Origins of Human Cooperation

MICHAEL TOMASELLO

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MICHAEL TOMASELLO is codirector of the Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany. He is also codirector of the Wolfgang Köhler Primate Research Center. His research interests focus on processes of social cognition, social learning, and communication/language in human children and great apes. Tomasello's published books include *First Verbs* (1992), *Primate Cognition* (1997), *The Cultural Origins of Human Cognition* (1999), *Constructing a Language: A Usage-Based Theory of Language Acquisition* (2003), *Origins of Human Communication* (2008), and *Why We Cooperate* (2009).

OVERALL INTRODUCTION

Humans are an inordinately cooperative species. Reading the newspaper every day, one could plausibly be skeptical, but it is true if two qualifications are kept in mind. First, we are talking about as compared with our nearest primate relatives, who, so long as nonkin are involved, set the bar pretty low. And second, we are talking about cooperation within "the group," which is difficult to define in modern life but for most of human history corresponded simply to the couple of hundred individuals with whom one lived and interacted on a regular basis—as opposed to all those other barbarians that might be spotted from afar. With these qualifications in mind, humans are both altruistic and collaborative with nonkin in spectacularly unique ways.

To explain everything from donating to charity to creating governments, multiple approaches are needed, obviously. In our laboratory, we have focused on empirical studies of both altruism (one individual sacrificing in some way for another) and collaboration (two or more individuals working together for mutual benefit). We have focused on such activities in young children and our nearest primate relatives, the great apes, with hopes of being able to see things a bit more clearly in these somewhat simpler cases. In the next two days I will summarize our recent research on these topics: today on the ontogenetic origins of human altruism and tomorrow on the phylogenetic origins of human collaboration. My focus is empirical, but hopefully there are some things here that will be enlightening for philosophical analyses as well.

LECTURE I.
ONTOGENETIC ORIGINS OF HUMAN ALTRUISM

A prince must learn how not to be good.
—NICCOLÒ MACHIAVELLI

One of the great debates in Western civilization is whether humans are born cooperative and helpful, and society later corrupts them, or whether they are born selfish and unhelpful, and society teaches them better. As with all great debates, both arguments undoubtedly have some truth on

their side. Today I will defend a thesis that mainly sides with Rousseau's take on things, but adds some critical complexities. I will call this thesis, in deference to today's commentators, the Early Spelke, Later Dweck Hypothesis. Specifically, I will argue and present evidence that already from around their first birthdays—from when they first begin to walk and talk and become truly cultural beings—young human children are naturally cooperative and helpful in many, though obviously not all, situations. And they do not get this from adults; it comes naturally. (That is the Spelke part.) But later in ontogeny, children's relatively indiscriminate cooperativeness will begin to be mediated by such things as their judgments of likely reciprocity and their concern for how others in the group judge them, which were instrumental in the evolution of humans' natural cooperativeness in the first place. And they will begin to internalize many culturally specific social norms for how we do things, how one ought to do things, if one is to be a member of this group. (That is the Dweck part.)

For those of you who think, like Debra Satz said to me, that your child must have skipped the naturally cooperative stage, let me quickly remind you again that we are talking about "relative to nonhuman primates." All viable organisms must have a selfish streak; they must be concerned about their own survival and well-being, or they will not be leaving many offspring. Human cooperativeness and helpfulness are, as it were, laid on top of this self-interested foundation. In addition—and this will be a key complexifying aspect of my account—I do not believe that human altruism is a single trait, but rather humans are more or less altruistic in different domains of activity, each of which has its own characteristics. In an economic framework used by Felix Warneken and myself (forthcoming b), there are three main types of human altruism as defined by the "commodity" involved: goods, services, and information. To be altruistic with respect to goods such as food is to be generous (what we also call sharing), to be altruistic with respect to services such as fetching an out-of-reach object for someone is to be helpful, and to share information and attitudes altruistically with others (including gossip) is to be informative. It is important to distinguish among these three types of altruism because the costs and benefits of each are different, and they may have different evolutionary histories.

So let us step through the empirical data available as to whether and in what ways young human children and their nearest primate relatives are, in order: helpful, informative, and generous.

Helping

The phenomenon, as we first reported it in Warneken and Tomasello (2006, 2007), is utterly simple. Infants of fourteen and eighteen months of age—just as they are beginning to walk and talk—confront an unrelated adult they have met just moments previously who has a simple problem. They help him solve his problem, everything from fetching out-of-reach objects to opening cabinet doors when the adult's hands are full. Of the twenty-four eighteen-month-old infants tested, twenty-two helped at least once, and they did so basically immediately.

There are two things to note here. The first is that each of these situations has a corresponding control condition. For example, instead of dropping his clothespin accidentally, the adult throws it down on purpose. Or instead of bumping into the cabinet with his hands full, he bumps into the cabinet trying to do something else. In these cases, the infants do nothing—showing that it is not just that they like fetching clothespins and opening cabinets in general. The second thing to notice is the variety of ways in which they help. They helped the adult solve four different kinds of problems: fetching out-of-reach objects, removing obstacles, correcting an adult's mistake, and choosing the correct means—all of them very likely novel, at least in their particulars, for the infants. To help others flexibly in these ways, infants need, first, to be able to perceive others' goals in a variety of situations and, second, to have the altruistic motive to help them.

There are five reasons to believe that helping others with simple physical problems such as these is a naturally emerging human behavior. The first is simply the relatively early emergence of the behavior: fourteen to eighteen months of age, before most parents have started to seriously expect their children, much less to train them, to behave prosocially. But this is, of course, a debatable point, as infants have certainly seen adults helping others many times during the first year of life. The other reasons all involve further empirical findings.

The second reason is that parental rewards and encouragement do not seem to increase infants' helping behavior. Thus, in Warneken and Tomasello (2007), we gave one year olds a reward every time they helped, and on each new trial the adult had a reward visibly in his hand, but this did not increase helping. In another recent study, Warneken and I gave infants an opportunity to help either on their own or when their mother was in the room and verbally encouraging them to help. Now here is something you parents might recognize: the parental encouragement did not affect the

infants' behavior at all; they helped the same amount with or without it. It is noteworthy that in both of these studies the infants were so inclined to help in general that to keep the overall level down—so that we could potentially see differences between conditions—we had to provide a distractor activity in which they were engaged when the opportunity to help arose. Nevertheless, in the vast majority of cases they pulled themselves away from this fun activity—they paid a cost—in order to help the struggling adult.

But the situation with rewards is even more interesting. In a recent study, Warneken and I (forthcoming a) also investigated Mark Lepper's overjustification effect with respect to helping. In a treatment phase, all infants (twenty months of age) were given various opportunities to help, and did so on five occasions (the few children who did not help on five occasions did not participate further). Some of the children were given a concrete reward every time they helped: a small toy that they could use to create an exciting effect, which they loved. Other children were given no reward all, not even a smile or a thank-you from the adults who simply accepted the help with no reaction whatsoever. Then came a test phase in which infants had the opportunity to help several times again, with no reaction at all from the adult. The finding was that the children who had been rewarded five times in the treatment phase actually helped *less* during the test phase than those who had not been rewarded. This so-called overjustification effect has been documented by Lepper and others in many domains of activity, and is thought to signal that the behavior is intrinsically motivating. The idea is that for intrinsically rewarding activities, external rewards undermine this intrinsic motivation—externalize it to the reward. A behavior that was already driven by external rewards should not be affected by further rewards in this way. And so not only do concrete rewards not help children's helping, but they may even undermine it.

The third reason to believe that infants are not helping just for rewards or to please parents is that chimpanzees engage in the same behavior. We administered the same battery of ten tasks, from the original Warneken and Tomasello (2006) study, to three human-raised chimpanzees. Although they did not help in the other tasks, they did help humans to fetch out-of-reach objects (and not in the control condition). We realize that there may be many reasons that human-raised chimpanzees would help the human—who, after all, controls their food—and so in another study we gave mother-raised chimpanzees the opportunity to help one another (Warneken et al. 2007). The situation was that one chimpanzee watched

while another struggled to open a door to a room. The observing ape knew from previous experience that the door could be opened by removing a pin. The surprising finding was that observers did indeed remove the pin and help their groupmate gain access to the room (and there was no evidence that they expected any reward). They did not do this in two control conditions in which the groupmate was not attempting to gain access in this same way. The main point for current purposes is that if our nearest primate relatives engage in this same helping behavior—including ones whose previous contact with humans was minimal—this is additional evidence that humans' helping behavior is not created by a humanlike cultural environment.

The fourth reason I will mention only briefly because the data have not been fully analyzed. Tara Callaghan has just completed a study looking at children in more traditional cultures—in which parents tend to allow their children to develop with much less adult teaching and intervention—and these children help in basically the same situations, and at basically the same ages, as the Western middle-class children that we have studied.

Fifth and finally, in a recent study Amrisha Vaish, Malinda Carpenter, and I (forthcoming) have shown that young children's helping behavior is mediated by empathetic concern. The setup was this. Eighteen- and twenty-four-month-old infants looked on as one adult grabbed the drawing that another had just been working on and deliberately tore it up. As soon as this happened, infants looked to the victim (who expressed no emotion) with a facial expression that could be coded blindly and reliably as "concerned." That is, they did this more than in a control condition in which the adult simply took a blank piece of paper from in front of the victim and tore it up. Then, most important for current purposes, children from both conditions were given an opportunity to help the victim (or the adult who was sitting in the same place when the blank piece of paper was torn up in the control condition). The result was that they helped the victim—the adult whose drawing had been torn up—more often than they helped the adult from the control condition. Importantly, the more infants displayed concerned looks to the victim as her drawing was being torn up, the greater their tendency to help her. This suggests that infants' naturally occurring empathetic or sympathetic responses to the victim's plight mediated their tendency to help. It is this "concern," then, we would argue, and not external rewards, that motivates young children's helping.

For these five reasons, then—early emergence, immunity from encouragement and undermining from rewards, deep evolutionary roots in great

apes, cross-cultural robustness, and rootedness in natural sympathetic emotions—we believe that children's early helping is not a behavior created by socialization practices. Rather, it is an outward expression of their natural tendency to sympathize with others having problems. Research in other laboratories is consistent with this conclusion, as Kuhlmeier and colleagues (2003) have shown in experiments using video displays that even infants below one year of age prefer to interact with helpful over unhelpful agents.

Informing

Although both chimpanzees and young human children help others in some situations, there is one special form of helping in which only children engage, and that is helping by providing needed information, or simply informing. Importantly, this is not dependent on language. Human infants inform others of things from as early as twelve months of age, prelinguistically, by using the pointing gesture. Chimpanzees and other apes do not point for one another at all, and, I will argue, they do not use any other means of communication to inform one another of things helpfully either.

The empirical data are these. Liszkowski et al. (2006) set up a situation in which twelve-month-old prelinguistic infants watched as an adult engaged in some boring, adult-centered task, like stapling papers. She also manipulated another object during the same period of time. Then she left the room. Another adult then came in and moved the two objects back and up on some shelves. The original adult then came back in, papers in hand, ready to continue stapling. But there was no stapler on her table as she searched for it, gesturing quizzically but not talking at all. As in the instrumental helping studies, these young infants perceived the adult's problem and were motivated to help her—which most of them did by simply pointing to the location of the sought-for stapler (much more than the other object, which had been handled an equal amount). Importantly, it was not the case that infants wanted the stapler for themselves—as they did not engage in the usual demanding behavior such as whining, reaching, and so forth, after the adult grasped the stapler. Once she had it in her hand, they stopped pointing and were satisfied. In some follow-up studies, Liszkowski, Carpenter, and I (2008) also ruled out that infants simply wanted to see the stapling activity reinstated. They did this by having the adult use both objects originally in one and the same activity—the only difference being that subsequently she knew the location of one of

them and not the other. And here infants pointed to the one that the adult needed help finding, even though both of them were equally needed for the activity.

Although apes do not point for one another, they do sometimes point for humans—mainly to get humans to fetch food for them (Leavens, Hopkins, and Bard 2005). Indeed, in all observed cases of apes pointing for humans, the motive is imperative/directive. Also, in case you are interested, Kanzi and other apes who have learned some kind of human-centered communication use it to communicate only with humans, not with one another, and they do so almost exclusively for imperative/directive purposes. But some years ago, Josep Call and I (1994) observed that if a human needed a tool to open a box that contained food for the ape, the ape would point to the location of the tool for the human. One could interpret this as informing the human, but it is also possible that the ape is imperatively ordering the human, "Get the tool." In a recent study, Bullinger, Kaminski, and I (submitted) directly compared apes and human children as they pointed for tools in a situation like this one, except that in one condition the tool was used by the human to fetch something for the ape, whereas in another condition the tool was used by the human to fetch something for herself. We used an ABA design in which subjects began in the first session and ended in the third session pointing for a tool the human used to fetch something for them. But in the middle session they were supposed to point for a tool the human used to fetch something for herself (with no reward for the subject). The main finding was that the apes pointed reliably only when they themselves would get something in the end—which is consistent with the interpretation that their pointing is really a directive ("Get the tool"). The infants, on the other hand, pointed equally often in both cases. Interestingly, some infants actually showed a bit of upset when the condition appeared in which the adult wanted the tool in order to fetch a reward for herself. But they pointed to the tool for her when she looked around quizzically nevertheless; they could not help but be informative.

Perhaps surprisingly, apes do not even *comprehend* pointing when it is used in an informative manner. Apes follow gaze and pointing direction to visible targets, but they do not seem to understand an informative communicative intent. Thus, in many different studies we have found that when apes are searching for hidden food and a human points to a cup to inform them of its location, they do not understand; they do not ask themselves why the pointer wanted them to attend to the cup; they do not

seek relevance. This makes perfect ape sense, of course, as in their everyday lives apes do not experience someone pointing out food for them helpfully—they compete with others for food—and so they do not assume an altruistic intent here. Human infants, on the other hand, understand informative pointing and make the appropriate relevance inference in such situations prelinguistically, at twelve to fourteen months of age (Behne, Carpenter, and Tomasello 2005). In this situation, infants appear to ask themselves the question: why does *she* think that my attending to that cup will be helpful or relevant for *me*? This self-question is based on something like the Gricean principle of cooperation that others are trying to be helpful by informing me of things relevant not to themselves but to their interlocutors. Chimpanzees do not operate with anything like a Gricean principle of cooperation—and accurately so in their natural worlds—and thus they have no basis for making the appropriate relevance inference.

But what about ape alarm calls and food calls? Aren't they generated by an informative intent? In a word, no. The fact is that nonhuman primates give their alarm calls when they spy a predator, even if all of the other members of the group are right there looking at the predator and screaming themselves, and they give food calls when they discover a rich source of food, even if the whole group is with them already. Their goal in such situations cannot be to inform others, as everyone is clearly already in the know. Whatever they are doing, it is for their own, or their kin's, direct benefit. (One may speculate that with alarm calls they are alerting the predator that he has been spotted—making them a poor target—and with food calls they are ensuring that they have company when they eat as protection against predators.) As evidence that this is not just my opinion, I can also offer two quotes from arguably the leading two research teams today on nonhuman primate vocalizations. First, Seyfarth and Cheney say, "Listeners acquire information from signalers who do not, in the human sense, intend to provide it" (2003, 168), and, second, Zuberbühler says, "Nonhuman primates vocalize in response to important events, irrespective of how potential recipients may view the situation" (2005, 126). Apes do not, in either gesture or vocalizations, intend to inform one another of things helpfully.

Interestingly, human infants not only inform others of things helpfully, and accurately interpret informative intentions directed to them, but even understand imperatives in a cooperative fashion. Thus, most human imperatives are not commands to "Get me water," but rather something more indirect like "I'd like some water"—which is simply a statement of my de-

sire. I can get water by simply informing others of my desire because they are so cooperative that simply knowing my desire leads them automatically to want to fulfill it. In a recent study, Gerlind Grosse, Henrike Moll, and I (submitted) asked twenty-month-old infants to fetch Gerlind "the battery," with one battery on the table right in front of her and the other on a table across the room. The idea of the study was that if the children viewed it as a command to fetch, pure and simple, then either battery would fulfill the directive equally well. But if they viewed it as a cooperative request for help, then the logic of cooperative helping specifies that she would only be asking for help doing something that she could not more easily do for herself—and so she would likely be asking for the battery across the room. And that is exactly what the young children assumed, showing that for them, the imperative mode can sometimes be a request for help based on the cooperative logic of helping.

And so the comparison between children and apes is different in the case of informing. In the case of informing, as opposed to instrumental helping, humans do some things cooperatively that apes seemingly do not do at all. This suggests that altruism is not a general trait, but rather altruistic motives may arise in some domains of activity—for various reasons—but not in others. Next time I will try to provide an evolutionary explanation for why only humans help others by providing information (quickly: because it arose as a way of coordinating collaborative activities of a type that chimpanzees do not engage in). In terms of ontogeny, it seems hard to imagine that these twelve-month-old infants are providing information helpfully because they have been rewarded or encouraged to do so; sharing information freely seems to come naturally even to very young children. Of course, children soon learn to lie also, but that comes only some years later and presupposes preexisting cooperation and trust. If people did not have a tendency to trust one another's helpfulness, lying could never get off the ground.

Sharing

Virtually all experts would agree that apes are not very altruistic in the sharing of resources such as food. Sharing valuable resources is obviously a more difficult proposition than simply helping people by expending a few ergs of energy fetching things for them or pointing to things for them. And, of course, if our plane crashes in the Andes and I have one granola bar left in my pocket, I, the human, am not likely to be so generous with it either. Nevertheless, in more or less direct comparisons in two experimental

paradigms, human children are more generous with food and valued objects than are our great-ape relatives.

First, in very similar studies conducted in two laboratories independently—one by Joan Silk and colleagues (2005) and the other by Keith Jensen in our laboratory (Jensen, Call, and Tomasello 2007b)—it was found that chimpanzees do not seem to care at all about the food others may or may not be receiving. In our version, the chimpanzee subject was faced with the choice of pulling in one of two boards, on each of which were two reward trays—one tray accessible to the subject and one tray accessible to another individual in an adjoining cage. In the simplest situation, one of the boards contained one piece of food for the subject and none for the partner, whereas the other board contained one piece of food for each. Thus, the energy that needed to be expended was identical in the two cases, and the reward for the subject (one piece of food) was identical in the two cases. And so the question was whether the chimpanzees would go ahead and pull the board that would also deliver some food to the partner—at absolutely no cost to themselves. The answer in both studies is that they did not. Nor did they systematically try to prevent the other from getting food by always pulling the one that only had food for them—they basically pulled indiscriminately as they seemed to be focused only on the food possibilities for themselves. To ensure that they knew what food was going to the other cage, we also had a control condition in which the other cage was empty and the door to it was open—so that the pulling chimp could quickly go get the food designated for the other cage. In this case, they most often pulled the board with pieces of food for both cages. Fehr, Bernhard, and Rockenbach (2008) have recently shown that school-age children in a very similar paradigm pull the equitable option more than the selfish option, and Brownell, Svetlova, and Nichols (forthcoming) found the same thing with children at twenty-five months of age.

One might naturally puzzle over the fact that chimpanzees seem to help others attain their instrumental goals in the Warneken et al. helping studies, but here they do not help the other get food even when it costs them nothing. We are currently working on a study to help resolve this puzzle, but for the moment our best speculation is simply that in the Silk-Jensen experimental paradigm, the chimpanzees are focused on getting food for themselves—in which case what happens to the other is irrelevant—whereas in the various helping paradigms, the chimpanzees are not in a position to get food for themselves at all, and so their own forag-

ing needs and competitive strategies do not predominate (and the cost of helping is negligible; they have nothing else to do).

In the second experimental paradigm we can see the effects of chimpanzee food competition quite directly. Melis, Hare, and I (2006b) presented chimpanzees with a board outside their cage that needed two individuals to pull in. Previous studies had shown them to be not very good in this task. But the problem was that in previous studies the food was always presented clumped in the middle of the board, so that there was always the problem of sharing at the end. Melis, Hare, and I replicated this effect, but in addition we presented the chimpanzees with a condition in which the food was already divided—some on one end of the board for one partner and some on the other end of the board for the other partner. In this case, all of a sudden their ability to collaborate became much better. It seems that the reason chimpanzees had previously been poor in this task was not because they could not handle it cognitively, but rather because they were already thinking of the fight at the end as they tried to get it together to collaborate. Recently, Lohse et al. (submitted) have done the same study with young children, and the children do not really care one way or the other whether the food is predivided. And it is not that the children always divide the food equally. Sometimes one individual will take more than her share, but then the partner will still be ready to try again on the next trial, trusting that they will be able to work it out. Chimpanzees do not have this trust.

But what about in more natural settings? There have been some recent studies of male chimpanzees in the wild sharing food with potential coalition and mating partners, but the assumption of everyone is that this is barter and not generosity. And if chimpanzees are presented with a low-quality food such as branches of leaves tied together by humans (as in de Waal 1989), they are tolerant of others feeding from the same branches. But the natural behavior of feeding chimpanzees is to separate themselves from the others by a few meters as they eat, if this is possible, and to relinquish food to others only under direct begging or harassment. Human infants, in contrast, like giving objects to people—indeed offering them—and this is often food. At the same time, they can become attached to objects and stubborn about not letting go. We are on shaky ground here because there are no comparative experiments—and it very well could be that the key factor is that infants just do not care about most objects or food very much—and so it would be generous to call them generous. But nevertheless it would appear that in natural settings even very young

children happily give away and offer objects and food more readily than do their simian cousins.

Finally, one very telling situation is the sharing of food between mothers and their children. The basic idea is that chimpanzee youngsters as foragers are on their own, and indeed somewhat in competition with their mothers. In a recent study, Ueno and Matsuzawa (2004) looked systematically at food sharing among three mother-infant pairs. They recorded eighty-four attempts by the infant to get food from the mother; fifty of these were rejected. Of the thirty-four successful attempts by the infants, almost all of them were for the palatable part of the food Mom was eating (so it is clear what they wanted). Mothers more actively transferred food only very rarely, fifteen times. But when they did so it was always—100 percent of the time—the less palatable part of the food they were eating, that is, the peeling, the husk, or the shell. This is more than they would do for other adults, of course, and so there are clearly some maternal instincts at work here. But human mothers actively provision their infants—or buy them off with junk food—at a much higher and more generous rate.

In the case of sharing resources such as food, then, human children seem to be more generous than chimpanzees. But here again I would emphasize that this is only a matter of degree—starving humans are not so generous with food either. It is just that chimpanzees act as if they were always starving.

Later Development

So, very young human children are helpful and informative—when conditions call for it—and more generous with food than are chimpanzees, actually offering food to others on occasion. There is very little evidence in any of these cases that children's altruism is created by parents or any other form of socialization. But socialization does play a critical role, obviously, before it is all over. Different cultures have different values and social norms, and different individuals have different experiences, and these make a difference. Perhaps of most interest, children internalize many of these values and experiences and regulate their own behavior via them.

Let us divide the influences of culture into two broad sets. One set is the individual's direct social experiences in interacting with others, and the lessons she learns about how to interact with others based on their reactions and the resulting outcome. On the positive side, children certainly learn that in most situations being cooperative and helpful engen-

ders cooperation and helpfulness in return, and so that encourages them in this direction—that is, with those individuals who are reciprocators. On the more cautious side, children also learn that always being cooperative and helpful may lead to others taking advantage of them. And so after their initial period of a kind of indiscriminate altruism, mixed with some selfishness about valuable things, young children become more discerning based on various characteristics of potential targets of their altruism. Several recent studies have shown that children begin to make these judgments about others from around three years of age. For example, in a study by Olson and Spelke (2008), from Spelke's lab, children at around this age *share* more often if the recipient was previously nice to them and is from their group. Vaish, Carpenter, and I (submitted), in our lab, found something similar with a helping measure: children of this age more often *help* those who have been helpful to others previously. So children begin learning fairly quickly who and who not to be nice to based on their own individual experiences with those people.

The other set of cultural influences involves the values and norms of the group, which the child experiences less through direct feedback from interactions with others and more through modeling, communication, and instruction. For the most part, cultures try to encourage helpfulness and cooperation through various kinds of social norms: be nice, be helpful, don't lie, share your toys. These have a positive side—we feel good about ourselves if we live up to some social norm. But evolutionarily, it is likely that the main function of norms is to threaten punishment for violators, either directly or indirectly (for example, via gossip about reputation). Children at some point become aware that they are the target of the judgments of others, who are using these norms as standards, and so they attempt to influence these judgments—what Goffman calls impression management. With this kind of vigilance is born the public self, whose reputation we all spend so much time and energy cultivating and defending, and which influences our behavior in all kinds of important ways, as Carol Dweck's work has shown us.

In our lab, the aspect of this process that we have worked on most directly is social norms. Let us start with the apes. Apes do not have social norms, in my opinion. They have two precursor behaviors that discourage antisocial behavior in (1) retaliation against others who harm them or their children and (2) avoiding noncooperators when choosing partners—which I will detail tomorrow. But social norms obviously involve more than this. Social norms involve (1) a mutual recognition of their force,

(2) a mutual recognition of their general applicability to all, and (3) third-party enforcement from "disinterested" parties.

Brosnan, Schiff, and de Waal (2005) have recently claimed, in a much publicized study, that some nonhuman primates have a normative sense of fairness. The best-known study is with capuchin monkeys, but there is a similar one with chimpanzees. The finding is that when a human gives a chimpanzee a low-quality food, such as a cucumber, she will normally accept it. But if the human first gives another chimpanzee next door a high-quality food, such as a grape, then that same individual will now reject the cucumber. The authors' interpretation depends on social comparison (she got something better than me) and a sense of fairness (this inequity between us is not fair). But studies from three completely different laboratories in the case of the capuchins, and from our laboratory in the case of the chimpanzees, have all found that this is a spurious result—in the sense that it does not depend on a social comparison at all. The finding of Bräuer, Call, and Tomasello (2006), for example, is that simply seeing and expecting to receive the grape automatically makes the cucumber look less attractive to chimpanzees—without any other individuals around at all. There is no social comparison going on—only food comparison—and so nothing in the direction of norms of fairness is going on either.

In a second research paradigm in our laboratory we have presented the ultimatum game from experimental economics to chimpanzees. The game in the human case is this. The subject is given an amount of real money, say one hundred euros, and is told that she should offer some to an unknown partner. This partner may then accept the offer, in which case they both take their shares and go home, or the partner may reject the offer and no one gets anything. There are some cultural variations in how humans react, but by far the most common reaction of partners in this game is to reject low offers, less than about thirty euros. Rational maximizing would say take the thirty euros because, even though that guy is a jerk, thirty is better than none. But people do not do this; in rejecting it they, in essence, pay thirty euros to watch the proposer suffer the loss of the seventy euros he thought he was going to get. Why is the partner being so mean—and in fact paying money in order to be mean? Because the proposer was not being fair. Proposers are not stupid, by the way—they know that low offers will be rejected as unfair—and so the majority of proposers in the majority of cultures offer fifty euros (or something close). In contrast, in this game chimpanzees are rational maximizers—they take the thirty. Indeed, they will take only one. Jensen, Call, and I (2007a) constructed a mini

ultimatum game in which the proposer was faced with two trays with a preestablished division of food for himself and for the partner. For example, in one condition the choice was between "eight grapes for me, two for you" versus "five for us each." The proposer then pulled the tray as far as he could, halfway, and the responder then had the choice of completing the deal by pulling the tray the rest of the way—or not (which would be a rejection). Humans typically reject as unfair an offer of "eight for me, two for you" when "five for us each" was an alternative the proposer could have chosen. But chimpanzees do not. The one-sentence summary of our results is that proposers almost always made selfish offers, and responders almost always accepted anything—except zero. It is important that they rejected an offer of "ten grapes for me and zero for you," as this shows that they were not just pulling indiscriminately but were indeed attending to the reward that they would get. In this experimental paradigm as well, then, we see no evidence that apes are working with social norms of fairness.

In the case of children, we may point to two types of social norms: those based on issues of cooperation (with moral norms as a special case) and those based on conformity (with constitutive norms or rules as a special case). In terms of altruism, children's spontaneous helping, informing, and sharing—as described above—will at some point come under the sway of the deontic. In terms of helping, imagine one adult asking another at the dinner table to please pass the salt, and the other just says, "No." This cannot happen, as one simply cannot refuse a request for help if the cost is minimal, without some excuse at least. In terms of informing, if I learn that your child has been seriously injured at school, I simply must tell you. If you find out later that I knew about it but did not tell you, our friendship is very likely over. And in terms of sharing, if I have a lot of food and you have none, my reputation would never survive stinginess for no apparent reason. Perhaps surprisingly, we know very little about young children's coming to comprehend their spontaneous altruistic acts as also being subject to social norms, whose violation has serious social consequences. The reason is that virtually all of the research has been on moral norms in which one person inflicts some harm on another, and almost none on situations in which someone does not behave altruistically when they are expected to.

We know a bit more about children's understanding of and reaction to norms of conformity. Recent research highlights three remarkable things. First, from around three or four years of age young children understand

the difference between social regularities that do not carry force and those that do (Kalish 2006). For example, children of this age understand that people often wear shorts in hot weather, but that is not because they think they are supposed to, whereas they wear coats and ties to weddings because they think they are supposed to. Dress at weddings is a social norm governed by people's expectations and attitudes, whereas dress in hot weather is not. Importantly, Kalish (2006) has also found that children do not just follow norms as they encounter them, but in new situations they actively seek out what they are supposed to do—what the social norms and rules are in the situation—so that they can behave accordingly. On their first day in a new classroom, children want to know what they are supposed to do with their coats; when they learn that we hang our coats on the rack before sitting down at our desks each morning, they understand this as the way "things are done" here, and they want to do it this way too.

Second, Rakoczy, Warneken, and I (2008) have shown that not only do children actively follow social norms, but they also participate in enforcing them. This is of critical importance, as it is one thing to follow a norm—perhaps to avoid the negative consequences of not following it—and it is quite another to legislate the norm when not involved oneself. Legislating norms is a version of what has been called in evolutionary accounts third-party punishment, which is known from theoretical models to be an extremely effective facilitator of cooperation. Thus, in one of Rakoczy's studies three-year-old children are simply shown how to play a game. When a puppet then enters later and announces it will play the game also, but then does so in a different way, most of the children object, sometimes vociferously. Importantly, the children's language when they objected demonstrated clearly that they were not just expressing their personal displeasure at a deviation; they said generic, normative things like "It doesn't work like that," "You can't do that," and so forth. It is not just that they do not like the puppet's playing the game in his own way; he is playing it wrong. The children's emotional investment in enforcing the norm was ever apparent.

The third point is that in these studies the rules or norms we are talking about are not just regulative rules that act as a kind of traffic cop of social interaction, but rather they are constitutive rules that actually create the game—and the game is then solitary after one has learned it. This shows that children view even simple conventional norms of how a game is played—with no moral or even cooperative implications whatsoever—not just as instrumental guides to their own effective action likely to please

adults or be rewarding in some other way but as supra-individual entities that carry social force independent of such "instrumental" considerations.

So why do children respect social norms? Where does their force come from? Following Durkheim, Piaget (1935) famously argued that their force emanates from two sources: (1) authority/power, coming from interactions with adults, with an ultimate threat of punishment; and (2) reciprocity/empathy, coming from interactions with coequal peers, with an ultimate threat and promise that others will treat me like I treat them. But great apes know both power and reciprocity, and they have not developed social norms. Power is certainly not enough. As seen in Rakoczy's studies of the learning and playing of rule games, children even respect the force of constitutive norms—rules that create a game—even though a breach of these rules clearly will not result in any form of punishment from adults or anyone else. And reciprocity is not enough either. Although one could say that children follow the constitutive rules of some games with a sense of reciprocity—the partner will abide by the rules only if I do—the first game we saw in the experiment was a solitary game once one learned how to play; there would be no reciprocal consequences if I decided to play my solitary game in a different way. And most of all, we still must explain why children not only respect constitutive norms in solitary games but also enforce them on others—sometimes with great vehemence. Sensitivity to authority and reciprocity do not in any obvious way generate such a motivation for third-party enforcement.

Authority and reciprocity clearly have important roles to play in children's coming to respect social norms. But they are not sufficient; they are too external. To account for such things as respecting the rules in rule games and enforcing social norms, we need more direct and intrinsic social motivations. I have two proposals. First, children seem to be sensitive to social pressure more directly, that is, without the benefits of reciprocity or the force of authority. Thus, humans have especially strong positive motives (as compared with apes) to cooperate with others in group activities—these bring them pleasure, as we will see tomorrow—which also means that they are especially sensitive to being excluded from such activities. In addition, humans have especially strong motives (as compared with apes) to conform to the behavior of others in the group. In the studies with the sanctioning children, we originally thought that to convey the idea that there was a right way and a wrong way to play the game, the child should watch the adult make a mistake and correct herself. But it turns out that was not necessary. The children had only to see the adult demonstrate

the game—in a straightforward way with no normative judgments or language—before they jumped to normative conclusions about how the game *should* be played! So young children are also much more sensitive than other apes to being "like" others in their group, to do things the way others around them do them. This is based both on a negative pressure to conform—so that others will not exclude me as different, which young children do to others all the time—and on a more positive feeling of group identity: I am a member of this group, and we do things like this. Tomasello and Rakoczy (2003) argue that initially the social judgments children are worried about and internalize are embodied in significant other individuals such as parents (G. H. Mead's significant other), and before too long they are generalized to become the truly general cultural norms of the group (Mead's generalized other).

But we also argue now—and this is the second proposal—that children's respect for social norms is not due solely to their special sensitivity to social pressures to cooperate and to conform (or to authority and reciprocity). From a young age, children also possess a kind of social rationality along the lines of what Thomas Nagel proposes in *The Possibility of Altruism*, what we might call a "he is me" attitude of identification with others, and a conception of the self as one among many—leading to the impersonal "view from nowhere." This comes out especially clearly in cooperative activities based on shared intentionality (as described by, for example, Bratman, Searle, Tuomela, and Gilbert). I will have much more to say about this tomorrow, but for now the important point is that in shared cooperative activities, as Bratman calls them, we have a shared goal that creates an interdependence among us. If we are carrying a table together to the bedroom, I cannot simply drop it and run off without hurting us and our goal. In shared cooperative activities, my individual rationality (I want to transport the table to the bedroom so I should do *X*) is transformed into a social rationality of interdependence (*we* want to transport the table to the bedroom, so *I* should do *X* and you should do *Y*). *The key point is that although sensitivity to social pressures alone may be able to account for children's tendency to conform, without this added dimension of some kind of "we" identity and rationality, it is impossible to explain why children actively enforce social norms on others from a third-party stance*. This is especially true for activities such as solitary social games, in which norm violations lead to basically no concrete consequences for anyone—and so there is no basis for the normative judgment other than "we" do not do it like that.

(If children are simply mimicking adults' sanctioning others—which they are not in any simple way, based on our observations—then we must ask why adults do it, and again our answer would have to go beyond social pressures alone.)

The universality of social norms, and their critical role in evolution, is apparent in the anthropological literature. Kim Hill has written a recent review in which he focuses on the most biologically relevant entities of all—food and mates—and found that in all the traditional societies he looked at, there are very powerful social norms about what one can and cannot do. The critical role of norms in human evolution is also apparent in the fact that humans have evolved special emotions adapted for their presence. Guilt and shame presuppose some kind of social norms, or at least social judgments, that people internalize and use to judge themselves (with feeling). In one interpretation, guilt and shame are kind of self-punishments that serve, first, to make it less likely that I will engage in the same transgression in the future and, second, to display to others that I indeed have the norm, even if I did not live up to it in this case. (In studies with adults, onlookers are much less likely to think badly of someone who causes some harm accidentally if that person immediately displays outward signs of guilt.) Guilt and shame are thus biologically based emotional reactions that presuppose the kinds of normative (or at least punitive) environments that humans have constructed for themselves. They are thus particularly good examples of products of a coevolutionary process of the type studied by Bill Durham (1992) and others.

So, the development of altruistic tendencies in young children is clearly shaped by socialization. They arrive at the process with a predisposition for helpfulness and cooperation. But then they learn to be selective about whom to help, inform, and share with, and they also learn to manage the impression they are making on others—their public reputation and self—as a way of influencing the actions of those others toward themselves. And finally, they learn the social norms that characterize the cultural world in which they live, and they actively attempt to learn what these are and to follow them, and even begin to participate in the enforcement process by reminding others of the norms, and even punishing themselves—through guilt and shame—when they do not live up to them. All of this reflects not only humans' special sensitivity to social pressure of various kinds but also a kind of group identity and social rationality that is inherent in all our activities involving shared intentionality.

Conclusion

And so my Early Spelke, Later Dweck Hypothesis amounts to this. Infants come to culture already helpful, informative, and generous—when it is not detrimental to their immediate well-being to be so—as a kind of ontogenetic adaptation to their dependent state in which parents have their best interests at heart, protect them, and mediate their social interactions with others. In early childhood as they transform themselves into public persons with their own identity, they become selective with their altruism, concerned with their own reputation, and eager to follow and even enforce social norms. It is interesting in this regard that adults who assume that children are not naturally helpful and cooperative, and so attempt to make them so through external reinforcements and punishments, do not create children who internalize social norms and use them to regulate their own behavior. Much research has shown that so-called inductive parenting—in which adults communicate with children about the effects of their actions on others and about the rationality of cooperative social action—is the most effective parenting style to encourage internalization of societal norms and values. Such inductive parenting works best, I would argue, because it correctly assumes a child is already predisposed to make the cooperative choice when the effects of her actions on others and on group functioning are pointed out to her.

Interestingly, this Early Spelke, Later Dweck developmental pattern may be seen as a kind of ontogenetic reflection of the famous tit-for-tat strategy, demonstrated in many formal models to be especially effective in maintaining cooperation among nonkin. One starts out altruistic and then treats others as they treat you. This is exactly the way children, over a several-year period, behave based on their direct experiences with others. In addition, the research I have reported here is consistent with the many formal models demonstrating the crucial role of various kinds of punishment and norms for maintaining cooperation in social groups, and with empirical studies showing that humans are especially prone to punish noncooperators. From a young age human children are especially sensitive, as compared with other apes, to the social pressures and social norms that govern interactions in their culture.

Some would claim that humans also exhibit so-called strong reciprocity, in which individuals of all ages behave altruistically toward others in the group relatively indiscriminately, so that all group members give and receive altruistic acts regularly with no individual accounting necessary—engendered ultimately by the evolutionary process of cultural-group se-

lection. I believe that strong reciprocity is at work with very low-cost acts like passing the salt and helping old ladies across the street—we do these unthinkingly and without any cost accounting. But as the costs rise, our helpfulness, generosity, and informativeness are governed by our sensitivities to reciprocation and reputation, as positive incentives for cooperation, and to punishment and social norms, as negative sanctions against noncooperation—as well as to the social rationality of interdependent cooperative activities resting on shared intentionality.

In any case, in the lecture tomorrow I will focus on evolution specifically, with a focus on mutualistic collaboration as the evolutionary source not only of human skills and motives for shared intentionality but also of altruism—not to mention conventional communication and social institutions. But for now, it is enough to claim simply that human beings are altruistic in a number of species-unique ways and that even very young children are spontaneously predisposed to be altruists—after which they learn to modulate this predisposition based both on their own experience with others and on their respect for social norms.

LECTURE II.
PHYLOGENETIC ORIGINS OF HUMAN COLLABORATION

In the contemporary study of human behavioral evolution, the central problem is cooperation. But what is typically meant by cooperation is altruism, because altruism is the big theoretical fish, the modeling challenge. There is no widely accepted solution to the problem, but there is no shortage of proposals either. The challenge is that there must be some way for sacrificing individuals to not sacrifice themselves or their progeny out of existence; there must be some kind of compensating advantage for their sacrifice. It has been shown that punishment of noncooperators helps to stabilize cooperation—again, in the sense of altruism—but punishment is a public good for which the punisher pays the cost and everyone benefits, the so-called second-order problem. And punishment can do its work only if the punished have a tendency to react by doing "the right thing" in response, and so punishment cannot explain origins.

I will certainly not solve the evolution of altruism problem here. But that is okay, because I do not believe it is the central process anyway; that is, I do not believe altruism is the central process responsible for human cooperation in the larger sense of humans' tendency and ability to live and operate together in institution-based cultural groups. In this story, altruism is only a bit player; the star is mutualism in which we all benefit from our cooperation but only if we work together—what I will call collaboration. We can still have the problem of free riding here, of course, but in the most concrete cases where you and I must work together to move a heavy log, for instance, free riding is not really possible because each of our efforts is required for success, and shirking is immediately apparent. As a side benefit, in the context of a mutualistic effort, my altruism toward you—for example, pointing out a tool that will help you do your job—actually helps me as well, as you doing your job helps us toward our common goal. So mutualism might also be the birthplace of human altruism—a protected environment, as it were—to get things started in that direction.

If we take modern apes in general as the model for humans' last common ancestor with other primates, we have a fairly long path to traverse to get to the kinds of large-scale collaborative activities and cultural institutions that characterize modern human groups. But that is what we will try to do here, albeit sketchily. Importantly, as a starting point, we know from the work of Joan Silk and others that nonhuman primate soci-

eties are based in large part on kinship and nepotism, with a healthy dose of dominance thrown in in most cases. Any cooperation they show will thus most likely be based on kinship or direct reciprocity. And we know from the work of Brian Skyrms and others that in building human-style collaboration from this ape foundation our problem is not a prisoner's dilemma in which individuals assess their own benefits versus those of the group. Rather, our problem is a stag hunt in which everyone prefers to collaborate because of the rewards it brings us each and our compatriots, and the problem is how we can get our act together to do so. This is not a trivial task, since what I do in such situations depends on what I think you will you do and vice versa, recursively—which means that we must be able to communicate and trust one another sufficiently. I will thus call my evolutionary hypothesis, in deference to *today's* commentators, the Silk for Apes, Skyrms for Humans Hypothesis.

To get from ape group activities to human collaboration, we need three basic sets of processes—or so I will argue. Most important, early humans had to evolve some serious social-cognitive skills and motivations for coordinating and communicating with others in complex ways involving joint goals and coordinated division of labor among the various roles—what I will call skills and motivations for shared intentionality. Second, to even begin these complex collaborative activities early humans had to first become more tolerant and trusting of one another than are modern apes, perhaps especially in the context of food. And third, these more tolerant and collaborative humans had to develop some group-level, institutional practices involving public social norms and the assignment of deontic status to institutional roles. But before focusing on these three processes, in turn, let us first characterize the starting point and end point of our hypothetical evolutionary pathway a bit more concretely.

From Individual to Shared Intentionality

Let us begin with a concrete example that anchors the two end points of our evolutionary story. Let us talk about foraging versus shopping. When humans go foraging for nuts in the forest, much is the same as when chimpanzees go foraging for nuts in the forest: they both understand the spatial layout of the forest, the causality involved in using tools to extract food, and their companions as goal-directed agents. But what about when humans go foraging for food in the supermarket? Some things happen here that do not happen in chimpanzee foraging—because they involve things that go beyond purely individual cognition and motivation.

Let us suppose a scenario as follows. We enter the store, pick up a few items, stand in line at the checkout, hand the clerk a credit card to pay, take our items, and leave. This could be described in chimpanzee terms fairly simply as going somewhere, fetching objects, and returning. But humans understand shopping—either more or less explicitly—on a whole other level, on the level of institutional reality. As just a sample: (1) entering the store subjects us to a whole set of rights and obligations—customers have the right to purchase items for the posted price, the obligation to not steal or destroy items, and so on, because the objects are the private property of the store owner; (2) I can expect the items to be healthy because the government has a department that ensures this—so if it is not true, I can sue someone; (3) money has a whole institutional structure behind it that everyone trusts so much that they hand over goods for this special paper, or even for electronic marks somewhere coming from my credit card; and (4) I stand in line because there is the norm to do this, and if I try to jump the line people will rebuke me, I will feel guilty, and my reputation as a nice person will suffer. And we could go on listing, practically indefinitely, all of the institutional realities inhabiting the public sphere that foraging chimpanzees presumably do not experience at all.

What is common to all of these things is a uniquely human sense of "we," a sense of shared intentionality. And it does not come only from the collective, institutional world of supermarkets, private property, health departments, and the like. This sense can be seen—perhaps even a bit more sharply—in simpler social interactions. For example, suppose you and I agree to take a walk together. Along the way, I suddenly, without warning, veer off and go my own way, leaving you standing there alone. You are not only surprised but miffed (or maybe worried about me), so that when you return home you will tell your friends about the incident. The breach is that "we" were walking to the store together, and I broke that "we" unilaterally—due to either my selfishness or my derangement. Interestingly, I could have avoided the whole incident by simply "taking leave," saying that I just remembered something important I had to do, and so asking permission, as it were, to break our "we."

This sense that we are doing something together—which creates mutual expectations, and even rights and obligations—is arguably uniquely human even in this simple case. And Searle (1995), among others, has shown how it can scale up to the kinds of collective intentionality involved in doing something as institutionally complex as shopping at a supermarket involving rights, obligations, money, and governments, which exist—

and only exist—because "we" all believe and act as if they do. The upshot is that human beings live not only in the physical and social worlds of other apes but also in an institutional or cultural world, of their own making, that is populated with all kinds of deontically empowered entities. The specifics of this world vary greatly among different groups of people, but all groups of people live in some such world.

Although many of the observable features of the cultural world that differentiate humans from their nearest primate relatives are obvious enough, it turns out that identifying the underlying psychological processes that have enabled humans to build this cultural world is far from straightforward. The approach in our laboratory has been to identify differences in the way great apes and young children engage with others socially as they collaborate and communicate with them—in relatively simple situations. For today, I will focus on the three sets of processes listed, in turn: (1) coordination and communication, (2) tolerance and trust, and (3) norms and institutions. And, to keep things relatively simple and focused, I will tell my evolutionary tales mostly in the context of foraging and food, as I have come to believe that many of the key steps in the evolution of human cooperation had to do with how individuals dealt with other individuals in the context of procuring their daily bread.

Coordination and Communication

All social animals are, by definition, cooperative in the sense of living together relatively peacefully in groups. Most social species forage as a group in one way or another, mostly as a defense against predation (as the explanation goes). In many mammalian species, individuals in addition form specific relationships with other individuals, leading to such things as coalitions and alliances in their competition for food and mates, and in many mammalian species, defense from predators is a group activity as well. Chimpanzees and other great apes do all of these group things, and our question is how these are similar to and different from human forms of collaboration.

In my characterization of human collaboration, I draw heavily on the analysis of Bratman (1992)—supplemented with a little Gilbert (1989) on the side. In shared cooperative activities, as Bratman calls them, the interactants must first of all be mutually responsive to one another's intentional states. But beyond this minimal requirement, the two key characteristics are: (1) the participants have a joint goal in the sense that they each have the goal that we (in mutual knowledge) do *X* together, and (2) the

participants coordinate their roles—their plans and subplans of action, including helping the other in her role as needed—which are interdependent. Importantly, establishing a joint goal constitutes a kind of coordination problem by itself and so requires—following Herb Clark's analysis (1996)—some specific forms of communication.

Arguably, the most complex collaborative activity in which chimpanzees engage in the wild is their group hunting of red colobus monkeys in the Tai Forest in Ivory Coast. In the account of my colleague Christophe Boesch (2005), the chimpanzees have a shared goal and take complementary roles in their hunting. One individual, called the driver, chases the prey in a certain direction, while others, so-called blockers, climb the trees and prevent the prey from changing direction—and an ambusher then moves in front of the prey, making an escape impossible. Of course, when the hunting event is described with this vocabulary of complementary roles, it appears to be a truly collaborative activity: complementary roles already imply that there is a joint goal, shared by the role takers. But the question is whether this vocabulary is appropriate.

From my perspective, a more plausible characterization of this hunting activity is as follows. Things begin when one male chimpanzee begins chasing a monkey through the trees, given that others are around (which he knows is necessary for success). Each other chimpanzee then goes, in turn, to the most opportune spatial position still available at any given moment in the emerging hunt—the second chimpanzee goes in front of the fleeing monkey, the third goes to a plausible other escape route, others stay on the ground in case he drops down. In this process, each participant is attempting to maximize its own chances of catching the prey, without any kind of prior joint goal or plan or assignment of roles. This kind of hunting event clearly is a group activity of some complexity in which individuals are mutually responsive to one another's spatial position as they encircle the prey. But wolves and lions do something very similar, and most researchers do not attribute to them any kind of joint goals or plans. In the terminology of Toumela (2007), the apes are engaged in a group activity in I-mode, not in We-mode.

As opposed to the chimpanzees' group activity in I-mode, young children from soon after their first birthdays work in We-mode, forming a joint goal with their partner. This is clearest in a comparative study in which Felix Warneken et al. (Warneken, Chen, and Tomasello 2006; Warneken and Tomasello 2007) presented fourteen- to twenty-four-month-old children and three human-raised juvenile chimpanzees with

four collaborative activities: two instrumental tasks in which there was a concrete goal and two social games in which there was no concrete goal other than playing the collaborative game itself. The human adult partner was programmed to quit acting at some point in the tasks as a way of determining subjects' understanding of the adult's commitment to the joint activity. Results were clear and consistent. The chimpanzees showed no interest in the social games, basically declining to participate. In the problem-solving tasks, in contrast, they synchronized their behavior relatively skillfully with that of the human, as shown by the fact that they were often successful in bringing about the desired result. However, when the human partner stopped participating, no chimpanzee ever made a communicative attempt to reengage her—even in cases where they were seemingly highly motivated to obtain the goal—suggesting that they had not formed with her a joint goal. In contrast, the human children collaborated in the social games as well as the instrumental tasks. Indeed, they sometimes turned the instrumental tasks into social games by placing the obtained reward back into the apparatus to start the activity again; the collaborative activity itself was more rewarding than the instrumental goal. Most important, when the adult stopped participating in the activity, the children actively encouraged him to reengage by communicating with him in some way, suggesting that they had formed with him a shared goal to which they now wanted him to recommit.

Two other experiments from our lab demonstrate further children's ability to commit to a joint goal. The first tested the idea that neither partner in a collaborative activity is satisfied until both have gotten their reward: the joint goal includes both partners benefiting. Katharina Hammann et al. (forthcoming) had a pair of three-year-old children work fairly hard to lift and move a pole up a steplike apparatus, one child on each end of the pole. Attached to each end was a bowl with a reward that needed cashing in a few feet away. The trick was that one child's reward became available to her first, through a hole in the Plexiglas covering the steps. Children in this position took their reward, but then noticed that for the other child to get hers they needed to work together for one more step. Some of the fortunate children cashed in their reward first, but then they returned to collaborate on the final step to make sure that the less fortunate child got hers. Other of the fortunate children even waited and helped the unrewarded child before cashing in their own reward. Overall, most of the children seemed to feel committed to their joint goal—namely, that the task be completed so that both got their reward—much more than in

a control condition in which each had her own smaller pole with her own reward, in which case the more fortunate children sometimes helped the less fortunate children but less often.

Second, Maria Gräfenhein et al. (forthcoming) had an adult and child begin a collaborative activity with an explicit joint commitment. The adult said something like, "Hey. Let's go play that game. Okay?" and only when the child explicitly agreed did they proceed to play the game together. In a control condition, the child began playing the game on her own and the adult joined her unbidden. In both conditions the adult then stopped playing for no reason. Three-year-old children (but not two-year-old children) behaved differently depending on whether they and the adult had made an explicit commitment. If they had, then they were more demanding that the adult return to the activity—after all, they had agreed to do it together. Moreover, in a variation on this procedure, when we enticed the child away from the shared activity (with an even more fun game across the room), those who had made an explicit commitment with the adult were much more likely than the others to "take leave" from her by, for example, saying something to her, handing her the tool, or looking to her face before departing. They knew that they were breaking a commitment and attempted to ease the blow by acknowledging it first. (Given that the younger two year olds did not do this kind of commitment and obligation thing, perhaps we can say—continuing our play with names—that the eighteen month olds in our original study are at the Bratman stage, and these children are at the Gilbert stage.)

In addition to a joint goal, a fully collaborative activity requires that there be some division of labor and that each partner understand the other's role. In another study, Malinda Carpenter, Tricia Striano, and I (2005) engaged in a collaborative activity with very young children, around eighteen months of age, and then took over their role on the next turn—forcing them into a role they had never played. Even these very young children readily adapted to the new role, suggesting that in their initial joint activity with the adult they had somehow processed her perspective and role. Three young human-raised chimpanzees did not reverse roles in the same way. Our interpretation is that this role reversal signals that the human infants understood the joint activity from a "bird's-eye view," with the joint goal and complementary roles all in a single representational format (similar to Nagel's "view from nowhere" [1986]). In contrast, the chimpanzees understood their own action from a first-person perspective and that of the partner from a third-person perspective, but

they did not have a bird's-eye view of the activity and roles. Human collaborative activities thus have in them, from the perspective of both participants, generalized roles potentially fillable by anyone, including the self—what some philosophers call agent-neutral roles. We will return to the importance of agent-neutral roles later.

As individuals coordinate their actions with one another in collaborative activities, they also coordinate their attention. Indeed, in the child development literature the earliest collaborative activities are often called joint attentional activities. At about nine months of age infants begin for the first time to do things with adults like roll a ball back and forth, or stack blocks together, that involve a very simple joint goal. As they are doing this, they monitor the adult and her attention, who is of course monitoring them and their attention. No one is certain how best to characterize this potentially infinite loop of my monitoring the other monitoring my monitoring the other, and so forth, but it seems to be part of infants' experience—in some nascent form—from before the first birthday. However it is best characterized, it is made possible initially by having a joint goal. If we both know together that we have the joint goal of making this tool together, then it is relatively easy for each of us to know where the other's attention is focused because it is the same for both of us: we are focused on things relevant to our goal. Later, infants can enter into joint attention without a joint goal—for example, if a loud noise happens she and the adult can attend to it together (what we have called bottom-up joint attention, since it begins with an attention-grabbing event)—but in the beginning, in both phylogeny and ontogeny, joint attention happens only in the context of a joint goal (what we have called top-down joint attention, since actors' goals determine attention).

Importantly, in collaborative activities participants not only have joint attention on things relevant to the common goal but also have their own perspective on things as well. Indeed, as Henrike Moll and I (2007) have argued, the whole notion of perspective depends on our first having a joint attentional focus, as topic, that we may then view differently (otherwise we just see completely different things). This dual-level attentional structure—shared focus of attention at a higher level, differentiated into perspectives at a lower level—is of course directly parallel to the dual-level intentional structure of the collaborative activity itself (shared goal with individual roles), and ultimately derives from it. Perspective in joint attention plays a critical role in human communication, of course. To illustrate, consider the experiment by Moll et al. (2006) with one-year-old children.

An adult entered the room, looked at the side of a complex toy from a moderate distance, and said, "Oh! Cool! Look at that!" For some of the children, this was their first encounter with the adult, and so they assumed she was reacting to this cool toy she was seeing for the first time. But for other children, this adult was reentering the room because previously the two of them had played with this complex toy extensively. The toy was thus old news, a part of their common ground, as Herb Clark would call it. In this case, the children assumed that the adult could not be talking about the whole object—one does not emote excitedly to another about something that is old news for us—and so they assumed that she was excited about either some other object or some other aspect of the complex toy.

By all indications—including several experiments that looked quite carefully for it (for example, Tomasello and Carpenter 2005)—great apes do not participate with others in joint attention. Various data show that a chimpanzee knows that his groupmate sees the monkey (see Call and Tomasello 2008 for a review), but there is no evidence that he knows that his groupmate sees him seeing the monkey. That is, there is no evidence that great apes can do even one step of recursive mind reading (if you will allow me this term), which is the cognitive underpinning of all forms of common conceptual ground. If the basic structure of human communication is pointing out new things to others within the context of our common ground as topic, the point is, to repeat, that this common ground (or joint attention) is most naturally and readily established early in ontogeny in collaborative activities (consistent with Herb Clark's arguments for adults). If we may generalize to phylogeny, then we may hypothesize that the first step on the way to what has been called mutual knowledge, common knowledge, joint attention, mutual cognitive environment, intersubjectivity, and so forth was taken in collaborative activities with joint goals, and since great apes do not participate in activities with this structure, there is no question of joint attention (Tomasello 2008). I should also add that in all of our several collaboration studies with great apes, there is basically no attempt at overt communication—ever—whereas the children engage in all kinds of verbal and nonverbal communication for forming their joint goals and coordinating their roles in the activity.

Human cooperative communication thus evolved first inside of collaborative activities because these activities provided the needed common ground for establishing joint topics, and they generated the cooperative motives that Grice (1975) established as essential if the inferential machinery is to work appropriately. Consider the case of the most basic of

uniquely human communicative acts, the pointing gesture. Pointing by itself, outside of any shared context, means nothing. But if we are in the midst of a collaborative activity, the pointing gesture is immediately and unambiguously meaningful. As Wittgenstein (1953) first noted, I may point to a piece of paper, its color, its shape, or any of its many different aspects, depending on the *Lebensform* (form of life) in which the communicative act is embedded. Making contact with some *Lebensform* grounds the act in a shared social practice, which gives meaning to the otherwise empty pointing gesture. And without this grounding, as we all know, conventional communication using "arbitrary" linguistic symbols—in which normative community criteria for communicative form also apply—is simply gavagai noise. Only sometime after humans had developed means of cooperative communication inside of collaborative activities did they begin to communicate cooperatively outside of such activities.

And so, the species-unique structure of human collaborative activities is: joint goal with interdependent and interchangeable roles, coordinated by joint attention and individual perspectives. Human beings evolved skills and motivations for engaging in these kind of activities for concrete mutualistic gains, in Skyrms's stag hunt. Skills and motivations for cooperative communication coevolved with these collaborative activities, because it not only depended on them but also contributed to them by facilitating the coordination needed to coconstruct a joint goal and differentiated roles. My hypothesis is that concrete collaborative activities of the type we see today in young children are mostly representative of the earliest collaborative activities in human evolution. They have the same basic structure as the collaborative hunting of large game, or the collaborative gathering of fruit in which one individual helps the other climb the tree to then drop fruits down for both of them to share later. And indeed, following Kim Sterelny's recent Nicod Lectures (2008), I believe the ecological context within which these skills and motivations developed was some kind of cooperative foraging. Humans were put under some kind of selective pressure to collaborate in their gathering of food—they in fact became obligate collaborators—in a way that their closest primate relatives were not.

For those who need something a bit more concrete than the observation and analysis of behavior and cognition, let me point out that humans have a physiological characteristic that is highly unusual and potentially connected to their cooperativeness. All two hundred–plus species of nonhuman primates have basically dark eyes, with the white sclera barely

visible. The white sclera of humans—that is, the part one can see—is about three times larger, making the direction of human gaze much more easily detectable by others. And indeed in a recent experiment my colleagues and I (2007) showed that in following the gaze direction of others, chimpanzees rely almost exclusively on head direction (for example, they follow your head direction up even if your eyes are closed), whereas human infants rely mainly on eye direction (for example, they follow your eyes up even if your head stays stationary). Evolutionarily, one can readily imagine why it is of benefit for you to be able to follow my eye direction easily—to spy predators and food, for example—but nature cannot select the whiteness of my eyes based on some advantage to you; it must be of some advantage to me. We have argued in what we call the cooperative eye hypothesis that advertising my eye direction for all to see could have evolved only in a cooperative social environment in which others were not likely to exploit it to my detriment. Thus, one possibility is that eyes that facilitated others' tracking of my gaze direction evolved in cooperative social groups in which we were collaborating in joint tasks and monitoring one another's attentional focus recursively to our mutual benefit.

Tolerance and Trust

I am focusing here on collaborative activities as the key to many things uniquely human. But in an evolutionary story it is actually a kind of middle step. In a moment we will turn our attention to such things as social norms and institutions as outgrowths of collaborative activities, but first I want to focus briefly on an initial step that paved the way for the evolution of complex collaborative activities. The key point is that none of the things we have been talking about could get moving evolutionarily in animals that were always competing. There had to be some initial step of tolerance and trust—in our current story, around food—to put some population of our ancestors in a position where selection for sophisticated collaborative skills could take place.

In the standard evolutionary explanation of sociality, animal species become social as protection from predation, which is generally better in groups. If such protection is not needed, individuals are better off foraging for food on their own, because then they do not have to compete with others for food constantly. When food is dispersed, there are generally no problems: antelopes graze across the fertile plains peacefully, staying together for protection. But when food is found in clumps, dominance raises its ugly head: when a primate group finds a tree full of fruit, there is typi-

cally both scramble and competition, and individuals separate themselves from others by at least a few meters as they eat. The ultimate clumped source of food is a prey animal. For solitary hunters this is no problem, of course, but for social carnivores such as lions and wolves, a group kill raises the problem of how to share the spoils. The solution is that the carcass is large enough that even while some individuals may get more, each individual still gets plenty. In the case where one individual actually makes the final kill, as the others approach the carcass the killer must allow them to have some because attempting to fend off one competitor would mean losing the carcass to others (this is the so-called tolerated-theft model of food sharing).

Chimpanzees make their living mainly off of fruits and other vegetation. Fruits tend to be a clumped, highly valued resource, and so there is competition. But some chimpanzees also engage in group hunting for red colobus monkeys, as just described. As noted, Boesch argues that this group hunting is truly collaborative—with shared goals and a division of labor among roles—and he bases part of his argument on the fact that when the monkey is captured the hunters get more of the meat than do bystanders who did not hunt. He claims that this supports the idea of a shared goal with a fair division of spoils. But recent research by Gilby (2006) demonstrates otherwise. Gilby notes, first of all, that the chimpanzee who actually makes the kill immediately attempts to avoid others by stealing away from the kill site, if possible, or by climbing to the end of a branch to restrict the access of other chimpanzees. Nevertheless, meat possessors are typically surrounded by beggars, who do such things as pull on the meat or cover the possessor's mouth with their hand. The possessor typically allows the beggars to take some of the meat, but what Gilby documents quantitatively is that this is a direct result of begging and harassment: the more a beggar begs and harasses, the more food he gets. The stridency of the harassment may be thought of as a kind of index of how strongly the harasser would be willing to fight. There is also the related possibility that hunters obtain more meat than latecomers because they are the first ones immediately at the carcass and begging, whereas latecomers are relegated to the second ring.

This account of chimpanzee group hunting is supported by the experimental study of Melis, Hare, and Tomasello (2006b) reported yesterday. Recall that we presented a pair of chimpanzees with out-of-reach food that could be obtained only if they each pulled on one of the two ropes available (attached to a platform with food on it) and did so simultaneously.

The main finding was that when there were two piles of food, one in front of each participant, there was a good amount of synchronized pulling and so success. However, when there was only one pile of food in the middle of the platform, making it difficult to share at the end, coordination fell apart almost completely. In general, chimpanzees are so competitive over food that they can coordinate synchronized activities only when the division-of-spoils problem is somehow solved for them. In a similar experiment with bonobos, our other closest living relative with a reputation for being more cooperative in general (Hare et al. 2007), there was a bit more tolerance over clumped piles of food—but not so much more.

Again as mentioned yesterday, we have now done this study with children. The clumped food did not bother the children at all, and indeed they worked out various ways for dividing it up with almost no squabbling at all. (I guess I should note for those of you with multiple children that these were not pairs of siblings.) Interestingly, in this situation children sometimes challenge one another over issues of fairness. For example, in one trial one of the children took all of the candies that she and her partner pulled in together. The deprived child then challenged, and the greedy child immediately relented. In these situations we see very few challenges, and almost no relenting, when the two children have procured equal shares.

Also, we have a study going on now in which we create various kinds of collective-action problems. For example, subjects pull in a board with two sets of rewards on it, as you just saw, but in some cases the distribution of food is highly asymmetrical—for example, five for me and one for you, and even six for me and none for you. Obviously, without some kind of arrangement for dividing things up more fairly, collaboration will fall apart over time. And this is exactly what we are observing with chimpanzees. The dominant individual tries to dominate things, and the subordinate will often help pull the board in for a trial or two, but then everything implodes. Typically, the one who ends up with the food does not share it, and this behavior obviously does not facilitate further cooperation. The prediction is that the children will find various ways of dividing up things more fairly in order to keep the collaboration going across trials.

The main point is this. For humans to have evolved complex skills and motivations for collaborative activities in which everyone benefits, there had to have been an initial step that broke us out of the great-ape pattern of strong food competition, low tolerance for food sharing, and no food offering at all. It is relatively easy for chimpanzees to collaborate in the

"large carcass" scenario in which each individual has a reasonable probability of capturing the monkey, and even unsuccessful participants can still harass the capturer and get some meat. But how can there be a joint goal of capturing a monkey—in the sense that humans have a joint goal that we all work together and benefit together—when everyone knows there will be a fight over sharing it at the end?

There are a number of evolutionary hypotheses about the context in which humans became more socially tolerant and less competitive over food. We could tell a story totally within the context of foraging, such that collaboration became obligate, and those individuals who were less competitive with food and more tolerant of others had an adaptive advantage (assuming they could find one another, as Skyrms [2004] has shown). We could also tell a story (see Hare and Tomasello 2005) that since hunter-gatherer societies tend to be egalitarian, with bullies often ostracized or killed, humans underwent a kind of self-domestication process, in which very aggressive and acquisitive individuals were weeded out by the group. Finally, following Sarah Hrdy (forthcoming), we could argue for the importance of so-called cooperative breeding (cooperative child care). It is a startling fact that in all of the great-ape species except humans the mother provides basically 100 percent of child care. In humans, across traditional and modern societies, the average figure is closer to 50 percent. In cooperative breeders, helpers, in addition to basic child-care activities such as carrying the infant and protecting it, often engage in a variety of prosocial behaviors such as active food provisioning (offering) to the infant. In any case, Hrdy argues that this changed social context—which may have arisen due to differences in the way humans needed to forage and the relationships between females and males in the direction of monogamy—created humans' unique prosocial motivations. I myself am not so fond of telling evolutionary fairy tales involving specific events, and so for me it seems possible that any or all of these scenarios may have played a role. The important point for me is simply that there was some initial step in human evolution away from great apes, involving the emotional and motivational side of things, that put human beings in the new adaptive space in which complex skills and motivations for collaborative activities could be selected.

Finally, as alluded to yesterday, I would like to add that mutualistic collaborative activities may provide a natural home for acts of altruism. The simple idea is that when we are engaged in a mutually beneficial collaborative activity, when I help you play your role—either through physical

help or by informing you of something useful—I am helping myself, as your success in your role is critical to our overall success. Mutualistic activities thus provide a protected environment for the initial steps in the evolution of altruistic motives. "All" that has to be done subsequently is for conditions to evolve that enable individuals to extend their helpful attitude outside of this protected environment. For this, we must invoke the usual suspects—reciprocity and reputation leading the way, followed by punishment and social norms. But the point is that creating altruistic motives outside of mutualistic activities—and outside of kin-selection contexts (which may have been the protected environment for other primates)—would be extremely difficult, if not impossible. But generalizing already existing motives to new individuals and contexts is not nearly so evolutionarily problematic. If the right conditions arise, the machinery is already there.

Norms and Institutions

If we were thinking in terms of an evolutionary story, at this point we would have hominids who were more tolerant and trusting of one another than are modern-day great apes and who had more powerful skills and motivations for shared intentionality and collaboration. But to complete the picture—to get from foraging to shopping—we need some group-level processes; specifically, we need social norms and institutions.

As argued yesterday, I do not believe that great apes have any social norms, if we mean by this norms with social force, enforced by third parties. But in recent studies my colleagues and I have documented two related behaviors. First, using the same pulling-in-a-plank mutualistic task as before, Melis, Hare, and I (2006a) gave chimpanzees a choice of collaborative partners, one of whom we knew from previous testing was a very good collaborator and one of whom we knew was very poor. The subjects very quickly learned which was which, and they avoided choosing the poor collaborator. Of course, the subjects were simply trying to maximize their own gains from the collaborative activity in this situation with no thought of punishing the poor collaborator. But such choices—in what some people have called a biological market—serve to discourage poor collaborators nonetheless, as they are excluded from beneficial opportunities. Such exclusion may thus be seen as a forerunner to punishment.

Second, Jensen, Call, and I (2007b) in our lab have shown that if one chimpanzee steals food from another, the victim will retaliate by preventing him from keeping and eating the food. But so far in ongoing research

we have not observed any comparable behavior from observers, that is, individuals do not try to prevent thieves from enjoying their bounty (or inflict any other kind of negative sanction) if the thief stole it from someone else; we have so far observed no third-party punishment. These two great-ape behaviors—what we might call excluding and retaliating—thus serve to discourage antisocial behavior among groupmates. But in neither case is there any kind of social norm being applied, certainly not in any agent-neutral sense from a third-party stance.

In contrast, as alluded to yesterday, humans operate with two basic types of social norms, though many norms are hybrids: norms of cooperation (including moral norms) and norms of conformity (including constitutive rules). First, norms of cooperation presumably emanate historically from situations in which individuals pursuing their own self-interest (but who also have some other regarding preferences) bump into each other in one way or another, either in individualistic or in mutualistic situations. Through processes that we do not understand very well, mutual expectations arise, and perhaps individuals try to get others to behave in certain ways (along the lines of Knight 1992) or agree to behave in certain ways, such that in the end some kind of equilibrium results. To the extent that this equilibrium is governed by mutually known standards of behavior that all prefer—such that deviations are punished or discouraged in some way, even by third parties—we may begin to speak of social norms or rules.

I will not pretend that I have any fundamentally new answers to this, one of the most fundamental questions in all of the social sciences: where do these cooperative norms come from, and how do they arise? I would just like to propose that the kinds of collaborative activities in which young children today engage are the natural home of cooperative social norms. This is because they contain the seeds of the two key ingredients. First, social norms have force. This can, of course, come from the threat of punishment for norm violators, but norms have a rational dimension as well, as argued by Thomas Nagel, among others. In mutualistic collaborative activities, we both know together that we both depend on one another for reaching our joint goal. This basically transforms the individual normativity of rational action (to achieve this goal, I should do *X*) into a kind of social normativity of joint rational action (to achieve our joint goal, I should do *X*, and you should do *Y*). If you do not do *Y*, the cause of our failure is your behavior, and that makes me angry at you. The force comes from our mutually recognized interdependence and our natural reactions to failure.

This is still not a social norm, of course, because it lacks the second ingredient: generality. Normative judgments by definition require some generalized standard to which an individual's specific activities are compared. The way that might work is this. Some collaborative activities in a community are performed over and over by various members of a social group, with different individuals in different roles on different occasions, such that they become cultural practices whose structure—in terms of the joint goals and the various roles involved—everyone knows mutually. To gather honey from beehives in trees, for instance, one person stands next to the tree, another climbs on her shoulders and gathers the honey from the hive, and a third pours the honey into a vessel. As novices tag along and come to socially learn what to do in the different roles in this activity, the roles become defined in a general way, such that there are mutual expectations in the group that anyone playing role *X* must do certain things for group success. Any praise or blame for an individual in a particular role, then, is in the context of the standard that everyone mutually knows must be met for group success. Said another way, each role acquires its rights and obligations in the activity, because group success depends on whoever is playing the role doing the mutually expected and desired things effectively. Social practices in which "we" act together interdependently in interchangeable roles toward a joint goal thus generate, over time, mutual expectations leading to generalized, agent-neutral normative judgments.

To illustrate in a very general way the birth of a social practice, let me describe a typical scene from the helping experiments of Warneken and colleagues—if they are repeated over and over. To begin, the child watches passively as the adult puts magazines away in the cabinet. Then when he has trouble with the doors, because his hands are full of magazines, the child helps him open the doors. Then, having figured things out, the child on the third occasion actually anticipates everything and leads the way in the collaborative activity of putting away the magazines—even directing the adult in his role. Over the three enactments of this activity, then, the child and adult develop mutual expectations about one another's behavior, such that the child ends up communicating to the adult something like "They go there," meaning that in this activity of putting away magazines, the person carrying them does this (normatively). It is noteworthy for our evolutionary story that this child is only eighteen months of age, barely verbal, and is not really using any normative language at all—and indeed the normative interpretation I have given his pointing is not the only possible one. But still, from all of our studies, it seems clear that on the basis of

just one or a few experiences in an activity with an adult, children readily jump to the conclusion that this is how it is done, how "we" do it.

Norms of conformity are something different. At some point in human evolution, it became important for individuals in a group to all behave alike; indeed, there arose pressure to conform. The proximate motivation here is simply to be like others, to be accepted in the group, to be one of the "we" that constitutes the group and that competes with other groups. The social rationality is that if we are to function as a group, we must do things in ways that have proven effective in the past, and we must distinguish ourselves from others who do not know our ways. Rob Boyd and P.J. Richerson (2006) have argued that imitation and conformity are in many ways the central processes that led humans in new directions evolutionarily. The reason is that imitation and conformity can create high degrees of within-group homogeneity and between-group heterogeneity, and at a faster timescale than biological evolution. Because of this peculiar fact—presumably characteristic of no other species—a new process of cultural group selection became possible. Human social groups became maximally distinctive from one another—in language, dress, and customs—and they competed with one another, such that those with the most effective social practices thrived relative to others. This is presumably the source of humans' in-group, out-group mentality, which Kinzler, Dupoux, and Spelke (2007) have shown is operative even in very young infants (who, for example, prefer to interact with people who speak their own language—even before they themselves speak), the flip side of which is positive group identity.

For both cooperation and conformity norms, everything is cemented with the emergence of guilt and shame—which presuppose some kind of social norms, or at least social judgments, and so the kind of coevolutionary process between biological and cultural evolution that Bill Durham (1992) has investigated to such great effect. Rob Boyd, in what I consider an extremely deep insight into all of this, has argued that one thing punishment and norms do is to turn problems of competition into problems of coordination. Without punishment and norms, I am thinking mostly of how I can get the most food. With punishment and norms, I am also thinking about how potential punishers and gossipers want me to share and share alike, and so I must, in effect, coordinate with their desires. Internalized social norms, with accompanying guilt and shame, ensure that individuals are coordinating in many cases without even behaving overtly.

In any case, we have now put together most of the ingredients we need to get to social institutions: shared cooperative activities with joint goals and attention and agent-neutral roles, all in a normative envelope. We still need one more, and that is some kind of imagination and symbolic communication, which, due to limitations of time, I will just throw into the mix unanalyzed—except to say that evolutionarily I believe the first step was iconic gestures, not yet conventionalized, in which I pantomime some scene for you in a kind of a pretense display. In children, what we first see of this is pretend play. And contrary to its reputation as a solitary activity—which it may be in older children—its origins (at least the acting out of scenes for others' variety) are inherently social. Children, with another person, form a joint commitment to treat this stick as a horse. What they have done here, in the language of Searle (1995), is to create a status function. For purposes of our play here, this stick is a horse, or this block is a piece of bread. In a recent article, Hannes Rakoczy, Felix Warneken, and I (2008) argued that such status functions socially created in pretense are precursors ontogenetically, and perhaps phylogenetically, to such things as our collectively treating this piece of paper as money or this person as president, with all of the rights and obligations that these treatings entail. Importantly, in a recent study Emily Wyman, Hannes Rakoczy, and I (forthcoming) have demonstrated that these jointly assigned status functions already in young children carry normative force. In this study, children agreed with the adult that one object was bread to eat in their pretend game and another was soap for cleaning up. Then when a puppet came in and confused the agreed-upon assignments, by trying to eat the soap, the children objected strenuously. We have agreed that this object will be the bread and this will be the soap, and any violation of this must be corrected.

Children jointly agreeing that a wooden block is a bar of soap thus constitutes a step on the way to human institutional reality in which things are given special deontic status by some form of collective agreement and practice. These go beyond merely cooperative norms or conformity norms of social behavior in that they begin with a created symbolic reality (the pretend or institutional scenario) and then assign deontic powers to the players within that scenario—just as we are getting ready to do next Tuesday.

Conclusion

My Silk for Apes, Skyrms for Humans Hypothesis is thus essentially that to have created the ways of life that they have, *Homo sapiens* must have begun with collaborative activities of a kind that other primates simply

are not equipped for either emotionally or cognitively. Specifically, they came to engage in collaborative activities with a joint goal and distinct and generalized roles, with participants mutually aware that they were interdependent on one another for success. These activities hold the seeds of generalized, agent-neutral normative judgments of rights and responsibilities, as well as various kinds of division-of-labor and status assignments as seen in social institutions. They also are the birthplace of human altruistic acts and humans' uniquely cooperative forms of communication. Shared cooperative activities—to return to Bratman's term—are the birthplace of human culture.

OVERALL CONCLUSION

Let me conclude these two lectures with one final study, which I think brings things together especially nicely by illustrating that what makes humans special phylogenetically is their special cultural ontogeny. In a recent study by Esther Herrmann et al. (2007), we gave a huge battery of tasks, covering all kinds of cognitive skills, to chimpanzees and orangutans as well as to two-year-old human children. If what differentiated humans from their nearest primate relatives was simply a greater degree of general intelligence, then the children should have differed from the apes uniformly across all the different kinds of tasks. But that was not what we found. What we found was that the two year olds were very similar to the apes in their cognitive skills for dealing with space, quantities, and causality—two year olds still have their basic great-ape skills for dealing with the physical world. But the children showed much more sophisticated cognitive skills for dealing with the social world of intention reading, social learning, and communication—as building blocks for skills and motivations for shared intentionality. These are precisely the kinds of social-cognitive skills they will need to collaborate and communicate and learn from others, and so to become full-fledged members of a cultural group—which will enhance all of their cognitive and social skills across the board.

Normal human ontogeny thus involves, necessarily, a cultural dimension that the ontogeny of other primates does not. A chimpanzee can develop its species-typical cognitive skills in a wide variety of social contexts. But without the human cultural niche, and skills of cultural cognition for participating in it, a developing human child would not end up as a normally functioning person at all. Human beings are biologically adapted to

grow and develop to maturity within a cultural context. Through our collaborative efforts we have built our cultural worlds, and we are constantly adapting to them.

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