Culture and Biology: The Foundation of Pathways of Development

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Abstract
This paper develops the argument that the relationship of biology and culture is systematic: evolved predispositions and learning devices allow individuals to acquire contextually relevant information to become competent in particular environments. It is proposed to synthesize evolutionary theory with cultural and indigenous approaches defining cultural contexts on the basis of shared practices and shared beliefs. Human development can be understood as a series of evolved developmental tasks that need to be solved locally to define adaptive life histories. Early parenting strategies are defined for two prototypical sociocultural contexts: rural farmers in traditional non-Western villages and urban Western middle-class families. Parenting strategies are supposed to lay the foundation during the brain imprint period of infancy for different developmental pathways of self-development.

Introduction
In this paper, it is argued that development can be understood as the acquisition of cultural knowledge based in universal biological predispositions. Cultural knowledge provides individuals with the contents and the tools to master the challenges of particular environments. Environments are constituted by physical and social structures and processes. Culture can thus be understood as the human medium of adaptation (Keller, 2003, 2007).

This view of development as construction and co-construction of cultural information on the basis of informed hypotheses that are derived from the evolutionary heritage is relatively new (see e.g., Greenfield, 2002; Greenfield, Keller, Fuligni, & Maynard, 2003; Keller, 2002, 2007). It represents a major challenge to the still existing categorical and dichotomous examination of nature and culture. In the following paragraphs, first, the reflection of culture in developmental research of different theoretical traditions will be highlighted. Then the basic components for the proposed integration will be introduced (i.e., the human nature and cultural/contextual variations). The conception of developmental pathways is presented as a new synthesis of the interplay of biology and culture as understood here.
The Reflection of Culture in Developmental Sciences

The study of culture in developmental processes has been – surprisingly enough – mainly directed at showing its non-existence for a long time. To put it differently, the inclusion of culture in developmental studies was mainly aimed at demonstrating pancultural and universal processes constituting the human nature (e.g., Eibl-Eibesfeldt, 1989). As a consequence, developmental science as represented in textbooks basically still takes for granted that research that has been conducted with Euro-Americans or Europeans also applies to the rest (i.e., the majority world). If culture is mentioned at all, it brings in variability; culture as a systematic informant of development is hardly recognized.

Attachment theory may constitute a prominent example for the claim of universality in mainstream developmental science (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969). John Bowlby’s study of the mental health problems of British children who had been institutionalized following separations from their families during World War II (Bowlby, 1969, 1980) led him to synthesize ethological and psychoanalytic perspectives with his clinical experiences and a systems theory view. As a result, he formulated a theory that emphasizes phylogenetic preparedness for attachment to a caregiving person, which is considered equal in importance to the satisfaction of primary physiological needs. Mary Ainsworth (1969; Ainsworth et al., 1978) extended Bowlby’s attachment theory with conceptual and methodological contributions. Among other things, she proposed to assess the attachment quality in a situation, called the Strange Situation Procedure, where mainly the 1-year-old child experiences different social settings including encountering a strange person and separating from the mother. The resulting three (to four) attachment qualities are considered to represent universal strategies that have the same meaning in very different cultural environments and the same ontogenetic foundation (for a more extended view, see Belsky, 1999).

Although the first developmental study of attachment was carried out among the Ganda in Uganda by Mary Ainsworth (1967), attachment theory and research did not capitalize on these roots. The adaptation of the Ganda procedures to the East Coast context of Baltimore has become the basis for the universality claim. For example, the 1-year-old Baltimore children did not react fearful, when their mothers left the room, as did the Ganda children. To increase their arousal, the Strange Situation procedure was created as a laboratory based sequence of separation from the mother and encountering a strange person. This procedure was then exported worldwide as the adequate assessment tool for children’s attachment quality. Cross-cultural studies, therefore, are aimed at creating conditions of variability that allow to validate the universalistic stance. The sometimes-remarkable differences that were found were neglected or post hoc attributed to some cultural background without specifying it and without
The opposite philosophy guides cultural anthropological and cultural psychological approaches that emphasize the cultural specificity of human behaviour and development (e.g., Shweder et al., 1998) and the dialectical and mutual constitution of culture and psychology. Culture is assumed to exist inside as well as outside the human psyche (D’Andrade, 1984; Greenfield, 1996). The participation in everyday contexts and the interaction with cultural experts is constitutive of developmental processes and the creation of shared beliefs and behaviours (Bruner, 1993; Greenfield, 2004).

Thus, the cultural psychological perspective implies that research is conceptualised as a local communication process. Communication with the people of the study community in their own language is a prerequisite for cultural analyses of shared activities and shared meanings. Most of the culture psychological approaches are in depth analyses of one culture instead of comparing cultures (e.g., the learning of weaving of Zinacantec Mayan girls: Greenfield, 2004).

A different yet related approach emerged from the dissatisfaction of non-Western scientists with the dominance of Western ideology in understanding human behaviour and thought. Indigenous psychologies emerged with the objective to decolonize the mind (see Sinha, 1996). In fact, most of the indigenous conceptions were developed by scholars from former British colonies. Indigenous conceptions share with cultural psychological approaches the foundation in the everyday psychology and ethnotheories of humans of the particular culture (Greenfield, 1997). The unique contribution of indigenous psychology is the notion that psychological concepts and psychological theory, not just data collection techniques, should be developed within each culture. The goal of indigenous psychology is to take informal folk theories of psychological functioning and formalize them into psychological theories (Greenfield & Keller, 2004).

Instead of further differentiating these approaches, we propose to combine them. The combination, however, does not reflect an eclectic summary. We rather base the synthesis on the complimentarity of evolutionary theory with cultural and indigenous approaches. The combination of these approaches seems to offer a new avenue to understand development on the basis of universal evolved developmental tasks and the predispositions to solve them as well as the particular solutions in specific cultural contexts on the basis of the shared beliefs and shared practices that local people have developed over time including the processes of change.

The Biological and Cultural Nature of Humans

Based on evolutionary theory, the formula ‘culture via nature’ (Voland, 2000) expresses the focus on adaptation to different and changing environmental conditions as the major objective regarding the interplay of culture and
biology. The evolution of the brain as rooted in the social complexity of higher primate’s lives is crucial for this understanding. Brain growth correlates with an extended childhood, stressing learning as the prominent strategy of adaptation (Bjorklund & Pellegrini, 2002). The human childhood represents the longest pre-reproductive phase in animal kingdom with substantial costs in terms of high mortality due to illness and accidents. Nevertheless, the gains are obviously high enough to take the losses into account. The prolonged childhood allows to acquire the sociocognitive and motivational competences that are necessary to navigate successfully in complex social groups.

Infants are not born as a ‘tabula rasa’ but are equipped with epigenetic programs that prepare them for an ‘inborn environment’ (i.e., environmental conditions to which humans have adapted during phylogeny). Learning is based on environmentally labile open genetic programs (Mayr, 1988). Because learning is an individual process with an individual outcome, open genetic programs set the stage for differential effects of environmental influences. The structure and function of the developing brain are determined by how experiences, especially within interpersonal relationships, shape the genetically programmed maturation of the nervous system. Thus, social experiences influence gene transcription (Schore, 2000). The important message is that social interactions among humans shape neural connections (i.e., the fine-tuning of the brain) as well as the mental representation of experiences and thus the psychological foundation of the individual.

Environmental Variation

In the following paragraphs, the environmental variation in which children grow up and construct and co-construct their psychology will be summarized. The emphasis is on infancy, which is predictive for later developmental achievements because it can be regarded as brain imprint period (Keller, 2007). The reported differences are organized around two extreme environmental conditions: Western urban middle-class and rural, traditionally living farmers in the non-Western world. These two environments differ with respect to sociodemographic characteristics and in turn cultural models of the self. Infants’ socialization environments will be characterized in terms of the social settings and the nature of the social exchange.

Social Settings

Infants participate in social processes actively from birth on and process information actively and selectively (Keller, 2002). Nevertheless, due to lack of motor and executive control, they grow up in the ‘scripts’ of other people (Nelson, 1981), usually genetically related individuals. The mother is the primary social agent for an infant during the first months of life;
however, there are vast differences among the social realities, in which mother and infant are embedded. In Western nuclear families, infants and small children usually spend the day in the company of their mother or even all alone to a substantial extent (e.g., one third of the day: Whiting, 1981). In the face-to-face system of a traditional village, infants and small children are never alone, but assemble social experiences with a number of relatives and neighbours. Tronick, Morelli, and Ivey (1992) observed in field studies in Zaire that infants and toddlers spent about 50% of the daytime in social interactions with other caretakers than the mother. These different settings are associated with different ideas about the responsibilities for the children’s growth and development. The parents are legally and socially responsible for their children in Western cultures, whereas a child belongs to the mother only as long as she or he is in the womb as a Cameroonian proverb expresses, where childcare is a communal obligation (Yovsi, 2003).

Besides the different social matrices during the daytime, also nightly sleeping arrangements differ across these cultural environments (Greenfield & Suzuki, 1998). One of the major socialization instructions in Western middle-class cultures is early independence, especially expressed in sleeping alone in an own bed or even an own room. It is an unquestioned ideal that infants are expected to sleep through the night with about 3 months and thus being able for independent sleeping. These beliefs are rooted in concerns about spoiling the infant leading to unwanted dependence. In addition, parental intimacy is considered to be incompatible with co-sleeping arrangements, a legacy of psychoanalytical thinking. This attitude is supported by pediatricians who are the main informants about childcare to the young parents (Keller, Miranda, & Gauda, 1984). Spock and Rothenberg (1992), authors of a very prominent parent guide in the United States, instruct US-American parents in this sense definitely that ‘it’s a sensible rule not to take a child into a parents bed for any reason’.

In much of the majority world, the idea that infants would sleep separate from the mother or other family members or, even worth, in a separate room is regarded as child abuse. Cameroonian Nso farmer did not believe that German mothers would do something like this (Keller et al., 2004). In traditional Nso farmer families, children sleep behind the mother who faces the door to protect her offspring from evil spirits that may come at night and steel the children. The father sleeps in a different room (Yovsi & Keller, 2003). It is interesting that with increasing levels of formal education, mothers and fathers sleep in the same bed, however, with the small children. Formal education thus seems to influence the primarity of family subsystems from the mother–child unit to the marital relationship. In this case, children also leave the parental bed earlier than in traditional families, however, not to sleep alone but to sleep with other relatives.
The Nature of Social Exchange

The pioneers of cross-cultural socialization research like the Whitings (Whiting & Whiting, 1975), LeVine (1988), Konner (1977), Super (1976), the Munroes (Munroe & Munroe, 1994) to name just a few, have all unanimously reported basic differences in socialization strategies between—mainly African-rural villagers and Euro-American middle-class families. The African village babies experience substantially more body contact and body stimulation compared with their Western peers (Konner, 1977; Ochs & Schieffelin, 1984; Richman et al., 1988). J. W. M. Whiting (1981, 1990) showed that Gusii children are held on the bodies of their caregivers twice as much as the US-American babies, whom he characterized as ‘packaged’ due to wraps of clothes that prevent direct skin-to-skin contact. Whiting differentiated ‘back and hip cultures’, mainly situated in the warmer regions of this globe from ‘crib and cradle’ cultures in colder regions.

African babies on the other hand experience less distal communication in terms of eye contact, talking, and object stimulation, which is the major channel of communication for the Western babies (for a summary, see Keller, 2007). Western middle-class parents devote their full attention to their babies when they play with them. They try to engage the baby in mutual conversations through face-to-face contact and language; they interest their babies in toys and objects, which also is considered to entertain them without the mothers’ involvement.

Settings for Learning: Acquiring Competence in Sociocultural Context

The early socialization environments that were briefly characterized thus far imply different strategies of information processing. Although evolution provides all of us with the same tool kit, the tools that are finally used vary greatly in prominence across sociocultural contexts. The most prominent mode of learning and information processing in the traditional farming culture can be captured with an apprenticeship model (Cole, 1996; Keller, 2003; Rogoff, 2003; Vygotski, 1978). The child is regarded as an apprentice in a sociocultural environment, in which he or she participates in everyday activities in order to construct local knowledge. The participation of the novice is guided by adults and older children who raise the capacities of the novice to a level that could not been achieved on his or her own. This conception has been introduced by Vygotski (1978) as the ‘zone of proximal development’.

The nature of the apprenticeship model highlights learning as mainly consisting of observation and imitation with language playing a minor role. Patricia Greenfield has described this learning style comprehensively with learning to weave of Zinacantec Maya Indian girls (Greenfield, 1996, 2004; Greenfield & Childs, 1977). The learning of the complex and
difficult pattern was acquired mainly by long observational units. Asking
questions from the girls’ side as well as verbal instructions from the
mothers was considered as inappropriate. This learning style is associated
with a particular pattern of attention regulation, where different attentional
foci co-exist as has been described by Rogoff, Mistry, Göncü, and Mosier
(1991) and Verhoef and Morelli (2007; see also Saraswathi & Pai, 1997).
The child is not the focus of the caregiver’s attention but is monitored
constantly while other activities are performed, like doing household
chores or talking to an interviewer. The pattern is eventually adopted by
the children.

The major difference to the model of the learner as a quasi-equal
partner prevalent in Western middle-class is that what is considered as
important for the development of competence is outsourced of everyday
interactions in specific and mainly institutionalized learning contexts, like
kindergartens and schools. The major mode of learning consists of verbal
instruction from the teachers’ part and questions as well as participation
in verbal discourses from the learners’ part. This learning style is prepared
in family interactions when adults structure playful learning contexts for
their children with exclusive attention and dyadic exchanges. Children
address questions to their mothers, also when these are engaged in con-
versations. Mothers interrupt the conversations and answer the questions
of their children.

The two styles as characterized here represent extremes for extremely
different, prototypical, contexts. In reality, many combinations and mixtures
will occur. An interesting facet is that formal education and sociohistorical
changes influence these learning styles to a substantial degree. Patricia
Greenfield observed in the Maya community that Western type of schooling
and economical changes (farmers became entrepreneurs) changed the girl
learners’ style from observation and imitation to trial-and-error learning
and increasing verbal instructions from the mothers. In addition, the
century-old weaving patterns were increasingly subject to change, thus
introducing individual creativity (Greenfield, 2004). These changes underline
the adaptational focus of the interplay between culture and biology.

**Developmental Pathways as the Synthesis of the Evolved
Nature with the Cultural Context**

The conception of developmental pathways is a consequence of the inter-
play between culture and biology as specified so far. It rests on the
assumption of universal developmental tasks that have evolved during
phylogeny in order to solve recurrent problems of our ancestors. It is also
part of the evolutionary heritage that individuals are prepared for the
solution of the developmental tasks with open genetic programs or
particular learning devices that allow to acquire optimal strategies for coping
with particular environments.
Developmental tasks are commonly understood as a combination of maturational, social, and psychological challenges that need to be mastered in order to progress on a developmental timeline (Erikson, 1968; Havighurst, 1972). We define developmental tasks as overarching themes that individuals have to solve during particular life stages, like developing primary relationships during infancy or becoming a parent during early adulthood. This conception of developmental tasks stresses the dynamic and interactive character of development. Developmental tasks can be regarded as flexible frame-joints connecting different phases of the life history; they organize the solution of the next developmental tasks on the basis of the prior ones in terms of timing and mode and quality. Consistency, coherence, and continuity of life strategies result.

The psychological continuity in self-perception is constructed and co-constructed as a concomitant sociocultural process. Cultural norms and values are the blueprint for this process. From cross-cultural (e.g., Hofstede, 1997; Triandis, 1995) as well as cultural psychological (Markus & Kitayama, 1991) perspectives, integrative conceptions for value systems have been proposed that underlie the development of psychological continuity and thus the self and in broader terms the personality.

Cultural value systems and thus self-development are related to socio-economic and sociodemographic contexts (Kağıtçıbaşı, 2007; Keller, 2007). We have characterized two different socioeconomic contexts earlier: rural traditional farmers and urban middle-class Western societies. Rural traditional farmers have a low level of formal schooling; they usually start reproduction early in their late teens (fathers may be older) and have many offspring. Children are raised in extended families or communal networks. Families are hierarchically organized due to gender and seniority. Western urban families have a high level of formal education; they usually start reproduction in their late 20th to mid/end 30s. They have one to two children on average who are raised in nuclear families with the mother usually being the main caretaker during the early years.

Two different prototypes of self-conceptions can be related to these contexts. The urban life style in the Western world can best be accommodated by an independent individual who strives for optimal deployment of talents and capabilities in clear-cut separation from and competition with others. The self-perception is based on traits that are stable across time and situations (Kağıtçıbaşı, 1997; Markus & Kitayama, 1998). The rural life circumstances can be best accommodated by an interdependent individual who is basically cross-lined with others and wants to exhaust his or her resources to support the primary social network, usually the family: The self perception centres around the conjoint identity with the significant others and varies with relationships and situations.

The cultural models of the self specify socialization instructions to solve the developmental tasks over the life history. On the most abstract level,
they define socialization goals that can be directly transferred from the
cultural models (i.e., becoming independent or interdependent, respectively).
Socialization goals are extrapolated in cultural belief systems or parenting
ethnotheories (Keller, 1996; Super & Harkness, 1996). These ethnotheories
constitute explicit as well as implicit knowledge about parenting, socialization,
and the nature of a child. They constitute the normative framework in
which children develop (Keller, 2007).

Parenting behavior finally is the translation of the belief systems into
contexts and patterns of social exchange. The two strategies that we have
presented earlier can now be related to the cultural models of independence
and interdependence.

The parenting strategy that supports the cultural model of independence
rests on the interaction of two separate and quasi-equal partners who
spend exclusive time with each other. Face-to-face contact is the central
communicative channel during the early months of life. Babies spend a
considerable amount of time lying on their backs and mother or father
bending over them, looking, talking, and mirroring the baby’s signals.
Parents basically respond contingently to infants behavioral cues (i.e., in a
time window faster than a second). This intuitive regulation matches the
memory span of the infant during the first months and allows the baby
to link the own behaviour with that of the interactional partner and thus
experience causality (Keller, Kärtner, Borke, Yovsi, & Kleis, 2005).
Besides face-to-face exchange and eye contact, object play and toys are
the second important domain of parenting. This parenting strategy is
distal, in that the distant senses are the major avenue of building emotional
bonds between caregiver and infant.

Early conversations during play interactions further elaborate the
cultural script.

Mothers ask questions and give the baby choices. They reflect an image
of the baby as a mental being with needs, preferences, and wishes that
need to be taken serious. The ability to spend time alone is regarded as
the babies desire, as the following example from conversations of a Euro-
American mother from Los Angeles interacting with their 3-month-old
baby demonstrates:

‘Want to look at mommy for a second or are you busy? Busy huh? Yes ...’
‘Okay, should I read another little book to you, in Greek?’
‘What are you looking at? What are you looking at, darling? Do you
need this instead?’
‘I am going to leave you alone so you can play all by yourself’

The parenting strategy that supports the cultural model of interdependence
places major emphasis on their children’s physical closeness and emotional
relatedness with their families from birth on. Parenting is parent centered
because parents best know what is good for their children, so that there
is no need to explore their wishes.

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Parenting during infancy primarily consists of extensive body contact, body stimulation, and the continuous monitoring of negative infant signals. Cameroonian Nso babies spend most of their earliest weeks wrapped on the mothers’ body, also when she does household chores or works on the farmland. They are nursed when their mother is washing vegetables or cooking meals. This parenting strategy does not allow extensive face-to-face contact and exclusive dyadic attention. The conversations are brief, utilizing vocalizations more than verbal messages. Mainly social topics are addressed. Following is a brief excerpt of a transcript from an interactional episode between an Nso mother with her 3-month-old baby.

Mutiah, Mutiah, Mutiah, Mutiah, Mutiah.
Mm.
Mm.
Muti, Muti, Muti, Muti. Mm, mm.
Eeyy, Mutiah, Mutiah, Mutiah.
Mutiah, Mutiah, Mutiah, Mutiah.
Are you seeing madam (the researcher)?
Mutiah, are you seeing her?
Are you seeing her?
Eehh.
Are you seeing madam?
Are you seeing her?
Mm.
Are you seeing madam?
Mutiah.
Look, look.
Are you seeing her?
Are you seeing her?
Mm.
Are you seeing madam?
Muti.
Mm.
Yes, look at madam.

Moreover, the conversations often are combining rhythmic language with rhythmic movements to bring the infant into synchrony with the mother, enmeshing the ego – other boundaries that are so central in the independent mode.

**Outlook**

In the previous paragraphs, we have discussed prototypical environments and prototypical cultural models. These models can be regarded as mutually exclusive because what is regarded as normative in one model is considered
a pathological condition in the other. The close mother infant symbiosis in the cultural model of interdependence is regarded as a serious threat to the healthy self-development of a child in Western middle-class families (Keller, 2007). However, there are many more cultural models than these two extremes. Kağıtçibaşı (1996) has proposed the model of autonomous relatedness, which combines the autonomy from the independent model with the relatedness of the interdependent model to a new synthesis, which should be adaptive for educated middle-class families in non-Western societies, the majority world. However, the model of autonomy-relatedness is much more varied than the two prototypical models. Autonomy and relatedness may vary in amount, in meaning, and in structure (Keller, 2007). In any case, however, human development can be understood as the interplay of the evolved nature with contextual and cultural contexts.

Short Biography

Heidi Keller’s research is located at the intersection of evolutionary theory and cultural/cross-cultural psychology. She has authored and co-authored in diverse journals such as Annual Review of Psychology, Child Development, Developmental Psychology, Infancy, Journal of Cross-Cultural Psychology or International Journal of Behavioral Development, handbooks and encyclopaedias like International Encyclopedia of the Social and Behavioral Sciences and Encyclopaedia of Applied Psychology as well as major German language handbooks and encyclopaedias. She has published several books, latest ‘Cultures of Infancy’, which is a synthesis of her synthesis of evolutionary theory and her cultural and cross-cultural research program. Current research centres of longitudinal analyses of developmental pathways within and across nations. She has been a visiting professor at UCLA, NIH, Universidad de Costa Rica and MS University of Baroda. She has held the Nehru chair professorship and was a fellow in residence at the Netherlands Institute for Advanced Study in the Humanities and Social Sciences. She holds a diploma of Psychology and a PhD from the University of Mainz and habilitation from the Technical University of Darmstadt.

Endnote

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References


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