

## Chapter 2

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## CHAPTER TWO

### PURPOSES AND CROSS-PURPOSES OF MEMES

One of the many things that have evolved by natural selection is evolvability itself. One example of this is the evolution of sexual reproduction, which mixes genes in such a way as to introduce wide variation for selection in organisms while still ensuring that most remain viable. Another example is the evolution of homeo box genes. These are genes lying close together on the same chromosome that control the expression of other genes whose phenotypic effects lie within strictly limited bodily areas. Thus one part of the animal can be changed in various ways, effectively experimented with, without at the same time affecting random unrelated parts of the organism. The evolution of completely new levels of natural selection that ride piggyback on lower levels is another way in which evolution evolves. The evolution of behavioral systems controlled partly by mechanisms that learn by operant or instrumental conditioning, discussed in the last chapter, is an example of the evolution of a new level of selection, as are the development of trial and error in perception of paths to a goal and the development of Popperian trial and error by which representations are experimented with in thought. In Chapter One, I argued that the purposes that emerge from these various levels of selection are not always compatible with one another but are sometimes crossing purposes.

Another aid to evolution results from systematic segmentation and then recombination of elements that have already served usefully in prior combinations. There is evidence that segmentation and recombination are at work in trial and error learning of motor skills. Segments of behavior lineages of various durations are retained or substituted for during the learning process, much as segments of chromosomes of various lengths are recombined during sexual reproduction and selection (Hull et al 2001). Recombination is also exemplified by the way the immune system works (Cziko 1995, Hull et al 2001). One of the requirements for the emergence of adaptive products from a process of competitive selection for reproduction is that the reproduction should be extremely accurate for the most part, reproducing always the same aspects of each new model. Dawkins (1976) calls this requirement "fidelity." Of course some variation is needed or no evolution would occur, but it must be carefully controlled variation. One way to make reproduction faithful is to digitalize what is to be copied, and then design the copying machinery to recognize only the presence or absence of each digit, ignoring minor variations in the original. This is how DNA is copied, for example. The digits are the "letters" ACGT which in combinations of three make up the "codons" each of which stands for one of the twenty amino acids. The copying within the immune system is similar.

In this chapter I will discuss another level of replication and selection from which natural purposes emerge, again, sometimes crossing with lower levels. This is a level on which reproduced cultural items of the sort Dawkins called "memes" are selected (Dawkins 1976).<sup>1</sup> It is also a level on which segmentation and recombination of definite digital units often occurs, the most striking example being the phonological, morphological and syntactic structures of natural languages, which account for the accurate reproduction and rapid evolution of linguistic elements and for the possibility of compositional semantics.<sup>2</sup>

Richard Dawkins invented the term "memes" to stand for items that are reproduced by imitation rather than reproduced genetically (Dawkins 1976, Chapter 11). According to Dawkins, memes are such things as tunes, fashions in dress, other kinds of fads, handed-down ideas, values, forms of expression, words, and so forth. They get copied, one person copying from another. And given that people have limited memories, and limited energies and time to devote to copying

things, these things can be thought of, Dawkins claims, as competing with one another for reproduction. Following the logic of Chapter One above, what a meme does that accounts for its continuing to be reproduced while other memes die out corresponds to the purpose of the meme. It is what the meme has been selected for. An example already mentioned is human greeting rituals. There must be some reason why all human cultures have greeting rituals, though these are passed on through imitation rather than through the genes.

Dawkins originally compared memes to viruses, which use the cellular mechanisms designed to reproduce genes to reproduce themselves. The purposes of viruses need not, of course, coincide at all with the purposes of the mechanisms that reproduce them. Similarly, what makes a meme such as an annoying tune or a superstitious belief stick in one's mind and be reproduced may be some quirk or side effect of people's brains having no biological or psychological function. Dawkins suspected that very many of the memes people harbor cross people's own purposes or the purposes of their genes. Think, for example, of the meme that is high heeled shoes and the meme that is pious celibacy. Susan Blackmore (1999) goes so far as to assert that memes are an independent force making "things happen that serve to spread memes whether or not they spread genes" in a way that mere "Skinnerian learning and Popperian problem-solving" do not. "I suggest that the human brain is an example of memes forcing genes to build ever better and better memespreading devices. The brain is forced to grow bigger far faster and at much greater cost than would be predicted on the grounds of biological advantage alone" (p. 119). But Blackmore does not describe any mechanism by which memes could force genes in this way, merely boldly asserting that memes (somehow) have this power because they are a "second replicator" that is "set loose on the world." Given that the capacity to replicate memes (cultural artifacts), found only feebly when at all in other species, is clearly genetically determined, memes are dependent for their proliferation on the cooperation of the genes in a way that is deeply asymmetric. If the genes that replicate memes are not helped but hindered by these memes, they will disappear from the gene pool. Similarly, if genes for increasing meme production do not consequently increase their own production, they will not increase in the gene pool. (Our cells don't evolve so as better to accommodate viruses just because viruses use our cells' copy machines for their own purposes.) On the other hand, surely Dawkins is right that memes can cross purposes with the genes that enabled them, exactly as conditioned behaviors and rationally selected purposes can. They can also cross over people's psychological purposes, conflicting with their tastes, aversions or preferences. Thus nervous English speakers say "...uh...uh..." at intervals, nervous German speakers say "...also...also...", nervous Russian speakers produce a series of just audible grunts under their breath and nervous Hungarian speakers (I am told) say "...ö...ö...ö..." Exactly why these memes proliferate is a good question, but that many speakers want very much to be rid of this habit is quite certain. It could be that some memes have no purposes at all beyond that of triggering our replicating machinery. That our replicating machinery is triggered by them could be merely a side effect of design for better uses of this machinery. But this leaves open what the purpose of our original capacity for reproducing memes is. How is the capacity to replicate cultural artifacts useful to us?

Susan Blackmore proposes that the original purpose of this capacity was to allow imitation of useful behaviors and the passing on of small bits of technology directly from one person to another. Bits of practical knowledge laboriously learned by one individual through trial and error are copied by others, with an enormous community saving. Hence the advent of culture.<sup>3</sup> It does seem obvious enough that a genetically designed ability to pass on technology in this way might

proliferate itself. Notice, however, that if passing on technology were all that memetic replication was used for, no new kinds of purposes would emerge from it. Suppose that one man makes an arrow for shooting deer, others copy his method and design, and still others copy the copies, either using or trading their products. If the design proliferates because the arrow shoots well, the purpose of the original, derived from the original maker's intentions, and the purpose of the copies, reproduced because their models shoot well, are the same. Artifacts that are copied from one another in this manner have a second source of purpose or function from that of the original from which they are copied, namely, the function that accounts for their reproduction. But except in odd cases, this function will be the same as the function of the original. Of course people do sometimes find uses for artifacts for which they were not originally designed and it is possible that some artifacts might even be proliferated for such purposes. But still, the purpose will be a practical human purpose, coinciding with some ordinary psychological purpose of humans who use it. It will not be some new kind of private purpose invented by the memes. Technological memes get themselves replicated by serving people's prior interests. They are not like viruses. Some technological innovations may be more easily understood and remembered than others, and for this reason may proliferate more readily. Part of what they have been selected for is their ability to be reproduced accurately through the medium of human minds. But this does not subvert their essentially human purposes.

Imitation plays a very obvious role in the arts as broadly conceived. Visual art objects and styles, musical compositions and musical styles, tunes, dances, stories, poems, jokes, games and amusements of every kind are both purposefully reproduced and often unconsciously reproduced. Here again, however, no new element of purpose is added by the memes. It is possible, of course, that our interest in the arts is an accidental byproduct of cognitive features originally selected during our evolutionary history for quite other reasons. But if so, still the memes connected with the arts have not invented these interests, producing the psychological aims and purposes that match them. The memes have merely fed these interests a much richer diet than if each person had to invent all of his own amusements, or invent all of the entertainments he uses to invoke the gratitude and appreciation of others. The functions of artistic memes that survive will be to serve prior human interests.

Similarly, beliefs, and ideas and concepts can be considered memes, handed down by mechanisms that reproduce them fairly accurately. Many of these beliefs and ideas may be false, of course, and may circulate widely for reasons having nothing to do with their practical value or their truth value. But again, the basic mechanisms involved in their reproduction have either been genetically selected for or selected for by learning and reasoning. The probability is that these mechanisms have served purposes of the genes or of the psyche more often than conflicting with these purposes. Side effects and mishaps resulting from use of these mechanisms will surely occur, but there is no reason to suppose that they systematically produce memes with purposes of a different kind from those either of the genes or of the psyche.

There is a domain of memes that do possess a whole new kind of purpose, however, not found on lower levels. These purposes are cooperative purposes. The mechanisms that produce these memes have apparently been designed to facilitate social coordination. To serve a coordinating function is to facilitate the purposes of two or more individuals at once, bringing the separate behaviors of these individuals into a designed coordination that benefits both but that has not been designed by either individually. I will discuss one example of coordinating memetic

functions that is quite speculative, namely, the purpose of certain kinds of social conventions, and a second kind that I take to be quite solid, namely, the memetic functions of various conventional elements of human languages. The memetic functions of conventional language elements are one of the kinds of "meanings" that they have, so one of the connections between meaning as purposing and meaning as a property of signs will be revealed by this discussion.

A puzzling phenomenon involving memes is the uniformity of human behaviors within a given culture that do not seem, in themselves, to be any more technically, artistically or epistemically rewarding than any of numerous alternatives would be. Styles of dress, kinds of food eaten, behaviors at meals, in the market, in places of entertainment, when socializing, courting behaviors, ways of greeting, ways of celebrating or grieving, ways of accepting or turning down offers and so forth, and also the times and places at which these various activities occur seem to be fairly arbitrary yet highly uniform within each culture. Surely this uniformity is not accounted for by lack of imaginativeness. Moreover in all cultures people seem to find comfort in conformity, a strong fear of being considered different is common, indeed, it is typical for conformity to be strongly sanctioned. Consider, for example, the standard way of reprimanding children: "Sally, we don't run outside in our pajamas!" "No, Johnny, we don't eat peas with our fingers!" What WE do or what ONE does (Heidegger's *Das Mann*) is conceived both as what people do do, and at the same time as what people must do or ought to do. I suspect that a disposition to conformity may actually be built in to the human psyche. If so, the purpose may concern social coordination.<sup>4</sup> Let me explain.

Recent speculations about the history of our minds have emphasized the special demands of living in a complex social community in which many conspecifics must be recognized, learned about, and dealt with individually. It is proposed that the ability to live in such a community requires predicting other individuals' behaviors and that this requires a deep understanding of other individuals' minds. Certainly one characteristic that helps to distinguish us sharply from other species is our inventiveness as individuals, and this trait might naturally lead us to be far less predictable in our individual behaviors than are the members of other species. A second trait that distinguishes us is our huge dependence on others in nearly all aspects of our lives. We use and rely on others, and they on us, for a multitude of everyday purposes. Just as we could not learn to use natural objects to our advantage if nature were completely unpredictable, we could not rely on or even walk safely among other humans if we could not predict many aspects of their behaviors. It is claimed then that the social animal needs to develop a theory of mind, a grasp of intentional psychology, so as to predict the behavior of its fellows. And this need quickly escalates. As others begin to understand my mind better, hence to predict my behaviors better, and to adjust their own behaviors accordingly, I need to develop a more and more sophisticated kind of Machiavellian intelligence so as to continue to compete in this context. Trying to keep one thought ahead of the people around me when they are trying to keep one thought ahead of me puts quite a strain on the intellect. This is how, it is proposed, we humans were driven to become so smart.

This way of thinking about the demands of social living seems to be premised on the idea that social cooperation typically requires altruism on the part of the cooperating parties, who will try to duck their cooperative responsibilities if they possibly can. The ability to anticipate, detect and punish "cheaters" or "free riders," for example, is taken to be central to the development of our kind of intelligence and to the maintenance of a cooperative society. The problem of maintaining an honest communication system in the face of the advantages that accrue to the liar is claimed to

be another central issue.

I do not think this is how it works at all. First, for the most part, thinking of social interaction on the model of a competitive game is quite wrong. Most aspects of social living involve cooperation in ways that benefit everyone. Typical patterns of cooperation do not require altruism on anyone's part, hence do not need to be maintained by sophisticated methods of cheater detection, lie detection, keeping one thought ahead of the next fellow and so forth. If you and I were trying to move a couch together, for example, and I failed to pick up my end, or we failed to walk in the same direction, it is not just your purpose that would be frustrated, but mine. Similarly, consider what will happen to the driver who fails to conform to the cooperative right hand rule of the road in America. Consider recording the next hundred fact-stating sentences you utter and then asking yourself for each of them how you would have benefited by lying in this instance rather than telling the truth! Trying to understand how cooperative living developed is not like trying to understand how altruism developed. People are not, typically, playing against each other. Social cooperation very seldom resembles a game of prisoner's dilemma. That doesn't mean, of course, that it never does. It doesn't mean that there never are occasions on which one needs to be aware of the possibility of someone's cheating. But for the most part, social cooperation benefits both or all parties. There is nothing mysterious about its evolution in this respect.

Second, the idea that we usually predict one another's individual behaviors by speculating about each others' personal motives and beliefs seems to me quite wrong. Partly, we expect people to exhibit behavioral patterns similar to those they have shown in the past. Some people usually come to work on foot and on time, others drive or take the metro and often arrive late. Some people always eat lunch at noon, others at other times or irregularly. Some people will talk on and on if you start conversing with them, others are very reticent. Some always stick to their word, others change their minds frequently. Some always eat eggs for breakfast, others always eat yogurt. We take these patterns into account, betting on their continuation when it is useful or necessary to do so. When we use belief-desire psychology, it is almost always for explanation after the fact, not for prediction. We may explain why John always has yogurt for breakfast by saying he must like it, but if he actually eats yogurt only for his health, it won't matter to our predictions.

Less obvious, but perhaps more important, we are often able to predict one another's behavior due to patterns of social conformity or social convention. We become acutely aware of this when we find ourselves in another culture where things are done differently. Then we are inconvenienced or embarrassed to discover that people come to market or close markets at a different time, sleep and eat meals at different times, use different eating utensils, prefer to sit in different postures on different sorts of mats, cushions, chairs or stools, accept or turn down invitations in different ways, give or bring different kinds of gifts and for different kinds of occasions, count on assistance of kinds we don't expect from people connected to them in ways we didn't expect, recreate at different times, in different ways, and in different kinds of places, are especially respectful of persons in different kinds of offices, and so forth. They may also drive on a different side of the road!

Focusing on the example of driving, clearly it is sometimes essential to be able to count on uniform behavior in other people. Other kinds of conformity may also support everyone's well-being, proving efficient and convenient for everyone or for most people much of the time. In many domains, a built in disposition to do as others do would have a strong tendency to benefit all. Moreover, the more models there are to copy, the more definite it becomes just what it is that should be copied. Quite good fidelity to some pattern or another would slowly but naturally

emerge even from initial chaos by this simple principle of self organization. On the other hand, there will usually be times when conforming is not particularly convenient for an individual. The disposition to conform will sometimes cross over more primitive purposes. Since it is usually best for others that one conform, however, pressures and sanctions will quite naturally be applied. Indeed, a general disposition to discourage nonconforming behaviors in others probably benefits all in the end.

Behavioral dispositions that are genetically selected for are not triggered by the intentional contents of sophisticated cognitive systems but in much less discriminating ways. Moreover, whether a certain kind of practice serves a useful coordination function or not typically depends on what other social practices are being followed. It is pretty hard to imagine how you could construct a primitive perceptual or cognitive trigger that would discriminate between behaviors that are socially useful to copy and to sanction and those that are not. It is easy to understand why not only socially useful behaviors, but many behaviors originally proliferated for accidental reasons of taste, attraction, salience and so forth can easily become part of the standard social repertoire.

Thus the disposition to social conformity and the conventional behaviors produced by it may have a purpose, even though many examples of social conformity fail to serve this purpose. The purpose of these behaviors is a general one, derived from the purpose of the mechanisms that create social conformity. A different question concerns whether these behaviors have memetic purposes, derived from selection of individual behavioral memes from among competitors. A guess might be that memes not serving a coordinating function are less likely to be highly sanctioned and less likely to be faithfully copied since no one is actually damaged or inconvenienced when they are ignored or drift into new forms. It may be hard not to chafe at the inconvenience when one's daughter turns vegetarian and you are asked to cook two kinds of meals every evening, but not hard to put up with her new tastes in clothes if she buys her own. And indeed, fads and fashions in dress do tend to change more rapidly than, say, family diets. There may be mild to strong selection pressures stabilizing some but not all individual social conformities. And of course there are statutes and laws stabilizing some others. Then the behaviors exemplifying these conformities do have memetic purposes of their own, but again, not purposes that cross the purposes of most people most of the time.

Perhaps the clearest analogs to genes among memes are the reproduced elements out of which language is built, such as phonemes, words, syntactic structures, elements of prosody, and so forth. These are memes that definitely do have coordinating memetic functions. They are combined and recombined to produce the functions of phrases and full sentences, that is, roughly, the literal meanings of these. There is evidence, moreover, that we have special mechanisms genetically designed to make the rapid evolution and discriminating selection of language forms possible.

The fidelity with which selected items are reproduced is a crucial factor enabling natural selection to produce functional products. Two mechanisms seem to have been built in to ensure fidelity in copying language forms. First is a capacity to grasp, during the first few months of life, the phonological structure of one's language. Phonological structure determines what will count as correct reproduction of an element such as a word or a sentence, enabling the learner to discriminate those aspects of speech signals that matter to meaning from those that can vary freely. Second, Chomskian linguists posit that universal grammar serves as a filter determining which

aspects of the structure of the language it hears a child will reproduce.<sup>5</sup>

In the case of human language, prior agreement on the kind of materials that are to be used in communication and the aspects of these materials that are to be significant produces a genuinely new kind of faithful replicator, ready for selection. Language forms are then subject to a new and characteristic kind of selection pressure, guiding the evolution of a cleanly different level of natural purpose or function. Unlike the case of most technical skills passed down by imitation, but more like the case of other conventional social forms, those effects that encourage continued replication of a language form are not determined by the purposes only of the agent producing them. The functions of language devices are fulfilled through cooperation between speakers and hearers, hence are determined by the interests of both. Language devices will produce effects that interest speakers often enough to encourage continued replication only if hearers replicate hoped-for cooperative responses often enough. And hearers will continue to replicate intended cooperative responses often enough only if the results are, in turn, of interest to hearers.

Consider, for example, a speaker whose purpose in using the word "dog" is to communicate about or to call attention to facts that concern dogs. (This probably won't be an explicitly represented purpose, of course. It can be a purpose of the speaking without that -- Chapter One.) Such a speaker will eventually stop trying to use the word "dog" for this purpose if there is no evidence that it ever has this effect on hearers. Similarly, a hearer whose language-understanding faculties turn his mind to dogs with the purpose of collecting information about dogs whenever speakers use the word "dog" will soon unlearn this response if speakers never use the word "dog" such that it carries information about dogs.

Consider those syntactic forms that get labeled as "indicative" forms in various languages. These forms sometimes have a number of alternative functions, just as one's tongue has alternative functions, being designed, for example, to help both with mastication and with speech production. But no form will be labeled "indicative" unless one of its central functions is this. It effects production of true beliefs having whatever propositional content the various other aspects of the sentences exhibiting it embody. This effect is often of interest both to speakers and to hearers. Production of false hearer beliefs may occasionally interest speakers, but rarely serves the interests of hearers. A hearer unable to interpret the indicative sentences he hears so as sometimes to extract genuine information from them would soon cease to form beliefs on their basis. He might first try out other interpretations of the form, and of other linguistic elements used with it, but eventually he would have to give up on it altogether. And if hearers ceased ever using indicative sentences as guides in forming beliefs, speakers would stop trying to use them to impart beliefs. Production of true beliefs, then, is a linguistic function of the indicative form itself, whether or not a particular speaker and/or hearer have as their purpose to use it that way on a given occasion.

Similarly, a linguistic function of imperative mood sentences is to instigate actions that accord with their propositional contents. If it were not sometimes in the interest of hearers to comply with imperatives Cadvice, instructions, directions, friendly requests, sanctioned imperatives, and so forthC hearers would soon cease to comply with them. And if hearers never complied with imperatives, speakers would soon cease to issue them. imperative syntactic forms would either become obsolete or change their functions.

Thus it is that the function of a public language device itself is not on the same level as either speaker purposes or hearer purposes taken alone. Conventional language devices are selected for performing services satisfactory at once to both partners in communication. These language forms are arbitrary, of course, within broad limits. There is nothing magical about the



form itself that enables it (sometimes) to serve its memetic function. It can perform that function only because speakers and hearers are trained to respond with and to it in ways that have some stability, each given the expected performance of the other. (These themes are much expanded in Millikan 1984 Chapter 4 and Millikan 1998, 2001a, 2003).

The functions of conventional language devices considered as such are memetic purposes. But when language parts are used in figures of speech or used as bases for Gricean implicatures, the underlying memetic purposes of these expressions are crossed by the speakers purposes. Then what the speaker means may not be what the words mean, or may be more than what the words mean. The very same expression token then has two purposes derived from two different sources that cross, a literal meaning deriving from its function in the public language and a pragmatic meaning deriving from the speaker's purposes. Public-language meaning and speaker meaning often diverge in this way.

I said in the introduction of this book that the meanings of signs are not usually considered to be their purposes but rather to be what they represent or signify. But if we look really closely, the memetic purposes of conventional language forms do seem to be what these forms mean. Compare, for example, the following sentences: (1) "Jeanette will stop" (2) "Jeannette, stop!" (3) "Will Jeanett stop?" (4) "Would that Jeanette stops!". These four sentences seem all to represent the same, for they all represent or refer to Jeanette's stopping. In the first, Jeanette's stopping is asserted; in the second it is directed; in the third it is questioned; in the fourth it is wished for. In philosophical tradition, we say that these sentences all have the same "satisfaction conditions."<sup>6</sup> But though they represent the same, they don't mean the same. They are not translations of one another. "Jeanette, stop!" translated into French, is "Jeanette, arrete!", not "Que Jeanette arrete" or "Jeanette, arretera-t-elle?," and this is because only "Jeanette, arrete!" has the same purpose or function as "Jeanette, stop!" Memetic purpose seems to be what is preserved in literal translation of conventional language forms. I will return to this theme in Chapter Seven.

Returning to a theme from Chapter One, are the purposes of public language forms real purposes, or are they purposes only metaphorically or analogically? They have exactly the same kind of foundation as does any other kind of purpose. The purposes of conventional language forms are as real as any purposes can be.

## FOOTNOTES







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1. These various levels of evolvability should not be confused with the levels constituted by gene selection, individual selection and group selection, sometimes referred to as "levels of selection."

2. Other examples of the digitalization of memes are discussed under the heading "normalization" in (Dennett forthcoming)

3. One way of "imitating" another is to imitate the very motions the other makes. Another is merely to reproduce the external physical processes or procedures used in reaching a certain goal, employing whatever motions are natural for this purpose. What we mostly imitate for our practical purposes, I believe, is end products and procedures, and only in a very few instances motions. Similarly, it has long been known that it is typically actions identified by their consequences that become reinforced in operant conditioning, rather than the particular movements that instantiate them (Tolman 1932). It seems possible that for purposes of proliferating technology, the important ability humans possess is not imitation per se but

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merely the ability to recreate a causal sequence that has been observed to lead to a certain consequence. To imitate in this way, one must understand which properties of an artifact are the ones that make it useful, or which are the causally efficacious aspects of a sequence with a useful outcome. This must be coupled, of course, with the ability to produce the parts of the sequence, or to manipulate or fashion the object. Suppose that I notice that when the coconut fell from the tree, hitting the rock with considerable impact, it broke open. I then copy that sequence by throwing the coconut at the rock so that it hits with considerable impact, and breaks open. When the bonobo Kanzi was allowed to observe how to knap flint so as to produce sharp chips with which to cut a rope to let food down for reward, his original method of creating flakes was by throwing one rock onto another on the ground (Rumbaugh et al, 2000). Exactly similarly, if I notice that you fashioned the tool with the knife, and sharpened the knife with the whetstone by applying water and rubbing the two together, that is noticing what sequence you accomplished, not what motions you employed. According to Michael Tomasello (2000), he

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"reviewed all the experimental evidence on chimpanzee imitative learning of tool use (a total of five studies) and concluded that chimpanzees are very good at learning about the dynamic affordances of objects that they discover through watching others manipulate them, but are not skilled at learning from others a new behavioral strategy per se. For example, if a mother rolls over a log and eats the insects underneath, her child will very likely follow suit. This is simply because the child learned from the mother's act that there are insects under the log...." (p. 175).

According to the animal trainer Karen Pryor (1999), domestic cats are extremely good at learning by observation in this manner. It may be that the acquisition of technology from others does not primarily depend on or follow from the ability either to imitate others's motions or from any particular disposition to model what another person does, as opposed to what has been observed to happen in nature. Our ability to learn technology may rest more on our ability to register observed causal connections.

On the other hand, there is evidence that children are more slavish in copying the exact behaviors that a



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model displays in learning a new bit of technology than are the apparently more rational great apes. Andrew Whiten (2005) has compared the learning of skills by copying in apes with this sort of learning in children. Children, but not apes, will copy motions and other embedded actions within an activity that are not required in order to reach the goal of the activity. Apes do the rational thing, taking shortcuts and so forth, whereas children are more likely directly to imitate motions and irrelevant actions. It could be argued, perhaps, that human technology is often far more causally opaque than the simple tasks that Whiten taught to the children and apes in his experiments. If complicated technological skills depend on causal processes that are not easy to understand or not understood at all, the disposition to copy motions or routines blindly might be of some benefit in this area. Blind copying without understanding is nicely illustrated, for example, by the story of the woman who always cut off both ends of a beef roast before putting it in the roasting pan, following after her mother, who followed after her grandmother. On being questioned, the grandmother explained that she did this only

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because her roasting pan was usually too small for her roasts.

4. One hypothesis is that conformity helps to maintain group identity. Outsiders are easily recognized by their foreign behavior patterns. But the groups to which humans belonged during the critical period of their evolution were small enough that every individual in these groups would have known every other individually by face, by name and by reputation. Surely no further means of telling insiders from outlanders would have been needed.

5. There are rumors that natural selection was not involved in the process that produced Chomskian universal grammar. Again I quote Fodor, since he has been more explicit with his reasons for believing this than has Chomsky.

...the facts that make a speaker/hearer's innate beliefs about the universals of language true (or false) aren't facts about the world; they're facts about the minds of the creature's conspecifics. Roughly speaking, all that is needed to ensure that

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my innate beliefs about linguistic structure will allow me to learn the language that you speak is that you and I are conspecifics; and (hence) that your linguistic behavior is shaped by the same "innate linguistic theory" as my beliefs about your linguistic behavior. And, presumably, what guarantees all these correspondences is that, qua conspecifics, we have the genotypic determinants of our innate beliefs in common. (2000, p. 95)

Similarly, I suppose, the fact that we are conspecifics should also guarantee that we can guess each other's hair color without looking because our hair colors are all the same? Clearly, that is a silly argument. The crucial question should be why we all are born with the same, supposedly arbitrary, universal grammar inside. How did it happen that the first Homo who accidentally acquired human universal grammar by a genetic fluke (according to Fodor) handed it down to all the rest of us? Why did all the Homos lacking this arbitrary trait get selected out?

Chomsky himself seems to have supposed that arguments for the arbitrary nature of human universal

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grammar are arguments for its not having been selected for. But every form of animal communication is arbitrary in form if one ignores its concrete history in the specific species--every bird song, every mating display, every pheromone, every danger signal is arbitrary. Each got there to be selected for by an accidental historical genetic fluke or set of flukes. No biologist doubts, however, that these signals have all been co-evolved, along with the dispositions to react to them appropriately, through the action of natural selection.

6. The satisfaction conditions of assertions are usually called "truth conditions." Truth conditions are one kind or example of satisfaction conditions. Similarly, the satisfaction conditions of directives are sometimes called "compliance conditions."