

Research



Cite this article: Kline MA, Shamsudheen R, Broesch T. 2018 Variation is the universal: making cultural evolution work in developmental psychology. *Phil. Trans. R. Soc. B* **373**: 20170059.
<http://dx.doi.org/10.1098/rstb.2017.0059>

Accepted: 12 December 2017

One contribution of 16 to a theme issue 'Bridging cultural gaps: interdisciplinary studies in human cultural evolution'.

Subject Areas:

cognition, evolution, developmental biology, behaviour

Keywords:

cultural evolution, developmental psychology, cross-cultural psychology, ethnocentrism, evolution and human behaviour

Author for correspondence:

Michelle Ann Kline
e-mail: michelle.ann.kline@gmail.com

[†]The second and third authors contributed equally to this manuscript.

Variation is the universal: making cultural evolution work in developmental psychology

Michelle Ann Kline^{1,2}, Rubeena Shamsudheen^{3,†} and Tanya Broesch^{1,†}

¹Department of Psychology, Simon Fraser University, Burnaby, BC, Canada V5A 1S6

²Institute of Human Origins, Arizona State University, Tempe, AZ 85287-4101, USA

³Department of Cognitive Science, Central European University, Nador u. 9, 1051 Budapest, Hungary

MAK, 0000-0002-1998-6928

Culture is a human universal, yet it is a source of variation in human psychology, behaviour and development. Developmental researchers are now expanding the geographical scope of research to include populations beyond relatively wealthy Western communities. However, culture and context still play a secondary role in the theoretical grounding of developmental psychology research, far too often. In this paper, we highlight four false assumptions that are common in psychology, and that detract from the quality of both standard and cross-cultural research in development. These assumptions are: (i) *the universality assumption*, that empirical uniformity is evidence for universality, while any variation is evidence for culturally derived variation; (ii) *the Western centrality assumption*, that Western populations represent a normal and/or healthy standard against which development in all societies can be compared; (iii) *the deficit assumption*, that population-level differences in developmental timing or outcomes are necessarily due to something lacking among non-Western populations; and (iv) *the equivalency assumption*, that using identical research methods will necessarily produce equivalent and externally valid data, across disparate cultural contexts. For each assumption, we draw on cultural evolutionary theory to critique and replace the assumption with a theoretically grounded approach to culture in development. We support these suggestions with positive examples drawn from research in development. Finally, we conclude with a call for researchers to take reasonable steps towards more fully incorporating culture and context into studies of development, by expanding their participant pools in strategic ways. This will lead to a more inclusive and therefore more accurate description of human development.

This article is part of the theme issue 'Bridging cultural gaps: interdisciplinary studies in human cultural evolution'.

1. Human development requires culture

Humans stand out among other animals because we adapt to new environments both by being clever innovators [1] and through the accumulation of cultural knowledge across generations [2,3]. Social learning, including intensive forms such as teaching [4–6], can facilitate cumulative cultural evolution. In fact, low-cost social learning mechanisms, as well as sources of innovation, are prerequisites for the evolution of cumulative culture. For this reason, social learning mechanisms are central to the understanding of cultural evolution—and cultural evolution is key to explaining why and how human ontogeny is so very flexible.

Culture is a human universal: all societies have shared knowledge, practices, beliefs and rituals that are transmitted socially. At the same time, culture is also a source of psychological and behavioural variation both within and across populations. Developmental processes that are sensitive to socio-environmental influences are one way that flexibility can evolve [7,8], and evolution can produce developmental processes that vary in adaptive ways in terms of the degree and nature of their flexibility [9]. Elaborating on the relationship between culture

and development first requires recognizing that evolution and development are not mutually exclusive, then building on that insight to explore how evolved developmental mechanisms that are sensitive to cultural influence can create psychological and behavioural variation across and within societies [8].

2. Developmental psychology requires a culturally diverse sample

Despite the importance of culture to development, developmental psychology as a field retains a near-absolute focus on development in relatively wealthy Western, English-speaking populations. Henrich *et al.* [9] term general psychology's participant pool 'WEIRD': Western, educated, industrialized, rich and democratic. A recent review provides evidence that this is also the case in leading developmental psychology journals: more than 90% of study populations represented there are from the USA, Europe and/or are English-speaking [10]. The rest of the world is vastly underrepresented, with only approximately 7% of participant populations coming from non-Western human populations (the remainder are non-human animal populations). In this context, developmental psychologists who pursue cross-cultural research are wisely expanding the scope of research to include participants beyond predominantly Western, upper middle class and often ethnically white participants [9,11,12]. We applaud these efforts—anything less would only perpetuate an incomplete and inaccurate picture of human development.

Poor sampling, however, is not the only problem in the field. Arnett [11], and Meadon & Spurrett [13] address a lack of inclusivity in the broader practice of psychology: theories, studies and publications in the American Psychological Association journals are all overwhelmingly created, reviewed and edited by this same subset of the world's population. This is one reason why the sampling problem in developmental psychology is not likely to be solved by laboratory-based researchers making the decision to take on cross-cultural work unilaterally, in the short term. Dropping in on communities with unfamiliar cultures to run brief, one-off studies without a long-term reciprocal relationship with the community can be ethically dubious [14], especially where there is a power differential. Further, interpreting results in isolation from a population's daily cultural context can produce more confusion than answers [15]. And yet avoiding these pitfalls requires investing what can be a prohibitive amount of time, effort and funding to start and maintain a field site. A more plausible way to ameliorate psychology's WEIRD problem is to recruit, support, include and collaborate with more scientists from beyond the WEIRD populations that have created the bias in the first place [11,13]. Alternatively, researchers can work with non-university populations nearby, to explore variation among people in their own local context [14]. More generally, researchers who study WEIRD populations must also recognize that their populations are also influenced by culture and should consider carefully how to define the specific population from which they recruit participants. Both these strategies fit with a broader, theoretically motivated approach to expand the inclusiveness of sampling in developmental psychology. This paper aims to show why developmental psychology needs this change, and establish some guidelines for how to study culture's role in development, no matter how near or far from home the study site may be.

3. Cultural evolution can motivate a better science of developmental psychology

Cross-cultural data are expensive to get, but valuable to have. Their rarity in developmental psychology is due to more than a lack of interest in cross-cultural sampling, and we cannot dissolve those very real barriers in this paper. Instead, our goals in this paper are twofold. First, we aim to convince researchers in the field of developmental psychology that considerations of culture are relevant to their work, even if they do not do far-flung fieldwork themselves. Second, for cross-cultural developmental psychologists, we aim to leverage cultural evolutionary theory to enrich the central role of cross-cultural data to developmental psychology as a field. To achieve these aims, we highlight four common but false assumptions in present-day approaches to cultural variation in developmental psychology, and critique each in turn by drawing on cultural evolutionary theory and empirical findings. This step of identifying and refuting these assumptions will help to integrate the 'cross-cultural' niche within developmental psychology, in general, by demonstrating how culture and culture-based assumptions underlie some of the basic ideas that motivate research in developmental psychology. Those assumptions are that: (i) universality and uniformity are equivalent: that what is universal must necessarily follow a uniform pattern of development; (ii) Western populations are central in human psychology; (iii) differences among populations in development are always indicative of deficits; (iv) methods can automatically be transported across cultural contexts and yet maintain validity. We critique each assumption in turn, by drawing both on cultural evolutionary theory and on positive examples from the developmental psychology literature. In our conclusion section (§8), we summarize a general strategy for research that eschews these assumptions, and argue that this approach can pave the way for an improved science of developmental psychology by placing the cultural nature of humans at its centre.

4. Problem no. 1: the universality as uniformity assumption

The *universality assumption* is the belief that observed uniformity is evidence for species-wide, biologically based universality. By contrast, any variation is regarded as evidence for culturally derived differences. By 'universal', we mean core mental or behavioural attributes shared by humans everywhere [16]. This assumption sometimes takes the form of an explicit claim that uniformity implies genetic underpinnings (often mis-categorized as 'biological' or 'evolutionary'), while variation necessarily indicates 'cultural' influences [17]. In all its forms, this assumption rests on the false nature/nurture dichotomy, that culture and biology are separate, opposite and competing explanations. In reality, human cultural capacities are part of our biology [18,19]. Equating psychological or behavioural variation with cultural influence precludes a deeper understanding of human behaviour, because a universally shared developmental process can function to produce behavioural or psychological variation. Instead, developmental flexibility and culture are both parts of the biology of human development, not alternative explanations—culture is a part of human biology and development [8].

This false dichotomy between nature and nurture produces two versions of the universality as uniformity assumption: (a) that variation is equivalent to a lack of universality, and that (b) psychological/behavioural similarity is equivalent to universality. For the sake of clarity, we address each in turn.

(a) Variation equals cultural influence and lack of universality

This assumption is often implicit in data analysis and study interpretation. For example, researchers conduct cross-site comparisons and conclude that any between-site difference is 'cultural', without explaining how culture produces differences in psychology and behaviour. In addition, researchers often treat whole cultures as if they are a single experimental condition, without considering the influence of environmental factors, such as resource availability, wealth or differences in the interpretation of the method (see §6 below). For example, directly comparing norms for anonymous sharing among wealthy Americans with those among poor, food-insecure Polynesian populations may result in differences—but those differences may be due to circumstances specific to resource scarcity, rather than some underspecified aspect of culture. This line of reasoning is not considered sufficient for studies of culture in other animals, and leads to energetic debates about sources of behavioural variation even in our closest living relatives (e.g. [20–22]). However, the same logic is rarely questioned in cross-cultural comparisons of human psychology. While cross-cultural comparisons do contribute to our knowledge of the range of variation in human behaviour, most fall short of understanding the sources and the scale of variation that can emerge via developmental processes—the real question at hand.

(b) Uniformity equals genetic roots and lack of cultural influence

The other side of the universality assumption consists of a belief that uniformity in behaviour and psychology is indicative of universally 'innate' traits that develop without cultural inputs.

When developmental psychologists ask whether a feature is innate, and then seek to show that it emerges early and reliably across human populations, they rely upon assumptions that equate sameness, universality and innateness. By contrast, biologists have recognized notions of innateness as useless in ecology, biology and behaviour since the early 1990s [19]. This rests on a recognition, as Barrett [8, p.157] writes, that '...[t]here are not two kinds of things, the innate and the non-innate, but only one, the developmental process itself.' Put simply, genes rely upon the environment in order to create an organism, and vice versa. In humans, culture is part of that ever-present environment.

(c) Improvements

The equation of sameness with universality, and the desire to describe a general human psychology in these terms, have long been a driving philosophy in American psychology [11,16,23]. While valuable as a first pass, documenting similarities across sociocultural contexts is a subpar strategy for data collection when the goal is to understand culture's role in shaping development, or vice versa. Cultural evolutionary

theory offers an alternative perspective for shaping research questions: that genes and culture have co-evolved in humans. Because of this 'dual-inheritance' system, both genetic and cultural information are essential ingredients in any explanation of human biology. Most developmental psychologists would not argue with this stance, but putting it into action in a research programme is still a challenge. Cultural evolutionary theory is useful in this practical sense, because it provides a working definition of culture that can inform quantitative work: '[c]ulture is information capable of affecting individuals' behaviour, that they acquire from other members of their species through teaching, imitation, and other forms of social transmission' [19, p. 5].

Cultural evolution's distinction of culture as socially learned information is useful as a research tool because it means developmental psychologists need not ask whether any particular trait is universal, biological and innate, versus cultural. When biology and culture are not opposites, this either/or is a meaningless, and therefore unanswerable, question. Instead, developmental psychology can embrace a transformed question: what is the relative influence of environmental, cultural and other contextual factors on shaping development of specific traits, in particular population? In other words, how variable and flexible is the development of this trait? Answering this context-rich question through studies that theorize about the functional role of variation will produce a body of evidence on how human psychological development varies. From this, researchers can build a more complete map of human psychological development.

This view, rooted in cultural evolutionary theory, places flexibility at the centre of understanding what is universal about human psychological development. This provides a theoretically motivated way to predict when and how culture ought to impact development, rather than simply checking Western-based work against non-Western populations and lumping traits that are the 'same' as universal, and those that are 'different' as cultural.

(d) Developmental research case study

Studies of human language acquisition and socialization provide evidence for both variation in a cultural context, and shared developmental processes. Geographically and culturally disparate populations typically speak different languages, and in some cases even show variation in the neurological underpinnings necessary to master and use different languages [24]. The cultural expectations for children as language learners are shaped by their cultural contexts, and in some ways are inseparable from socialization more generally [25]. Language acquisition processes illustrate that developmental processes themselves—such as statistical learning [26]—can constitute universal learning mechanisms, which in turn generate behavioural and psychological variation. The same can be said for children's early learning environments: there are both shared and variable features, cross-culturally. For example, Broesch & Bryant [27,28] find that mothers and fathers across disparate societies routinely modify the properties of their speech when addressing young infants compared to when they address adults, yet they do so in different ways [28]. Despite identifying the existence of infant-directed speech by caregivers in North America, Kenya, Fiji and Vanuatu, they also find that parents vary cross-culturally in the form their infant-directed speech takes. Mothers across diverse societies and rural Vanuatu

fathers modified their speech by adjusting features of the perceived pitch of their speech to infants. However, fathers in North America only slowed down the rate of their speech, without adjusting the perceived pitch [27]. The results of this study demonstrate why researchers cannot simply search for universality by equating it with similarity: it is too broad a question, and would lead us to ignore key details about the flexible nature of developmental processes.

5. Problem no. 2: the Western centrality assumption

The *Western centrality assumption* is the belief that Western populations represent a normal and/or healthy standard against which development in all societies can and should be compared. This assumption literally fits the original definition of *ethnocentric* [29], in that it divides global populations into two rough categories, 'the West' and 'the Rest,' with Western societies at the centre of everything. This assumption is rarely if ever made explicit in print, but it is worked into the foundation of much developmental research, including the cognitive and medical milestones that serve as guidelines for both Western parents and international health agencies.

(a) Improvements

From a cultural evolutionary perspective, lumping Western and non-Western societies into two broad categories of analysis is simply throwing data away. The study of cultural evolution is necessarily built on the study of the cultural history of societies all over the world, because explaining cultural variation requires a breadth of data across socioecological environments ([19]; see e.g. the range of sites included in Mace *et al.*'s edited volume [30]). From this perspective, every cultural context is an equally valid study site, and the importance of a particular site is down to its specific cultural features and their relevance to the research question. For example, Polynesia's history of step-wise settlement by ocean-faring canoe and its estimable rates of contact among societies make its cultural history an excellent case study on how population interconnectedness can influence the accumulation of complex material culture [31,32]. The key message from cultural evolutionary theory here is that these studies stand alone, and do not require a Western comparison sample to lend them value.

(b) Developmental research case study

The Western centrality assumption directly damages the accuracy and usefulness of developmental research. For example, Karasik *et al.* [33] review how developmental textbooks and medical guidelines employ standards for motor development that are built exclusively on American middle-class samples as proscriptive milestones. Karasik *et al.*'s data, drawn from six different societies, document within- and between-population variation in both the timing of the motor development of sitting, as well as the social and material contexts that contribute to those differences. This establishes a causal link between context and developmental trajectories. Karasik *et al.* conclude that using American-centric guidelines as if they are universal has 'led to a gross misrepresentation of motor development' (p. 1033). Treating Western samples as a universal measuring stick for development is, unfortunately, a pervasive practice. Greenfield *et al.* [34] review evidence that

developmental trajectories derived from the study of Western populations, with their focus on independence, are unlikely to match how children learn and grow in sociocultural contexts where interdependence is prioritized. This is particularly true for social development. For example, while adolescence may be a transition to autonomy in independence-focused societies, in an interdependent society it is instead a relational shift that makes sense only in the context of kinship and community [34]. Likewise, classic theories of attachment [35] presuppose that the end goal of child development is independence and autonomy, rather than locally appropriate integration into kinship- and community-based interdependent relationships. In a review, Keller [36] questions whether these theories hold up when used to explain behaviour in cultural contexts beyond Western societies, and argues that incorporating data from additional populations requires revising existing theory along lines suggested by cultural and evolutionary theories of development.

6. Problem no. 3: the deficit assumption

The *deficit assumption* is that population-level differences in developmental timing or outcomes are necessarily caused by something lacking, typically in parenting or educational systems. This line of reasoning allows for no flexibility, and assumes a single, inflexible developmental outcome. The assumption rides the coattails of the Western centrality assumption, in that the timeline that establishes 'normal' development from 'delayed' development is typically anchored on data from Western populations. However, the deficit assumption can also apply to Western populations or subpopulations therein. For example, Lancy [37] argues that excessive levels of teaching in Western societies may impinge on the development of a child's autonomy. The deficit assumption is also sometimes applied to subpopulations within Western societies, and so has recently become an important domain for self-critique in the field of developmental psychology (see [38]). However, the deficit assumption differs from the Western centrality assumption in two important ways. First, the deficit assumption carries an extra layer of interpretation in comparison to the Western centrality assumption. By this we mean that researchers simultaneously judge a given pattern in development as deviant and also attribute that difference to something that is lacking or missing from a family's or a population's way of raising children. This carries with it a value judgement that goes beyond a scientific approach to describing and explaining variation, and in doing so obscures the science itself. Second, the Western centrality assumption functions only in one direction. By contrast, the deficit assumption can lead researchers to claim that Western children are somehow worse off than non-Western ones. Often this takes the form of arguing that Western children are coddled, spoiled or excessively dependent on direct parent intervention.

In assuming that group-level developmental differences are due to what is lacking in schooling or parenting, researchers frequently fail to (a) give any evidence for this mechanism beyond handwaving that 'culture' is the cause, and (b) in doing so, fail to consider the many specific axes of variation that comprise between-population differences. When researchers fail to give a specific cultural mechanism yet attribute differences to 'culture,' some of the variation may be due to situation (e.g. resource insecurity) rather than culturally

inherited differences (e.g. collective ownership norms). Where this is the case, it is a serious challenge to the validity of cross-cultural comparisons, in that it fails to account for potential confounding variables. Recognizing and controlling for potential confounds are accepted as a crucial components of high-quality research in developmental psychology, with particular attention to detail in experimental studies. The same standard should be applied at the level of cross-cultural comparisons. The risk of neglecting to recognize a confounding variable decreases with a research team's expertise in the local context at their study site. Finally, the deficit assumption reinforces a deeper-seated assumption, (c) that there is one shared, correct outcome for various stages of development, and that this does not vary across populations or across societies.

(a) Improvements

Cultural evolutionary theory instead presents a functionalist perspective. This means that the focus is on how different domains of development fit into both physical maturity and context-dependent social, emotional and relational factors. This emphasis on function in context is shared with dynamic systems theories [39], but an evolutionary approach is further motivated by understanding how developmental processes have emerged over an evolutionary timespan and in comparison to other species. From this perspective, developmental flexibility, including social learning, is part of what allows human culture to evolve faster than the human gene pool [40], and this in turn makes humans adaptable over short timescales [2]. (In contrast with dynamic systems theory, the term 'adapt' is almost never used in cultural evolutionary theory to refer to the timescale of a single individual behaving flexibly, but rather it is a population-level concept.) As a result, psychological development is pluralistic by design, and this evolved because flexibility is incredibly useful for a wide-ranging, invasive species like *Homo sapiens*. Barrett [8] has coined the term 'designed emergence' to capture the idea that developmental processes are flexible as a result of evolution by natural selection. Simply put, this means there is a range of healthy, functional outcomes that emerge from developmental processes. Outside of that range, pathology is still possible, especially in cases of extreme abuse or neglect that fall outside the breadth of typical human experience. Specific outcomes are not predetermined by genes, but are instead shaped by the interaction between genes and environment in ways that have been manufactured by natural selection. For developmental psychologists, the take-home message here is that shared processes of human development have a variety of outcomes, and this flexibility in outcomes is a feature rather than a bug. Developmental researchers can leverage this insight to create and evaluate hypotheses about how the form and developmental timing of psychological phenomena fit in functional ways with children's roles in varying sociocultural contexts.

(b) Developmental case study

For example, psychologists have long assumed that direct, active teaching (often characterized by the verbal communication of abstract ideas) is the most efficient way to scaffold learning, and that therefore it must be present in all human societies (for review see [6]). By contrast, some anthropologists have often conflated direct instruction with involuntary, forced transmission, which replaces more enjoyable and (by this account) effective forms of learning by participation

([37,41,42]; see [6] for review). For both accounts, at least some societies have got the wrong answer to how children learn best—and children in those societies are at a deficit.

Kline [6,43] uses cultural evolutionary theory as a foundation to argue that there are many functionally distinct types of teaching, which can be mixed and matched with learning problems. From this perspective, no single type always provides a 'best' outcome for the learner, because it depends on the learning problem at hand. This approach treats development as an integral working part of evolutionary processes, and prioritizes functional and causal explanations of variation. This is in contrast with other evolutionary accounts that explain why humans, and only humans, teach by referring to constraints in other animals. When successful, a cultural evolutionary approach uses the rich and culturally specific interpretations offered by ethnographic research as insights that can inform broader claims about the evolution and nature of human developmental psychology. Taking a functionalist, cultural evolutionary perspective offers power for generating and testing hypotheses in developmental psychology by incorporating the full range of human variation into what developmental psychologists term 'typical' development.

7. Problem no. 4: the equivalency assumption

The *equivalency assumption* is that using identical research methods, scales or questions will automatically produce equivalent and externally valid data, even across disparate cultural contexts. Arnett [11] elaborates on this rationale as the predominant philosophy of science in experimental American psychology: that in the laboratory, it does not matter who the participants are, or where or how they live—it matters only that the procedures within the experiment itself are sufficiently controlled. The equivalency assumption is demonstrably false when taken to the extreme: written methods must be translated, and translation inevitably brings up questions of whether or not there are shared concepts and meanings, across sociolinguistic contexts. Non-linguistic methods may avoid the problem of translation, but the question of whether methods and stimuli map to shared concepts, social context and expected behaviour across cultural groups is still an important one. Such comparisons are only useful when the meaning of the protocol is comparable across societies [44–46]. Further, assuming equivalency also means that researchers may fail to account for culturally specific environmental factors in development that are either present in WEIRD contexts but not at their study site, or that are absent in WEIRD contexts and therefore may be unrecognized as important factors at their study sites. For example, while direct verbal instruction may be rare in many non-Western societies, ethnographic studies of development in these contexts reveal a rich, interactive social context in which learning happens via participant observation and inclusion of children in everyday activities [37,41,47]. The social learning mechanisms vary but learning and developmental change happen in all cultural contexts.

(a) Improvements

Cultural evolutionary theory treats the human brain, mind and behaviour as having evolved in the context of human interaction with the world, rich with social and cultural context. Ignoring that this cultural context affects how participants understand and respond to methods is particularly

problematic when transporting methodologies across sociocultural contexts that differ in broad ways [16,44,48,49]. This is a problem even for developmental psychologists who do not venture to do cross-cultural work, because it means their methods and their results may be culture-bound and therefore limited in ways they have not explored.

The equivalency assumption raises a particularly difficult challenge for cross-cultural comparisons in developmental psychology. The standards for experimental control are stringent and technically demanding. For example, effect sizes and statistical significance for studies with infants can depend on looking times that differ in terms of milliseconds. These tasks often require electricity, delicate equipment, trained personnel and quiet laboratory space to run effectively. However, even a perfectly replicated and controlled methodology cannot guarantee that participants from two different sociocultural contexts are interpreting the situation in similar ways and therefore the behaviours observed may not be comparable.

As Heine and co-workers [44,50] conclude, there is no straightforward solution for this broad problem of context-specific methodological validity. Instead, establishing real comparability across populations requires *more* context, not less—and this means bringing ethnography into the picture as a standard resource to inform the design and interpretation of studies in developmental psychology. Cultural evolutionary research may seem an unlikely resource for addressing this methodological challenge because the field has no signature methodology of its own: for example, its studies of learning biases draw upon established psychological methods, and its studies of behaviour build on human behavioural ecology and animal behaviour. The formal mathematical models that established the field are themselves built on established models in epidemiology and genetics. The field is so thoroughly interdisciplinary that some cultural evolutionists have even proposed a division of labour within cultural evolutionary studies that subsumes existing disciplines [51]. We advocate instead for a mixed-methods approach, deploying methods in combinations that strategically compensate for the particular shortcomings of each method, and that are suitable for the research problem at hand. This is standard practice in some areas of social science, including the anthropological sciences, where both qualitative and quantitative data and analyses are used as needed [52].

(b) Developmental case study

For example, researchers often treat mutual eye gaze between infant and caretaker as a reliable and stand-alone indicator of joint attention in the study of infant cognition. However, Akhtar & Gernsbacher [53] point out that the social role of eye gaze is variable across cultural contexts, and hence is not always a reliable indicator of joint attention. North Americans typically privilege eye contact and verbal interaction as a key part of parenting [54], but Gusii mothers in Kenya avert their eyes in response to mutual eye gaze with an excited infant, in part to keep their babies calm [55]. According to LeVine & LeVine [55], gaze avoidance by mothers is consistent with polite behaviour by Gusii adults, where excessive eye contact is considered rude and sometimes even aggressive. Gaze avoidance does not mean Gusii mothers are inattentive to their infants, but rather that they do not use mutual gaze as a means of establishing joint attention. Instead, they may use

more physical types of interaction—a typical Gusii mother cosleeps with her infant, breastfeeds on demand and responds quickly to her infant's distress. Based on Lancy's review of the ethnographic literature on children and childhood [54], the Gusii approach of using more tactile contact and gestural communication may be more typical around the world than the North American approach, which emphasizes eye contact and verbal communication. An excessive focus on eye gaze as the key element in joint attention (e.g. [56]) may twist the scientific understanding of joint attention by underestimating its prevalence in societies where eye gaze is less important than in North American contexts.

Rather than the narrowly Western-centric cue of eye gaze, vocal and postural behaviours may represent a more culturally generalizable set of cues for the study of infant social cognition [53]. In fact, gestural, postural and vocal cues may play an important role in Western contexts, but one that is de-emphasized in developmental psychology as a reflection of North American culture. However, the plurality of methodological approaches suggested by cultural evolutionary theory means there is another option besides searching for single (or a set of) cues that always indicate joint attention, across sociocultural contexts. Instead, researchers should use an array of cues, designed for particular sociocultural contexts, to compare the prevalence and behavioural form of joint attention across human populations. Using identical methods based on culturally specific cues will produce only superficially comparable data, and will produce a misleading picture of the ways in which populations vary.

8. Conclusion

For each assumption above, we offer a shift in perspective that uses cultural evolutionary theory to pry those assumptions loose from present-day developmental psychological research. For standard developmental psychology, this means seeing the culture-bound nature of the questions, methods and results, and appropriately characterizing the generalizability of the research given the limited samples. For cross-cultural developmental psychology, this means guarding against some of the assumptions that are common in psychology more generally, and employing cultural evolutionary theory to improve how cross-cultural research is designed, conducted and interpreted.

Using this approach, researchers can take some small steps to remediate the sampling problem in developmental psychology. Researchers working at institutions in WEIRD societies can step off campus to create more inclusive study by sampling populations in their towns but beyond campus, and in doing so can increase the inclusivity of their samples with a moderate level of investment in community engagement. They can also collaborate with and learn from colleagues at institutions outside of North America and Western Europe, to work with scholars who are both highly trained academics as well as regional experts in the societies in which they work and live. We do not argue that researchers should avoid studying or drawing comparisons between WEIRD populations and additional populations around the world. Instead, we argue that carefully specifying the meanings of cross-cultural studies, using cultural evolutionary theory, may open up a rich avenue for comparative research. This includes comparisons both within and between populations, to look for robust relationships between cultural variation and corresponding psychological, behavioural

and developmental variation. This kind of data will allow researchers to study just how flexible human psychological development may be, because it allows us to ask whether the same causal relationships hold for development across populations, or whether the relationships and processes themselves are flexible. In essence, this approach ties the form of developmental flexibility to the sociocultural and ecological contexts in which human psychology functions over the lifespan.

Researchers before us have tackled the question of appropriate cross-cultural comparisons, with a similar emphasis on the need for strategic selection of field sites and research problems (see e.g. [9,16]). In addition to these existing recommendations, we caution against any approach that treats entire 'cultures' or nations as indivisible wholes that are culturally, psychologically or behaviourally homogeneous. Rather than comparing whole 'cultures,' researchers should aim to map variation both within and across populations, along measurable axes of variation. This is especially applicable to broad cross-site surveys, which often include only coarse measures of cultural variation (e.g. gross domestic product, Gini coefficient or years of education), treat single sites as representative of entire countries, and further conflate those countries with 'cultures.' However, it is equally applicable to studies restricted to Western populations, where researchers can both expand the inclusivity of their samples, and be more explicit about the degrees of variation included in those samples. Both these practices will lead to better science in developmental psychology. By placing cultural context—and the flexibility that it entails—at the centre of this work, researchers will gain a

deeper understanding of the developmental processes that build human cultural variation.

The overarching message from a cultural evolutionary perspective is that developmental trajectories and endpoints can vary due to the human ability to learn flexibly, acquire information from others, and to recombine socially and individually learned information in creative ways. Using this as a springboard, developmental psychologists are well positioned to explore the developmental mechanisms and processes by which human children adapt to their local sociocultural and environmental contexts. Doing so will mean shedding light on one of the broadest human universals of all: variability.

Data accessibility. This article has no additional data.

Authors' contributions. M.A.K. conceived of and drafted the manuscript. R.S. and T.B. both made intellectual contributions prior to the manuscript's first draft, and made edits and contributions to manuscript drafts. R.S. and T.B. contributed equally. All the authors approved the final version of this manuscript.

Competing interests. We declare we have no competing interests.

Funding. This research was made possible through the support of a grant from the John Templeton Foundation to the Institute of Human Origins at Arizona State University (no. 14020515). The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the John Templeton Foundation.

Acknowledgements. We would like to thank Central European University's Department of Cognitive Science, for inviting the authors to a Social Mind Institute Workshop, which led to the formation of some of the early ideas for this paper.

References

- Pinker S. 2010 The cognitive niche: coevolution of intelligence, sociality, and language. *Proc. Natl Acad. Sci. USA* **107**(Suppl. 2), 8993–8999. (doi:10.1073/pnas.0914630107)
- Boyd R, Richerson PJ, Henrich J. 2011 Colloquium Paper: The cultural niche: why social learning is essential for human adaptation. *Proc. Natl Acad. Sci. USA* **108**(Suppl. 2), 10 918–10 925. (doi:10.1073/pnas.1100290108)
- Henrich J. 2015 *The secret of our success: how culture is driving human evolution, domesticating our species, and making us smarter*. Princeton, NJ: Princeton University Press.
- Tennie C, Call J, Tomasello M. 2009 Ratcheting up the ratchet: on the evolution of cumulative culture. *Phil. Trans. R. Soc. B* **364**, 2405–2415. (doi:10.1098/rstb.2009.0052)
- Dean LG, Vale GL, Laland KN, Flynn E, Kendal RL. 2013 Human cumulative culture: a comparative perspective. *Biol. Rev.* **89**, 284–301. (doi:10.1111/brv.12053)
- Kline MA. 2015 How to learn about teaching: an evolutionary framework for the study of teaching behavior in humans and other animals. *Behav. Brain Sci.* **38**, 1–70. (doi:10.1017/S0140525X14001071)
- Jablonska E, Lamb MJ. 2014 *Evolution in four dimensions*, 2nd edn. Cambridge, MA: MIT press.
- Barrett HC. 2014 *The shape of thought*. Oxford, UK: Oxford University Press.
- Henrich J, Heine SJ, Norenzayan A. 2010 The weirdest people in the world? *Behav. Brain Sci.* **33**, 61–83. (doi:10.1017/S0140525X0999152X)
- Nielsen M, Haun D, Kartner J, Legare CH. 2017 The persistent sampling bias in developmental psychology: a call to action. *J. Exp. Child Psychol.* **162**, 31–38. (doi:10.1016/j.jecp.2017.04.017)
- Arnett JJ. 2008 The neglected 95%. *Am. Psychol.* **63**, 602–614. (doi:10.1037/0003-066X.63.7.602)
- Nielsen M, Haun D. 2015 Why developmental psychology is incomplete without comparative and cross-cultural perspectives. *Phil. Trans. R. Soc. B* **371**, 20150071. (doi:10.1098/rstb.2015.0071)
- Meadon M, Spurrett D. 2010 It's not just the subjects—there are too many WEIRD researchers. *Behav. Brain Sci.* **33**, 104–115. (doi:10.1017/S0140525X10000208)
- Fernald A. 2010 Getting beyond the 'convenience sample' in research on early cognitive development. *Behav. Brain Sci.* **33**, 91–92. (doi:10.1017/S0140525X10000294)
- Rai TS, Fiske A. 2010 ODD (observation-and description-deprived) psychological research. *Behav. Brain Sci.* **33**, 106–107. (doi:10.1017/S0140525X10000221)
- Norenzayan A, Heine SJ. 2005 Psychological universals: what are they and how can we know? *Psychol. Bull.* **131**, 763–784. (doi:10.1037/0033-2909.131.5.763)
- Apicella CL, Barrett HC. 2016 Cross-cultural evolutionary psychology. *Curr. Opin. Psychol.* **7**, 92–97. (doi:10.1016/j.copsyc.2015.08.015)
- Boyd R, Richerson PJ. 1985 *Culture and the evolutionary process*. Chicago, IL: University of Chicago Press.
- Richerson PJ, Boyd R. 2005 *Not by genes alone: how culture transformed human evolution*. Chicago, IL: University of Chicago Press.
- Whiten A, Horner V, Marshall-Pescini S. 2003 Cultural panthropology. *Evol. Anthropol.* **12**, 92–105. (doi:10.1002/evan.10107)
- Langergraber KE, Vigilant L. 2011 Genetic differences cannot be excluded from generating behavioural differences among chimpanzee groups. *Proc. R. Soc. B* **278**, 2094–2095. (doi:10.1098/rspb.2011.0391)
- Langergraber K, Schubert G, Rowney C, Wrangham R, Zommers Z, Vigilant L. 2011 Genetic differentiation and the evolution of cooperation in chimpanzees and humans. *Proc. R. Soc. B* **278**, 2546–2552. (doi:10.1098/rspb.2010.2592)
- Shweder RA. 1999 Why cultural psychology? *Ethos* **27**(1), 62–73. (doi:10.1525/eth.1999.27.1.62)
- Gea J, Peng G, Lyu B, Wang Y, Zhuo Y, Niuf Z, Tang LH. 2015 Cross-language differences in the brain network subserving intelligible speech. *Proc. Natl Acad. Sci. USA* **112**, 2972–2977. (doi:10.1073/pnas.1416000112)

25. Schieffelin B, Ochs E. 1986 Language socialization. *Annu. Rev. Anthropol.* **15**, 163–191. (doi:10.1146/annurev.an.15.100186.001115)
26. Saffran JR, Aslin RN, Newport EL. 1996 Statistical learning by 8-month-old infants. *Science* **274**, 1926–1928. (doi:10.1126/science.274.5294.1926)
27. Broesch T, Bryant GA. 2017 Fathers' infant-directed speech in a small-scale society. *Child Dev.* (doi:10.1111/cdev.12768)
28. Broesch TL, Bryant GA. 2015 Prosody in infant-directed speech is similar across western and traditional cultures. *J. Cogn. Dev.* **16**, 31–43. (doi:10.1080/15248372.2013.833923)
29. LeVine RA. 2001 Ethnocentrism. In *International encyclopedia of the social and behavioral sciences* (eds NJ Smelser, PB Baltes), pp. 4852–4854. Oxford, UK: Oxford University Press.
30. Mace R, Holden C, Shennan S (eds). 2005 *The evolution of cultural diversity: a phylogenetic approach*. Walnut Creek, CA: Leftcoast Press.
31. Kline MA, Boyd R. 2010 Population size predicts technological complexity in Oceania. *Proc. R. Soc. B* **277**, 2559–2564. (doi:10.1098/rspb.2010.0452)
32. Henrich J *et al.* 2016 Understanding cumulative cultural evolution. *Proc. Natl Acad. Sci. USA.* **113**, E6724–E6725. (doi:10.1073/pnas.1610005113)
33. Karasik LB, Tamis-LeMonda CS, Adolph KE, Bornstein MH. 2015 Places and postures. *J. Cross Cult. Psychol.* **46**, 1023–1038. (doi:10.1177/0022022115593803)
34. Greenfield PM, Keller H, Fuligni A, Maynard A. 2003 Cultural pathways through universal development. *Annu. Rev. Psychol.* **54**, 461–490. (doi:10.1146/annurev.psych.54.101601.145221)
35. Bowlby J. 1989 *Attachment theory*. Los Angeles, CA: Lifespan Learning Institute.
36. Keller H. 2013 Attachment and culture. *J. Cross Cult. Psychol.* **44**, 175–194. (doi:10.1177/0022022112472253)
37. Lancy DF. 2010 Learning 'from nobody': the limited role of teaching in folk models of children's development. *Childhood Past.* **3.1**, 79–106. (doi:10.1179/cip.2010.3.1.79)
38. Akhtar N, Jaswal VK. 2013 Deficit or difference? Interpreting diverse developmental paths: an introduction to the special section. *Dev. Psychol.* **49**, 1–3. (doi:10.1037/a0029851)
39. Smith LB. 1993 *A dynamic systems approach to development: applications*. Cambridge, MA: MIT Press.
40. Perreault C. 2012 The pace of cultural evolution. *PLoS ONE* **7**, e45150. (doi:10.1371/journal.pone.0045150)
41. Paradise R, Rogoff B. 2009 Side by side: learning by observing and pitching in. *Ethos* **37**, 102–138. (doi:10.1111/j.1548-1352.2009.01033.x)
42. Rogoff B, Matusov E, White C. 1996 Models of teaching and learning: participation in a community of learners. In *The handbook of education and human development: New models of learning, teaching and schooling* (eds DR Olson, N Torrance), pp. 388–414. Oxford, UK: Blackwell.
43. Kline MA. 2016 TEACH: an ethogram-based method to observe and record teaching behavior. *Field Methods* **29**, 205–220. (doi:10.1177/1525822X16669282)
44. Heine SJ, Norenzayan A. 2006 Toward a psychological science for a cultural species. *Perspect. Psychol. Sci.* **1**, 251–269. (doi:10.1111/j.1745-6916.2006.00015.x)
45. Pepitone A, Triandis HC. 1987 On the universality of social psychological theories. *J. Cross Cult. Psychol.* **18**, 471–498. (doi:10.1177/0022002187018004003)
46. Poortinga YH. 1989 Equivalence of cross-cultural data: an overview of basic issues. *Int. J. Psychol.* **24**, 737–756. (doi:10.1080/00207598908246809)
47. Rogoff B, Paradise R, Arauz R, Correa-Chávez M, Angelillo C. 2003 Firsthand learning through intent participation. *Annu. Rev. Psychol.* **54**, 175–203. (doi:10.1146/annurev.psych.54.101601.145118)
48. Cohen D. 2007 Methods in cultural psychology. In *Handbook of cultural psychology*, pp. 196–236. London, UK: The Guilford Press.
49. Greenfield PM. 1997 Culture as process: empirical methods for cultural psychology. In *Handbook of cross-cultural psychology: theory and method* (eds JW Berry, YH Poortinga, J Pandey), pp. 301–346. Boston, MA: Allyn & Bacon.
50. Heine SJ, Lehman DR, Peng K, Greenholtz J. 2002 What's wrong with cross-cultural comparisons of subjective Likert scales?: The reference-group effect. *J. Pers. Soc. Psychol.* **82**, 903–918. (doi:10.1037/0022-3514.82.6.903)
51. Mesoudi A, Whiten A, Laland KN. 2006 Toward a unified science of cultural evolution. *Behav. Brain Sci.* **29**, 329–383. (doi:10.1017/S0140525X06009083)
52. Bernard HR. 2011 *Research methods in anthropology: qualitative and quantitative approaches*, 5th edn. New York, NY: Altamira Press.
53. Akhtar N, Gernsbacher MA. 2008 On privileging the role of gaze in infant social cognition. *Child Dev. Perspect.* **2**, 59–65. (doi:10.1111/j.1750-8606.2008.00044.x)
54. Lancy DF. 2008 *The anthropology of childhood*. Cambridge, UK: Cambridge University Press.
55. LeVine RA, Levine S. 1996 *Child care and culture: lessons from Africa*. Cambridge, UK: Cambridge University Press.
56. Tomasello M, Carpenter M, Call J, Behne T, Moll H. 2005 Understanding sharing intentions: the origins of cultural cognition. *Behav. Brain Sci.* **28**, 675–735. (doi:10.1017/S0140525X05000129)