

Adaptationism, culture and the malleability of human nature

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A traditional family of explanations in anthropology and the social sciences explains people's behavior in terms of culture. For example, if you want to know why women in group A choose mates with this type of characteristic feature, while women in group B choose mates with that type of characteristic feature, the answer is that people *socially learn* their patterns of mate choice from others in their group, and these two groups simply differ in what patterns of mate choice are conveyed during this social learning process. We can call this family of explanations *culturist explanations*.

In the last three decades, another kind of explanation has loomed large in the behavioral sciences, so-called *adaptationist explanations*. According to at least one important variant of this family of explanations, people's behavior is to be explained in terms of the fact that it is the product of a rich suite of psychological mechanisms. These mechanisms, in turn, were shaped by natural selection to solve the recurrent adaptive problems faced by humans in ancestral environments.

What is the relationship between adaptationist and culturist explanations? One view, perhaps a fairly common view, is that these two kinds of explanations compete. It is sometimes thought that if an adaptationist explanation of some behavioral phenomenon is true, then this fact shows a culturist explanation of that very same phenomenon is false, or else the adaptationist explanation pre-empts, or crowds out the culturist explanation in some way. I'll call this the *competition* thesis. Something like the competition thesis

appears to have motivated some of the more rancorous exchanges between adaptationists and culturists in the last few decades.

However, there is in fact a quite natural way of reconciling adaptationist and culturist explanations. Kim Sterelny and Paul Griffiths suggest the basic outline for how this reconciliation strategy works:

If an evolutionary explanation of, say, mate choice or the distribution of resources to children really does displace one from the social sciences, then the social sciences are indeed threatened with pre-emption. However, we have our doubts about the contrast, on which the debate depends, between biologically and socially produced traits... One of the founders of the evolutionary analysis of behavior, Niko Tinbergen, distinguished four explanatory projects: (1) the evolutionary history of a behavior; (2) the current use of the behavior in the life of the organism; (3) the development of the behavior over the life of the organism; and (4) the psychological and other mechanisms used in the control of the behavior (Tinbergen 1963). Given Tinbergen's distinctions, it's quite plausible to suppose that evolutionary theorists and social scientists may be engaged in different explanatory projects (Sterelny and Griffiths 2000, 19).

Let us explore Sterelny and Griffiths' suggestion in more detail. Suppose that it was a recurrent feature of ancestral environments that *social learning*, i.e. adopting the beliefs, practices, etc.. of others within one's cultural milieu, was in one's best evolutionary interest. Then adaptationist reasoning predicts that people would have evolved mechanisms that dispose them to engage in social learning. In this case, there is a *division of labor* between adaptationist and culturist explanations. The two kinds of explanations don't compete, and indeed actually complement each other, because, in light of Tinbergen's distinctions noted above, they are embedded within different explanatory projects. A culturist explanation appeals to the proximal mechanisms that underwrite social learning (project four). An adaptationist explanation appeals to the evolutionary rationale for why these social learning mechanisms evolved (project one).

The core idea of the preceding reconciliation strategy relies on the idea that the mechanisms that underwrite social learning can themselves be explained in adaptationist terms. There are, however, two quite distinct ways of understanding adaptive logic of social learning. One way of understanding it is in terms of the *Information Learning Model*. This model has been discussed by a number of prominent evolutionary-minded biologists and psychologists (Cavalli-Sforza and Feldman 1981; Tooby and Devore 1987), but it has been most extensively developed by Robert Boyd, Peter Richerson and their colleagues (Boyd and Richerson 1985). The basic idea of the Information Learning Model is that social learning is adaptive because other individuals in one's group are likely to have valuable information, knowledge, skills etc.. that are well worth acquiring. For example, people in simple societies face the challenges of extracting food, water and shelter from a highly variable world. Other individuals in one's group may possess information about matters central to these challenges, such as information regarding where to hunt, what kinds of food to eat or how to make a kayak. According to the Information Learning Model, because social learning provides access to an extraordinarily useful storehouse of adaptive information, natural selection builds dispositions to engage in social learning as parts of human psychology.

There are some domains, however, in which the Information Learning Model seems to provide a poor account of the adaptive rationale of social learning. For example, people socially learn the *values and conventions* of their group, including the group's traditional language, moral norms, aesthetic standards, religious practices and other kinds of values and conventions. It seems implausible that social learning in these domains is to be understood in terms of the Information Learning Model, i.e. in terms of

the fact that these values and conventions embody information about how it's adaptive to behave. In this paper, I'll suggest an alternative model for understanding the adaptive rationale for social learning in the domain of values and conventions. I call the model the Strategic Learning Model. The basic idea of the Strategic Learning Model is that it's often adaptive to adopt the prevailing practices of the group because the very fact that others engage in these practices makes it the case that doing what they do will be in one's long-term selfish reproductive interests. For example, suppose the prevailing language practice of the group is Esperanto, then it will be in one's own long-term interest to adopt this practice as well.

Overall, the Strategic Learning Model hasn't been carefully distinguished from the Information Learning Model nor has it been developed very extensively. So one goal of this paper is to distinguish these two models and to develop the Strategic Learning Model in more detail. A second goal of the paper is to demonstrate the importance of the Strategic Learning Model. Adaptationist theories (in particular, *sociobiological* theories) typically encounter their most strident opposition from culturist critics when these theories are directed at, or have implications for, the highly controversial and emotionally charged domain of *values*. For example, E. O. Wilson, David Barash and other sociobiologists have advanced adaptationist explanations of sex roles, aggression, xenophobia, rape, the abuse of step children and many other features of human social life that are closely connected with deeply held values and normative social rules (Wilson 1975; Barash 1979; see Kitcher 1985). These theorists have sometimes suggested that there are limits to our ability to change or reform these features of social life, that is, there are limits to the *malleability of human nature*. I'll argue that at least some of these

claims are founded on a picture of human nature that is importantly false. The Strategic Learning Model, I'll maintain, suggests that there are good reasons, indeed good *adaptationist* reasons, for believing that human nature is malleable in ways that adaptationist theorizing has typically not recognized.

This paper is divided into five parts. In Part I, I'll provide a brief account of how I will interpret the notions of *culture*, *social learning*, and *social learning mechanisms*. In part II, I'll review the Information Learning Model, focusing on the way the model has been developed by Boyd and Richerson and their colleagues. In part III, I'll set out the basic structure of the Strategic Learning Model and apply the model to several human social domains. In part IV, I'll carefully distinguish the Information Learning Model from the Strategic Learning Model. In part V, I'll discuss how these two models illuminate the contentious issue of the malleability of human nature.

Part I: Culture, social learning and social learning mechanisms

In this part of the paper, I'll offer a quick account of how I'll interpret the notions of *culture*, *social learning*, and *social learning mechanisms*. I'll begin with culture. I follow a large number of theorists in adopting an *ideational* approach to culture: Culture is the body of information residing in the minds of people that was acquired by social learning (Durham 1992; Boyd and Richerson 1985). *Social learning*, in turn, is a learning process in which a mental state in one person causally contributes to the formation of a mental state in another person, where the latter mental state resembles the former (Boyd and Richerson 1985; Sperber 1996).¹ Two paradigmatic examples of

¹ There are a number of ways in which the notion of resemblance can be formalized and made more precise. For the purposes of this paper, an intuitive notion of resemblance will suffice.

social learning processes are *teaching* and *imitation*. Social learning is important because it can lead to the transmission of information such as beliefs, values and skills between individuals and across generations.

A *social learning mechanism* is an innate psychological mechanism that facilitates, or otherwise increases the likelihood that a person will engage in social learning (relative to the case where the mechanism is absent). Social learning mechanisms may take a number of different forms. For example, a social learning mechanism might be quite simple – consisting of little more than an innate desire to imitate the practices of one’s peers. Alternatively, a social learning mechanism might be quite complex. For example, the mechanism might be associated with a body of domain-specific information, or it might be associated with other kinds of specialized processes (see Shettleworth 2000).

Any social learning mechanism will inevitably be *constrained* in various ways. For example, constraints or biases may channel the mechanism in certain directions and/or rule out certain other possibilities. It’s important to recognize that the existence of constraints and biases of this sort does not disqualify a mechanism from counting as a social learning mechanism. Indeed, *any* learning process must be constrained or biased in at least some ways, since the idea of unconstrained learning is logically incoherent (see Wexler and Culicover 1980). So long as the space of options that can be acquired by a learning mechanism is reasonably large, and *the contents of the local culture determine which member of the space of options is realized*, the mechanism ought to legitimately count as a social learning mechanism.

To repeat, social learning mechanisms are important because they forge a connection between adaptationist and culturist patterns of explanation. Adaptationist reasoning can help us understand why various social learning mechanisms evolved. The existence of these social learning mechanisms, in turn, vindicates the role of culture in explaining people's behavior. In the next two parts of the paper, I'll identify two very different pathways by which natural selection builds social learning mechanisms into human psychology.

Part II: The Information Learning Model

In this part of the paper, I'll very briefly set out the Information Learning Model, which describes one kind of evolutionary scenario by which natural selection builds social learning mechanisms into human psychology. The model has been carefully developed by others, in particular Boyd and Richerson and their colleagues, so I'll offer just a quick sketch of the view.

The core idea of Information Learning Model is that since others in one's social milieu often possess highly adaptive information, natural selection builds various social learning mechanisms into human psychology in order to facilitate easy access to this useful information. Culture may come to contain adaptive information for two interrelated reasons. The first is that others in the group may acquire some novel piece of knowledge or some useful skill by means of *individual learning*. Individual learning refers to a cluster of process by which people acquire and modify beliefs and skills by interacting with, and getting feedback from, the (non-social) environment. Examples of individual learning processes include classical conditioning, trial and error instrumental learning and various forms of inductive learning. If a person uses individual learning to

acquire some piece of knowledge or some useful skill, then this valuable information can, in turn, be cheaply acquired by others via social learning (Boyd and Richerson 1995).

The second reason that culture tends to contain adaptive information, which builds on the first reason, is that culture has the properties of an *inheritance system*, and change in the cultural system is *cumulative*. The cultural inheritance system can best be explained by analogy with the more familiar genetic inheritance system. In the genetic inheritance system, there is a statistically defined pattern of resemblance between biological parents and children – for example, on average, taller parents have taller children and shorter parents have shorter children – and parents causally contribute to this resemblance by means of well-known genetic mechanisms.

The case of culture is formally analogous to the genetic case. In the social learning process, a mental state of a *cultural parent* causally facilitates the formation of a type-similar mental state in a *cultural child*. As a result, there is a statistically defined pattern of resemblance between cultural parents and children. For example, many of the beliefs, skills and practices of Kung San! children resemble those of their Kung San! parents, and this pattern of resemblance obtains because of social learning. Thus, culture can be viewed as an inheritance system, with social learning providing the mechanism of inheritance.²

A unique feature of cultural inheritance system that distinguishes it from genetic inheritance system is that in the cultural system, novel cultural variants can emerge by a *directed* process. A person can design a novel cultural variant whose cultural fitness is

² It is important to keep in mind that “cultural parents” need not be biological related to (nor older than) their “cultural children.” Moreover, with respect to a given trait, a cultural child may have one, several or many cultural parents.

better than one would expect were that variant generated by chance.³ Furthermore, these novel variants are heritable in that they can be transmitted by social learning. Many functionally complex and enormously sophisticated cultural variants, for example, the technologies of kayak building and watch-making (two favorite Boyd and Richerson examples), emerged by a process in which human designers made incremental design changes and these changes accumulated over extended stretches of time. The cumulative and directed nature of the cultural inheritance system makes it an enormously powerful tool for generating innovations that have enabled humans to adapt to a wider variety of environments than any other animal species.

Consider, for example, the Copper Inuit (another favorite Boyd and Richerson example) who inhabit the coastline of Canada's Coronation Gulf. The Copper exhibit a remarkable array of culturally-learned practices and skills related to matters such as fur-harvesting, igloo-making, seal-hunting and kayak-building (see Jeness 1970). These practices and skills are enormously sophisticated, and have enabled the Copper to survive in conditions highly unfavorable for human life. Suppose a typical Western city-dweller were transplanted into the environment faced by the Copper. Were she to try to use individual learning to acquire the skills and techniques of daily living, she would no doubt quickly perish. There is, perhaps, just one way that she might survive and that is by *adopting the practices of the Copper*. This example illustrates, quite dramatically, why it's adaptive to acquire information from culture.

The preceding intuitive argument for why it's adaptive to engage in social learning is backed up by mathematical modeling. Boyd and Richerson and their

³ Analogous to genetic fitness, the *cultural* fitness of a cultural variant is the variant's chances of surviving and being socially transmitted.

colleagues have shown that given certain plausible assumptions, for example that environments vary (but don't vary too much), and that individual learning is costly and not too accurate, natural selection favors the evolution of social learning mechanisms that dispose an individual to acquire information from culture (Boyd and Richerson 1985; Henrich and Boyd 1998).

Let me now summarize the core features of the **Information Learning Model**:

1. Other individuals in one's group reliably possess adaptive information
2. Acquiring this information via social learning tends to be in one's selfish evolutionary interest.
3. For this reason, natural selection builds various social learning mechanisms into human psychology that allow a person to rapidly and reliably acquire information from others.

The Information Learning Model is one pathway by which natural selection builds social learning mechanisms as parts of human psychology. In the following section, I look at another model of the adaptive logic of social learning that is quite distinct from the Information Learning Model and has been much less well explored.

Part III: The Strategic Learning Model

I'll introduce the Strategic Learning Model by means of an example. Imagine a child will be born into some human society, perhaps Navajo, Kung San!, Copper Inuit, Malaysian Semai, or some other society, and once that child is born, you are responsible for choosing what language would be optimal for the child in terms of maximizing the child's long-term selfish advantage. How would you make this decision? One way to approach this decision is to focus on the *intrinsic* features of a language that make the language useful or practical. For example some languages may be more expressive in terms of range of vocabulary, others may have more regular sentence structure and still others

may be easier to learn, and so on for a wide range of attributes that a language may possess. In deciding what language would be best for the child to speak, perhaps you could look through a catalog of the various languages spoken across the world and assign to the child the language that finishes first in terms of having the optimal overall profile of attributes such as these.

A problem with the preceding approach to assigning a language to the child is that in focusing on the intrinsic features of a language, this approach fails to recognize that a fundamental purpose of language is *communication*. Because communication requires proper coordination between speaker and hearer, the question of which language is optimal for the child to speak will be heavily determined by the social milieu in which the child finds herself. While the intrinsic features of a language like ease of learning and regularity of sentence structure, etc., certainly do matter, the importance of these features is typically dwarfed by the need to properly match one's language with the language spoken in one's community. So in assigning a language to the child, the most effective decision rule will typically be quite simple: The child should speak the language that happens to prevail in her local community, *whatever that language may be*.

We can formalize the preceding intuitions by recognizing that problem of linguistic communication has the underlying structure of what game theorists call a *coordination problem*. The hallmark of a coordination problem is that there are a range of available strategies available to some group of agents, and so long as the others adopt one of these strategies, then each agent is best off adopting this strategy as well. In other words, the intrinsic merits of the individual strategies are not terribly important; what

makes a strategy best in terms of maximizing one's selfish interests is the fact that the strategy is *shared*.

Coordination games are paradigm examples of strategic situations that have multiple stable solutions. For example, if others in one's community are speaking Swahili, then each person is better off speaking Swahili as well. If others are speaking Navajo, then each person in that community is best off speaking Navajo, and so on for the any of the roughly 6,000 extant human languages. We can call situations like these MESS's, Multiple Equilibria Strategic Situations. Language is just one instance of a MESS but there are many others as well, several of which I'll be discussing in the next sections of the paper. For the present time, the point I want to emphasize is that MESS's provide the basis for another model that explains the adaptive value of social learning that is quite distinct from the Information Learning Model.

According to this so-called Strategic Learning Model, certain social domains are "MESSy", i.e. they allow for multiple stable patterns of behavior. Language is one example. The problem of linguistic communication can be solved by implementing any one from a large number of possible languages, and given that one of these languages prevails in a community, this pattern of behavior will tend to be stable since no person has any incentive to deviate from this language. MESSy social domains are a fertile source for the emergence of between-group diversity because when multiple different solutions are available for solving strategic problems, inevitably groups can (and do) reach different solutions to these problems. In the context of MESS-associated between-group diversity, social learning is favored over hard-wired innate phenotypes because individuals must be prepared to adopt whichever variant happens to prevail in their own

local cultural milieu. For example, as I noted earlier, the best language to speak is the language that is spoken in one's local community, more or less *whatever language that may be*. The core idea of the Strategic Learning Model is that since in the context of a MESS, each person is better off adopting the practice of the local group, the long-enduring presence of MESS's can lead to the emergence of innate social learning mechanisms that dispose an individual to rapidly and automatically identify and adopt local cultural practices.

Overall, the Strategic Learning Model resembles the Information Learning Model in that it proposes that natural selection favors the evolution of innate social learning mechanisms as part of universal human psychology. However, the two models differ in that they propose a quite distinct route by which social learning mechanisms are evolutionarily favored. In the following sections, I'll illustrate the Strategic Learning Model by considering several human social domains to which the model plausibly applies.

3.2 Moral Norms

Moral norms are rules universally present in human groups and they regulate a wide variety of social domains. A characteristic feature of moral norms is that they are enforced by *informal punishment*. For example, those that violate moral norms may be criticized, condemned, avoided, ostracized, or they may even be hit or directly harmed in others ways (Sober and Wilson 1998, Boehm 1999). There are now a number of game-theoretic models that show that if most people in a population comply with moral norms and punish those who violate them (and punishment is itself stabilized by some mechanism), then the system will be stable over time. In particular, the system will be at

an *equilibrium* in the sense that given that others comply with norms and punish norm violators, it will be in each person's long-term selfish interests to do the same (Axelrod 1986; Rasmussen and Hirshliefer 1987; Boyd and Richerson 1992).

Interestingly, when punishment is used to sustain compliance with moral rules, a wide variety of rules can be stabilized. This point is emphasized in an important article by Boyd and Richerson, provocatively titled "Punishment can stabilize cooperation (or anything else) in sizable groups" (Boyd and Richerson 1992; see also Sripada 2005). Boyd and Richerson show that given that the group punishes violations of a rule, it is in one's own interest to comply with the rule, more or less *regardless* of the content of the rule. Thus moral systems, i.e. systems of moral norms sustained by punishment, are an example of a MESS. In fact, they are an example of a MESS, *par excellence*, since just about *any pattern of behavior* can be potentially stabilized in such systems.

Moral systems generate powerful pressures for individuals to socially learn the prevailing patterns of behavior of the group. If a person is out of step with the moral rules of the group, the person may pay a very high price in terms of punishment. Much as in the case of language, where there is powerful pressure to speak the same language of one's group (regardless of the language) or else suffer linguistic isolation, there is powerful pressure as well to conform to the moral code of one's group (regardless of the code) or else suffer punishment at the hands of the group. Furthermore, it's quite plausible that long-enduring pressures for social learning in the moral domain would have favored the evolution of specific psychological mechanisms for the acquisition of moral norms. Elsewhere, Steve Stich and I have assembled various lines of evidence that supports this claim (Sripada and Stich forthcoming).

A key piece of evidence in favor of this view is the highly unusual pattern of universality and variability associated with moral norms. Moral norms are associated with a characteristic motivational syndrome, involving both motivations to comply with moral norms and motivations to punish norm violations. This syndrome is importantly linked to the emotions, including, anger, disgust and contempt (when the violator is a third-party); and shame and guilt (when the violator is the subject) (Haidt 1999). Though the preceding features of moral norms are universal, the *contents* of moral norms vary significantly from group to group (Westermarck 1937, Sober and Wilson 1998; Sripada and Stich forthcoming). We argued that the most plausible explanation for this pattern of universality and variability is that there is a specialized innate mechanism that flexibly internalizes the moral norms of the group. This mechanism is designed to automatically generate the characteristic motivational syndrome associated with moral norms, thus explaining how the universal motivational syndrome associated with moral norms can be elicited by different rules in different groups.

The Strategic Learning Model makes a key prediction that we should find the following three features clustered together: (1) MESS's; (2) Between-group diversity; and (3) Social learning mechanisms that dispose an individual to rapidly and automatically adopt the practices of the local group. I believe that the elements of this triad do in fact co-occur in the case of moral norms. Moral norms are associated with a punishment-based MESS. Moral norms do in fact exhibit substantial between-group diversity. And moral norms are plausibly associated with innate social learning mechanisms that dispose individuals to internalize the moral norms of the local culture.

So moral norms are one domain in which the predications of the Strategic Learning Model appear to be vindicated.

3.3 Costly signaling-associated domains

Are there other social domains to which the Strategic Learning Model applies? Recall the Strategic Learning Model applies in domains in which there is *MESS-associated between-group diversity*. So in seeking out other social domains for which the Strategic Learning Model might apply, we should pay close attention to social domains that instantiate MESS's. Like coordination games, which were discussed earlier in the context of human languages, and punishment-based games, which were discussed in the context of moral norms, so-called *costly signaling games* are another important category of games that have the potential to generate MESS's.

In a costly signaling game, an individual produces a *costly* display that serves to indicate some underlying talent or attribute of the individual. The costliness of the signal is crucial for maintaining the signal's "honesty", since only an individual that in fact possesses the relevant underlying talent or attribute can afford to produce a costly display (see Zahavi and Zahavi 1997). The peacock's richly colored and intricately patterned plumage is a classic example of a costly signal – the plumage serves to signal the underlying fitness of the peacock to peahens. An expensive engagement ring is another plausible example of a costly signal, in this case a costly signal of one's disposition to commit to the marital relationship.

Costly signaling games can support multiple stable patterns of behavior, i.e. they can generate a MESS. The reason is that so long as a signal is costly, and thus a reliable sign of the underlying attribute it is intended to indicate, the signal can take a wide

variety of forms. That is, the signal can be quite *arbitrary*, so-long as production of the signal and the standards for recognizing or appreciating the signal are *shared* throughout the population. The potential arbitrariness of costly signaling displays is widely accepted by biologists and well evidenced in the animal world. For example, in addition to the peacock, many other species display “ornaments” that serve as costly signals of an organism’s fitness to members of the opposite sex. These ornaments are often highly baroque and highly differentiated, even among closely related species. There are over half-million species of beetle, and no two have the same sexual ornaments. There are over a dozen species of bowerbird, and no two construct the same style of courtship nest. These examples, and many others, illustrate the immense diversifying potential of costly signaling displays (Miller 2000; see also Andersson 1994).

Recently, a number of theorists have proposed that costly signaling plays an important role in many human social domains. In what follows, I’ll discuss several of these proposals (see also Zahavi and Zahavi 1997). It’s worth emphasizing that the proposals I’ll be discussing are somewhat speculative – while there is some evidence for these proposals, the evidence is far from conclusive. In discussing the following proposals, my goal is to explore *potential* further applications of the Strategic Learning Model, and I don’t mean to suggest that any of the following proposals are definitively corroborated.

William Irons has argued that *ritualistic religious rules* serve as costly signals of one’s dispositions to commit to the religious group (Irons 2001). Irons cites his experiences among Muslim Yomut Turkmen, who circumcise all males, pray five times a day to Mecca, fast one month a year, sacrifice animals and engage in an number of other

seemingly arbitrary and burdensome practices. According to Irons, burdensome practices such as these serve to distinguish those truly committed to long-term membership in the religious group from those interested in exploiting the group for short-term gains, since only the former would want to bear the costs of participating in the burdensome practices of the group (see also Iannaccone 1992, 1994).

Geoffrey Miller has argued that costly signaling plays at least part of the explanation of the function of seemingly wasteful and ostentatious *artistic displays* (Miller 2000). Artistic displays can be divided into two main types – *body ornamentation*, including tattooing, body modification, make-up, and fashion, and *public art*, including paintings, artifacts, poetry, oration and humor. According to Miller, artistic displays function as costly signals in that they require years of effort to perfect and maintain, and only artists with robust underlying talents and good fitness reserves can afford to produce these displays.

A number of theorists have argued that costly-signaling plays a role in so-called *generosity norms*, such as norms that govern the hunting of large game, provisioning of feasts, giving of gifts and other practices that appear both altruistic and ostentatious. For example, among the Meriam of Melanesia, several years after a death occurs, the family of the deceased is expected to put on a lavish feast and erect an expensive, permanent tombstone. A particularly prized dish at the feast is turtle meat. Turtle hunting is dangerous, time consuming and demands great physical strength and dexterity. Yet families reliably provide significant quantities of turtle meat for the feast. This is despite the fact that providing turtle meat isn't enforced by punishment (as in the case of behaviors enforced as moral norms), and those who receive turtle meat aren't expected to

reciprocate. According to one theory, a family that provisions a large quantity of turtle meat is repaid in the currency of “status”. The display of a large quantity of turtle meat sends a costly signal that the males in the family are of high quality, since only a family with high-quality males could bear the costs of obtaining a significant amount of turtle meat (Smith and Bird 2000, see also Hawkes and Bird 2002).

Ritualistic religious rules, artistic displays and generosity norms are plausibly associated with costly signaling-based MESS’s. In addition, there is solid evidence that all three domains are also associated with substantial *between-group diversity*. For example, Irons notes that while the presence of ritualistic religious rules appears to be universal in all human groups, the contents of these rules differ significantly from group to group (Irons 2001). Similarly, Miller notes that while dispositions to produce and appreciate art are a human universal, the particular aesthetic standards that govern the production and appreciation of art differ from group to group (Miller 2000). In the case of generosity norms, too, there is good evidence for a similar pattern in which the presence of generosity norms is universal while the particular content of these norms is variable (Hawkes and Bird 2002; Boone 1998; Sosis 2000; Smith and Bird 2000).

Since ritualistic religious rules, aesthetic standards and generosity norms each appears to exhibit MESS-associated between-group diversity, is the third member of the Strategic Learning Triad present as well? That is, are there specific innate social learning mechanisms associated with these domains? While I am not aware of any empirical evidence that *directly* addresses this question, I believe the hypothesis that there are innate social learning mechanisms associated with these domains is nonetheless quite plausible. In particular, it’s likely that people are disposed to readily *internalize* the

ritualistic religious rules, aesthetic standards and generosity norms of the local group. Thus, much as in the case of moral norms, there is good reason to believe that ritualistic religious rules, aesthetic standards and generosity norms also exhibit the Strategic Learning Triad.

3.4 Language

Language is another domain that appears to exhibit the Strategic Learning Triad. As I noted earlier, linguistic communication is a coordination problem with multiple stable solutions, i.e. it is a MESS. The various languages of the world can be seen as distinct solutions to this coordination problem. Since there is MESS-associated between-group diversity in the domain of language, is the third member of the triad present as well, i.e. is there an innate social learning mechanism associated with language acquisition? I believe that there is evidence that there is.

Many theorists have argued that humans possess an innate *language acquisition device* (Chomsky 1965; Pinker 1994). At least some of these theorists have also argued that it is the evolved function of this language acquisition device to ensure that the child internalizes the language of the local culture (Pinker and Bloom 1990; Pinker 1994; Deacon 1997). The language acquisition device is, of course, also thought to be associated with powerful innate constraints and biases that sharply restrict the range of permissible linguistic variation. In particular, many theorists believe that the core syntactic rules of language are associated with various innate *parameters*, where each parameter can be set in just a few (typically two) ways (Chomsky 1988).

Given that there are powerful innate constraints and biases that operate in language acquisition, it might seem odd to suggest that the language acquisition device is

a *social learning mechanism*. However, as I noted earlier, the existence of innate constraints and biases does not preclude a mechanism from counting as a social learning mechanism. In the case of language, we should focus instead on the fact that the various parameters associated with the core syntactic rules do permit a fair degree of linguistic variation. There are over 6,000 extant languages, and presumably many more are at least biologically possible (Baker 2001). Furthermore, innate constraints and biases are most restrictive with respect to the core syntactic rules. Other parts of language learning, such as lexical learning, are far less restricted. Overall, the language acquisition device does in fact permit a range of linguistic options, where the range is reasonably large, and *culture determines which linguistic option is realized*. Thus the language acquisition device should be seen as social learning mechanism, albeit an importantly constrained one.

The subject of the evolution of language is enormously complex and contentious. I believe that there are various kinds of evidence that support the hypothesis that the Strategic Learning Model tells at least part of the story for how the language acquisition device evolved, and why it permits an extensive range of linguistic variation. However, a full defense of this claim would take us far afield, and so I leave the details of this story for another day.

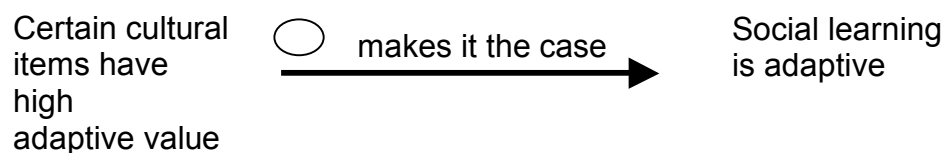
Part IV: Information Learning versus Strategic Learning

The Information Learning Model and the Strategic Learning Model are both pathways by which natural selection builds innate social learning mechanisms into human psychology. It is perhaps for this reason that the two models have not been carefully distinguished from each other in the literature. However, despite the fact that

they share certain superficial similarities, I believe that the two models are in fact quite distinct. In this part of the paper, I'll discuss four, partially overlapping ways in which the two models differ.

First, the two models differ with respect to what makes social learning adaptive. In the case of the Information Learning Model, items that are part of culture contain high-value information about what it's adaptive to do, making it adaptive to engage in social learning. However in the case of the Strategic Learning Model, in addition to this informational relationship, there is an even more important casual arrow that operates in the opposite direction – the fact that a person acquires a cultural item, and others do the same, *makes it the case* that the item is adaptive to acquire (see figure 1). Put another way, in the case of strategic learning, the adaptiveness of social learning is a kind of self-fulfilling prophecy. For example, in the language case, so long the people in a group continue to socially learn the language of the group, the social learning of language will continue to be adaptive.

The Information Learning Model



The Strategic Learning Model

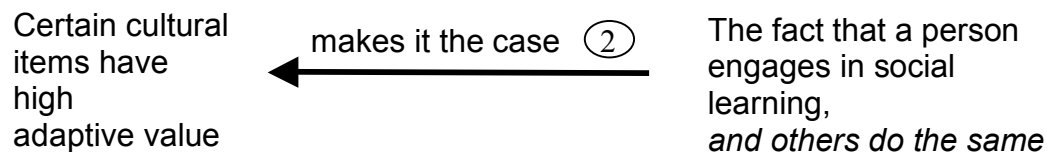


Figure 1: In the Strategic Learning Model, *in addition* to the causal arrow that operates in the Information Learning Model (labeled “1”), there is a second causal arrow that operates in the opposite direction (labeled “2”).

Second, the two models differ in terms of the fact that they take advantage of two different properties of culture. The Information Learning Model relies on the fact that culture is *cumulative and directed*. As I noted above, the cumulative and directed nature of culture allows for the gradual accumulation, over extended stretches of time, of rich quantities of functionally complex and highly useful information. The fact that culture contains highly useful information, in turn, makes it the case that engaging in social learning is adaptive. In contrast, the Strategic Learning Model relies on the fact that culture is, at least often enough, *shared*. In many cases, when an individual engages in social learning, it is likely to be the case that others in the social group have done, and/or will do, the same. In strategic contexts in which a particular behavior is adaptive if others engage in the same behavior, the fact that culture is shared will make it the case that it is adaptive to engage in social learning.

Third, the two models apply, for the most part, to different domains. The Information Learning Model is particularly well-suited for what one might call *fact-related domains*. That is, it applies to domains in which there is natural sense in which there is a right answer to the question of what cultural item one ought to adopt (or, perhaps, several equally good right answers). For example, there is a natural sense in which there is a right answer to the question of what one ought to believe (in the case of factual beliefs) or the means by which one ought to achieve one's goals (in the case of skills).

The Strategic Learning Model, in contrast, is particularly well-suited for *value-related domains*. In these domains, there is no natural way to understand the idea of there

being a right answer to the question of what cultural item one ought to adopt. Instead, the most adaptive values to adopt will often depend on the values that others in one's group have adopted. For example, the moral norms or aesthetic standards that one should adopt depend heavily on the moral norms or aesthetic standards that others in one's group have adopted.⁴

Finally, the two models correspond to different branches of the theory of optimality. The Information Learning Model is based on the idea of *decision-theoretic* optimality. The theory of decisions is applicable to decisions whose pay-offs depend on the agent's actions and the environment the agent confronts, where this environment is devoid of other rational agents. The Strategic Learning Model is based on the idea of *game-theoretic optimality*. The theory of games is applicable to decisions whose pay-offs depend on both the agent's actions *and also the actions of other rational agents*. Since decision-theoretic optimality and game-theoretic optimality represent the only two branches of the theory of optimality, it's plausible that the Information Learning Model, which relies on decision-theoretic optimality, and the Strategic Learning Model, which relies on game-theoretic optimality, jointly exhaust the available kinds of adaptive models for the evolution of social learning.

Part V: The malleability of human nature

Recall the competition thesis, the thesis that holds that if an adaptationist explanation of some behavioral phenomenon is true, then this fact shows a culturist explanation of that phenomenon is false, or else the adaptationist explanation pre-empts

⁴ It's worth emphasizing that the Strategic Learning Model applies primarily, *but not exclusively*, to value-related domains. For example, earlier I argued that the model applies to language, which is not a value-related domain.

or crowds out the culturist explanation in some way. The Information Learning Model and the Strategic Learning Model show why the competition thesis will often be false. In domains to which these two models apply, there will instead be a *division of labor* between adaptationist and culturist explanations. Culturists appeal proximally to the operation of social learning mechanisms in explaining human behavior. Adaptationists appeal to the ultimate evolutionary rationale for why these social learning mechanisms evolved. Both explanations are relevant, and they complement each other in producing a more comprehensive and satisfying explanation of human behavior.⁵

In addition to the preceding division of labor between adaptationist and culturist explanations, there is also a second division of labor that is worth exploring. This is the division of labor between the Information Learning Model and the Strategic Learning Model. Earlier, I suggested that the two models typically apply to different domains – the Information Learning Model typically applies to fact-related domains while the Strategic Learning Model typically applies to value-related domains. In this final part of the paper, I’ll argue that this division of labor between the two models has important and underappreciated implications for an issue that has long been contentious in the behavioral sciences – *the malleability of human nature*.

I’ll begin by sketching a picture of human nature that I believe is quite widespread among adaptationist thinkers, even though it is rarely explicitly acknowledged. For reasons that will become apparent shortly, I call this view the “Fixed Ends View”. The Fixed Ends View relies on the idea, which is quite familiar from folk psychology, that

⁵ While culturist explanations of human behavior appeal, at least implicitly, to proximal social learning mechanisms, the *overall* structure of these explanations needn’t be so simple. Indeed, they will typically be enormously complex, involving theoretically-rich

human behavior can be conceptualized as being the product of two different kinds of mental states, beliefs and desires. Very roughly, beliefs represent (or aim to represent) the way the world is, while desires represent non-actual states of the world that the person is disposed to bring about. Since the term “desire” has a host of theoretical and ordinary language meanings, many of which are hotly contested (for example, see Marks, ed., 1986), I’ll use the more neutral term “ends” in its place. Some ends are *ultimate ends*. These are the ends that are held irrespective of the way that they promote one’s other ends. *Instrumental ends*, in contrast, are ends that are pursued in order to satisfy one’s ultimate ends. Put another way (and put very roughly), ultimate ends determine which states of affairs a person is motivated to bring about, while instrumental ends determine the means by which she will bring about these states of affairs. Clearly ultimate ends are important because they establish the fundamental targets of behavior.

So where do ultimate ends come from? According to many adaptationists, people’s ultimate ends are, for the most part, universal, innate and fixed. David Barash spells out how adaptationists reach this conclusion,

Why is sugar sweet? Because it contains sucrose, of course. But why do we experience it the way we do? What is the explanation for sugar’s sweetness? Clearly, just as beauty is in the eye of the beholder, sweetness is in the mouth of the taster. To anteaters, ants are sweet; anteaters may even find sugar bitter – certainly they don’t like it as we do. The reason is clear enough: we are primates, and some of our ancestors spent a great deal of time in trees, where they ate a great deal of fruit. Ripe fruit is more nutritious than unripe, and one thing about ripe fruit is that it contains sugar... Perhaps we should take a closer look at the behaviors we find personally satisfying and ask why we should find them so. The comfortable feeling after eating, the sense of well-being that follows a good rest, sexual satisfaction, the pleasure of healthy movement, personal autonomy, the respect of others, the accomplishments of ourselves and our offspring -- all of these we find pleasurable. And, it’s interesting, all these

historical, stochastic and various other dynamical elements (see Boyd and Richerson 1985).

pleasures contribute in one way or another to our own fitness. We have been selected, naturally, to engage in them. We find them sweet...At their core, most human beings agree on what behaviors are sweet; however, we satisfy our sweet tooth with a wide range of ingredients and the special recipes of cultural diversity (Barash 1979, 39-41).

In the preceding passage, Barash identifies certain goals – for example, the goals of being well rested, having sex, eating food, and so on – as being reliably correlated with the enhancement of reproductive success in the environments in which humans evolved. He then applies standard adaptationist reasoning to infer that contemporary humans would have been naturally selected to possess these goals as innate, fixed ultimate ends. Indeed, Barash suggest that goals such as these are a human universal. Of course, Barash acknowledges that there is room for cultural diversity. But cultural diversity only occurs with respect to the *means* by which fixed, universal ends are achieved. For example, one group may satisfy its taste for sweets by eating fruits while another may manufacture candy. The taste for sweet foods, however, is itself innate, universal and not susceptible to culturally-determined variation.

Other adaptationists have reached the preceding conclusion – that ultimate ends are likely to be universal, innate and fixed – by a slightly different route; these theorists reject the claim that ultimate ends will exhibit significant degrees of flexibility or plasticity. For example, Tooby and Cosmides write,

...to be endowed with broad behavioral plasticity unconnected to adaptive targets or environmental conditions is an evolutionary death sentence, guaranteeing that the design that generates it will be removed from the population... Designs that produce “plasticity” can be retained by selection only if they have features that guide behavior into the infinitesimally small regions of relatively successful performance with sufficient frequency... This narrowly specialized form of plasticity requires three components (1) a set of mechanisms that define an adaptive target (such as finding food, finding home, or finding a mate); (2) a set of mechanisms that can compute or otherwise determine what responses are

most likely to achieve the adaptive target in each set of circumstances that one is likely to encounter; and (3) the ability to implement the specific response once it is selected... Adaptive flexibility requires a guidance system (Tooby and Cosmides 1992, 101).

Notice that Tooby and Cosmides aren't denying that human psychology is capable of significant plasticity. Rather, their claim is that plasticity must always be guided and constrained by mechanisms that define the adaptive targets of behavior (i.e. ultimate ends). These ultimate ends, however, must *not* themselves be capable of plasticity. According to Cosmides and Tooby, to allow plasticity with respect to one's ultimate ends would essentially be to allow unconstrained plasticity, which they regard as "an evolutionary death sentence". Thus they claim that adaptationist reasoning leads one to predict that plasticity will be confined to one very specific aspect of a person's psychology – the identification and implementation of novel behaviors that more optimally achieve one's ultimate ends.

Tooby and Cosmides go on to acknowledge the importance of culture as a store of useful *information* that allows one to identify the means to more optimally achieve one's ultimate ends.

Why did ancestral hominid foragers evolve mechanisms that allowed them to reconstruct the representations present in the minds of those around them? ...the advantage of such mechanisms is straightforward. Information about adaptive courses of action in local conditions is difficult and costly to obtain by individual experience alone... The mutual sharing of valuable knowledge and discoveries has a dramatic effect on the mechanisms that attempt to adaptively adjust behavior to local conditions (Tooby and Cosmides 1992, 119).

Notice, however, that when this informational view of culture is coupled with the Fixed Ends View of human nature, the result is that culture is relegated to a subsidiary role in the shaping of human behavior. While culture can serve as the source of

information for more optimally achieving one's ultimate ends, it is more or less impotent to change these ends. It is not surprising, then, that at least some adaptationist theorists have been famously pessimistic that culture can serve as a mechanism for modifying human nature in any fundamental way (see Kitcher 1985 and Segerstrale 2000 for reviews).

However, I believe that the Fixed Ends View is importantly incorrect. Recall that there are two quite different models of how natural selection might favor the evolution of social learning mechanisms. The Information Learning Model typically applies to *fact-related domains*, for example, in the acquisition of factual beliefs and skills. As I've noted, many theorists who accept what I've called the Fixed Ends View also acknowledge an important role for information learning in human behavior. According to these theorists, culture serves as a source of information for more optimally achieving fixed ultimate ends.

The Strategic Learning Model, however, appears particularly well suited for *value-related domains*. This model suggests that people may possess social learning mechanisms that allow them to internalize a range of values from their culture. For example, they may internalize moral norms, standards for the art and beauty, standards of etiquette and socially-appropriate behavior, various kinds of ritualistic norms and a range of other kinds of culturally conveyed values.

If the Strategic Learning Model is right (that is, if the model does in fact apply to many human social domains) then this suggests an important revision in the Fixed Ends View. In this revised view, the set of one's ultimate ends consists of *at least two* different types. While there certainly will be many ultimate ends that are innate,

universal and relatively fixed, there will also be certain ultimate ends that arise via the operation of social learning mechanisms, and that are susceptible to significant degrees of cultural determination and cultural variation. The revised picture suggested by the Strategic Learning Model has important implications for how we conceive of the malleability of human nature. I'll illustrate these implications with an example.

The evolutionary psychologists Margo Wilson and Martin Daly have argued that human males exhibit *sexually proprietary attitudes* towards women. That is, much as songbirds and lions defend territories, human males lay claim to women as a valuable resource, and advertise (and execute) intentions to defend this resource from rivals. Moreover, Wilson and Daly argue that the cluster of mechanisms and decision rules underlying these proprietary attitudes, including most prominently *male sexual jealousy*, are evolved adaptations, which are innate and universal among human males (Wilson and Daly 1992).

Let's suppose that Wilson and Daly are right that male sexual jealousy is in fact an innate, universal, and relatively fixed aspect of human psychology (there is actually much controversy about this issue – for example, see DeSteno et al 2002). And let us suppose that male sexual jealousy is the source of *ultimate ends* for controlling and defending women as a proprietary resource. It nonetheless does not follow that tendencies towards sexual jealousy will be rigidly *manifested* in human behavior. The reason is that human behavior is the product of multiple competing sources of ultimate motivation. Motivations arising from male sexual jealousy needn't be manifested in behavior because they may be countervailed by these other sources of motivation.

One source of countervailing motivation plausibly arises from the psychology subserving *moral norms*. Earlier, I've argued that there is an innate social learning mechanism associated with the domain of moral norms that allows people to flexibly acquire a wide variety of moral norms. For example, people in certain human groups may acquire moral norms that regard displays of male sexual jealousy as morally wrong and even shameful. These moral norms may give rise to ultimate motivations that countervail motivations towards displays of sexual jealousy. So even if the psychology underlying male sexual jealousy is innate and relatively fixed, there may be many human groups in which jealousy-based motivations are routinely countervailed by moral norm-based motivations. Wilson and Daly appear to agree. In the penultimate paragraph of the essay, they write,

In some societies, nothing is more shameful than to be cuckolded, and a violent reaction is laudable; in others, jealousy is shameful, and its violent expression is criminal. One would like to better describe and understand such diversity... (Wilson and Daly 1992, 313).

The preceding example illustrates that even if adaptationist reasoning leads us to predict a set of innate, fixed ultimate ends that operate in a particular psychological domain, this needn't imply that human behavior must be correspondingly fixed or relatively rigid. Nor does not follow that a culturist explanation of behavior in that domain is necessarily relegated to merely explaining the means by which we achieve these innate, fixed ends. The Strategic Learning Model shows why innate, fixed ultimate ends may co-exist with ultimate ends that arise from social learning mechanisms, and are thus susceptible to important degrees of cultural modification.

Conclusion

In this paper, I presented two models, the Information Learning Model and the Strategic Learning Model, that illuminate the relationship between adaptationist and culturist explanations of human behavior. These models suggest that there will typically be a *division of labor* between adaptationist and culturist explanations. Culturists appeal to conformist proximal mechanisms in explaining human behavior. Adaptationist appeal to the evolutionary rationale for why these conformist mechanisms evolved.

I also argued that these two models provide deep insights into the contentious issue of the malleability of human nature. The question of whether, and to what extent, human nature is fixed or flexible has profound moral and political implications. For example, if certain features of human nature are fixed, then it would seem that social policies designed to alter these features would be ineffective, and thus certain kinds of desired social arrangements would be permanently foreclosed. It is no wonder then that adaptationist theories that suggest that human nature is fixed in fundamental ways have aroused such anxiety, passion and controversy.

In discussing the issue of the malleability of human nature, I argued that there is a second important and underappreciated division of labor between the Information Learning Model and the Strategic Learning Model – each model plays a role in explaining different aspects of human flexibility. The Information Learning Model shows why natural selection favors culturally-determined *means-end flexibility*, i.e. flexibility in the acquisition of information from culture that enables more optimal achievement of one's ultimate ends. The Strategic Learning Model shows why there is culturally-determined flexibility in ultimate ends themselves.

In drawing conclusions about the malleability of human nature, adaptationists have often assumed a picture of human nature in which a person's ultimate ends are innate and more or less fixed. However, the Strategic Learning Model suggests that this so-called "Fixed Ends View" is false. Thus, the Strategic Learning Model is important because it shows why there are good reasons, indeed good *adaptationist reasons*, for supposing that human nature is substantially more malleable than many adaptationists have themselves supposed.

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