



## COMMENTARY

### NCT and culture-conscious developmental science

### The Laboratory of Comparative Human Cognition

This is a commentary on Flynn *et al.* (2012).

We share the belief that there is great potential for developmental science in bringing the ideas of Niche Construction Theory (NCT), as developed in evolutionary biology, into conversation with Vygotskian-inspired theories such as cultural-historical and activity theories, distributed cognition, and embodied cognition, although from our vantage point the latter differ in substantive ways that may be differently generative. On the evidence of this paper, NCT and culture-inclusive developmental science share a number of assumptions including:

- 1 Culture is a central factor in human development.
- 2 Children are active agents of their own development; however, agency is severely constrained given the cultural / cognitive / ecological niches into which they are born.
- 3 Human ontogeny emerges from processes taking place simultaneously across three developmental histories operating on different temporal scales. Following Vygotsky, we refer to them as phylogenetic, cultural-historical, and ontogenetic histories (Wertsch, 1985).
- 4 These three developmental histories are part of a single process of species evolution; changes at one level are contingent upon, and feed back upon, processes at other levels. At each developmental history, or time scale, the process of change must be seen as involving a 'triple helix'.
- 5 Each developmental history manifests a different principle of change. Phylogenetic change is Darwinian while cultural-historical change is Lamarckian. Ontogeny is a hybrid of the two processes of change and their associated time scales.

Despite these similarities, we detect tensions in how 'culture' is conceptualized. In our view, this fundamental concept is not reducible to tools, engineering, practices, symbolic representations, information about appropriate behaviors, or other means. Rather, culture is best

conceived of as a medium that mediates the relationship between phylogeny and ontogeny, shaping the goals as well as the means of human activity. This view requires that we interpret culture as more than an added layer of complexity which, along with neural plasticity, 'lends human niche construction a special potency'.

To advance interdisciplinary collaboration around the concept of culture as a medium and not just a means of human development, we explore several implications of accepting the idea that ontogeny emerges from the simultaneous influence of life processes operating on different time scales, and according to different principles of change.

We have chosen as an example the developmental mechanism called prolepsis: a caregiver's use of an imagined future for an infant to shape the present experiences of the infant (Cole, 1996). Prolepsis is central to all culturally mediated human experience. It provides a way to think systematically about ontogenesis and, in addition, to consider the ways in which each developmental history in the triple helix recursively contributes to the development of human psychological functions. For example, MacFarlane (1977) recorded conversations between British obstetricians and parents at their children's birth. Sample comments about a baby girl included, 'I shall be worried to death when she's eighteen', and 'it can't play rugby'. The sexism in these remarks is instructive: the parents interpreted the biological characteristics of the child in terms of the meanings they had made of their own past, culturally mediated, experience. In the 1950s, it was considered 'common knowledge' that when girls enter adolescence they become the object of boys' sexual attention and that girls don't play rugby. Drawing on their past, and assuming cultural continuity, the parents projected their expectations into the future of their child and imported that imagined future back into the current setting. As a

Address for correspondence: Michael Cole, Department of Communication, 0506, University of California, San Diego, La Jolla, CA 92093, USA; e-mail: mcole@ucsd.edu

The following members of LCHC participated in the writing of this commentary. They are ordered by the first letter of the person's first name. Deborah Downing-Wilson, Etienne Pelaprat, Ivan Rosero, Jennifer Vadeboncoeur, Martin Packer and Michael Cole.

result, their culturally constructed psychological functions – remembering their past and imagining their child’s future – became a culturally patterned material constraint on the child’s life experiences in the present.

Thus, adults bounce babies of either sex who wear blue diapers while treating babies wearing pink in a gentle manner, attributing beauty and sweet temperaments to them (Rubin, Provezano & Luria, 1974). Adults construct different material environments in relation to systems of cultural meaning that enable and constrain forms of gender identity. Significantly, the adults are not building upon the characteristics of the child’s biology or existing repertoire of behavior, but are instead imposing their own interpretations of culturally relevant behavior, immersing the child in what it means to be a boy or a girl by modifying the social environment through which the child grows.

MacFarlane’s example also illustrates an important distinction between central concepts, such as ‘social’ and ‘cultural’, that tend to be conflated in the literature cited by Flynn *et al.* ‘Culture’ in this case refers to remembered forms of activity and associated meanings deemed desirable. ‘Social’ refers to the people whose behavior is conforming to, and implementing, the given cultural value system. This example also motivates the special emphasis placed on the social origins of higher psychological functions by cultural-historical psychologists (Rogoff, 2003; Valsiner, 1997; Vygotsky, 1930/1997; Wertsch, 1985). Humans are social in a sense that is totally different from the sociability of other species. Only a culture-using human being ‘re-members’ the cultural past, ‘imagines’ it in the future, and then ‘designs’ that conceptual future in the present to construct the material, sociocultural environment for the newcomer.

Prolepsis, fundamental throughout human ontogeny, highlights the non-linear, often non-functional process of the cultural mediation of ontogenetic experience, as well as the unique ways in which it is lived with significant social others (Cole, 1996). It is a mechanism through

which ‘the end is in the beginning’: an historical teleology that constrains the epigenetic process.

As another way to examine the understanding of culture vis-a-vis NCT, it is common to find spider’s webs given as examples of ecological niche construction. The spider’s web is also invoked by the anthropologist Clifford Geertz (1973) who suggested that ‘man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs’ (p. 5). Could it be that ‘niche construction’ and ‘culture’ are synonyms for each other? If so, Geertz’s web suggests that meaning-making practices – semiosis – in human development constitute a difference in kind, and not degree, between human and non-human species’ niche construction.

## References

- Cole, M. (1996). *Cultural psychology: A one and future discipline*. Cambridge, MA: Belknap Press of Harvard University Press.
- Flynn, E.G., Laland, K.N., Kendal, R.L., & Kendal, J.R. (2012). Developmental niche construction. *Developmental Science*.
- Geertz, C. (1973). *The interpretation of cultures*. New York: Basic Books.
- MacFarlane, A. (1977). *The psychology of childbirth*. Cambridge MA: Harvard University Press.
- Rogoff, B. (2003). *The cultural nature of human development*. New York: Oxford University Press.
- Rubin, J.Z., Provenzano, F.J., & Luria, Z. (1974). The eye of the beholder: parents’ views on sex of newborns. *American Journal of Orthopsychiatry*, **44** (4), 512–519.
- Valsiner, J. (1997). *Culture and the development of children’s action* (2nd edn.). Chichester: Wiley.
- Vygotsky, L.S. (1930/1997). *The collected works of L.S. Vygotsky: The history of the development of higher mental functions* (Vol. 4). New York: Plenum.
- Wertsch, J.V. (1985). *Vygotsky and the social formation of mind*. Cambridge MA: Harvard University Press.