Weaving together culture and cognition: an illustration from Madagascar

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Weaving Together Culture and Cognition: An Illustration from Madagascar[1]

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ABSTRACT: This paper presents the results of an interdisciplinary collaboration between an anthropologist and two cognitive developmental psychologists. It pits the anthropological study of cultural representations against the psychological study of innate representational constraints. More specifically, it pits the ethnographic account of how Vezo adults in Madagascar describe the processes by which babies come to resemble people other than their birth parents against the claim that the development of concepts of birth parentage and biological inheritance is guided by innate constraints. Once woven together, the two accounts raise issues of theoretical import for both the anthropological study of culture and the psychological study of cognition and cognitive development.

In the last decade the problematic relationship between the study of mind and the study of culture has attracted increased attention. Whereas Hutchins (1995) has shown how culture was relegated to a peripheral role in the study of cognition – as Cole (1996, p. 327) puts it, "Why has it proven so difficult for psychologists to keep culture in mind?" – Shore (1996) has demonstrated how anthropology achieved its independence from psychology by establishing culture as the content of mind rather than one of its defining attributes. Acknowledging the contemporary relevance of this history, Strauss and Quinn (1997) have felt the need to pre-empt various forms of "anthropological resistance" to the proposition that the study of cultural meanings must include the study of how the human mind works. Still, despite the fact that the histories of both disciplines have converged in separating mind from culture, there has been a growing recognition on both sides that the human mind cannot be studied independently of the cultural context in which it develops, and that cultural knowledge cannot be studied without reference to the cognitive organisation and development of individual minds (e.g., Bloch, 1998; Boyer, 1994; Cole, 1996; Hirschfeld, 1988; Hutchins, 1995; Shweder and al., 1998; Shore, 1996; Sperber, 1996; Strauss & Quinn,1997; *The Journal of Cognition and Culture*, 2001; Toren, 1999; Whitehouse, 1996).

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Of course, it is one thing for anthropologists and psychologists to recognize the need to combine the study of culture and cognition, and it is another thing to implement a programme of interdisciplinary research that overcomes the very real methodological and theoretical barriers that stand in its way. This paper is about the results of one such implementation, when an anthropologist trained in traditional ethnographic methods and inclined to find radically different conceptual understandings across cultural contexts teamed up with two cognitive developmental psychologists trained in experimental methods and inclined to uncover cross-cultural universality in children's and adults' representations of the world. The paper starts with their two distinctive threads and develops by weaving them together. Hopefully, it will become apparent that the methodological and theoretical efforts involved in this collaboration have been worthwhile.[2]

THE ANTHROPOLOGIST'S ACCOUNT

Imagine being an anthropologist doing fieldwork in Betania, a village of Vezo fishing people on the western coast of Madagascar. You have learnt the language and over time local people have grown to trust you. They let you participate in their daily activities and they have stopped marvelling at your ability to utter the simplest of greetings, to walk any distance without gasping, or to eat the local food without choking. You have gradually become part of their everyday landscape. Little by little, you have been plugged into the village social network: you attend funerals and other mortuary rituals, you are invited to "marriages" and you visit women who have just given birth. Let me take you through one such visit.

You slowly approach the house and call out your greeting. From inside the house, the women who attend to mother and baby respond by inviting you in. You enter and you are struck by the darkness and the stuffiness of the atmosphere. The mother is lying on the bed and next to her is the baby. You can just about make out their shapes, as they are individually wrapped up in layers of blankets, with the two bundles being in turn wrapped together in what looks like a gigantic cocoon. The blankets are not just meant to keep mother and baby hot. Even more importantly, they are meant to insulate them from the dangerous "winds" that could enter their wounded bodies, through the vagina in the case of the mother and through the navel in the case of the baby.

You'll be allowed to take a peep at the baby and you might be invited to hold it, securely wrapped up in its bundle. As you stare in awe at the perfectly formed face, at the beautifully smooth skin, at the quivering lips, you will be surprised to hear that the people around you, whether visitors or hosts, are busy telling each other how very ugly the new born baby is. They say it very emphatically (*r-a-a-a-ty zaza ty*), so emphatically that you can sense that they do not really mean it. Indeed, if you later challenge people and ask them why they said that the newborn baby was ugly, they will explain that one does not want to bring bad luck on the baby by saying that it looks beautiful, healthy, and chubby. Compliments call for trouble, as if one were drawing the attention of powerful forces, such as disaffected ancestors, which may intervene to transform good looking, healthy, and chubby babies into ugly, sickly and bony ones.

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[2] For a full account of the results of this collaboration, see Astuti, Solomon & Carey, 2004. For another example of fruitful interdisciplinary collaborations, see Medin, Ross & Cox, 2006.

This explanation fits in with people's acute awareness of the fact that babies are extremely vulnerable and in need of constant protection: keeping them wrapped up in layers of blankets and saying that they are ugly appear to be elements of the same safeguarding strategy. And yet, as you try to remember to say that a stunningly beautiful baby is very ugly, you are bound to notice what people do *not* say about the baby, namely that she has taken after her mother in this feature and after her father in that feature. Let me pursue this absence further.

If you were to investigate how babies are thought to come into being, you will discover that Vezo stipulate a strong bodily connection between the child and both parents who have generated it (see Astuti, 1993 for details). Nonetheless, when asked to explain how babies turn out to look the way they do (e.g. big eyes, light skin, bent nose, etc.), Vezo adults, as other people in Madagascar and indeed as people in other parts of the world, invoke mechanisms other than procreation, and the contribution of people other than the baby's birth parents (see e.g., Bloch, 1993 and Thomas, 1999 for other Malagasy examples; Carsten, 1991, p. 431, for a Malay example; Stafford, personal communication for a Chinese example).

For example, if a pregnant woman takes a strong dislike for someone, whether related to her or not, her baby will come to resemble the disliked person. By contrast, spending a lot of time with, or even just thinking a lot about someone during pregnancy, will cause the child to look like the frequented person. If a pregnant woman has a lover, the lover will "steal" some of the baby's facial traits, which means that the baby's face will bear some signs of its mother's relationship. More seriously: why was that child born with a clubfoot? Because when his mother was a child she used to tease one of her contemporaries who had a clubfoot, the result of a badly administered quinine injection. When she gave birth, she was shocked to see that her baby had an identical defect to the one she used to make fun of. Even after birth, a baby's physiognomy can be altered by the visitation of a variety of wandering spirits; if the baby is left alone and is approached by a spirit, the encounter will result in the reshaping of the baby's face. Such spirits have an easy job because babies are wobbly, bendable and boneless.

These observations suggest that the reason Vezo do not remark on the resemblance between babies and their birth parents is that the perceived mechanisms by which people come to acquire their physical characteristics locate the resemblance elsewhere – between those who are related through social intercourse, rather than between those who share a bodily connection through conception and birth. In turn, this conclusion suggests that, more generally, Vezo do not make the ontological distinction between the baby as a biological organism and its social personhood. It is indeed difficult to see where one would begin and the other one end, given that social causes – such as teasing or spending time together – are said to shape the baby's organic make up. By implication, the distinction between birth (as a biological process) and nurture (as a social process) is also blurred, in so far as biological parenthood is socialized (as evidenced by the many people the baby will resemble) and nurturing relations are somatized (because of the effect that nurture has on the baby's bodily make-up).

This conclusion sits comfortably with mainstream anthropological theorizing, and the extremely influential claim in the anthropological literature

on kinship – or rather, on the critique of the study of kinship (Schneider, 1984) – that non-Western peoples such as the Vezo do not recognize the ontological distinction between "facts of biology" and "facts of sociality" (e.g., Ingold, 1991, p. 362 for a particularly clear formulation of this point). This claim has been central to the demise of traditional kinship studies (Schneider, 1984; Carsten, 2000), which were accused of naively assuming that the reported diversity in kinship systems (e.g., matrilineal versus patrilineal descent) was due to the *cultural* variations in the interpretations of the same *natural* facts. Instead, "the notion of a pure, pristine state of biological relationships 'out there in reality' which is the same for all mankind is sheer nonsense" (Schneider, 1965, p. 97).

THE PSYCHOLOGIST'S ACCOUNT

Now imagine being a psychologist. You are open to the possibility that in some domains of knowledge human conceptual development is guided by innate constraints and you want to establish whether folkbiology is one of the domains that are so constrained, as suggested by some (e.g., Atran, 1998; Atran and al., 1997; Lopez and al., 1997; Medin & Atran, 2004). Accordingly, you are interested in cross-cultural studies of conceptual development and its adult endpoint, because such studies can ensure that what are described as universal habits of mind actually apply beyond the minds of urban, middle-class Euro-Americans that are the subjects of most cognitive studies (e.g. Coley, 2000; Diesendruk, 2001; Walker, 1999). From this perspective, the conclusion reached by the anthropological investigation among the Vezo is very significant: if it is true that Vezo adults do not recognize the ontological distinction between facts of biology and facts of sociality, then the proposal that there is "a folk biological system (FBS) of the human mind that discriminates and categorizes parts of the flux of human experience as 'biological' and develops complex abilities to infer and interpret this structured, core cognitive domain" (Medin & Atran, 2004: 961) must be called into question. Similarly, the ethnographic description of how Vezo adults account for their babies' physiognomy challenges the claim that concepts such as birth parentage and biological inheritance are innately constrained, for if so we would expect them to be cross-culturally universal.

Nonetheless, as a psychologist, you are likely to be suspicious of the kind of evidence that is adduced to make the radical anthropological claim of ontological incommensurability. Not only is the evidence anecdotal. It is also of a very specific kind, consisting as it does of culturally codified statements about the ugliness of newborn babies or the likely consequences of teasing some one with a crooked foot. Aware of the potential discrepancy between the intuitions that guide people's automatic inferences and the knowledge that people elaborate through cultural learning and self-reflection (e.g., Barrett 1998), what you require as evidence that Vezo adults do not differentiate between facts of biology and facts of sociality is the absence of this distinction in their inferential reasoning.

You team up with an anthropologist who has extended fieldwork experience in a Vezo community in order to avoid the flaws of "parachuting psychology" – the practice of "parachuting" experimental psychologists in the midst of exotic populations they know far too little about. She will recruit trusting and cooperative villagers and will ask them to take part in a simple experimental procedure, the so-called adoption task, that will target people's

understanding of the process of biological inheritance. This procedure was originally designed to explore North American children's understanding of family resemblance and of the differential role that procreation and nurture play in the transmission of properties from parents to offspring (Solomon and al., 1996). Like most tasks used by developmental psychologists, the adoption task was designed with the following consideration in mind: young children's knowledge is systematically underestimated if it is assessed by verbal production tasks, since children are typically unable to self-reflectively describe what they know. Therefore, to establish that young children (or pre-linguistic infants) master certain numerical, physical, psychological or biological concepts, developmental psychologists design experimental techniques that require young participants to choose between different outcomes (by looking, pointing, reaching, answering simple forced-choice questions), but do not expect them to be able to explain why they do so. The experimenter infers from their responses the knowledge that the children must have (or lack) to come to that particular conclusion.

In the case of the adoption task, children are told a simple story about a baby born to one set of parents and raised by another. One of the birth parents is then attributed a certain property, while one of the adoptive parents is attributed another contrastive property. Children have to answer the following question: once the baby is fully grown up, will s/he resemble the birth or the adoptive parent on that property? In other words, they have to make a simple similarity judgement. Crucially, the task presents them with two distinct kinds of properties: bodily properties on the one hand (e.g., having blond as opposed to dark hair), and mental properties, such as beliefs, on the other (e.g., believing that skunks can see in the dark as opposed to believing that skunks cannot see in the dark). If children judge that the adopted child will resemble the birth parent on bodily properties (because such properties are inherited through biological descent) and the adoptive parent on mental properties (because such properties are acquired through learning and habituation) one can infer that they, like North-American adults, have come to differentiate between two distinct causal mechanisms for the transmission of two ontologically distinct properties of the person, and can thus be credited with a causal understanding of biological inheritance as distinct from social learning.

The characteristics that make the adoption task an appropriate tool for working with children make it equally useful for working with Vezo adults who are quite adept at systematizing and verbalizing their views about the world. Specifically, the advantage of using the adoption task to explore how Vezo adults construe the process of biological inheritance is that it does not directly tap into their stock cultural knowledge. Notably, the adoption task sets out a hypothetical scenario – a riddle – which can be kept as culture-neutral as possible. For example, the story can be told in such a way that it does not evoke the social and moral setting in which Vezo adoption normally takes place (i.e., among close relatives), and the traits for the resemblance questions can be chosen so as to be value free (e.g., bodily characteristics that people consider neither desirable nor unattractive; beliefs which carry no obvious truth value). By virtue of their sheer oddity (see below), the resemblance questions do not prime participants' beliefs about the plasticity of babies' physiognomy or their narratives about the role of social relations in shaping the organic make-up of the person. Instead, they force participants to figure out the answer to entirely novel questions.

What happens, then, when Vezo adults participate in the adoption task and are asked to judge whether the adopted boy would resemble his birth or adoptive father on bodily properties, beliefs and skills?[3] The first thing to be said is that they were initially rather doubtful about the seriousness of the exercise. Betania villagers are pretty used to having their resident anthropologist relentlessly asking all sorts of questions, but they were not prepared for questions of this kind:

The father[4] who generated the child (*baba niteraky azy*) believed that chameleons have 30 teeth, whereas the father who raised the child (*baba niteza azy*) believed that chameleons have 20 teeth. In your opinion, when the child is fully grown up, will he believe that chameleons have 30 teeth like the father who generated him or will he believe that chameleons have 20 teeth like the father who raised him?

Villagers were visibly puzzled by the procedure. Nonetheless, by the time they got half way through the task – when they had realized that only some of the questions were about the adopted child's mind or character (*sainy*, *toetsiny*) while the others were about his physical appearance (*vatany*)[5] – they became visibly more engaged. There were at this moment clear signs of recognition (e.g., "Now I can see what this is all about!") as participants saw the point of what had seemed until then a pointless conversation. What they saw, half way through the task, was that the questions were not aimed at finding out the obvious, i.e. whether babies get their looks from the parents who generated them (for those who were first presented with the set of questions about bodily traits), or whether people come to believe what they are taught by their parents (for those who were first presented with the set of questions about beliefs).[6] Rather, what the questions were trying to find out was whether there is any *difference* between the way children come to have their parents' looks and the way they come to share their parents' beliefs and skills. Nothing in the task forced participants to get *this* point, but they overwhelmingly did.

Participants' overall performance can be captured by analyzing their individual patterns of judgments. Following Solomon and al. (1996), participants are said to have shown a *Differentiated Pattern*, if they judge that the adopted child would resemble the birth parent on most of the bodily traits and the adoptive father on most of the beliefs (their judgments on skills were not considered in determining the Differentiated pattern); they are said to have shown a *Birth Parent Bias*, if they judge that the adopted child would resemble the *birth* parent on all or almost all traits (bodily properties, beliefs and skills);

[3] The adoption task was first successfully used by Bloch among the Zafimaniry of Madagascar (Bloch, Solomon & Carey, 2001).

[4] A control task was designed to establish whether participants might reason differently depending on whether the link of filiation targeted by the questions was paternal or maternal; there was no evidence of a systematic effect and therefore in what follows I ignore this variable.

[5] The study was balanced across participants according to a Latin-Square design in order to control for the potential confounding factors of whether the bodily traits were presented before or after the beliefs, and which value of a pair of features was attributed to the birth parent**.** Thus, half of the participants were first asked the questions about the resemblance on bodily traits, while the other half were first asked the questions about the resemblance on beliefs (the questions about skills were always presented last).

[6] Note, however, that there was no order effect. This means that participants responded to the first set of questions they were presented (either about bodily traits or about beliefs) irrespective of the insight they were going to gain half way through the task.

they are said to have shown an *Adoptive Parent Bias* if they judge that the adopted child would resemble the *adoptive* parent on all or almost all traits (bodily properties, beliefs and skills). Finally, participants who do not show any of the above patterns are said to have shown a *Mixed Pattern*.

An overwhelming 77 percent of Vezo adult participants showed a Differentiated Pattern.[7] For this pattern of judgments to emerge, participants must have reasoned that bodily properties are inherited through links of filiation (hence the child's resemblance to the birth parent), and that beliefs are transmitted through learning and teaching (hence the child's resemblance to the adoptive parent). This finding suggests that Vezo adults differentiate between two causal mechanisms (one having to do with generating children, the other one having to do with nurturing them) for the transmission of two distinct kinds of properties (bodily traits and beliefs).

This finding proved to be very robust. The adoption scenario was manipulated in a number of ways, for example by making the birth and adoptive parents either Vezo or Masikoro (the Vezo's agricultural neighbours) or Vezo and Karany (town-dwellers of Indo-Pakistani descent). More significantly, in one follow-up study the scenario closely matched the kinship arrangements that are normally mobilized in actual cases of adoption (the birth and adoptive parents were the children of two sisters). But none of these manipulations had any effect. In all cases, the overwhelming majority of participants showed a Differentiated Pattern (see Astuti and al., 2004, and Astuti, Solomon & Carey, in preparation).

These results are evidence that Vezo adults have constructed a concept of biological inheritance as distinct from a concept of social learning and, more generally, that they draw the ontological distinction between "facts of biology" and "facts of sociality". Obviously, this conclusion does not entail that the concepts of "biological inheritance" and "social learning" held by Vezo adults map exactly onto the equivalent set of concepts held by Euro American adults. Given the different intellectual traditions and socio-economic contexts in which these concepts get constructed, this claim would be daft (for example, there is no evidence that Vezo adults are familiar with western accounts of biological inheritance in terms of genetic coding). Nonetheless, the evidence suggests that Vezo and Euro American concepts of biological inheritance and social learning are commensurable to one another, in so far as they play the same inferential role in adult reasoning about family resemblance.

This is confirmed by the spontaneous justifications that participants offered in support of their judgments, which provide a more qualitative picture of their causal reasoning. Below are some extracts from the protocols of a few adults who showed a Differentiated Pattern.[8] Since the task was very repetitive, participants provided justifications only for a selection of their judgements; for each justification, the traits for which it was given are indicated in brackets.

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[7] Of the remaining participants, 6 percent showed a Birth Parent Bias, 3 percent an Adoptive Parent Bias, and 13 percent a Mixed Pattern. For complete statistical analyses, see Astuti and al., 2004.

[8] The complete quantitative and qualitative analysis of all the justifications can be found in Astuti and al., 2004. A sample of complete protocols by adult participants who showed Differentiated, Birth Parent Bias, Adoptive Parent Bias, and Mixed Patterns can be found at http://www.wjh.harvard.edu/~lds/pdfs/vezo.pdf.

23 years old, male informant

> [The father who generated the child believed that papaya is healthier than pineapple; the father who raised the child believed that pineapple is healthier than papaya]: **He'll be like the father who raised him because he grew up here** [in the adoptive parents' village]**, and his thoughts grew apart from the other father.**
>
> [The father who generate the child was crossed eyed; the father who raised the child had straight eyes]: **He'll be like his father, because he is the one who generated him and for this reason the boy's face will be like his.**

49 years old, male informant

> [The father who generated the child had roundish ears; the father who raised the child had pointed ears]: **Like the father who generated him. When it comes to believing things, the child will follow the father who raised him, but when it comes to the ways of his body** (*fombam-batany*) **this will depend on the father who generated him. These things are determined by one's blood** (*mandeha aminy ra*).

60 years old, male informant

> [The father who generated the child believed that cows have stronger teeth than horses; the father who raised the boy believed that horses have stronger teeth than cows]: **Like the father who raised him because the thoughts of those who raise him have power/influence over him. They are the "owners" of the child** (*tompony*) **since the child would not be alive if it were not for them. And yet the parents who generated him also have power/influence since if it weren't for them he would not have come out onto this earth.**
>
> [The father who generated him had pointed ears; the father who raised him had roundish ears]: **Like the father who generated him, because that's where the child gets his template** (*modely*) **from.**

49 years old, female informant

> [The father who generated him had a flat appendix; the father who raised him had a roundish appendix]: **He will look only like the father who generated him. In his body** (*am-batany*) **he will be like the one who generated him**.
>
> [The father who generated him believed that chameleons have 30 teeth; the father who raised him believed that chameleons have 20 teeth]: **Like the father who raised him because this is about his character** (*toetsiny*) **and not about his body** (*vatany*), **and he will believe like the father who brought him up because he hears his words.**

These statements are significant for at least two reasons. First, they confirm that the coding of participants' resemblance judgments captures something important about their reasoning strategy. Vezo adults who showed a Differentiated Pattern in their judgments could not have been more articulate in identifying the difference between a person's character and ways of thinking, which are acquired through listening, looking, learning, growing up with someone, and the properties of the body, which are acquired through the

"template" that is passed on through procreation. Second, the justifications demonstrate that the conceptual knowledge Vezo adults drew upon when answering the resemblance questions is readily available to their conscious scrutiny and verbal elaboration. They did not find it in any way difficult to put their causal reasoning into words (as one might imagine they would if, for example, they were asked to reflect on certain aspects of their spatial or linguistic knowledge). In many ways, the justifications reveal that Vezo adults found the task somewhat obvious, and the reasoning necessary to solve it positively transparent.

WEAVING THE TWO ACCOUNTS TOGETHER: THE SIGNIFICANCE FOR ANTHROPOLOGISTS

We are thus faced with an alarming discrepancy between the conclusion reached through the practice of interpretative ethnography and the conclusion reached by targeting Vezo adults' inferential reasoning. On one account, Vezo disallow the distinction between organism and social person, between biological inheritance and socially mediated learning; on the other account, Vezo use these distinctions productively to predict how individual properties get transmitted from parents to offspring.

Many anthropologists are simply going to dismiss the findings of the adoption task, because they see a suspicious similarity between the ontological commitments of the researcher and the ontological distinctions allegedly made by Vezo adults (see Ingold, 2004; McKinnon, 2002). On this view, the finding that Vezo differentiate between what is inborn and what is learnt, between birth and adoption, between bodily and mental properties is a misleading fabrication, the inevitable outcome of a naïve methodology coupled with theoretical preconceptions. This, however, is a spurious argument, for although the adoption task is undoubtedly *constructed* around the distinctions that it aims to reveal, it cannot *impose* them on the participants. If participants do not differentiate between birth and adoptive parents, between birth and nurture, between bodily and mental traits, they will proceed through the task blissfully unaware of the distinctions being probed, free to use a number of alternative, non-dualistic reasoning strategies (e.g., the child will resemble the adoptive parents on all traits because of its extreme malleability; the "true" parent is the one that generates, and the child will therefore resemble him on all traits; the "true" parent is the one that adopts, and the child will therefore resemble him on all traits; the child will have whichever trait seems truer or preferable, irrespective of whether it is the trait attributed to the birth or adoptive parent; etc.).[9]

But what are we to make of the discovery that Vezo adults have constructed an understanding of biological inheritance and that they know why offspring resemble their birth parents in their physiognomy? Clearly, as far as the interpretive aim of anthropology is concerned, one is left with the task of explaining why, if Vezo adults know that human physiognomy is determined

[9] That the adoption task does not have the magical power to impose dualistic categories onto a monistic mind is no vacuous speculation. As discussed in the next section, when used with young children, the adoption task has consistently failed to detect any differentiation between inherited and acquired properties, between birth and social parents, between "facts of biology" and "facts of sociality". In other words, the adoption task *is* a sensitive diagnostic tool: if participants are not "infected" by dualistic reasoning, they will *not* test positive.

by the "template" that babies inherit from the parents who generated them, they insist that their children resemble people other than their birth parents. In what follows I shall propose an explanation, and I will relate it to the findings of the adoption task.

Let me start from an observation that is probably familiar to most readers. When people in England say, as they do, that my son resembles his father and me (e.g., he has taken after his father in the shape of his mouth, and after me in the shape of his eyes), they establish our exclusive claims as his parents. We would find it odd if someone said, as Vezo people would, that my son resembles the yoga instructor I met weekly when I was pregnant. The reason we would find it odd is not simply that we do not believe that a baby's features can be affected by the mother's relationship with her yoga instructor (especially if she is a woman!); more profoundly, we would find it odd because we do not feel that a yoga instructor should have any claim over her pupil's baby.

By contrast, what Vezo people would find odd is the suggestion that birth parents have exclusive claims over their children, and remarks about the resemblance between children and the parents who have generated them would be interpreted as a way of suggesting just that. This is why, I suggest, Vezo people are not predisposed to see resemblance where its existence is an index of a unique and exclusive relationship between parents and their children. Instead, the many ways in which babies come to resemble people other than their birth parents work to dissolve that uniqueness and exclusivity, by socializing parenthood and extending the child's bodily connections well beyond those with its parents.

This way of (not) seeing resemblance is just one instance of a much wider strategy. As argued elsewhere (Astuti, 2000), the notion that children "belong" to more people than their birth parents (and that grandchildren and great grandchildren "belong" to more people than their grandparents and great grandparents) is central to Vezo kinship and to the realization of people's most valued aim in life: to reach old age surrounded by a vast number of descendants. While this objective is inherent to the Vezo undifferentiated system of kinship reckoning, which is inclusive rather than exclusive, people also actively pursue this end in their everyday practices. For example, although children tend to be raised by their birth parents, it is considered unforgivingly rude for such parents to assert their unique rights or duties over *their* children.[10] By contrast, every effort is made to break down the boundaries that demarcate individual family units – for example, by encouraging children to eat from any of the kitchens of their numerous "parents" (e.g., mother's sisters, mother's brothers, father's sisters, father's brothers, and so on).[11] Although there is a

[10] The only context when this is admissible is when ancestral matters are concerned, such as the decision to perform the ritual that establishes exclusive rights over one's children's dead bodies (see Astuti, 1995a for further details).

[11] This behaviour is common throughout Madagascar (e.g., Bloch, 1971, p. 83) and it extends to children's sleeping arrangements. Bloch (personal communication) reports that during his fieldwork among the Merina in the highlands of Madagascar, a little boy got lost in the fields. However, since his parents assumed that he was staying with some other "parents", and it would have been considered rude for them to look for him, it took some time before the extended family realized that he was actually missing. See Bloch (1986) for a general discussion of the way Merina construe biological ties and how they overcome their divisiveness through ritual means.

well-understood practical advantage in sharing children in this way, an important effect of this practice is that it trains children and adults alike to disregard the distinctions between one's birth and other classificatory parents, between one's full and one's classificatory siblings. Exactly the same effect is achieved when people do *not* attend to the resemblance between babies and their birth parents and choose to see it elsewhere.

During one administration of the adoption task, one of the few participants who showed a Birth Parent Bias (that is, he judged that the adopted child would resemble the birth parent on all properties) offered a striking justification for one of his judgements. He said that the adopted child would have pointed ears like his birth father because "in the case of human beings there must be a sign, a proof, that your child is *yours*" (*olom-belo tsy maintsy misy famantara io anakinao*). The results of the adoption task have revealed that the majority of Vezo adults are aware that children bear such signs; encouraging children to eat and sleep in many different houses and asserting that babies' physiognomy is shaped by the actions of people other than the parents who generate them are some of the practices through which the majority of Vezo adults strive to erase these signs as best as they can.

If so, it stands to reason that anthropologists cannot begin to understand the motivation behind these practices – to create a community in which children are generated, nurtured and moulded by a much larger network of relations than the ones demarcated by their birth parents – if they were to assume that Vezo ontology is blind to the difference that these ways of eating, sleeping and seeing are meant to mitigate. Although at first ethnographic sight it might seem that Vezo kinship transcends the distinctions between the "facts of biology" and the "facts of sociality", between physical and social identities, between organism and person, the claim that Vezo ontology is monistic is not only factually wrong; paradoxically, in making such a claim, anthropologists risk ignoring the meaning, moral valence, and psychological force of what Vezo adults tell them about their babies.

WEAVING THE TWO ACCOUNTS TOGETHER: THE SIGNIFICANCE FOR PSYCHOLOGISTS

Our psychologist's original motivation for joining force with an anthropologist was to test the hypothesis that conceptual development in the domain of folkbiology might be guided by innate constraints. In so far as it revealed a significant degree of convergence in the concepts of birth parentage and biological inheritance across radically different cultural contexts, the evidence provided by the study with Vezo adults is consistent with this hypothesis. Nonetheless, cross-cultural convergence in adult conceptual representations does not constitute sufficient evidence that conceptual development is innately constrained. This is because, as discussed at greater length elsewhere (Astuti and al., 2004), cross-cultural convergence in adults' representations can result from a process of unconstrained learning if the world provides consistent and stable data in favour of those representations. In addition to cross-cultural convergence in adult representations what is needed, therefore, is evidence that the relevant representations emerge early in development and that their emergence is impervious to the widely different cultural, social and educational environments in which children grow up. From this perspective, the collaboration with the anthropologist not only offers the opportunity to test for the universality of certain habits of the adult mind, but

also to explore whether the manner of constructing such habits is culturally inflected.

As mentioned earlier, the adoption task was originally designed for use with North American children. Likewise, the version of the task used to interview Vezo adults was presented to Vezo children, aged 6 to 13, and to Vezo adolescents, aged 14 to 20. The results indicate that before their mid-teens Vezo children understand neither that the biological process of reproduction is implicated in the transmission of bodily properties from parents to their offspring, nor that the processes of learning, practice and imitation are implicated in the transmission of beliefs.[12] In other words, 6- to 13-year olds have yet to construct the understanding of biological inheritance that is found among their parents and elders, and which emerges only from around age 14.

Vezo children's overall performance on the adoption task converges with that of children who have been tested in North America and Europe (Giménez & Harris, 2002; Solomon, 2002; Solomon and al., 1996; Springer, 1996; Springer & Keil, 1989; Weissman & Kalish, 1999; Williams & Affleck, 1999), in India (Mahalingham, 1998) and in another part of rural Madagascar (Bloch and al., 2001) in showing that an understanding of biological inheritance takes a considerable time to develop. Nonetheless, the length of time it takes varies considerably in these different contexts. Thus, while children in rural Madagascar begin to show a Differentiated Pattern at around age 14, urban Tamil children in India do so at around age 12, and middle-class children in North America at around age 6 or 7. There are likely to be several interconnected reasons for why, for example, Vezo children take so much longer than North American or European counterparts to construct the concept of biological inheritance. These range from Vezo children's very limited access to schooling to Vezo parents' culturally specific pedagogical expectations and practices (see Astuti and al., 2004 for details); but foremost among them is probably the fact that the testimony Vezo children receive from their parents and elders is precisely aimed at conflating the distinction between the biological mechanism of reproduction and the social mechanism of nurture (as when Vezo adults assert that a baby's physical features depend on what kind of people her mother befriended or disliked when she was pregnant, see above). Taken together, these findings and ethnographic observations indicate that the pace with which children construct the concepts of birth parentage and biological inheritance is sensitive to the cultural, social and educational environments in which they grow up. Furthermore, there is suggestive evidence that the steps taken by Vezo children as they construct these concepts are also context-dependent.

Specifically, the analysis of the judgments made on the adoption task by the group of adolescents and young adults, aged 14 to 20, reveals that those among them who are still in transition from the children's undifferentiated to the adults' differentiated pattern of reasoning[13] have nonetheless made a first significant realization: that a person's skills (such things as knowing how to

[12] Only 13 percent of the children showed a Differentiated Pattern. Of the remaining participants in this age group, 30 percent showed a Birth Parent Bias, 18 percent an Adoptive Parent Bias, and 40 percent a Mixed Pattern. On average, they judged that the adopted boy would resemble his birth parent 58 percent of time on bodily traits, 49 percent of the time on beliefs, and 50 percent of the time on skills. See Astuti and al., 2004 for more details.

[13] Namely, the 34 percent of adolescents who showed a Mixed Pattern of judgments.

make ropes or how to whistle) are learnt, rather than inherited.[14] Thus, even if they fail to differentiate between bodily properties and beliefs,[15] and even if their judgments for bodily properties indicate that they are still somewhat unsure as to what mechanism is responsible for the physical resemblance between parents and their offspring,[16] these adolescents reliably differentiate between bodily properties and skills (see Astuti and al., 2004 for further details). This complex pattern of results suggests that the crucial differentiation between properties of the person that are passed on through biological processes causally connected with birth and procreation and properties of the person that are passed on through social processes of learning and imitation is built upon and is driven by the understanding of how skills are acquired.

An anthropologist familiar with the cultural environment in which these conceptual developments unfold will not be surprised by the fact that even those adolescents who have yet to fully differentiate the mechanisms that determine a person's individual properties have made significant headway in their understanding of how skills are acquired and transmitted. Not only adolescents are in the midst of learning skills that are necessary for their livelihood, which they are increasingly responsible for providing themselves; by learning these skills – fishing, sailing, selling fish, etc. – these young men and women are also making themselves Vezo. Adults are adamant that young children, despite the fact that they have Vezo parents and are of Vezo descent, are not Vezo yet. This is because they are still unable to master the skills that, according to the adult theory of social group identity (Astuti, 1995a, 1995b), make people Vezo. This particular way of construing group identity is routinely made available and relevant to children. Thus, whenever a child demonstrates that she has learnt a new skill – for example, swimming or catching a fish – she will be praised that she is becoming Vezo; by contrast, whenever a child fails to perform like a Vezo – for example, if she struggles to eat a bony fish – she will be teased that she is Masikoro (the name of the Vezo's agriculturalist neighbours). Given the heavily weighted testimony they hear about how, by learning certain skills, one becomes or fails to become Vezo, we can understand why Vezo adolescents should pay particular attention to the ways in which skills are transmitted and acquired, and why the notion that skills are learnt through practice and habituation is the first one they come to master and subsequently recruit in theory building.

The existing evidence therefore suggests that the emphasis on the acquisition of skills as the constituent of group identity might guide Vezo children's conceptual development in culturally specific ways. Of course, to validate this hypothesis we would need comparative data from distinctively different cultural contexts, for example from societies where the inheritance of a certain kind of blood or of a certain kind of bones is taken to mediate people's affiliation to specific descent or ethnic groups. The prediction would be that in such contexts children would come to realize the significance of birth origins in the transmission of bodily traits before they understand the role of learning and habituation in the acquisition of skills.

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[14] Their mean percentage of birth judgments for skills (25) was no different from that of adults (24).

[15] Their mean percentage of birth judgments for beliefs (58) was no different from chance.

[16] Their mean percentage of birth judgments on bodily properties (69) was different from chance but was significantly different from the percentage of birth judgments (94) given by those adolescents who showed a Differentiated Pattern.

To recap: the findings of the study among Vezo children, adolescents and adults indicate that the construction of the concepts of birth parentage and biological inheritance takes a considerable time; when placed in a comparative perspective, the findings also indicate that the pace of development is sensitive to the cultural, social and educational environments in which children happen to grow up; when analyzed against the backdrop of the Vezo theory of group identity, they suggest that the specific steps taken by Vezo children as they construct these concepts might also be context-dependent.

Taken together, these results challenge the hypothesis that concepts such as biological inheritance and birth parentage are part of children's innate conceptual repertoire, and suggest instead that these concepts emerge after a prolonged constructive process, whose pace and trajectory are sensitive to the culturally specific conditions in which development unfolds. Nonetheless, despite their significance, these conditions only affect the pace and trajectory of conceptual development, not its overall end-point.

CONCLUSION

This paper has pitted the anthropological study of cultural representations, assumed by most anthropologists to be historically specific and unconstrained in their variability, against the psychological study of innate representational constraints, assumed by some psychologists to guide conceptual development towards cross-cultural convergence in core domains of knowledge. More specifically, this paper has pitted the ethnographic account of how Vezo adults in Madagascar describe the processes by which babies come to resemble people other than their birth parents against the claim that the development of concepts of birth parentage and biological inheritance is guided by innate constraints. Once woven together, the two accounts raise issues of theoretical import for both the anthropological study of culture and the psychological study of cognition and cognitive development.

On the one hand – the anthropological hand—the discovery that Vezo adults know that their babies get their physiognomy from their birth parents, but choose to state otherwise, raises the question of what kind of knowledge is accessed by ethnographic methods. Clearly, Vezo adults are much more interested in articulating the knowledge that helps them create the kind of moral world in which children are generated, nurtured and moulded by a large network of relations, than they are in discussing their understanding of the mechanism of biological inheritance. As ethnographers, we are unlikely to find evidence of the latter, while we are likely to be seduced by the radical ontological incommensurability implied by the former. And yet, the collaboration with cognitive psychologists and the deployment of a simple experimental tool that targets people's inferential reasoning rather than engaging them in a moral discourse, has revealed that in fact Vezo adults take for granted the constraints imposed on human relations by the biological facts of reproduction. As ethnographers, we witness their efforts to transcend these constraints,[17] and we should strive to represent them for what they are: efforts to work against the ties of biological kinship, to attenuate the difference between birth and nurture, to erase the "signs" that only birth parents can leave on their children.

[17] See Firth, 1963: 190-93 for a similar point regarding the Tikopia practice of "the adhering child".

On the other hand – the psychological hand – the discovery that conceptual development in the domain of folkbiology is highly sensitive to the cultural and educational environment in which children grow up, even when its outcome is cross-culturally convergent, raises the question of what kind of comparative evidence psychologists should be seeking and what kind of theory they should be articulating to do justice to the fact that the cultural context in which conceptual development unfolds is unlikely to ever be just an independent variable.

Having discovered that Vezo adults understand the process of biological inheritance, psychologists might be tempted to treat the local notion that babies do not resemble their birth parents as inessential cultural fluff that can be disregarded in the study of Vezo cognition. This, however, would be a serious mistake, not just because the Vezo notion is imbued with moral value and clearly matters to the people concerned, but also because it is the outcome of a fundamental characteristic of human cognition – what Sperber calls our metarepresentational ability (e.g., Sperber 1994, 1997). It is this ability that allows Vezo adults to do more than represent the world as it is known to them.

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