He researches how the interplay of cultural and biological processes shapes the development of psychopathology and health and well-being.

**Eva H. Telzer** is an Assistant Professor of Psychology and Neuroscience at the University of North Carolina Chapel Hill. She researches how cultural processes shape brain development, with a focus on family and peer relationships and long-term psychological well-being.

**Nancy A. Gonzales** is Foundation Professor of Psychology at Arizona State University. She studies the role of culture in children's development, psychopathology and resilience.

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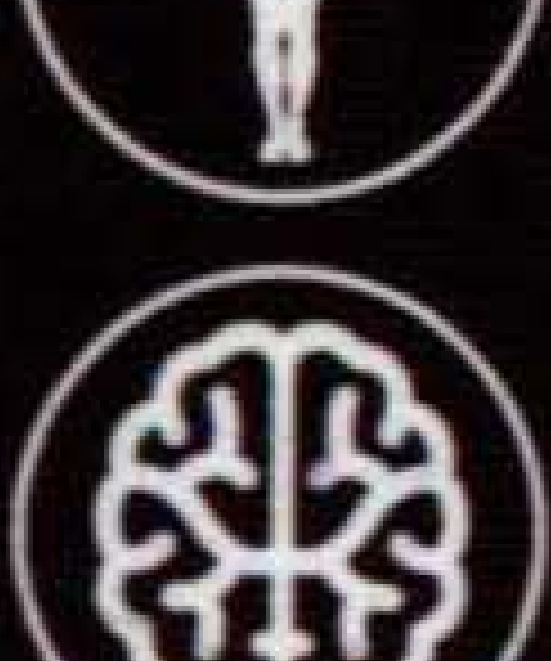
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## Biographical Notes

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**R. Alexander Bentley** is Chair of the Department of Comparative Cultural Studies at the University of Houston. His research interests are in modeling and understanding collective “herding” behavior in society and testing those models against real-world phenomena. A second, distinct area of research explores community diversity, kinship, and social complexity in prehistoric societies.

**Jennifer Botting** is a PhD student in the School of Psychology and Neuroscience at the University of St Andrews, researching social learning biases in wild vervet monkeys at the Inkawu Field Project, South Africa. Her research interests focus on social cognition in non-human primates.

**Belinda Campos** is an Associate Professor in the Department of Chicano/Latino Studies as well as an affiliate of the School of Medicine PRIME-LC Program and the Department of Psychology and Social Behavior at the University of California, Irvine. Her research examines the role of culture in shaping relationship experience and health. Her work shows that a cultural emphasis on prioritizing others before the self (as found in, for example, in Latino and East Asian cultures) can be beneficial for relationships and protective of health.

**José M. Causadías** is an Assistant Professor in the T. Denny Sanford School of Social and Family Dynamics at Arizona State University. His work is centered on promoting innovation in cultural research that can transform psychological and developmental sciences. With this aim in mind, he conducts research on culture and biology interplay, particularly in the field of cultural genomics.

**Lucia Cavanagh** is a doctoral student in the Counseling Psychology program at the University of Houston. She received a bachelor's degree in Psychology and English from the University of Florida. She is a member of the Hwemudua Addictions and Health Disparities Laboratory with research interests that center on biopsychosocial predictors of disease and drug use vulnerability, specifically focusing on psychoneuroimmunology, stress dysregulation, and neurocognition.

**Adam B. Cohen** is Associate Professor in the Department of Psychology at Arizona State University. His research focuses on the cultural and evolutionary psychology of religion. He is the editor of *Culture Reexamined* (American Psychological Association, 2014) and he was given the Margaret Gorman early career award by the American Psychological Association and the Godin prize by the International Association for the Psychology of Religion.

**Saarang Deshpande** is currently an undergraduate student at Cornell University and will be attending medical school after graduation. His research interests involve the intersection of neuroendocrinology, gene-environment interaction, and psychosocial intervention. He aims to focus on academic medical practice in neuropsychiatry.

**Stacey N. Doan** is a developmental health psychologist and Assistant Professor in the Department of Psychology at Claremont McKenna College. Her work focuses on understanding how social factors, such as socioeconomic practices, and cultural values and parenting practices influence health and well-being.

**Leah D. Doane** is an Associate Professor in the Department of Psychology at Arizona State University. She studies adolescent and emerging adult development, particularly with regard to identifying the psychophysiological mechanisms that underlie adolescent and young adult everyday stress experiences in naturalistic settings. Her most recent work uses culturally

and genetically informed designs for studying daily associations among socio-emotional experiences, physiology and sleep in the prediction of subsequent health and academic achievement in Latino children and adolescents.

**Gary W. Evans** is Elizabeth Lee Vincent Professor in the Department of Human Development at Cornell University. He is interested in how the physical environment affects human health and well-being among children. His specific areas of expertise include the environment of childhood poverty, children's environments, cumulative risk and child development, environmental stressors, and the development of children's environmental attitudes and behaviors.

**Ewune Ewane** is a doctoral student in the Counseling Psychology program at the University of Houston. She received her master's degree in Community Counseling at Loyola University Chicago and her bachelor's degree in Psychology at Marquette University. She is a member of the Hwemudua Addictions and Health Disparities Laboratory (HAHDL) and has research interests in addictions, health disparities, identity development, and African/African-American psychology.

**Nancy A. Gonzales** is ASU Foundation Professor in the Department of Psychology at Arizona State University. She received her PhD in Clinical Psychology from the University of Washington. Her research examines cultural and contextual influences on child and family developmental processes across the lifespan. Her work has focused particularly on the study of meaningful aspects of culture at multiple levels to understand the interplay of culture with normative and maladaptive adaptation within diverse communities.

**Ryan S. Hampton** is a PhD student in the Department of Psychology at Arizona State University. His research focuses on cultural variations in neural responses involved in processes related to affect, including empathy, emotion regulation, and positive self-views.

**LaBarron K. Hill** is an Assistant Professor in the Department of Psychiatry and Behavioral Sciences at the Duke University School of Medicine. His research focuses on deciphering the interaction of the biobehavioral mechanisms implicated in cardiovascular disease disparities.

**Lori S. Hoggard** is a Postdoctoral Research Associate in the Department of Social Medicine at the University of North Carolina at Chapel Hill. Her research focuses on elucidating the unique consequences of racial discrimination as a stressor and identifying potential protective or vulnerability factors in this context.

**Ummul-Kiram Kathawalla** is a PhD student and National Science Foundation Graduate Research Fellow in the Department of Psychology at the University of Minnesota, Twin Cities. Her research interests focus on understanding how various interpersonal, societal, and personal factors influence minority identity development. She is particularly interested in how identity formation contributes to the development and persistence of psychological conditions and physiological well-being.

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**Lynda C. Lin** is a PhD student in the Department of Psychology at the University of Illinois Urbana Champaign. She is interested in using an interdisciplinary approach to understand the underlying neural mechanisms through which culture can influence behavior.

**Ronda F. Lo** is a graduate student in the Department of Psychology at York University. She is broadly interested in how culture influences a number of cognitive processes and social behaviors, such as attention, language use, sibling relationships, and the intersection of national, ethnic, religious, and linguistic identities.

**Meghan L. Meyer** is an Assistant Professor in the Department of Psychological and Brain Sciences at Dartmouth College. Her research integrates social and cognitive neuroscience to promote the understanding of what drives our tendency, ability, and need to think about the social world around us.

**Stefanie B. Northover** received a Bachelor of Arts degree in psychology at California State University, Long Beach, and a Master of Science degree in psychology at McMaster University. She is currently a graduate student in social psychology at Arizona State University. She is interested in the psychology of religion from evolutionary and cultural perspectives.

**Ezemenari M. Obasi** is an Associate Professor at the University of Houston in the Department of Psychological, Health, and Learning Sciences (PHLS). His current program of research focuses on addictions, health disparities that disproportionately affect the African-American community, psychoneuroimmunology, and cultural predictors of health behaviors. He is the director of the Hwemudua Addictions and Health Disparities Laboratory (HAHDL) and the director of the University of Houston's HEALTH Research Institute. He also has unique expertise in the study of African/African-American culture and mental health. This includes human laboratory studies, field data collections in the community, and large-scale longitudinal research designs.

**Michael J. O'Brien** is Professor of Anthropology and Dean of the College of Arts and Science at the University of Missouri. His research interests are in developing theory to increase our understanding of numerous anthropological and archaeological issues, including the colonization of the New World and the subsequent spread of populations eastward across North America.

**Anthony D. Ong** is Associate Professor of Human Development at Cornell University. His research aims to advance understanding of human development and plasticity across multiple levels of analysis, including emotion–cognition interactions, sociocultural processes, and neurobiological systems. A major focus of his recent work involves understanding the physiological mechanisms through which subtle forms of recurring bias and unfair treatment get under the skin to affect disease susceptibility.

**Yang Qu** is a postdoctoral scholar at Stanford University. He received his PhD in Developmental Psychology from the University of Illinois at Urbana-Champaign. He uses an interdisciplinary approach to examine how culture shapes emotion, motivation, and decision making among adolescents and adults.

**Luke Rendell** is a MASTS Lecturer in the School of Biology at the University of St Andrews, appointed in 2012 after receiving a PhD from Dalhousie University in 2003. His broad research interests are focused on the evolution of learning and communication, with a particular emphasis on cetaceans, and has published over 60 papers on these topics. He is co-author of *The Cultural Lives of Whales and Dolphins* (Chicago University Press, 2015).

**Joni Y. Sasaki** is an Assistant Professor and director of the Culture and Religion Lab in the Department of Psychology at York University. In her research, she integrates perspectives from psychology and biology to examine basic scientific questions about culture and religion.

**Michael R. Sladek** is a doctoral student in Developmental Psychology at Arizona State University. He is interested in stress and coping processes among adolescents and young adults. From a biopsychosocial perspective, his research has focused on stress and coping among students transitioning to the college context using multiple assessment methods (e.g., daily diaries, stress biomarkers, sleep). With greater attention to culture, his current work extends this approach to Latino and other historically under-represented college students.

**Charles T. Snowdon** is Hilldale Professor Emeritus of Psychology and Zoology at the University of Wisconsin, Madison. His research has involved cooperatively breeding marmosets and tamarins, with work in captivity and in the field. He has studied the behavioral and neuroendocrine mechanisms involved in successful cooperative breeding as well as vocal and chemical signaling and social learning. He has served as an editor of *Animal Behaviour* and of the *Journal of Comparative Psychology*.

**Moin Syed** is an Associate Professor in the Department of Psychology at the University of Minnesota, Twin Cities. His research interests lie broadly in how adolescents and young adults from diverse ethnic, racial, and cultural backgrounds weave together their multiple identities to lead healthy, productive, and purposeful lives.

**Eva H. Telzer** is an Assistant Professor in the Department of Psychology and Neuroscience at the University of North Carolina at Chapel Hill. She received her PhD in Developmental Psychology from UCLA. Her research centers on adolescent development, social relationships, and the role the brain plays during this important transitional period. Her research takes a multi-method approach that includes the use of fMRI, daily diaries, and diurnal cortisol.

**Erica van de Waal** is a Society in Science–Branco Weiss Fellow at the Anthropological Institute and Museum of the University of Zurich and the research coordinator of the Inkawu Vervet Project in South Africa. She finished her PhD in 2010 and did four years of postdoctoral research at the University of St Andrews before taking up her current position. Her main research topic is animal cognition with a focus on primate social learning. She has co-authored a key paper on this last topic, “Potent social learning and conformity shape a wild primate’s foraging decisions,” published in *Science* (2013).

**Michael E. W. Varnum** is an Assistant Professor in the Department of Psychology at Arizona State University. His research focuses on the proximal biological mechanisms that underpin cultural variations in social cognition (using neuroscience techniques), as well as the role played by more distal ecological factors in patterns of cultural variation and cultural change. His research has been published in leading journals, including *PNAS*, *Psychological Science*, *Journal of Experimental Psychology: General*, and *NeuroImage*.

**Shu-wen Wang** is an Assistant Professor in the Department of Psychology at Haverford College. Her research examines stress, coping, and social behavior, with an emphasis on social support interactions. One branch of her work focuses on the cultural shaping of stress and coping processes, and has found that cultural values impact the use and experience of social support.

**Kristin A. Wilborn** is a postdoctoral research fellow at University of Houston. She received her doctoral degree in Experimental Psychology at the University of Texas at San Antonio, a master’s degree in Health Psychology at Texas State University, and a bachelor’s degree in Political Science at Furman University. She currently serves as the project manager in the Hwemudua Addictions and Health Disparities Laboratory (HAHDL), and

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**David R. Williams** is the Florence Sprague Norman and Laura Smart Norman Professor of Public Health at the Harvard T. H. Chan School of Public Health, and Professor of African and African American Studies and of Sociology at Harvard University. He is internationally recognized as a leading social scientist whose research is focused on the complex ways in which race, racism, socioeconomic status, stress, health behaviors, and religious involvement can affect physical and mental health.

**Sandra Yan** is a doctoral student in the Counseling Psychology program at University of Houston, where she received her bachelor's degree in Biology and Psychology. She is a member of the Hwemudua Addictions and Health Disparities Laboratory (HAHDL) and has research interests in addictions, psychoneuroimmunology, health disparities, and cultural psychology.

## Foreword: On Culture and Biology

I recently found myself at an interdisciplinary workshop on the topic of human nature. The only biologist present, I argued strongly that the term “human nature” was inherently problematical and should be abandoned (Laland & Brown, in press). Curiously, I was followed by two anthropologists willing to defend the concept. That our presentations should have gone against the historical tendency for our respective disciplines says something about how far research has come in the cross-disciplinary investigation of the biology–culture relationship. It also hints at some of the challenges ahead. For researchers seeking to understand the interplay between biology and culture, these are exciting yet tortuous times.

We now live in an age in which attempts to separate “nature” from “nurture” or “biology” from “culture” are long discredited. Countless experimental studies show how genes take cues from environments, how learning relies on gene expression, and how all development is a dynamic interplay between internal and external factors. Science had taught us that many of the genes expressed in our body are themselves environmentally acquired. The human microbiome – a community of bacteria, archaea, fungi and protozoa that cohabit our body cavities, surfaces and tissues – are symbionts we inherit from our mothers (but not through transmission of genes), or else pick up from the external environment. We have around 20,000 genes of our own, but our bodies house more than 3 million genes belonging to other species, which play important roles in nutrient acquisition, metabolism, immune function and behavior. Human development is a multi-species project.

Indeed, characterizing what is human appears to be becoming increasingly difficult. A decade ago we might have found it straightforward to distinguish our species from other living animals. Today we recognize that this exercise would have been far more challenging 100,000 years

ago, before the demise of other hominins. The fission–fusion nature of biological reality – for instance, the recently detected interbreeding of humans with Neanderthals and Denisovans (Green et al., 2010; Krause et al., 2010) – and the associated realization that even today’s human populations have variant evolutionary histories, both in space and time, render any attempt to describe the “biological essence” or “defining characteristics” of humanity vulnerable to arbitrary judgments. A few years ago researchers discovered that the African elephant is actually two separate non-interbreeding species, now known as the forest and savannah elephants (Roca, Georgiadis, Pecon-Slattery, & O’Brien, 2001). The properties that allow species to be distinguished (forest elephants have slightly thinner tusks and rounder ears than savannah elephants) are typically quite different from those seem to capture their “biological essence” (their large size, their trunk, their long lives).

Equally, conceptions of “human nature” or “human biology” as umbrella terms for a package of universal, evolved human characteristics have long but increasingly troubled histories within the human evolutionary behavioral sciences. These days, were researchers to document a constellation of reliably developing human capacities that are more or less ubiquitous, and whose development seems to be well buffered against broad environmental fluctuations, we would have difficulty in attributing such traits to “nature” as opposed to “nurture,” “culture,” or “environment.” Experimental findings are leading to a broadened conception of inheritance and the recognition that parent–offspring similarity results not solely from the transmission of genes from one generation to the next but also from the transfer of a wide variety of other resources, and through a variety of different pathways (epigenetic variants such as DNA methylation and small RNAs, antibodies, hormones, symbionts, ecological resources, and the social transmission of knowledge and skills). These data undermine the hitherto strict separation of development and heredity that followed August Weismann’s famous delineation of germ line and soma.

Phenotypes are not well described as the output of genetic programs; rather, they self-assemble through a reciprocally caused process that comprises both “upward” and “downward” causation, and in which genes are far from being the only informational resource. We don’t first develop a brain and then subsequently use it to perceive, learn and reason; rather, our perception, learning and reasoning fashion a thinking brain. Organisms are not passively molded by selection to suit a pre-existing environment: they part-construct the environments to which they adapt (Odling-Smee, Laland, & Feldman, 2003). Different developmental upbringings forge

different brains, and alternative environmental conditions precipitate variant gene expression. Cultural experiences leave neurobiological traces, which in turn are expressed in complex behavior that shapes the cultural experiences of others. The products of such within- and between-individual interactions are society-specific traditions, which anthropological, genetic and mathematical analyses now reveal have modified the natural selection acting on humans (and other species) in richly interwoven gene–culture coevolutionary histories (Laland, Odling-Smee, & Myles, 2010). Whatever level of analysis we choose, organisms are dynamical systems, constantly responding to, and changing, their immediate surrounds.

In line with this rejection of nature/nurture and biology/culture dichotomies, behavioral scientists have established that the social transmission of knowledge and skills, traditional behavior, and society-specific conventions, are no longer the exclusive province of humanity. To the contrary, a wide variety of animals, from fruit flies and wood crickets to gorillas and sperm whales, acquire knowledge and skills through copying the behavior of others. Paradoxically, biologists have begun to take “culture” seriously at virtually the same time that many social scientists have abandoned the notion. Fortunately, these ostensibly opposing trends have more in common than is apparent at first sight. Anthropologists’ disquiet with a monolithic conception of culture has much in common with my own troubles with “human nature.” That is because setting “culture” in opposition to “nature” (which is how culture is conceived by many anthropologists) inherently suffers from broadly equivalent deficiencies as the reverse. It is no easier to describe the culture of a population than to describe its biological nature.

Biology and culture have refused to be pinned down fundamentally because they are in constant flux. There are no species, genes, cultures, or natures: these are illusions of “things,” the traces of constancy in a network of dynamical interrelated processes. Yet that fluidity does not render the processes any less real or amenable to scientific investigation. Far from drowning in this sea of change and complexity, biology as an academic field has never been more vibrant, and investigations of the field’s interplay with culture are imbued with no less vigor than other biological domains. Technological advances in genomics, epigenetics, neuroscience, and the computational analysis of big data, lend new resolution to our research. Oftentimes pragmatic stances and simplifying assumptions are necessary for progress to be made. A powerful combination of new tools and innovative thinking is opening up exciting new avenues to study.