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22 Epilogue

Interdisciplinarity in the Study of Culture, Mind, and Brain

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Advancing an integrated understanding of culture, mind, and brain depends on fostering meaningful exchanges between diverse disciplines, each of which holds a piece of the puzzle. In this epilogue, we reflect on the prospects for advancing interdisciplinarity in the sciences of culture, mind, and brain and in the translation of research into social policy and practice. We come to this colloquy from the perspective of our respective disciplines: cultural psychiatry, biocultural and psychological anthropology, and cultural psychology. Over the last several decades, we have each participated in efforts to develop interdisciplinary programs and draw from this experience in our remarks. We also revisit some issues raised in the first edited volume based on the interdisciplinary conferences of the Foundation for Psychocultural Research (Kirmayer et al., 2007).

Varieties of Interdisciplinary Collaboration

Multidisciplinarity involves researchers from several disciplines working in parallel, with a clear division of labor, to address different aspects of a shared question or object of concern. *Interdisciplinarity* aims to go beyond this by promoting dialogue, knowledge exchange, and synthesis to create new frameworks and methodologies (Efstathiou & Mirmalek, 2014, p. 234). This can take many forms and result in hybrid methodologies, theory, and applications (Frodeman et al., 2017). Forms of interdisciplinarity are evident within neuroscience in current efforts to develop multilevel systems biology that integrates genomics, proteomics, metabolomics, and connectomics (the organization of brain circuitry, Alivisatos et al., 2012). As Sporns notes:

> The "omics" revolution that is still unfolding within the biological sciences is fueled by a paradigm shift away from reducing biological systems to individual parts (be they genes, proteins, neurons, or organisms) and towards considering all their parts and interactions at once. This paradigm shift requires the adoption of new models for representing, explaining and predicting complex biological functions, and these models draw heavily on the theoretical frameworks of system dynamics and network science.

> In a sense, connectomics is an extension of systems biology to neuroscience. The role of networks in systems biology is paralleled by the strong links that have formed, even at this early stage, between the emerging field of connectomics and the science of complex networks. These links are likely to grow even stronger in the future, and they will help in overcoming the many challenges connectomics currently faces. (Sporns, 2013, p. 56)

In terms of current work at the intersection of neuroscience and social science, we can distinguish several ways in which interdisciplinary collaboration is organized.

Neuroscience is increasingly being applied to address questions of central concern to the social sciences. There are two broad lines of work of this type: (1) using neuroscience to explore underlying mechanisms, constraints, or interactions in social cognition and behavior (which is a major focus of work presented in Part I of this volume); and (2) applying the insights of neuroscience to practical domains of social life (as seen in many of the contributions to Part II). Whole new hybrid fields have emerged based on employing neuroscientific models, methods, and modes of explanation to study social phenomena, including social, cultural, and affective neuroscience, as well as applied domains like neuroeducation, neuropolitics, neuroeconomics, neurophilosophy, and neurolaw. Of course, simply tacking the prefix "neuro" onto the name of a field may reflect the current fad for brain-centric explanations (so-called neuroenchantment; see Ali et al., 2014); but it may also signal meaningful engagements with cutting-edge research that can creatively reshape theory and practice in particular domains. Cognitive science, which began as an amalgam of psychology, computer science, linguistics, anthropology, neuroscience, and philosophy (Dawson, 2013), never gelled as a single discipline (Núñez et al., 2019), but has given rise to more deeply interdisciplinary approaches to mechanistic explanation in cognitive neuroscience that consider multiple levels of organization (Boone & Piccinini, 2016; Cooper & Peebles, 2015). When extended to social cognition, this framework recognizes social processes as additional mechanistic levels (Cacioppo et al., 2000). The methods and insights of neuroscience have contributed to social science by making it possible to examine some of the underlying processes that contribute to sociality, decision-making, and the response to a wide variety of social contextual features. The neurosciences can provide measures that do not depend on self-report, and apparent discrepancies between brain activity and self-report may yield important insights into processes like self-awareness, self-deception, coping, and communication.

Social sciences in turn can contribute to neuroscience research in a variety of ways. For our present purposes, it is useful to distinguish four broad approaches: (1) the study of social factors that influence the brain; (2) the translation of neuroscience research beyond the laboratory into applications in clinical and other social settings; (3) the critical social analysis of the cultural,

conceptual, and institutional framing and constraints on neuroscience research and its applications; and (4) the integration of all three in an ecosocial view of the brain (Laliberté et al., 2019).

Social Determinants. Work on social determinants examines social factors that influence brain development and functioning. For example, there is a wealth of evidence for the effects of early exposures to social adversity on subsequent brain structure and functioning (Hanson et al., 2010; Labonté et al., 2015). The timing of adversity is a crucial determinant of its impact on the epigenome (Dunn et al., 2019). Such work can help identify environmental factors that promote healthy brain development and resilience as well as those that cause vulnerability and illness (Paus, 2013).

Social Impacts, Applications, and Outcomes. The application of neuroscience in clinical or other settings requires translating knowledge into practical techniques informed by social context. While laboratory studies require a high degree of standardization and control over parameters that could affect the reproducibility of results, real-world applications must contend with the myriad changes of a world in flux. Applications must therefore respond to these larger, unpredictable dynamics. Sensitivity to context is essential to the skills that allow experts to translate generic knowledge into effective action.

Social Critique of Neuroscience. Critical neuroscience, an offshoot of science and technology studies, aims to analyze the production of neuroscientific knowledge and the ways it is applied by using the conceptual tools and frameworks of philosophy, social science, and political economy (Choudhury & Slaby, 2016). This includes examining the political economy of knowledge production (Robinson, 2019), as well as exploring how modes of self-understanding that are produced by neuroscience influence subsequent social processes (Rose & Abi-Rached, 2013; Vidal & Ortega, 2017). Practical applications of neuroscience research may have unforeseen and unintended consequences that need to be explored. Some of this may be subtle: for example, changes in the ways that people view agency, sense of self, emotion, and illness (Choudhury et al., 2015; Kirmayer & Gómez-Carrillo, 2019). Critical neuroscience itself can foster interdisciplinarity by exposing the hidden assumptions of current disciplinary practices and opening up a space for discussion, debate, and creative "entanglement" (Choudhury & Slaby, 2011; Fitzgerald & Callard, 2015).

Ecosocial View of the Brain. The preceding three modes of collaborative work can be brought together in an integrative view of the brain in environmental context. This includes dynamic links between the networks of the brain, the person as cognitive agent, and the social networks of the world (Fuchs, 2017). Cognition and experience then can be understood as arising from circuits that include the networks of the brain but that extend into the world to become part of a social–cultural ecology of mind (Kirmayer, 2015, 2019).

Challenges to Interdisciplinarity

While disciplinary specialization makes scientific progress possible, it can also create barriers to collaboration. The obstacles stem from institutional structures, methodological strategies, epistemic commitments, and implicit ontologies.

Disciplines themselves are the products of intellectual activities built around certain questions, bodies of knowledge, and methodologies, but they also reflect the institutional history of academia (Turner, 2017). This has resulted in different metrics of productivity, success, and reward. The guild-like nature of academic disciplines results in active efforts to police boundaries, which guard against hybrid or heterodox forms of activity that would undermine the core identity of the discipline. In this process, economic and power differentials skew the process of collaboration, spurring defensive postures and sometimes heated rivalries.

Despite frequent calls for interdisciplinarity to tackle urgent priorities in health and social policy, some evidence suggests that interdisciplinary research is less likely to be funded than projects that fall squarely within disciplinary boundaries (Bromham et al., 2016). Indeed, presenting interdisciplinary work in grant proposals and publications poses practical challenges. The description of theory and methods must adhere to conventional standards, providing sufficient detail to determine the rigor of multiple facets of the work, usually within the same space than would be allotted to a narrower study. This increases the risk that peer reviewers will identify gaps or weaknesses in the presentation. Similarly, publications presenting mixed methods research using both qualitative and quantitative methods often require more space than is available and thus expose themselves to critique from multiple angles in the peer-review process.

More substantive issues have to do with the nature of disciplinary interests. What counts as an interesting question and what is a satisfying, adequate, or productive answer varies from discipline to discipline. Objects of study are framed in terms of particular concepts and levels of description that constitute the domain of study for a discipline. These descriptions reflect an underlying ontology – that is, a set of commitments about the kinds of things that exist, which identifies objects, dimensions, metrics, measures, and domains that motivate the development of specific theories and methodologies (Bhaskar et al., 2018; Smith & Ceusters, 2010).

Methodologies provide specific ways of posing and answering questions, and these, in turn, serve to consolidate disciplinary boundaries, defined in terms of styles of reasoning, forms of evidence, strategies for validation, and bodies of cumulative knowledge. Measurement itself serves ontological purposes: what can be measured is real – in the sense that it points to (a fact about or property of) an object in the world. Methodologies thus give rise to and

support particular scientific ontologies (Smith & Ceusters, 2010; Larsen & Hastings, 2018). Once a methodology is developed, therefore, it can itself become a way to define a discipline. For example, development of brain imaging technologies enabled the emergence of cognitive neuroscience as a new discipline (Bennett & Hacker, 2003; Raichle, 2009).

To the extent that disciplines differ in their ontologies, and in what counts as an interesting question and a productive answer, they constitute distinct communities with their own practices, codes of conduct, and culture – not all of which converge easily. Each community of practice, then, may find another's framing of problems and everyday practices unclear, obtuse, or beside the point. For example, there have been sharp critiques from across the disciplinary divides of social science and neuroscience that reflect these differences, some of which may block the meaningful exchange of information, let alone active collaboration (DeVos & Pluth, 2015). Yet there is wide recognition that meaningful translation of neuroscientific knowledge into practice requires an appreciation of the technical limitations of specific methods and paradigms, and adequate contextualization of findings – work that requires engagement with social science perspectives (Pykett, 2015).

We suggest that the way forward in the sciences of culture, mind, and brain will involve a multilevel, ecosocial systems view. Such a view recognizes mechanisms at multiple levels of biological, psychological, and social organization (Badcock et al., 2019; Bechtel, 2012; Craver, 2009; O'Malley et al., 2014). These levels of organization involve different spatial and temporal scales and composition of components (Eronen, 2015), but give rise to emergent processes, which, in turn, result in new kinds of structures or objects, requiring that we expand our ontologies (Bhaskar et al., 2018; Kauffman, 2019; Noble, 2016). Each of these levels may have its own dynamics that constitute a field of study. This is the practical and methodological origin of disciplinary ontologies. But there are dynamics across levels and this in turn requires methodological pluralism and interdisciplinarity. Indeed, neuroscience itself requires interdisciplinarity to study the multiple levels of organization within the brain, and it faces many of the same conceptual and methodological challenges as work that aims to understand the brain in its larger ecosocial environment, as illustrated in Figure 22.1 (Kotchoubey et al., 2016).

Building Interdisciplinary Bridges

There are strategies to address each of these obstacles to effective interdisciplinary collaboration. Table 22.1 summarizes some of these strategies at institutional, conceptual, and methodological levels. While institutional support is essential for long-term and large-scale work, steps toward interdisciplinarity can occur through conceptual and methodological exchange.

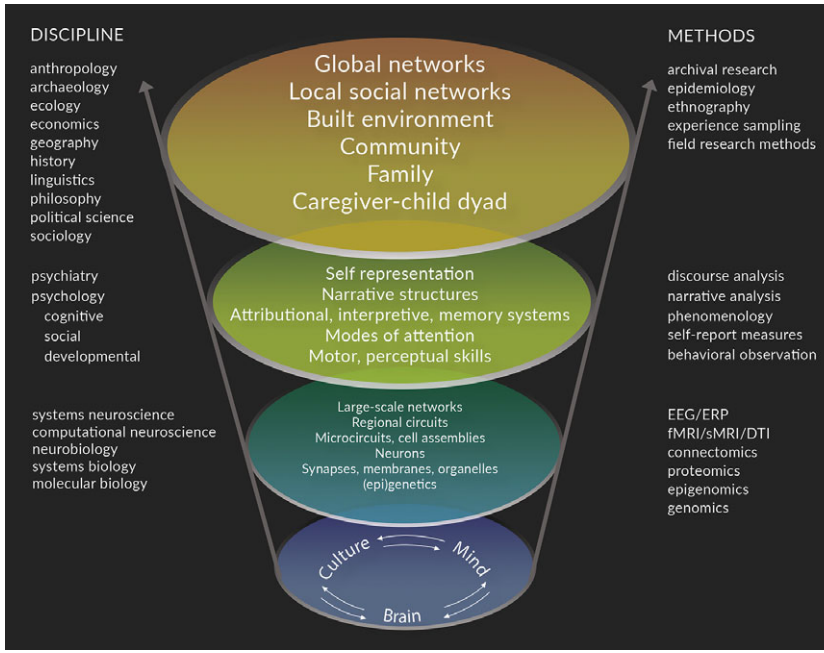

Figure 22.1 The co-construction of culture, mind, and brain on multiple levels. The domain of culture, mind, and brain is composed of multiple levels of organization, each with its own structure, dynamics, and descriptive vocabularies and methods.

Institutionally, interdisciplinarity requires creating places for work, training programs with appropriate mentoring, employment, and funding opportunities. Such institutional structures could equitably distribute economic and human resources (in terms of funded research projects and hiring), reward meaningful collaboration, and respect multiple metrics of success. This would including recognizing the value of process rather than just outcome as a necessary step toward productive interdisciplinary work. This demands that scholars familiar with the current exigencies of research in each domain have a hand in shaping institutional policy and practice. But this must occur in a larger context in which the importance of multiple levels of explanation is widely accepted.

Interdisciplinarity begins with recognition of its importance for tackling *multilevel problems* – since human systems span multiple scales, from cells to societies (Coen, 2012). To realize its potential, however, there must be personal and institutional commitments to open collaboration, working together to address hurdles. These include changes in funding priorities, the

Table 22.1 *Strategies for interdisciplinary collaboration*

Level	Strategy
Institutional	Create spaces and places for interdisciplinary exchange
	Fund interdisciplinary teams
	Establish metrics and sustained support for interdisciplinary work
Conceptual	Use cross-domain metaphors and expand conceptual vocabularies
	Establish common questions, objects of concern, or boundary objects
	Enlarge the dimensional space
	Develop shared ontologies
	Populate systems diagrams
Methodological	Correlate multiple methods for convergent validity
	Adapt methods to new objects
	Hybridize methods
	Develop new methods
	Create shared databases for access to methods and data

creation of spaces and adequate time to develop collaborations, and sustained support. Forms of recognition and reward of academic work need to take into account the time needed to develop truly meaningful collaborations and recognize that knowledge production in social science and neuroscience tend to operate on different timescales and with different metrics of success.

Involvement of stakeholders is vital first and foremost for ethical and political reasons. But the stakeholder perspective "on the ground" also can serve to challenge or upend conventional disciplinary boundaries and hierarchies, compelling meaningful collaboration to find ways to address relevant problems. Indeed, interdisciplinarity has been seen as a partial solution to the problem of equitable engagement and accountability in public science in so far as the bridge building makes contact with the concerns of everyday knowledge users and citizens (Barry & Born, 2013).

Enlarging the Conceptual Universe

The multilevel picture of mind, brain, and culture that we have sketched in Chapter 1 of this volume makes it clear that we need active dialogue and engagement among the humanities, social sciences, and biological sciences – each captures only some facets of being human, and the best picture we are likely to get of human functioning will come from interactional models. To do

this, research must employ social science models and methods that are as sophisticated as those of neuroscience, and neuroscience, in turn, needs to be centered on (or at least open to) the study of the varieties of human experience. But these disciplines all involve levels of organization that are more or less familiar. Existentially, everyday activities and experience seem to be located closer to social and psychological than to neurobiological phenomena. Hence, people tend to think that they already understand these processes intuitively through folk psychology or social background knowledge, even though they actually may be unable to see much of what actually undergirds their cognition and social behavior.

This blindness to the underpinnings of human cognition and social reality has a dual basis in individual psychology and social process. Self-awareness is like the tip of an iceberg, maintained (and sometimes subverted) by myriad non-conscious processes (of which the Freudian unconscious reflects only one subset). In fact, efforts to introspect often produce accounts that reveal neither the underlying machinery nor the external influences on individuals' actions, but a post hoc, conventional narrative that conforms to cultural models and expectations (Mercier & Sperber, 2017; Nisbett & Wilson, 1977; Schwitzgebel, 2011). This blindness extends to the understanding of others, since people often appreciate neither their inner psychological workings (which reflect not just their biology and psychology but also their personal history) nor the impact of their lifeworlds (which reflect not just current circumstances, but also collective history – both of which are refracted by cultural meaning). Hence, neither first-person accounts nor third-person "heterophenomenology" (that is, understanding the structure of another's experience by building bridges from their accounts to underlying mechanisms through natural science and experiment; Dennett, 2007) can give us a clear picture of human nature and its constitutive mechanisms – which involve processes located not just in the brain, but in the world also. These processes include interpersonal interaction, engagements with environmental affordances, and narrative practices of self-depiction and presentation (Di Paolo et al., 2018; Veissière et al., 2020).

When researchers approach the social world from the perspective of what they already know about the brain, they are led to focus on certain features that are relevant to current theories, constructs, and available measures in neuroscience. If instead we start from the social world, and ask what might be important about the brain given what is known about social processes, we may be led in different directions. The social world has its own structure and dynamics and does not present itself to the brain in terms of isolated factors or parameters but as meaningful wholes.

This poses a challenge to contemporary social and cultural neuroscience, which tend to operationalize culture in terms of individual traits or discrete social factors. Experimental cognitive social neuroscience tends to be single-

brain neuroscience that examines the impact of social stimuli (such as the presentation of a threatening face) on the individual or as a way to probe neural functioning. In focusing on the brain, the structure and dynamics of the social world may be grossly oversimplified or entirely lost. Ways to capture some of the dynamics of the social world include hyperscanning, ecological studies, and the use of big data to examine the interactions of multiple social dimensions through multivariate statistics, dynamical system theory, or agent-based modeling.

Conceptual and Methodological Pluralism

To engage with diverse methods, it is vital to begin with an ecumenical view that recognizes the strengths and limitations of specific methods. Methods are ways of taking hold of specific aspects of the world in particular ways (Krieger, 2012). The use of a method involves not simply a laboratory procedure, but participation in a community of practice with its own measures of conceptual relevance, fidelity, and validity (Collins, 2017; Collins & Evans, 2019). Learning a new method is learning a way of engaging the world – one that necessarily brings certain features or relationships into sharp relief while letting other aspects fall into shadow.

Methods can be brought into alignment by identifying common objects of concern, bridging concepts, and vocabularies. This process can also clarify the relationships among diverse methods. Each method exposes some facets of an object, situation, or event. When understood as revealing part of a whole, diverse methods can be correlated or compared to clarify the relationships between methods and models derived from different traditions. Triangulation of methods, then, is not simply a way to validate observations or see the object in multiple aspects, but to rethink the meaning and uses of each method.

The actual process of interdisciplinary engagement depends on identifying common interests, questions, and concerns. Considering the questions raised by specific disciplinary perspectives and the available methodological strategies allows us to identify what may be feasible to study at a given moment and what new methods need to be developed. Existing disciplinary work provides bridging for building an integrative view, in which each line of work finds its place in relation to others. The conceptual work can be seen as a kind of multidisciplinary puzzle solving, in which the validity of findings comes not only from their correspondence to reality but also from the ways the puzzle pieces fit together (Haack, 2005). Indeed, this fit can reveal new forms of coherence as it builds up a more detailed picture of the whole. This potential value of diverse methods does not amount to a blanket endorsement of every approach, but calls for a careful reflection on the virtues and limitations of different methodologies, clarifying their complementarity. The result is a rich,

iterative exchange in which particular kinds of questions are elaborated and addressed from multiple angles, and the answers that are obtained stimulate new questions, some of which will be better addressed from another disciplinary perspective. Seen from a distance, what is at play is more than the sum of multiple disciplines. Rather, it is an emergent field centered on the object of interest, which helps to define the relationships among seemingly disparate lines of inquiry, with corresponding epistemic resources and commitments (Anderson, 2016).

Methodological and explanatory pluralism therefore are not ends in themselves, but necessary responses to the complexity of phenomena. In the case of the interaction of social science and neuroscience, where the common objects of interest are human cognition and behavior – and the multiscale, multilevel coordination of structures from molecule to society – what is required is the development of multiple levels of description and coordinated methodological strategies. Integrating this hierarchy of structures and processes involves cross-level translation which demands thoroughgoing interdisciplinary collaboration.

From Systems Theory to the Ecology of Mind

Over the last 60 years, systems theory has emerged as a powerful way to identify commonalities in the dynamics of different scales and levels of structure in biological and social phenomena (Capra & Luisi, 2014; Krakauer, 2019; Siskin, 2016; West, 2017). The challenge is how to locate culture, mind, and brain within the same dynamical system. Systems theory offers a picture of how behavior and experience can emerge from interactions among many processes over the timespan of development and across the spatial networks of many individuals and aspects of the environment. The elaborate, multilevel systems that underwrite human action and experience have great complexity owing to their scale, but they also show recurrent patterns that follow from their organization and regulatory processes. While these recurring patterns do not allow us to identify a simple set of "laws" of behavior and culture, they do make it possible to recognize organizational principles, particular system dynamics, and their likely consequences (Badcock et al., 2019). Capturing these dynamic processes requires thinking about mind, brain, and culture in ecological terms.

Brain, mind, and culture each can be thought of as constituting complex systems that are open, nonlinear, and generally irreducible to simple component subsystems. Even simple systems can be exquisitely sensitive to initial or boundary conditions and display complex dynamics (Feldman, 2019). For an organism to survive, however, it must dampen or control some of this complexity. A key insight from cybernetics (the study of [self-]regulatory systems)

is the importance of *feedback loops* in organizing goal-directed behavior. Crucially, the higher-order levels or scales of structure feed back into lower-level processes by configuring relationships within and between individuals in new ways. As systems get larger, they may become more sensitive to conditions far away (think of the Internet) and long ago (think of the dependence of culture on history) and so require consideration of ever-widening cycles of interaction (Prigogine & Stengers, 1997).

The ubiquity of such circular causality, in which cause and effect are linked in cycles over time, has implications for how to do meaningful research and also for the prospects for making predictions – since some dynamic systems have stable attractors or final common pathways they arrive at no matter where they start, while others exhibit extreme sensitivity to initial conditions, with widely divergent trajectories or chaos (Kellert, 1993; Mitchell, 2009). Complexity theory provides tools for thinking about emergent system dynamics through mathematical models that can be simulated on computers (Byrne & Callaghan, 2013; Thurner et al., 2018). Multiple models can be compared to identify design principles that may have influenced evolutionary selection or adaptive fit (Gao & Ganguli, 2015).

While systems may exhibit similar dynamics, it remains that biological, psychological, and sociocultural systems each have their own unique properties, requiring specific methods to explore. What distinguishes human systems from most others is their self-referentiality and embedding in a human-designed environment that allows individuals to think with and through each other's experience (Veissière et al., 2020). This cooperative activity constitutes local cultural worlds. Through language and symbol systems, humans are able to think about their own constitution and modify it both from within and by taking action in the social world (Bateson, 1972). As a result of this capacity for self-description and ability to organize individual and collective action under these descriptions, human activities exhibit cognitive and sociocultural looping effects (Hacking, 1996, 1999, 2002). As people articulate and enact a way of being, it becomes a new social form and possibility for others. And as institutions and practices grow up around this way of being, it becomes a social fact, something that is taken for granted and that becomes the background to subsequent actions and gives them meaning (Searle, 2011). This background is not simply a matter of cognitive representations but of ways of actively engaging with social–environmental affordances (De Jaegher et al., 2016; Kirmayer & Ramstead, 2017; Ramstead et al., 2016).

Putting Culture at the Center

The contributions to this volume emphasize the co-construction of culture, mind, and brain. Cultural histories and forms of cooperative social activity are

central to the unique reach and scope of human cognition. Interdisciplinary research methods encourage a back and forth between frameworks that can throw new facets of mind, brain, and culture into relief. In particular, ethnographic methods that capture the material, sensory, and affective qualities of local worlds help us to appreciate the phenomenology of experience, but also point to the crucial features, dimensions, or components involved in system-level cultural processes that constitute human minds.

In anthropology and psychology, culture often has been approached in terms of types, traits, and characteristics of individuals and groups. In much health and social research, culture is conflated with social categories like race and ethnicity. These categories are produced by culture – or, more accurately, at and by the interface of cultures. They are important because of the ways they organize and rationalize social structures that may produce enormous disparities of health, wealth, and power. Their study requires close examination of how the categories are constructed, and their consequences for individual development, functioning, and interactions with others including larger social structures. But culture stands for more than these ways of partitioning human groups.

More contemporary views understand culture as providing knowledge, skills, and dispositions to respond to particular situational affordances in the environment. Culture guides the construction of these environments and niches, as well as the development of individuals more or less competent to engage with the resulting possibilities for action or affordances. Individuals then have agency in the ways they engage or attempt to disengage, rebel against, or transform these collectively maintained resources. Individuals are influenced by multiple cultural strands depending on their connections to others, and, in the contemporary world, these influences range far and wide and can be presented with a speed and intensity that upends habitual patterns, rapidly recruiting emotional responses to create new forms of transient social groups. The technologies of the Internet, information and telecommunications devices, and, especially, social media are changing the nature and dynamics of culture. These changing configurations call for new models and methods of research on culture, mind, and brain.

Evolutionary history, historical accident, choices based on partial knowledge, and local idiosyncrasy all contribute to a world in which the fit between specific behaviors and intermediate outcomes or long-term survival is always uncertain and which, given current impacts on the climate, may lead to our own extinction. By 2050, most of the global population will be living in urban environments (United Nations, 2018) – spending increasing amounts of time in large-scale virtual worlds and communities. The pace of change threatens to exceed human adaptive capacities. And there are increasing signs of strain in both individual physiology and psychology as well as in the dynamics of communities.

The world holds traps and challenges for the human brain: our hunger and satiety regulatory systems were not designed to deal with refined sugar or fast food (Lowe et al., 2019); our sleep–wake cycles were never intended for a world online 24/7 (Crary, 2013); our attentional systems were not optimized for a world saturated with screens and social media (Veissière & Stendel, 2018); our social affiliation system never anticipated a world in which individuals are connected not to 150 people in their in-group but to thousands or millions who can all push the levers of social approval or attack (Dunbar, 2016). Can an ecosocial understanding of the human brain contribute to human survival and our eventual posthuman evolution?

Cultural Diversity as Challenge and Promise

There are some 7000 cultures in the world, each with its own languages, social structures, and ways of life. Despite the effects of globalization, with mass migration, rapid telecommunications, and popular media promoting cultural exchange, there is little sign that cultural diversity is disappearing. Instead, there is an ongoing process of cultural hybridization and invention. New technologies are also reconfiguring the social world in ways that give new meanings to the notion of culture. In particular, engagements with communities through social media and the opportunities for living in virtual or augmented reality encourage us to use our brains in new ways. If these become more prevalent, there likely will be corresponding changes in our neurocognitive functioning.

In addition to addressing cultural diversity as a reality that needs exploration in its own right, cultural systems of knowledge can present radically different ways of thinking about ourselves. For example, the work on interdependence discussed in this volume speaks to an important shift in how we might conceive the person – not as an individual autonomous organism, as is common in Euro-American psychology, but as inherently relational, embedded in webs of shared meaning and interpersonal ties that are constitutive of both self and other. This interdependent view fits well with more relational or ecological understandings of the person that can be formalized and studied empirically.

But there are still other cultural views that can provoke a rethinking of human functioning (Kirmayer et al., 2018). Emerging work in Indigenous psychologies considers the impact on views of human dynamics of starting from fundamentally different premises about the nature of human personhood and experience (Allwood, 2018). Many Indigenous Peoples, for example, regard the person as deeply connected to the environment in ways that acknowledge nonhuman forms of agency. This radical shift in perspective raises challenging ethical and pragmatic issues, but it can interogate and clarify

the interplay between the normative claims that underwrite our life choices and the cultural, historical, and political systems we inhabit. Western folk psychology underlies a lot of theory building and examining its assumptions opens up a space for fresh thinking and creative innovations.

Cultures provide flexible toolkits, and the diversity of cultures represents a kind of cognitive diversity that may prove adaptive in the face of rapid change (Page, 2010). Indigenous psychologies encourage us to rethink our place in the world from one of dominion to coexistence. The years to come will tell whether this new thinking will provide us with the flexibility and innovation needed to survive the catastrophic consequences of our own "success."

Conclusion

Over the next decades, innovations in brain research will lead to significant advances in our understanding of social and contextual influences on human cognition, emotion, and behavior. The emerging view of the brain in terms of dynamic networks that are plastic and adaptable across the lifespan points to new ways to think about the role of social context in individual development. This can help us understand ourselves and address human vulnerability and resilience in new ways. However, to realize this promise, neuroscience must be brought into more active dialogue with the social sciences and humanities, including anthropology, and cultural psychology and psychiatry. This exchange can illuminate how contextual differences at multiple scales affect human consciousness, cognition, behavior, and sociality. The social sciences have the potential to enliven, enrich, and redirect theory, research, and applications of neuroscience by providing salient examples of variation, refined notions of the meanings of context, and novel methodologies to study action and experience. In addition to guiding and interpreting experimental work, critical social science perspectives can play an essential role in the interpretation of research findings that often have important ethical, social, and political implications.

If this book were a Shakespearean comedy, the *finale* might include a marriage, bringing together all of the opposites in some form of celebratory union. Neuroscience, psychological and social sciences, and the humanities are essential partners in any picture of the human condition. As a step toward this integration, the contributors to this book show how the brain must be understood as plastic and dynamic, part of a predictive/enactive – rather than passive/responsive – system that gives rise to individual psychology and cultural worlds. The brain is inherently social, an "organ of culture," shaped across the lifespan by social interactions and dependent on social and cultural contexts for its development and functioning. The circuits of the mind connect the brain and social world. The disciplines present in this book – and many

others not represented – must work in concert to describe these interacting networks. Neuroscience reveals how the brain engages the world; the social sciences show us how and why the various kinds of events in the world matter; and the humanities provide the language needed to speak truth to power. Each can contribute to our imaginative capacity to invent new ways of thinking, new forms of culture, and new possibilities for our lives.

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