

Which evolutionary model best explains the culture of honour?

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Abstract The culture of honour hypothesis offers a compelling example of how human psychology differentially adapts to pastoral and horticultural environments. However, there is disagreement over whether this pattern is best explained by a memetic, evolutionary psychological, dual inheritance, or niche construction model. I argue that this disagreement stems from two shortcomings: lack of clarity about the theoretical commitments of these models and inadequate comparative data for testing them. To resolve the first problem, I offer a theoretical framework for deriving competing predictions from each of the four models. In particular, this involves a novel interpretation of the difference between dual inheritance theory and cultural niche construction. I then illustrate a strategy for testing their predictions using data from the Human Relations Area File. Empirical results suggest that the aggressive psychological phenotype typically associated with honour culture is more common among pastoral societies than among horticultural societies. Theoretical considerations suggest that this pattern is best explained as a case of cultural niche construction.

Keywords Culture of honour · Cultural evolution · Cultural niche construction · Dual inheritance theory · Memetics · Evolutionary psychology

Introduction

Members of the FulBe Mare'en culture of Cameroon follow a traditional pastoral lifestyle. They inhabit small encampments of 3–20 families scattered across the arid plains of West Africa. Camp membership is highly fluid, with each family moving

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up to 25 times per year. FulBe lifestyle revolves around livestock, mainly cattle. Anthropologist Mark Moritz (2008) identifies some of the threats associated with this mode of subsistence: 'Threats to cattle range in severity from deadly cattle raids by Musgum fishermen to extortion by heavily armed robbers, theft by former Tupuri herder employees, theft by FulBe herders from subsistence herds, and theft by FulBe herders from herds of absentee owners' (p. 103). In his ethnographic account of the FulBe, Paul Eguchi offers a glimpse into how these conditions might have shaped FulBe psychology. Most notable is their hyper-sensitivity to insult:

Insults involving parents and genitalia (e.g. mbasu bamma [your father's penis] or kuttu yaa maa [your mother's genitals] are the most intense and humiliating and cause, as the FulBe describe it, 'soreness in the heart'...Such obscenities require an uncompromising defense of the parent's honor and one's own, often with a weapon...One-third of the prison population of Maroua, the provincial capital of the Far North Province of Cameroon, are in prison for stabbing to death someone who insulted their mother. (cited in Moritz 2008, p. 108)

Such anecdotes are not uncommon among pastoralists who embrace what has come to be known the culture of honour (Nisbett and Cohen 1996). From an evolutionary perspective it might seem surprising that this disruptive and apparently maladaptive cultural pattern should emerge and persist at various locations across the globe. The dominant explanation holds that the reactive psychological phenotype is advantageous in pastoral societies because it functions as a theft deterrent. This psychological disposition is thought to be structured by cultural norms which are, in turn, selected in pastoral environments because they enhance individual biological fitness. This, however, is not the only version of the evolutionary story. Another possibility is that honour cultures sometimes involve a runaway process of cultural transmission. On this view, their evolution is decoupled from their effects on biological fitness. Yet another possibility is that honour cultures are the expression of what Shackelford (2005) calls a hardwired 'reputation maintenance mechanism'. On this view, a hyper-aggressive sensitivity to honour has a genetic basis that gets triggered in pastoral environments.

Although these evolutionary scenarios are quite different, they each claim to find support in the available examples of honour culture. This predicament seems to have resulted from two related shortcomings. First, the theoretical commitments of some models have not been adequately developed to identify their competing predictions. This is especially the case for dual inheritance and niche construction models, which are often taken to make identical predictions about the coevolution of genes and phenotypes. A second shortcoming is that alternative models have not been tested using an adequate comparative framework. As I argue below, each model can be associated with one or more distinct type of factor that is thought to generate phenotypic differences among cultures. Teasing apart these causal hypotheses requires a sufficiently variable dataset. Minimally, there must be variation in the 'dosages' of each candidate difference-maker in order to evaluate their respective influences (Lang et al. 2002). By contrast, alternative models are typically assessed against populations (e.g. Northerners vs. Southerners) in which

the relevant factors cluster together. It is no surprise that alternative models lay claim to the culture of honour hypotheses—much of the available evidence is consistent with all of them. This paper aims to make progress on both fronts. I begin with a careful articulation of the culture of honour hypothesis. This is followed by a general framework for distinguishing the core theoretical commitments of the four dominant models of cultural evolution: memetics, evolutionary psychology, dual inheritance, and cultural niche construction. In particular, I defend a novel strategy for distinguishing the latter two models that enables one to test their rival predictions using comparative data. I then demonstrate how their competing predictions can be tested by drawing on data extracted from the Human Relations Area File.

The culture of honour hypothesis consists of two components

Before delving into these issues it is helpful to clarify some terminology. An individual's *psychological phenotype* is his disposition to respond to certain events (e.g. an insult or threat) with a distinctive cognitive, emotional or behavioural response. A population of individuals can also share a *cultural phenotype*. This refers to the body of socially transmitted information (e.g. norms, social scripts, parenting strategies, religious convictions, technologies, etc.) that is shared among members of a particular cultural group. Importantly, a psychological phenotype is a property of an individual whereas a cultural phenotype is a property of a population. Particular psychological phenotypes can also be influenced by both genetically and socially transmitted factors, whereas a cultural phenotype is passed on exclusively by social transmission. The *socioecological environment* is a set of conditions that determine the social and biological costs and benefits associated with certain patterns of behaviour. These conditions can be structured to some degree by the prevailing cultural phenotype. But it is usually not within an individual's power to alter them.

With these distinctions in place it becomes clear that the culture of honour hypothesis consists of two distinct components (Chu et al. 2000). What I'll call the *developmental thesis* proposes a causal link from cultural phenotype to psychological phenotype. Honour cultures are a distinct category of cultural phenotype. In these societies honour is closely related to social standing. Certain insults are recognized as a threat to one's honour. Usually, violent aggression is the only acceptable response to such insult. In their description of the honour culture that prevails in the American South, Nisbett and Cohen (1996) provide a fairly detailed account of this cultural phenotype. They note that attitudes towards insult differ markedly among Southerners and their Northern counterparts. To take just one example, Southerners encourage their children to respond to bullying with violence, whereas Northerners encourage their kids to turn the other cheek. The developmental component of the culture of honour thesis proposes that these elements of the Southern cultural phenotype structure an individual's psychological phenotype. Nisbett and Cohen (1996) support this claim with several lines of experimental

evidence. For instance, they show that insulted Southern males respond with a pronounced ‘fight or flight’ response. These individuals also report heightened levels of subjective anger and a readiness for violence. Insulted Southerners further exhibit a range of aggressive non-verbal behaviours, suggesting a willingness to escalate confrontation. In what follows, I refer to this collection of responses as the ‘reactive’ psychological phenotype. By contrast, Northerners display a very different psychological disposition. Under identical conditions, Northerners exhibit no strong fight or flight response, no proneness to anger, and they will typically shrug off an insult with humour. Hereafter, I refer to this response pattern as the ‘passive’ psychological phenotype.

The second, *evolutionary* component of the culture of honour hypothesis proposes a causal link from socioecological environment to cultural phenotype. In a prototypical pastoral environment an individual’s economic standing is largely bound up in livestock—a portable form of capital particularly vulnerable to theft. Pastoral settings are often sparsely populated and remote from sources of legal enforcement. Theoretical considerations suggest that these two conditions—vulnerability to theft and lack of legal recourse—favour the sort of reactive psychological phenotype characteristic of honour cultures. This idea has been explored formally by McElreath (2003), who shows that reputational effects can have an important influence on fitness under these conditions. Further theoretical support comes from Robert Frank’s (1988) idea of emotions as commitment devices. Consider an individual who threatens to retaliate if his capital is stolen. For this threat to deter, others must view it as credible. However, in a lawless society retaliation can be extremely costly, involving personal injury or death. It is often less costly for an individual to suffer occasional theft than to retaliate. But adopting this ‘rational’ principle of turning the other cheek only encourages further victimization. Frank proposes that emotions, in their capacity to override practical reason, provide a solution to this dilemma. A person who simply cannot restrain his own reactive tendencies is thereby *committed* to retaliation. If others recognize this reactive tendency, for instance in a person’s hyper-aggressive reaction to insult, he is less likely to be seriously tested on subsequent occasions.

Just as pastoral environments are thought to favour a psychological phenotype that is sensitive to honour and prone to aggression, it is likewise thought that horticultural environments select for the opposite psychological profile. Anthropologist Walter Goldschmidt was perhaps the first to observe that, among a group of related African cultures, “the pastoralists would be more ‘acting out’ in their interpersonal relationships, more ready to express anger and to take direct action, while the farmers would suppress their negative emotions and restrain their action” (1971, 16–17). Goldschmidt proposed that the cultural and psychological phenotypes favoured in pastoral societies are maladaptive in a farming context. Horticulturalists, he observed, are bound to a sedentary existence. They also rely on one another for defense, harvesting, and other highly cooperative endeavours. These conditions are thought to favour a value system that emphasizes passivity and tolerance—at least among fellow group members.

Perhaps the best available evidence for this evolutionary thesis comes from the field work of Robert Edgerton (1971), Goldschmidt's graduate student. The four tribal societies investigated by Edgerton were: the Hehe of Tanzania, the Kamba of Southern Kenya, the Pokot of Western Kenya, and the Sebei of Eastern Uganda. Each of these tribes contained both herding and farming communities that were fairly geographically isolated from one another. Edgerton exposed all eight populations to a battery of questions designed to probe their values and psychological dispositions. Across many of these variables, he found convergence among pastoralist cultures that diverged predictably from horticulturalists. Nisbett and Cohen also maintain that differences between Northerners and Southerners can be traced to their pre-colonial ancestry. Northerners are largely descended from English and German horticulturalists, while Southerners are descended from Scotch and Irish herders.

To summarize the evolutionary component of the culture of honour hypothesis, this thesis is best understood as a proposal about divergent selective pressures associated with pastoral and horticultural subsistence strategies. It proposes that distinct cultural phenotypes tend to evolve under these two socio-ecological environments. Taken together, the two components of the culture of honour hypothesis (one developmental, the other evolutionary) potentially illustrate how socioecological conditions shape human psychology via cultural transmission.

Theoretical commitments and competing predictions of alternative models

It is no surprise that evolutionary thinkers from a range of different theoretical backgrounds have seized upon this intriguing case. All four of the dominant models of cultural evolution (memetics, evolutionary psychology, dual inheritance, and niche construction) can arguably explain the pattern of cultural variation described by Nisbett and Cohen. This section focuses on the core theoretical commitments of all four models. The overall aim is to derive a set of distinct predictions from each model that can be tested using comparative data.

Meme theory

Memetic models propose that differences in psychological phenotypes are explained by differences in cultural phenotypes. On this view, culturally transmitted norms and practices influence emotions, attitudes, and behaviours. However, due to horizontal transmission, cultural inertia, or other factors that decouple culture from biological fitness, psychological phenotypes can become disassociated from the socioecological conditions that otherwise select for them. On this view, honour cultures certainly evolve, but this is not explained primarily in terms of the fitness benefits that they afford biological individuals within pastoral environments. Rather, it is due to the rate at which honour-related norms are transmitted and the capacity for those norms to influence individual psychology.

Memetic models suggest some fairly straightforward predictions about patterns of cultural variation. Among populations that differ in their psychological phenotype (reactive vs. passive) there should be a predictable pattern of covariation in norms and practices. Populations that value honour and condone violence should exhibit relatively high rates of violent aggression in response to insult compared to populations that downplay honour and condemn violence. However, a memetic model does not predict that these phenotypes will covary with differences in socioecological context (pastoralism vs horticulture). Recall that these socioecological contexts are thought to exert divergent selection pressures on biological individuals. Memetic models assume that cultural phenotypes are decoupled from biological fitness. Hence, across a sufficiently large sample of populations that vary in pastoral versus horticultural lifestyles, psychological and cultural phenotypes should vary randomly with respect to this variable.

An important qualification to these predictions deserves mention. It is possible for cultural phenotypes to persist even when the socioecological conditions that once favoured them no longer obtain. Nisbett and Cohen appeal to this phenomenon of ‘cultural inertia’ to explain the persistence of honour culture in the American South despite the transition away from pastoralism and the adoption of centralized authority. It would seem that the important methodological lesson is to consider *historical* socioecological conditions when looking for covariation with cultural or psychological phenotypes. However, there is a deeper theoretical issue. The fact that a cultural phenotype can persist for extended historical periods simply as an effect of its own cultural inertia arguably supports a memetic model. After all, this would suggest that maintenance of the cultural phenotype does not require selection on biological individuals. One way to deal with this issue distinguishes ‘origin explanations’ from ‘maintenance explanations.’ A memetic model might be adequate for explaining how a certain cultural phenotype is maintained, while a more elaborate model might be required to explain its origin.

The ideal circumstances for testing the strength of cultural inertia would be to look for cases in which cultural phenotypes persist even when they are biologically disadvantageous. For example, suppose that a pastoral population that embraces an honour culture subsequently converts to a horticultural lifestyle. Recall that the evolutionary component of the culture of honour hypotheses predicts divergent selection pressures among pastoral and horticultural contexts. If this is correct, the strength of cultural inertia for honour culture could be gauged according to the persistence of this cultural phenotype in the maladaptive horticultural environment.

Evolutionary psychology (EP)

EP models view psychological phenotypes as the expression of an underlying genetic disposition that has been shaped by selection on biological individuals. These models identify certain ‘adaptive problems’ that are thought to take on slightly different manifestations in different cultural contexts. However, it is assumed that those problems share certain underlying structural features that recur over human evolutionary history. For example, Todd Shackelford proposes that a recurring adaptive problem in human societies is the protection of one’s resources

from theft (for Shackelford, 'resources' includes mates). He further proposes that the maintenance of a good reputation has long been important for accessing resources, predating the relatively recent adoption of pastoralism. He thus proposes that humans have evolved a genetically specified 'reputation maintenance mechanism.' This purported mechanism has the capacity to generate the reactive psychological phenotype exemplified in the American South. However, this developmental response is thought to be calibrated to local sociocological parameters. In contexts where reputational damage results in a potential loss of resources, the evolved mechanism responds by setting a low threshold for violent aggression. In other contexts, where violent outbursts potentially tarnish one's reputation, the threshold for violent aggression is set much higher. Hence, this model is thought to explain the pattern of phenotypic variation that one observes across Northern and Southern cultures. Importantly, culturally transmitted information plays no role in explaining these differences. As I understand it, EP does not deny the possibility that some cultural variants (even particular norms and practices that pertain to honour) are culturally transmitted. Rather, it views these cultural variants as being insufficient to explain robust differences among psychological phenotypes. In other words, EP can be regarded as a kind of idealised model that focuses on genetically inherited psychological dispositions as the relevant difference makers for explaining patterns of phenotypic variation. Cultural transmission is ignored not because it doesn't exist, but rather because it is seen as causally inefficacious.

Before deriving comparative predictions from this model it is helpful to consider why some theorists regard it as a plausible default position. EP proponents often appeal to the so called diffusion problem to argue that cultural transmission on its own cannot produce stable psychological phenotypes (Atran 2001). This thesis is premised on the idea that there is a fundamental disanalogy between the way that genes are replicated and the process by which ideas are transmitted. Whereas genes involve a high fidelity process of template copying, ideas are thought to spread from one mind to another by 'inferential reconstruction.' Atran argues that we do not directly access the content of another person's thoughts. Instead, our access is mediated by syntactically coded utterances, gestures, and actions. Atran claims that these 'external representations' are typically poor reflections of the underlying ideas that generate them. Hence, interpreting another person's speech or behaviour is thought to involve a considerable amount of inferential reconstruction. Following Dan Sperber (1996), Atran maintains that this reconstruction process rapidly degrades the fidelity of cultural phenotypes over successive transmission events. In support of this claim Atran cites experimental evidence where, as in the children's game of Chinese Whispers, a phrase or story being passed along a chain of individuals becomes progressively distorted. If diffusion is a serious threat to cultural transmission, the thinking goes, then it is necessary to posit a genetic basis to explain stable psychological phenotypes.

This argument has been challenged on a number of fronts (Sterelny 2006; Henrich and Boyd 2002; Henrich et al. 2008). A thorough critique is beyond the scope of this paper. However, as the following section on cultural niche construction will discuss, an EP model is not required to explain the stability of psychological

phenotypes—even if the diffusion problem looms large. An alternative hypothesis is that the cultural phenotypes that influence psychological responses are themselves scaffolded by other cultural practices that maintain their fidelity.

EP models predict that psychological phenotypes will covary with the sociological conditions to which they are presumably adapted. Hence, the tendency to respond to insult with violence should recur in populations that have adopted pastoralism. Likewise, the tendency to refrain from violence should be found across horticultural contexts. An interesting prediction of EP models is that it should take relatively little time for these phenotypes to emerge once a population adopts either a pastoral or a horticultural lifestyle. This prediction stems from the idea that individuals are genetically predisposed to generate these phenotypes. Hence the relevant cultural variants do not have to appear *de novo* and then undergo cultural transmission, as alternative models assume. The challenge in testing this prediction is that the relevant historical information can be difficult to obtain.

Although EP predicts a tight correlation among particular socioecological conditions and corresponding psychological phenotypes, it is difficult say how cultural phenotypes are expected to vary on this model. Part of the challenge lies in empirically distinguishing cultural from psychological phenotypes. EP models embrace the idea of ‘evoked’ culture (Tooby and Cosmides 1992). On this view, even the norms and social scripts typically thought to be socially transmitted are in fact an expression of some genetically inherited disposition (Gangestad et al. 2009). This assumption makes EP models difficult to falsify using comparative data. A comparative approach looks for cases in which particular cultural phenotypes covary among populations with the psychological phenotypes that they are thought to influence. However, the idea of evoked culture explains this pattern in terms of a common underlying cause. Perhaps the strongest evidence against EP—barring identification of the relevant genes—is a pattern in which the predicted psychological phenotype is not uniformly expressed among cultures inhabiting the same socioecological context. EP must then explain why the phenotype did not appear despite the appropriate triggering conditions.

Dual inheritance versus niche construction

The two remaining models are more difficult to distinguish from one another than was the case for memetics and EP. As discussed below, both models posit an interaction between genetically and epigenetically inherited factors in the production of psychological phenotypes. The challenge is to identify a particular type of epigenetic factor that is identified by one model and not the other. After briefly outlining dual inheritance theory (DIT), I will defend a novel strategy for distinguishing it empirically from cultural niche construction (NCT).

DIT has been aptly described by Laland and Brown as, ‘a hybrid cross between memetics and evolutionary psychology, with a little mathematical rigor thrown into the pot’ (2002, p. 242). Like memetics, DIT views culture as a system of ideational phenomena (beliefs, skills, norms, and so on) that can be socially transmitted among unrelated individuals. Like EP, DIT posits genetically inherited psychological

dispositions that interact with socially transmitted information. Together, these two factors influence phenotypic evolution, potentially giving rise to variation among cultures in both psychological and cultural phenotypes.

A canonical example of DIT in humans involves the evolution of lactose tolerance. The genetically inherited capacity to digest fresh milk in adulthood exhibits a complex pattern of association with specific cultural practices surrounding dairy consumption (Holden and Mace 1997). Lactose tolerance is prominent in northern Europe and some African cultures with long traditions of consuming fresh milk. This phenotype is less common in Mediterranean cultures where milk products are processed into yogurt and cheese, thus reducing lactose content. Within East Asian and sub-Saharan cultures, where all forms of dairy consumption are rare, this phenotype is least prevalent. This pattern suggests that the genetic disposition for lactose tolerance coevolves with particular cultural practices surrounding lactose consumption. However, lactose consumption has been practiced for millennia in many North African and Middle Eastern cultures, where rates of lactose tolerance remain low (*ibid*). Such observations have suggested two alternative hypotheses. One proposal is that lactose tolerance is beneficial in low sunlight environments because it facilitates the absorption of vitamin D (Flatz and Rotthauwe 1973). A second proposal is that lactose tolerance is beneficial in arid environments where rates of milk consumption are particularly high in order to avoid dehydration (Cook and Al-Torki 1975). These two alternative hypotheses propose additional causal factors, in conjunction with dairy farming, as the explanation for the observed pattern of cultural variation in lactose tolerance. In a classic study, Holden and Mace (1997) tested these hypotheses using a phylogenetic comparison of 62 cultures in which levels of lactose tolerance varied. Importantly, their sample contained cultures in which the three candidate causal factors—lactose consumption, sunlight, and aridity—independently varied. The fact that lactose consumption was the only factor that covaried with high rates of lactose tolerance enabled them to rule out sunlight and aridity as likely causes. This study provides an excellent illustration of how DI models can be tested using comparative data. The characteristic feature of these models is that they identify two interacting causal factors—one cultural, the other genetic—to explain a particular pattern of phenotypic variation.

Niche construction models are perhaps the most challenging to interpret from within a comparative framework. One potential strategy is to draw on prototypical examples of niche construction in non-human animals for guidance. Beaver dams and termite mounds are canonical examples. In these cases, some modification to the physical environment is maintained by a population of organisms. These structures persist over multiple generations, thereby qualifying as a channel of epigenetic inheritance. Most importantly, these modified environments can influence phenotypic evolution in the populations that maintain them. Laland and Sterelny (2006) identify three distinct ways that phenotypes and niches might interact. One possibility involves ecological buffering. Some organisms (e.g. earthworms) create a suitable micro-niche that buffers certain traits against broader environmental changes. A second possibility involves coevolution among phenotypes and niches. Here, various elements of the niche impose a selection pressure on

certain phenotypes, resulting in genetic adaptation. The third possibility involves the regulation of gene expression. In this case, features of the niche influence the reaction norm of a trait. This can result in the stable production of certain phenotypes that are environmentally canalized by the elements of the niche. These three processes can interact, resulting in organisms that are highly functionally integrated with their constructed niches.

Turning to the case human culture, one finds a number of similarities to prototypical examples of niche construction. Cultural traditions are systems of epigenetic inheritance that can influence phenotypic evolution in all three of the ways that Laland and Sterelny outline. For example, the fabrication of clothing and shelter buffers humans against features of the broader environment, enabling some populations to inhabit extreme climates without requiring dramatic phenotypic changes. Phenotypes and cultural traditions also coevolve, as is exemplified by the evolution lactose tolerance. Features of a cultural tradition can also influence the development of certain phenotypes. Indeed, this is precisely what is proposed by the developmental component of the culture of honour hypothesis, where certain honour-conducive norms are thought to produce the reactive psychological phenotype exhibited in the American South. But these similarities do not point to a clear distinction between dual inheritance and cultural niche construction. In both models, one finds culturally transmitted factors interacting with genetically inherited factors to produce phenotypic differences. How, if at all, can these two models be distinguished in the case of human culture?

Sterelny (2003, 2006) offers an interesting solution to this problem. On his account, niche construction is equated with the practice of cultural scaffolding. Cultural scaffolding involves an interaction between two types of cultural factor. The first (scaffolding) factor facilitates the acquisition and retention of some second (scaffolded) factor. Sterelny's example of a scaffolding factor is the explicit teaching of certain lithic technologies. He argues that the capacity to build complex stone tools could not be acquired by simple imitation learning. Instead, teachers must emphasize and repeat certain steps in the construction process for transmission to succeed. By contrast, some cultural artefacts appear not to require scaffolding for their reliable transmission. For instance, the practice of termite fishing in chimpanzees seems to persist across transmission events by imitation learning alone. On Sterelny's account, the evolution of termite fishing can potentially be explained by a dual inheritance model; but the evolution of complex human tools is a case of niche construction. This proposal for distinguishing DIT from NCT has at least one significant benefit: the two types of model potentially generate distinct evolutionary predictions. This is true if simpler forms of imitation are vulnerable to the diffusion problem. Recall that the diffusion problem involves a loss of fidelity in some cultural variant over successive transmission events. Insofar as cultural scaffolding buffers against information loss, one would predict that complex traditions cannot evolve by dual inheritance alone. On Sterelny's account, complex cultural traditions evolve exclusively by a process of cultural niche construction, whereas dual inheritance generates less complex outcomes.

This version of the distinction is tailored to explaining the origin of complex culture in humans. However, it is less clear whether this distinction is suitable for

explaining patterns of variation in complex cultural phenotypes. This point can be framed as a dilemma for anyone who equates cultural niche construction with scaffolding. Suppose, on the one hand, that scaffolding is not necessary for the evolution of complex culture. Some theoretical work suggests, for example, that complex cultural traits can evolve in populations that rely only on simple learning rules alone (Henrich et al. 2008). This is just to say that the diffusion problem might be less significant than some theorists have assumed. In that case, dual inheritance and niche construction models no longer make distinct evolutionary predictions. Cultural scaffolding might facilitate the transmission of some cultural phenotypes and not others, but there would be no principled difference in complexity among the outcomes of these two processes. In which case, the utility of this distinction is seriously compromised. On the other hand, suppose that diffusion is in fact a significant threat to the fidelity of cultural transmission. In this case, all examples of complex cultural evolution would qualify as instances of niche construction because they are scaffolded. If that were true, then the operative distinction loses explanatory value for a different reason. Most of the salient differences among contemporary cultures (e.g. religion, subsistence strategies, normative frameworks, systems of government, technology, etc.) involve complex—i.e. scaffolded—cultural phenotypes. The implication is that dual inheritance theory explains few if any of the differences among contemporary human cultures. Hence, either the diffusion problem is overstated, and scaffolding is not a sufficiently robust causal process to differentiate DIT from NCT; or, diffusion is a serious problem, and DIT does not apply to most of the salient differences among cultures.

These implications would be acceptable were there no alternative way to distinguish these models. However, NCT is a new theory that has been largely motivated by canonical examples from the animal literature. The precise application of this theory to human culture is an ongoing topic for debate. In the remainder of this section I will propose an alternative way to distinguish DIT from NCT. The aim is to identify each model with a type of causal factor that is relevant to explaining cultural differences among contemporary human populations.

As a point of departure, it is helpful to reflect on the sorts of factor that are likely to influence patterns of phenotypic variation among cultures. One plausible candidate is the degree of functional integration among the components of a cultural tradition. Some traditions are highly integrated in the sense that their components work together in the production of a psychological phenotype. The literature on social construction of emotion offers a wealth of examples. For instance, Griffiths and Scarantino (2005) observe that over the course of military training a variety of different ‘emotional technologies’ ensure that soldiers will despise their enemy, exhibit loyalty to their unit, and not succumb to fear in the face of battle. Importantly, this psychological phenotype is reinforced by a broad range of rituals and norms that are embedded in the process of military training. Religions also exhibit a high degree of functional integration. For example, the vaulted ceilings of cathedrals are thought to conspire with the vivid imagery expressed in religious sermons to generate experiences of awe and reverence. We can think of these *cohesive traditions* (for lack of a better term) as the cultural analogues of genes that have redundant phenotypic effects. The removal of one gene does not prevent the

associated phenotype from developing. Likewise, the removal of one routine from a regiment of military training is unlikely to make soldiers less obedient. Importantly, not all cultural variants form cohesive traditions. Some variants are transmitted as fairly autonomous units. An example might be particular lithic technologies. Sterelny argues that the cultural transmission of complex stone tools requires a scaffolding mechanism such as guided learning. It is conceivable that these two components are transmitted as a fairly autonomous unit. One could acquire this skill package without having to embrace an interconnected system of norms and behaviours.

Differences in the degree of functional cohesion among cultural phenotypes should impact the rates at which phenotypes evolve. Functional cohesion is a buffering force against change in psychological phenotypes. One would thus predict that psychological phenotypes evolve more slowly when they are buffered by cohesive traditions than when they are scaffolded by relatively autonomous units. A second prediction concerns their influences on psychological phenotypes. Cohesive traditions consist of multiple reinforcing elements that work together in the production of a particular phenotype. By contrast, autonomous cultural units are more singular in their psychological effects. The removal of an autonomous element can result in the loss of the associated psychological phenotype. By contrast, the removal of a single element from a cohesive tradition is less likely to impact the associated phenotype, because complementary elements contribute to the same phenotypic outcome.

This distinction between cohesive traditions and autonomous cultural units provides an alternative framework for distinguishing NCT from DIT. In canonical examples of niche construction in animals, the epigenetically inherited structure is often highly functionally integrated. This property is perhaps most pronounced in the termite mounds studied by Scott Turner and colleagues (2000). Turner describes how various structural features of the termite nest regulate the moisture content within the colony. In such examples there is no single epigenetically transmitted factor that interacts with a particular phenotypic variable. Rather, there is an integrated system of ecological factors that influence the evolution and development of various aspects of the termite phenotype. Contrast this highly integrated system with the more singular causal relationship described in the evolution of lactose tolerance. In the latter example, a single cultural factor (amount of lactose consumption) coevolves with a particular phenotypic variable (degree of lactose tolerance). Here the epigenetic factor is capable of undergoing independent variation. As noted earlier, some cultures reduce lactose content in their diet by processing dairy products into cheese and yogurt. This small change in practice results in intermediate levels of lactose tolerance. Hence, in this canonical example of dual inheritance it is possible to isolate the relevant cultural factor from other features of the cultural phenotype and identify its particular phenotypic effect.

The final piece of the puzzle is to show how NCT and DIT generate distinct predictions that can be tested using comparative data. The most salient difference between these models is the number of distinct cultural factors that scaffold a particular psychological phenotype. NCT predicts that the reactive psychological phenotype will covary across cultures with a large number of norms and practices

Table 1 Summary of core theoretical commitments for each of the four dominant models of cultural evolution. Each model is associated with a set of comparative predictions describing the patterns of covariation that are predicted in a sample of populations that vary in (1) socioecological context, (2) cultural phenotypes, and (3) composition of psychological phenotypes

Model	Core theoretical commitment	Comparative predictions
Memetic	Cultural phenotypes generate psychological phenotypes independent of effects on biological fitness.	Particular psychological phenotypes should covary with particular cultural phenotypes among populations. Particular psychological phenotypes should vary randomly across socioecological contexts in which they are more or less biologically advantageous. Psychological phenotypes should persist in maladaptive socioecological contexts.
Evolutionary psychology	Recurring socioecological conditions trigger the development of adaptive psychological phenotypes.	Transition to alternate socioecological contexts should be followed by rapid change in psychological phenotype. Particular psychological phenotypes should covary with recurring socioecological contexts in which they are adaptive. Particular psychological phenotypes should vary randomly with respect to particular cultural phenotypes.
Dual inheritance	Autonomous cultural units interact with particular genetic dispositions to generate psychological phenotypes, adapting biological individuals to socioecological contexts.	Small number of cultural factors should covary with particular psychological phenotypes. Small number of cultural factors should covary with particular socioecological contexts.
Cultural niche construction	Cohesive cultural traditions interact with genetic dispositions to generate psychological phenotypes, adapting biological individuals to socioecological contexts.	Large number of cultural factors should covary with particular psychological phenotypes. Large number of cultural factors should covary with particular socioecological contexts. Small amounts of variation in the content of cultural phenotypes should not covary with differences in psychological phenotypes.

that promote aggression and emphasize honour. Likewise, NCT predicts that the passive psychological phenotype will covary with a large number of norms and practices that downplay honour and shun violence. By contrast, DIT predicts that each of these phenotypes will covary with a particular norm or practice. An important challenge in testing these predictions is how to individuate the relevant cultural elements. Nisbett and Cohen provide an illustration of how one might approach this issue. They surveyed both Northerners and Southerners about their attitudes towards (1) the appropriate response to insult, (2) the appropriate response to a physical affront, (3) the appropriate way to socialize children. One could

potentially expand on this methodology by including additional questions to their survey.¹ The more that these individual cultural factors conspire in the buffering of a psychological phenotype, the closer a system comes to satisfying the assumptions of NCT.

Nisbett and Cohen's survey is also instructive for a very different reason. Although they found that Northerners differed predictably from Southerners across all three cultural factors, this cannot be taken to support NCT. The problem is that only two populations were compared. It is impossible to determine from such a sparse dataset whether the three factors form a cohesive tradition. For example, it is impossible rule out the possibility that a single factor (e.g. differences in childhood socialization) is responsible for generating the observed phenotypic differences. In order to discriminate among these hypotheses a much more comprehensive sample is required. In particular, one must compare multiple populations in which there is variation in the particular elements that form a cultural phenotype. One can then begin to isolate those factors and determine whether their phenotypic effects are cohesive or singular. With this proposal on the table it is now possible to distinguish the competing predictions of all four models of cultural evolution (summarized in Table 1). Nisbett and Cohen's findings fail to discriminate among alternative models. However, in the following section I discuss a pilot study that aims to demonstrate how these models could potentially be tested by undertaking a more comprehensive cultural comparison.

Testing competing predictions using the Human Relations Area File

The aim of the discussion so far has been to develop a theoretical framework that allows rival models of cultural evolution to be tested using comparative data. Demonstrating the practical utility of this framework requires showing how it can be applied to an actual cross cultural sample. As it was argued earlier, Nisbett and Cohen's comparison among just two cultures cannot differentiate among competing predictions of rival models. In order to tease apart the relevant causal factors, a sample of cultures should ideally exhibit the following four features.

1. Variation in socioecological context (pastoral vs. horticultural).
2. Variation in psychological phenotype (reactive vs. passive).
3. Variation in content of cultural phenotype (emphasising honour and condoning violence vs. downplaying honour and condemning violence).
4. Variation in number of integrated components among cultural phenotypes (cohesive traditions vs. autonomous elements).

¹ Additional cultural factors that potentially influence the development of a reactive psychological phenotype might be found in the literature on the development of human aggression (e.g. Lemerise and Dodge 2008).

In an effort to compile an adequate data set, a sample of ethnographic excerpts was downloaded from the electronic version of the Human Relations Area File World Cultures (HRAF). This massive database contains over 600,000 pages of materials collected by professional anthropologists from 258 indigenous cultures. The most unique feature of the HRAF is a coding system called the Outline of Cultural Materials (OCM), which identifies some 630 subject areas. These codes have been painstakingly assigned by professional anthropologists, on a paragraph by paragraph basis, to all of the ethnographic materials contained in the HRAF. This is a valuable and underutilized resource for testing hypotheses in cultural evolution. In order to zero-in on excerpts most relevant to the culture of honour hypothesis, I restricted my sample to only cultures that had been HRAF-classified as Pastoralist, Horticulturalist, or Intensive Agriculturalist.² Just 18 OCM categories were deemed relevant to the culture of honour hypothesis (Table 3). This resulted in a more manageable database of 8441 excerpts drawn from 161 sources describing 18 distinct cultures (Table 2). The excerpts were downloaded into a database using Microsoft Access to allow for easy comparison (hereafter the COH Database).

Methods and operational assumptions

The first step was to identify particular OCM categories to serve as proxy variables for the relevant psychological and cultural phenotypes. Of the 18 OCM categories singled out for this study, two were taken to reflect differences in psychological phenotype. The HRAF Guidelines describe the category of Ingroup Antagonisms (OCM 578) as involving, ‘intentional impoliteness, ridicule, insults, vituperation; the prevalence, causes and forms of quarrels,’ as well as ‘Manifestations (e.g.) verbal exchanges, fist fights, duels’ (eHRAF World Cultures). Based on this description, it was assumed that differences in the number of excerpts reporting Ingroup Antagonisms among cultures reflects the extent to which they exhibit a reactive or passive psychological phenotype. Along similar lines, Offenses Against the Person (OCM 683) include, ‘Definitions, incidence of, and sanctions for acts of physical and verbal aggression (e.g., assault, battery, mayhem, slander, libel); penalties for sorcery; etc.’ (eHRAF World Cultures). This category of excerpt can also be taken to reflect a reactive as opposed to a passive psychological phenotype. It was therefore predicted that the frequency of excerpts in these two categories would be greater for Pastoralists than for the other two subsistence categories. This prediction was tested by regressing the proportions of excerpts contained in each OCM category across the three subsistence types. Importantly, some cultures were represented in the COH database by a much larger number of excerpts than others.

² The HRAF identifies nine subsistence categories altogether, three of which were selected for this study: *Pastoralist* cultures are defined as those which depend 56 % or more on herding and animal husbandry; *Horticulturalists* depend 56 % or more on simple agriculture; while *Intensive Agriculturalists* depend 56 % or more on large scale, irrigated agriculture. For current purposes, it was assumed that the pastoralists described in the HRAF approximate, more closely than the other two subsistence groups, the socio-ecological conditions identified by the culture of honour hypothesis, i.e. a herding-based economy autonomous from central authority. Intensive agricultural societies also served as a useful control for testing the evolutionary component, which predicts psychological divergence among pastoral and horticultural environments.

Table 2 Description of excerpts in COH Database

Subsistence type	Culture	Location	# Bibliographic sources	Excerpts
Pastoralists	Chukchee	Siberia	6	164
	Kurds	Kurdistan	9	121
	Bedouin	Libya	12	1118
	Maasai	Kenya/Tanzania	13	293
	Saami	Scandinavia	13	766
Horticulturalists	Alorese	East Indonesia	4	383
	Azande	Central Africa	17	389
	Garifuna	West Africa	13	402
	Garó	India	11	215
	Kogi	Colombia	2	206
	Kuna	Panama	16	714
	Mentawaians	Sumatra	4	131
	Rungus Dusun	Borneo	2	206
Intensive agriculturalists	Amhara	Ethiopia	8	624
	Badaga	Nilgiri, India	2	154
	Dogon	Mali	10	1103
	Ifugao	Philippines	7	656
	Kapauku	New Guinea	2	456
	Lepcha	Bhutan	6	164
	South Toraja	Sulawesi	4	176
Total	18		161	8441

To correct for this bias, the analysis was based on the relative proportions of excerpts contained in each OCM category for each culture. For example, a high proportion of Ingroup Antagonisms implies that a sizable number of all excerpts describing that culture fall into this category.

Identifying useful proxies for differences in the content of cultural phenotypes proved more challenging. Of the 16 remaining OCM categories, most do not single out a particular attitude towards violent aggression. For example, Transmission of Cultural Norms (OCM 867) and Ethics (OCM 577) are just as likely to contain excerpts that endorse aggression as they are to contain excerpts that condemn it. One important exception is the category of Social Control (OCM 626). This category includes excerpts that mention:

Incentives to conformity (e.g., expectation of rewards, reciprocity, fear of social and supernatural sanctions, conscience); means of inducing conformity (e.g., example, precept, praise, rewards, warnings, threats); pressure of public opinion; informal mechanisms of social control (e.g., criticism, ridicule, gossip, cursing, sorcery, intentional silence, ostracism); incidence and effectiveness of such sanctions as compared with the application of physical force; etc. (eHRAF World Cultures)

Based on this description, it was assumed that the proportion of excerpts reporting instances of Social Control reflect the extent to which a population condemns violence as a strategy for resolving disputes. It was therefore predicted that Pastoralists would contain lower frequencies of excerpts mentioning Social Control than Horticulturalists. This prediction was tested using the same procedure that was described above.

The most difficult factor to operationally define is the degree of functional integration among components of a cultural tradition. Earlier, it was proposed in the context of Nisbett and Cohen's work that attitudes toward childhood socialisation are a distinct type of cultural factor from attitudes towards violence in adults. Arguably, these two factors influence psychological phenotypes in different respects. Childhood socialization is thought to structure an individual's psychological phenotype, for example, to become prone to violence or sensitive to insult. Norms encountered in adulthood can either reinforce this training or mitigate its influence. The potential for these two types of cultural factor to vary in content suggests a very basic proxy for comparing the cohesiveness of cultural traditions among cultures. If attitudes towards childhood socialization are consistent with attitudes towards adult violence, this is evidence for a relatively cohesive tradition. By contrast, if just one of these elements is present it can be regarded as a relatively autonomous unit. The most conspicuous OCM category for addressing this issue is Aggression Training (OCM 865), defined as including, 'Adult beliefs, standards, and aims concerning aggression in children and means of controlling it; incidence and treatment of physical aggression (e.g., striking, biting, kicking, hair-pulling); incidence and treatment of verbal aggression...' (eHRAF World Cultures). Notice that this category does not discriminate with respect to content. Hence, in order to analyze this OCM category I reviewed all 199 excerpts labeled as Aggression Training. For each excerpt that mentioned a parental attitude toward aggression in children, it was recorded whether that attitude was (a) tolerant or promoting of aggression, (b) opposed to aggression, or (c) neutral. It was predicted that attitudes would be tolerant or promoting in Pastoral populations, opposing in Horticultural populations, and neutral in Intensive Agricultural societies. In addition, this variable provided a rough basis for discriminating DIT from NCT. Specifically, NCT predicts that attitudes tolerant or promoting of childhood aggression should cluster with low levels of Social Control in populations where Ingroup Antagonisms and Offenses Against the Person are relatively high. At the same time, NCT predicts that attitudes opposing childhood aggression should covary with high levels of Social Control and low levels of the two psychological proxies for psychological aggression. By contrast, DIT predicts no clustering in the two cultural factors. If just one type of cultural factor reliably covaries with proxies for the psychological phenotype, this is evidence for a relatively autonomous unit of influence.

It should be emphasized that this pilot study does not provide a comprehensive test of the four rival models. Rather, it should be regarded primarily as an illustration of how the predictions outlined in the previous section can be operationalised and tested. A more thorough study would identify several quantitative variables for gauging the content of psychological phenotypes. Ideally, these variables would be capable of independent variation, so that one could assess

the extent to which particular norms and attitudes cluster into cohesive traditions. The OCM classification system is a fairly blunt instrument in this respect. However, its value lies in the compilation of ethnographic reports collected independently at various time periods. The fact that excerpts were blindly coded also helps to correct against investigator bias.

Perhaps the most significant limitation of this pilot study is that phylogenetic relationships among cultures were unknown. There is some consolation in the fact that the 18 cultures investigated in this study came from different language groups which, in many cases, are disparately located across the globe (see Table 2). However, it remains possible that some cultural similarities were due to shared ancestry rather than to sociocological context. Results should be interpreted with this possibility in mind.

Results of pilot study

Perhaps the most important finding was that the proportion of excerpts coded as Ingroup Antagonisms were significantly higher among Pastoralists than among non-pastoralists (Kruskal–Wallis $X^2 = 5.9796$, $df = 2$, $p = 0.05$). This is impressive considering that only five Pastoral cultures were represented in the sample, thus reflecting a difference of considerable magnitude. It is also noteworthy that the majority of OCM categories (15 of the 18 examined) showed no significant association with a particular subsistence type. Hence, this association stood out as one of the few salient patterns in the sample (Table 3). Although the proportion of excerpts mentioning Offenses Against the Person was, on average, higher among Pastoralists than the other subsistence categories, this difference was not significant ($p = 0.778$). This lack of significance could be due to the relatively small number of excerpts in this OCM category overall.

A second OCM category that varied with subsistence type was Social Control (Kruskal–Wallis $X^2 = 5.7236$, $df = 2$, $p = 0.057$). Here again the difference was in the predicted direction, with Horticulturalists exhibiting a higher proportion of Social Control excerpts than the other two categories. Earlier, it was suggested that the definition of this category is suggestive of norms that condemn violence. Hence, it was taken to serve as a proxy for extent to which cultural phenotypes vary along this dimension. To verify this assumption, I inspected 90 randomly selected excerpts from the Social Control category of the COH Database. Even in this small sample one finds a distinct pattern. Explicit sanctions against outward aggression are common among Horticulturalists but rare in Pastoral societies. The following examples, drawn from Horticulturalist cultures, offer an instructive glimpse into the cultural phenotype typical of this subsistence category:

Azande (Central Africa): Belief in witchcraft is a valuable corrective to uncharitable impulses, because a show of spleen or meanness or hostility may bring serious consequences in its train. Since Azande do not know who are and who are not witches, they assume that all their neighbours may be witches, and are therefore careful not to offend any of them without good cause. (Seligman 1929, p. 117)

Table 3 Percentages of excerpts falling under each OCM category averaged across cultures within the same subsistence type. Significant differences are indicated with an asterisk “*”

OCM title	OCM #	Subsistence type		
		Pastoral	Horticulture	Intense Ag.
Drives and emotions	152	7.4	6.87	15.08
Personality development	155	1.61	5.99	6.94
Social personality	156	8.59	1.94	5.29
Personality traits	157	4.37	11.03	8.13
Gestures and signs	201	2.64	3.21	2.83
Public opinion	208	0.79	1.12	1.2
Ethics	577	7.63	10.38	9.98
Ingroup antagonisms	578	34.51*	19.18	23.0
Social control	626	3.23	9.05*	3.39
Inter-community relations	628	13.3	10.53	10.59
Offenses against persons	683	4.04	5.49	3.63
Property offenses	685	5.66	7.98	16.16
Social offenses	689	0.82	1.7	1.54
Techniques of socialization	861	3.71	3.77	2.62
Aggression training	865	0.91	5.31	1.28
Independence training	866	0.83	1.28	0.91
Transmission of norms	867	1.08*	3.75	2.47
Transmission of beliefs	869	0.55	1.35	3.66

Garó (India): An individual who habitually fails to co-operate with other villagers becomes an object of derision and his behaviour is openly criticized; but nobody has the authority to inflict punishment for non-compliance. The whole village organization works on the principle of reciprocity. If a villager does not co-operate in the construction of the house of a fellow villager, he cannot expect that other villagers would co-operate with him when his own house is being built. (Goswami and Majumdar 1968, p. 67)

Kuna (Panama): It is important to note that physical violence is avoided among the Kuna; there are very strong sanctions against it. Parents do not spank their children. Physical fighting is very rare and always becomes the subject of an evening discussion in the ‘gathering house,’ in which the protagonists are severely reprimanded and fined. (Sherzer 1983, p. 201)

Garifuna (West Africa): Since open aggression is not sanctioned in the social group at large, the weapon of ridicule in the form of derisive songs,

nicknames, and malicious gossip, is often resorted to. (Galvão and Coelho 1955, p. 68)

Somewhat surprisingly, there was a significant interaction among subsistence type and the OCM category labeled Transmission of Social Norms. Pastoralists contained a higher proportion of these excerpts than the other two subsistence types. However, this again might be an artefact due to the small number of excerpts in this category.

My final analysis involved a review of the excerpts falling under Aggression Training. It should be noted that only a small subset of excerpts (just 95 of the 199) clearly expressed parental attitudes towards aggression. Unfortunately, these excerpts did not contain a sufficient number of cultures from each subsistence category to allow for statistical comparison. On the whole, evidence of pro-aggression parenting norms was found in three out of the five Pastoral societies. By contrast, no pro-aggression norms were identified in Horticultural societies. Pro-aggression norms were only mentioned in two other cultures, both of them Intensive Agriculturalists. Although there were only three Horticultural populations represented in this subsample, they collectively accounted for over 50 % of all excerpts mentioning anti-aggression parenting norms. These findings, though inconclusive, are consistent with the predicted pattern of variation among parental attitudes and subsistence categories.

There was only one culture that diverged from this pattern. The Saami (a Pastoral culture) contained several excerpts mentioning anti-aggression parenting norms. For example, according to Pelto's ethnography of the Saami, 'fairly strict measures, including spanking, are used to teach children that they should not fight' (1962, p. 384). This is in contrast to relatively high rates of Ingroup Antagonism in this population. It should be noted that these reports come from a single source. However, this is not the only example of a pastoral culture exhibiting high rates of violence despite reports of norms that condemn aggression (Moritz, 2008). Such observations have led some anthropologists to suggest that aggressive psychological phenotypes can be generated simply by engaging in the practice of animal husbandry. As Lott and Hart (1977) hypothesize, "If a herdsman has the personality needed to display sufficient aggression to maintain his position as dominant over all cattle in his herd, we might expect that his interactions with people would also involve assertive and aggressive behaviour" (1977, p. 177). This hypothesis identifies an additional factor, independent of aggression norms and parenting styles, that potentially reinforces a reactive psychological phenotype in pastoralists. If correct, this hypothesis suggests that reactive psychological phenotypes are scaffolded by a variety of different components of a pastoral lifestyle.

This suggestion brings us to the final question of whether the cultural phenotypes associated with Pastoral or Horticultural populations tend to form cohesive traditions. It was predicted that covariation among parental attitudes and Social Control would be the kind of pattern one might expect according to NCT. Unfortunately, there were too few excerpts in the Aggression Training category to test for a statistical association. However, the available evidence points towards cohesive traditions. For example, excerpts for the Chuckchee and the Maasai (both

Pastoralists) describe the encouragement of aggression in children. Young men in both cultures were reported to undertake forms of ‘battle training’ involving mock property raids that occasionally become violent. This is a remarkable point of convergence among such distantly related Pastoral cultures. At the same time, both the Chuckchee and the Maasai exhibit some of the lowest proportions of excerpts mentioning Social Control (just 1.8 and 4.78 % respectively). By comparison, proportions of Social Control excerpts were characteristically high among Horticulturalists (Azande = 12.1 %, Garo = 7 %, Kuna = 17.8 %, Garifuna = 19.65 %). This pattern suggests that norms condemning violence are least frequent in cultures where pro-aggression parental practices are most likely to be found.

Conclusion: an argument for niche construction

Results of the pilot study suggest that the reactive psychological phenotype documented by Nisbett and Cohen in the American South emerges as a general pattern across pastoral environments. Which model of cultural evolution best explains this pattern? A memetic model can be ruled out on the grounds that it predicts random covariation among psychological phenotypes and socioecological contexts. Indeed, the tendency for the reactive psychological phenotype to be most prevalent across geographically isolated pastoral communities, but comparatively absent from horticultural contexts, suggests that it originates and is maintained by selection on biological individuals.

The observed pattern of covariation among psychological phenotypes and socioecological contexts is consistent with an EP model. This model proposes that the relevant phenotypes are developmentally triggered by the socioecological conditions in which they are biologically advantageous. As it was argued earlier, a compelling test of this hypothesis would involve a comparison of populations in which pastoral and horticultural practices have been recently adopted. Unfortunately this type of information was unavailable in the HRAF. However, other considerations suggest against the plausibility of EP. First, Nisbett and Cohen describe a number of different social norms and parental practices that distinguish Northerners from Southerners. The current pilot study likewise found that norms condemning violence are most common in horticultural contexts. On an EP model these norms are thought to be expressions of an evoked culture, having no impact on psychological phenotype. This assumption conflicts with a considerable body of psychological literature describing how different cultural practices generate distinct psychological outcomes (discussed in Linqvist 2007). Nor, as Sterelny has argued, is an EP model required to explain the fidelity of psychological phenotypes. The more evidence one finds for the cultural scaffolding of psychological phenotypes, the less compelling an EP model becomes. Finally, in the pilot study, comparisons of parental attitudes towards aggression did not support an EP model. Recall that EP views these as the expressions of an evoked culture. In which case, pro-aggression parental norms should be universal across pastoral contexts. On the contrary, one pastoral culture in the COH sample (the Saami) seemed to embrace anti-aggression

parenting norms. At the same time, pro aggression norms appeared in two industrial agricultural societies. Not only does this pattern conflict with the predictions of EP, it further suggests that parenting norms are socially transmitted rather than evoked. Hence, the fact that pro-aggression parenting norms were found in some pastoral cultures, but absent entirely from horticultural cultures where parental attitudes tended to be anti-aggression, suggests that they play a functional role in shaping psychological phenotypes.

Anthropological reports of Social Control describe social norms condemning violence. These were most prominent among Horticultural societies and uncommon among Pastoralists. This could be taken as evidence for DIT. However, it is noteworthy that a closer inspection of the specific content of these norms revealed a diversity of strategies for dampening violence. Some horticulturalists develop myths about witchcraft. Others adopt systems of public ridicule. And so on. It was argued earlier that DI models tend to identify a relatively autonomous cultural factor that covaries with the focal phenotype. On the contrary, social mechanisms for condemning violence among horticultural communities take a diversity of forms. There was also suggestive evidence that these norms cluster with similar parental attitudes towards aggression. Together, these two types of ecological factor would appear to conjointly shape psychological phenotypes. It was also argued that this pattern is best interpreted as a case of NCT. However, further investigation of the degree of clustering among cultural factors is an obvious avenue for future research.

Perhaps the most surprising result to come out of this study was that the Saami (a Pastoral cultural) seem to condemn aggression in children. Despite this, they exhibit high rates of Ingroup Antagonism and low levels of Social Control, as is typical of Pastoral societies. This observation is consistent with other anthropological reports of pastoral societies with high rates of aggression, while at the same time expressing certain attitudes against violence. Such examples suggest that pastoral societies contain a variety of compensatory norms and practices that work together in shaping the reactive psychological phenotype. Modifications to particular elements of this otherwise cohesive system tend not to disrupt the associated phenotype. As it was argued earlier, this pattern conforms with the predictions of NCT.

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