Understanding Common Developmental Timetables across Cultures from a Developmental Systems Perspective

Commentary on Lieven and Stoll

Jeremy I.M. Carpendale Tyler J. Wereha

Simon Fraser University, Burnaby, B.C., Canada

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Evidence that the development of communicative skills is influenced by the nature of children's social experience raises the question of how such development occurs in cultures that differ in the nature and amount of social interaction that young children experience. Lieven and Stoll [this issue] address this question in their article "Early communicative development in two cultures" in which they report a longitudinal naturalistic study of early communicative development in two cultures: a remote Chintang village in Eastern Nepal and a rural area of Western Germany. During the observations there were many more adults and other children present in the village in Nepal compared to the families in Germany, and the Nepalese children were often cared for by older children. But although these cultures seem very different, in fact, Lieven and Stoll found that the children experienced about the same amount of interaction across the two cultures; it was mainly whom they were interacting with that differed. Lieven and Stoll report similar timetables in the development of early communicative skills across the two cultures: "... babies from both cultures were on a similar timetable for the emergence of basic skills involving communicative interaction: pointing, imitation, and the combined categories of offering, reaching, requesting, showing, and attention-getting" (p. 197).

Empirical questions remain, of course, concerning individual differences in communicative development and whether different developmental timetables would be found in other cultures that might differ in other ways. However, the important developmental question raised by such research concerns common developmental timetables in early communicative development. The role of the input and the nature of the social context in which young children grow up has been a central question in

communicative development. Lieven and Stoll review research suggesting that, within Western cultures, the amount and type of speech children hear influences their language development, and the influence of social experience is also found in other areas of development such as social understanding [e.g., Carpendale & Lewis, 2010]. If social and communicative development appears to be influenced by children's history of social interaction when this varies across families within a culture, what happens in other cultures in which it is claimed that social interaction varies even more widely? Addressing this question empirically requires the sort of cross-cultural research that Lieven and Stoll report.

Lieven and Stoll set up one way of approaching this issue by pointing out that if interaction is important in early communicative development then low levels of interaction should impede such development, but "if children's ability to communicate and to read the intentions of others is seen as a species-specific adaptation on a biologically given developmental timetable [Tomasello, 2008], then whether others interact with the baby as if it were an intentional agent from birth would be less important" (p. 180). In addressing the question, "What accounts for the similarity in age of onset of these interactive skills?" Lieven and Stoll begin with two extreme answers: that is, "on the one hand, that it is all attributable to learning through interaction and, on the other, that in some form or other, these skills are innate" (p. 200). They move beyond this dichotomy to consider a systems approach to explaining their results. We outline a way to extend Lieven and Stoll's discussion by taking a developmental systems perspective [e.g., Griffiths & Stotz, 2000], recognizing that explanations for the development of communicative skills will necessarily depend on assumptions regarding the nature of meaning and how it is conveyed [e.g., Carpendale & Racine, 2006; Mead, 1934].

Claims concerning a common biological timetable for social cognitive development are ambiguous because there are two different sorts of answers regarding where this regularity in the timetable of development comes from. The first is that such development is "innate" or "intrinsic" or that infants are "endowed" with abilities, but these terms are used in many different ways [e.g., Mameli & Bateson, 2006]. One common use that tends to be the default position is that traits are genetically determined. However, there is a history of critical discussion in response to such claims, and, based on current work in biology, this does not seem to be biologically plausible [e.g., Griffiths, 2002; Jablonka & Lamb, 2005; Lehrman, 1970; Mareschal, Johnson, Sirois, Spratling, Thomas, & Westermann, 2007; Oyama, 1985]. That is, it is a "torturous route" from genes to complex abilities such as communicative skills [e.g., Fisher, 2006; Karmiloff-Smith, 2006], and it is all gene-environment interaction [Meaney, 2010], so claiming that something is innate or genetically determined is only a placeholder for the complex developmental story which is needed [e.g., Lickliter & Honeycutt, 2009]. Genes are one essential factor in a system of bi-directionally interacting factors, and complexity emerges rather than pre-exists at any particular level [e.g., Gottlieb, 2007; Hendriks-Jansen, 1996].

Explaining developmental regularity by a default reference to intrinsic factors stems in part from the influence of an evolutionary meta-theory that ignores developmental processes [Pigliucci & Müller, 2010]. Neo-Darwinism is based largely upon a population-genetic framework in which genotypes are used merely as *proxies* of phenotypes; population-geneticists are not concerned with developmental issues, but psychologists are. From a systems perspective, cross-cultural, longitudinal, and natu-

realistic methods like those utilized by Lieven and Stoll are necessary for developmental analyses of human abilities [Wereha & Racine, 2012]. Rather than defaulting to intrinsic factors in explaining development, careful analysis can clarify how recurring developmental conditions can bring about both stability and variability in developmental outcomes [Lickliter & Harshaw, 2010]. Such analyses are essential for establishing developmentally plausible evolutionary explanations of human psychological capacities [see Wereha & Racine, 2013].

A second reason that communicative skills could not depend only on individual social cognitive skills is the argument that conveying meaning must be based on a shared history of interaction, or a “common ground,” not just on individuals’ ability to understand others’ intentions [e.g., Canfield, 2007; Goldberg, 1991]. From this perspective, skills in understanding others and conveying meaning are based on shared experience in routine patterns of interaction in which children learn what happens next. Thus, what is important is *joint activity*, and this is what should be looked for in cross-cultural comparisons.

If the development of skills in conveying meaning must be based on experience with social routines but forms of interaction vary across cultures, then the problem is explaining similar patterns of development across cultures. Although some ways in which humans live together are conventional and vary across cultures, others may be a part of human natural history [Saari, 2004]. This is because some basic human activities may emerge given human infants’ typical physical embodiment and sensory abilities in the context of growing up with other people. Regularity in development can be explained from a developmental systems perspective through considering regularity in typical developmental conditions, some of which are not obvious just because they are so ubiquitous [e.g., Lickliter & Honeycutt, 2009]. From this perspective, biological factors are not clearly separable from other levels including social factors. For example, smiling is a social skill that develops within interaction, given biological factors, and then makes further, more complex forms of social interaction possible [Jones, 2008; Mcquaid, Bibok, & Carpendale, 2009; Messinger & Fogel, 2007].

Consider the case of the object-related patterns of interaction that Lieven and Stoll combine into an interactive category involving objects including offering, showing, reaching and requesting, and attempting to get others’ attention with an object. These are all activity patterns around objects and other people. Reaching and requesting depend on the infant’s physical and sensory abilities to see and reach toward objects. Infants can begin to reach toward objects of interest once they have learned to coordinate seeing and reaching. For humans, such actions occur within a social environment because human infants are born relatively helpless compared to other similar species, although with fairly advanced senses [Portmann, 1944/1990], and, because of their helplessness, they must be cared for. Thus, much of their early development is within a social context, and, therefore, their action may draw forth reactions from others. Their caregiver may respond to this manifestation of their attention and desire and give them the object if they fail to reach it. This activity pattern may become a request as infants learn the meaning their action has for others [Mead, 1934]. The problem space that infants experience is similar to that which chimpanzees kept in captivity experience, and chimpanzees in this social context do tend to learn how to make requests by pointing [Leavens, 2011]. Thus, the nature of human biological embodiment may result in forms of interaction in which early communica-

tive skills develop. Objects may then become a pivot around which enjoyable interaction can occur. Showing and offering are further social skills that may develop around an object.

Pointing is another social skill that Lieven and Stoll found develops at similar ages in the two cultures. They also found that, at 15 months of age, a considerable proportion of the infants' pointing was non-communicative. A possibility is that this non-communicative pointing is a manifestation of the infants' own interest toward aspects of their world to begin with, and then infants learn how others respond to their action [Carpendale & Carpendale, 2010]. If this is correct, then any timetable is not due to innate biological social knowledge but is instead the result of human infants' physical embodiment and activity within a social context. That is, the structure of the human hand means that the index finger is best suited for exploring close-by objects and may become associated with infants' attention to objects of interest. This is not directly social to begin with, but, due to infants' development within a social context in which others respond to their actions, infants develop social skills. That is, infants learn about the interactive potential of their social world. Human infants' biological embodiment results in a form of social activity in which infants learn how others respond to their actions. This is a pattern of interaction in which skills in conveying meaning can develop.

From a developmental systems perspective, there is no clear split between biological and social factors, and regularity in experience in human infancy may be ensured in typical cases by infants' and parents' characteristics and how they respond to each other. The biological characteristics and sensory abilities of human infants do not directly result in communicative development but, rather, influence their social experience, and it is within such activity that communicative skills develop. We have discussed how the nature of the human infant's biological embodiment may give rise to particular social contexts for development, and, in turn, neurological pathways form within such activity [Mareschal et al., 2007]. In a natural history of early communicative development, the embodied characteristics of infants and parents result in forms of interaction. This social experience, in turn, shapes neurological development. This discussion has raised further empirical questions about the nature of the interaction infants experience, in particular about the ways in which others *respond* to their various actions directed to objects both within and outside of their reach. There may be further activity patterns that reliably emerge in the natural history of human development. For example, infants and their parents typically demonstrate that they are happy to see each other, and their responses may result in activity patterns that can form the foundation for greetings [Canfield, 2007].

Conclusion

The early forms of communication studied by Lieven and Stoll are of great importance because they convey meaning in the same way as language. They are steps toward language and human forms of thinking. Because these skills involve conveying meaning, accounts of this development will be based on assumptions regarding meaning. We are convinced by arguments that meaning cannot be attached to words or gestures, and meaning must be based on shared routines or common ground [e.g., Canfield, 2007; Goldberg, 1991; Wittgenstein, 1968]. Therefore, these communica-

tive skills must develop socially and cannot be based only on individual cognitive skills. But if cultures differ in the nature of interaction children experience in development, how can regularity in outcome such as the timetable of development for early communicative skills be explained? The two common answers are that the source of the complexity is either primarily in the individual or in the environment. Although all researchers assume interaction, this is usually conceived of as interaction between two pre-existing levels, and it is possible to consider the relative contributions from each level. The developmental systems or process approach does not emphasize either the biological or the social level because these are not clearly separable levels; the infant's characteristics generate social relations, which in turn influence biological development. The focus is on the system or the process through which this system develops and regularity in outcome is due to the whole developmental system.

We have suggested a way to extend Lieven and Stoll's interpretation of their results by setting their research in the context of a developmental systems or process worldview. This discussion has raised further empirical questions about the nature of the interaction infants experience, in particular the ways in which others *respond* to their various actions directed to objects, both within and outside of their reach. If this is the way in which human forms of communication develop, then what is needed are longitudinal naturalistic observations of how activity patterns on which communication is based emerge and become more complex within infant-caregiver dyad interactions.

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