

DEVELOPMENTAL SOURCES OF SOCIAL DIVISIONS¹

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Background

My research has aimed for more than 30 years to shed light on human knowledge through study of its origins and development. That study has focused on the fundamental capacities of human infants and young children to reason and learn about the material world of objects, the abstract concepts at the foundations of science and mathematics, and the social world of people. The primary goal of this research, like that of the present workshop, is to shed light on human nature. I believe that we can learn a great deal about our mature selves by contemplating young developing minds, especially in the context of broader studies of human evolution (through systematic comparisons across species) and variability (through systematic comparisons of people living in different cultures and circumstances). To introduce my turn to the question of prejudice, I begin by outlining what I believe we have learned from infants about human nature.

First, infants understand some things but not others. For example, young infants represent objects and expect them to persist and move on contact, but they have no consistent expectations about the behavior of shadows or sand piles. Infants' understanding has been revealed most clearly in five domains: They make coherent, interconnected sets of inferences about inanimate objects and their motions, animate agents and their goal-directed actions, numbers and their relations of ordering and arithmetic, places in the navigable terrain, and geometrical forms and their relations of congruence and scaling (Spelke & Kinzler, 2007; Spelke, 2011). Of course, infants' grasp of each of these entities is highly limited, compared to that of older children and adults. For example, infants represent numbers approximately but not exactly (e.g., Izard, Sann, Spelke & Streri, 2009), and they determine their own spatial position by recording the distances and directions of surrounding surfaces but not the lengths of those surfaces or the angles they form (Lee, Sovrano & Spelke, 2012). Interestingly, young infants' knowledge

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appears to be shared by a host of other animals from primates to birds and even fish, who show the same abilities and signature limits. For example, chicks represent objects and places much as human infants do (e.g., Chian-detti & Vallortigara, 2011; Lee, Spelke & Vallortigara, 2012).

Infants' cognitive competences are not scaffolding to be thrown away as new capacities emerge. Instead, they are enduring systems of knowledge that continue to function in children and adults, who show the same abilities and limits as infants when they are tested under conditions that prevent the use of later-developing, symbolic skills. When adults must compare sets of objects on the basis of number or perform mental arithmetic under conditions that preclude counting or symbolic calculation, we show similar abilities and limits to those of infants (e.g., Barth, Kanwisher & Spelke, 2003). Moreover, the systems of knowledge that emerge in infancy serve as foundations for later developing uniquely human cognitive skills. For example, the core system of number supports children's learning and adults' performance of symbolic mathematics (e.g., Gilmore, McCarthy & Spelke, 2010; Halberda, *et al.*, 2012), and the core system of place representation supports children's learning to use maps and other spatial symbols (Dillon, Huang & Spelke, *in review*).

Nevertheless, adults and children all over the world go beyond the limits of these core systems by means of a universal, uniquely human process. Using symbol systems, especially language, we combine the representations delivered by our early developing cognitive systems so as to form new systems of knowledge. For example, infants at the end of the first year begin to combine their representations of objects, actions, and visual forms to create a uniquely human, productive system of knowledge of object kinds: a system that underlies the explosive development of tool use and artifact concepts in the second year of life (Xu, 2009). Moreover, 4-year-old children combine kind representations with their core representations of number to form the uniquely human system of knowledge of natural number, with its associated skills of counting and symbolic arithmetic (Carey, 2009; Spelke, 2000). Recent evidence suggests that older children combine their core geometric knowledge of places and of forms to construct abstract Euclidean geometry (Spelke, 2011; Dillon *et al.*, *in review*). More speculatively, children may combine their knowledge of living agents and their actions with a sixth system of knowledge, focused on the social world, so as to create uniquely human systems of cooperation and moral evaluation (Spelke, 2010).

These findings shed light on our common humanity. People all over the world, regardless of our specific beliefs and experiences, create our cultures and societies, beliefs and values, with the same tools, upon the same foundations. We have essentially the same interest in and orientation toward the

material world, the living world, and the abstract world of mathematics. Evidence is beginning to suggest, moreover, that people share a common view of the social world. When we go beyond intuition, moreover, we use the same productive cognitive capacities to extend our understanding and create systems of knowledge from formal mathematics to morality. A rich, shared nature unites us.

From this conclusion comes the puzzlement that led me to consider the developmental roots of human social divisions. All over the world, human adults appear to focus more on our differences than on our common humanity. History and contemporary life are marked by potent divisions and conflicts between human groups. The bases for these divisions are diverse, including race, ethnicity, religion, language, national identity, and social status. In all these cases, people go beyond their families and immediate communities and identify and associate with larger groups of individuals who are not personally known to one another but who share a common race, religion, nationality, or some other attribute. In some cases, identification and association with a large group is accompanied by antagonism toward other groups of individuals who differ on one or more of these dimensions. I do not find it surprising that humans around the world make and honor personal commitments to known others, helping family and friends and defending them from harm. Why, however, do we divide the human world into larger social groups, bringing to these groups similar patterns of commitment and conflict?

This question is especially pressing at the present time, because our species faces momentous problems that can only be solved by setting aside our differences and acting collectively to address problems that threaten our survival. We must stop the degradation of our planet, confront global threats to health, and defuse political and economic conflicts that could have worldwide repercussions in this nuclear age. To accomplish any of these tasks, I believe we need a better understanding both of the psychological forces that predispose us to create large-scale social divisions and of the cognitive resources that we can harness to overcome or manage them. Just as studies of infants and children have shed light on the nature, sources, limits, and resilience of our conceptions of objects, living beings, and mathematics, I hope that studies of infants and children will shed light on the nature, sources, limits and strengths of our conceptions of the social world.

Social preferences in infancy

It is evident to the most casual observer that infants, from birth, are bathed in social experience. Given a choice, infants would almost always

rather engage with people than with any other objects or events. Within the first few days of life, infants recognize the faces of their caregivers and the sounds of their speech (see Mehler & Dupoux, 1994). They detect when another person is looking at them and respond with heightened attention (Farroni, Simion, Csibra & Johnson, 2002). If a person gazes at them and then makes a social overture (a facial expression, a vocal exclamation, or gesture of the hand), infants tend to reproduce that gesture (Meltzoff & Moore, 1977), mirroring the expressions of their social partners much as do adults (Chartrand & Bargh, 1999).

In the first months of life, infants also begin to distinguish among people whom they encounter for the first time, based on their appearance. Research from a number of laboratories has probed 3-5 month old infants' reactions to four human social distinctions that have received high attention from social psychologists, and that are visually marked on the human face: distinctions of attractiveness, age, gender and race. In these studies, infants are presented with pairs of photographed faces of unknown people that vary on one of these dimensions, side by side, and their looking times to each face are measured and compared. When two faces differ in age or attractiveness, infants tend to look longer at the younger or more attractive one (Brooks & Lewis, 1976; Langlois, Ritter, Rogman & Vaughn, 1991). When two faces differ in gender, infants looked longer at face of the same gender as their primary caregiver (Quinn *et al.*, 2002; Ramsey, Langlois & Marti, 2005). When two faces differ in race, infants look longer at faces whose race matches that of their families and community (e.g., Bar Haim, Ziv, Lamy & Hodes, 2006).

There are reasons to doubt, however, that these early predispositions are roots of later social divisions and conflicts. First, looking preferences need not be a sign of social preferences. Instead, they may reflect effects of experience on perceptual skill: infants may look longer at faces that are more familiar because those faces are easier to process. Second, the social divisions that fuel wars and other conflicts almost always cross-cut distinctions of attractiveness, age, and gender, and they usually divide human groups more finely than does race, along lines that are difficult or impossible to discern simply by looking at a face. Do infants distinguish between unfamiliar people on the basis of any information that might connect to our mature propensities to divide the social world into internally cooperative and externally competitive groups?

Our first studies, conducted by Katherine Kinzler, focused on a dimension to which we knew infants were sensitive from birth: language and accent. In one study, Kinzler presented 5-month-old infants with

videotaped events showing two unfamiliar people, looking and speaking to the camera as if they were speaking to the infant, in alternation. The two speakers in fact were bilingual in English and Spanish, and each spoke in one of those languages to the infants, who lived in the U.S. in monolingual English-speaking families. Building on the visual preference methods just described, Kinzler tested infants' looking preferences between these two speakers both before and after they addressed the infant: At the beginning and ending of each experiment, the two people stood silent and smiling, side by side, and infants' looking times to each of them were compared. Infants looked equally at the two people at the outset (before they spoke) and during the speaking episodes (watching each person throughout the time that she addressed the infant). At the end of the study, however, infants looked longer at the person who had previously spoken in their native language (Kinzler, Dupoux & Spelke, 2007). Infants' preference for the native language, observed soon after birth (Mehler *et al.*, 1988), here led to a preference for a silent, socially engaging person who previously spoke in that language.

In subsequent studies, infants showed this preference when their native language was paired with faces but not with other visible objects. Moreover, the preference was observed with people whose speaking movements were accompanied by native-accented speech but not by people whose speaking movements were accompanied by familiar or novel inanimate sounds. The preference also was not observed when the videotaped faces and voices were presented in reverse, producing auditory stimulation with the spectral and gross temporal properties of speech, but that does not sound like speech to adults and is not processed as speech by infants (Dehaene-Lambertz, Dehaene & Hertz-Pannier, 2002). Above all, the preference was observed not only when two people spoke to infants in different languages but when both spoke in the infant's native language, with different accents. In this experiment, separate groups of infants in the U.S. and in France were presented with videotaped events depicting the speech of a native speaker of American English and a native speaker of French. Each speaker addressed the monolingual American infants in English and the monolingual French infants in French; infants therefore heard only their native language, spoken either with a native or foreign accent. The infants in both countries showed high and equal looking at the two speakers during both the initial silent presentation and the speaking episodes. After the speaking ended, however, they looked longer at the silently smiling person who had previously addressed them in their native accent. Language and accent consistently influenced infants' looking preferences.

Research by Gaye Soley revealed a further distinction that modulates young infants' looking preferences between unfamiliar people: the songs that they sing (Soley, 2012). Using Kinzler's method, Soley presented 5-month-old infants with videotaped events in which two speakers of their native language sang different songs to the infant. One person sang a song that the infants' parents reported was familiar to them, whereas the other person sang a song of matched rhythm that was unfamiliar (in different studies, the unfamiliar song either had a simple tonal melody or a more complex, atonal melody). Infants looked equally at the two people both during the initial preference test and during the singing, which elicited high attention regardless of the song. In the final test, however, infants looked longer at the person who had previously sung the song that was familiar to them. Interestingly, no such preference was found in a third study, in which the two people sang unfamiliar songs whose melodies were either tonal or atonal. Infants showed looking preferences between two now-silent people only when one person had sung a song that they knew.

Thus, infants show looking preferences for faces on the basis of race, gender, language, accent, and song. In all of these cases, infants look longer at the face whose properties are more familiar. But are any of these looking preferences indicative of social preferences? Moreover, are these reactions found only in infants, or do they endure over development? To address these questions, I turn to studies of older children and to more direct measures of social preference and social engagement.

Preferences of young children for speakers of their language

Kinzler and her collaborators have studied the effect of language on social preferences using diverse methods at ages ranging from 10 months to 6 years. I begin with a study of 10-month-old infants. At the end of the first year, infants begin to share attention to objects and with their social partners (Tomasello, 2008), and object offerings begin to have social meaning. Whereas younger infants respond to toy offerings based only on the properties of the toys, 10-month-old infants assess as well the properties of the person who is offering a toy to them, as if the toy offering were a social overture. Building on these findings, Kinzler and Emmanuel Dupoux, together with Justin Halberda, developed a new method to assess infants' social preferences, focusing on their selective acceptance of toys offered by two different people (Kinzler *et al.*, 2007).

Separate groups of French and American 10-month-old infants were presented with the same videotaped events in which native speakers of French and English alternately spoke to an infant in the speaker's native

language. Then the two people appeared, side-by-side and silently smiling, and each held up an identical toy and offered it to the infant. As each person extended her toy toward the infant, real versions of the two toys moved into view in front of the video images and came to rest in front of the infant, who was allowed to reach for them. French infants reached primarily for the toy offered by the person who had previously spoken in French, and American infants reached primarily for the toy offered by the person who had previously spoken in English. Thus, infants preferentially engaged with the person who had addressed them in their native language.

Kinzler and Kristin Shutts next asked whether infants would selectively learn about objects from native speakers. In two studies, infants viewed videotaped events in which speakers of English and French addressed the infant and then endorsed two different toys or foods. Then infants were allowed to choose between the pair of toys or foods for themselves. At 10 months, infants chose a toy of the type that had been recommended by the native speaker (Kinzler, Dupoux & Spelke, 2012). At 12 months, infants chose to eat food of the type that had been recommended by the native speaker (Shutts, Kinzler, McKee & Spelke, 2009). By the end of the first year, therefore, infants selectively favor the endorsements of others who share their language.

For 2-year-old children, Kinzler devised a different method, focused on children's preferential giving of objects to others (Kinzler *et al.*, 2012). Children living in France and the U.S. were taught a giving game, in which they saw two cartoon characters, side by side on a large video screen, with a real box in front of each character. Children were handed a toy and were encouraged to give it to the character of their choice by putting it inside that character's box; when they did so, the character moved happily in response. After giving toys to each character, the characters were replaced by films of the two women speaking in turn to the child in French and English. Then the women appeared together in silence, and children were handed a toy to give to one of them. Like the cartoon characters, each woman responded silently with a happy gesture and smile when given a toy. The children gave toys primarily to the person who had previously spoken to them in their native language. Although both people were silent and smiling throughout the time that the toddlers handled an object, the language they had previously spoken modulated the toddlers' acts of giving.

With Kathleen Corriveau and Paul Harris, Kinzler tested older children's propensity to learn from others who share their accent with a more explicit measure of selective learning (Kinzler, Corriveau and Harris, 2011). Four- and 5-year-old children were presented with two people who spoke to them in their native language, one with a native and one with a foreign ac-

cent. Then a new object was presented, and children were given the choice to ask one of the people about its function. Children preferentially asked the person who had spoken with the native accent. Finally, children viewed two silent films in which each person demonstrated a different function for the object, and they were asked what they thought its true function was. Children preferentially chose the function that had been demonstrated by the native speaker. At the end of the preschool years, therefore, children still learn selectively from those who share their native accent.

Finally, Kinzler and Shutts tested children's social preferences at 5 years of age with a more explicit measure of social preferences (Kinzler, Shutts, DeJesus & Spelke, 2009). American children were presented with still photographs of other children of the same age, gender and race. An experimenter pointed to each photographed child in turn, invited the participant to listen to that child's voice, and then played a short recording of a child's speech. After the child participant heard one target child speak in their native English with an American accent, and the other child speak either in French or in French-accented English, the experimenter asked which child he or she would rather have as a friend. Children reliably chose as a friend the child who spoke in their native language with a native accent. Indeed, they showed as strong a preference for the native speaker when the contrasting speech was French-accented English as when it was French. In both cases, however, it was possible that children's choices reflected a decision to engage with the person whom they could better understand. A third experiment investigated this possibility by presenting American children with two target children who spoke with French accents, one in French and the other in English. When asked whom they understood, the children chose the French-accented speaker of English. When asked whom they preferred to have as a friend, however, the children chose between the two target children at random. Children's selective association with speakers of their native language and accent evidently does not stem from a strategic choice to engage with people whom they can understand. Instead, children show a social preference for native language speakers.

These findings suggest that language is more than a medium of communication and a critical tool for thought. Language carries social meaning for infants and children. That suggestion is reinforced by research by Kuhl, Tsao & Liu (2003), showing that infants learn language primarily in a social context, from a person with whom they are actively and directly engaged. I will return to the social meaning of language later in this discussion, after considering children's developing social preferences between unfamiliar people who differ on other dimensions.

Preferences of young children for members of their race

While completing their studies of language-based social preferences, Kinzler and Shutts used the same methods to investigate children's social preferences between people who differ in race. Kinzler's first studies focused on 10-month-old infants and used the toy choice method described above, this time presenting videotaped events depicting two women who differed in race (White vs. Black). In one version of the study, both women were presented silently throughout the study, smiling at and gesturing to the infant in alternation and then simultaneously offering toys. In a second version of the study, both women spoke to infants in the same, native language. The study was conducted with infants living in families whose members were White, in two communities in which White people predominated. The findings of both studies contrasted with the findings from the studies presenting speakers of different languages. Infants accepted toys equally from the two women, showing no social preference for the person of their own race (Kinzler & Spelke, 2011).

Kinzler next tested for race preferences in two-year-old children from the same communities. Toddlers were taught the giving game with cartoon characters, as in the study of language preferences, and then were presented with the same two women of different races. Unlike toddlers presented with women who spoke different languages, these toddlers gave toys equally to the women of the two races (Kinzler & Spelke, 2011). At two years of age, children still showed no social preferences between two unfamiliar people on the basis of their race.

In a series of studies, Kristin Shutts tested for race preferences in 3- and 4-year-old U.S. children living in White families, using simple, explicit tasks. In one study, children were shown photographs of two target children of different races but the same age and gender (or, in a different condition, two children of different genders but the same age and race), and they were asked whom they would prefer to play with or to invite to their homes (Shutts, Roben & Spelke, in press). In another study, each of two target children differing in race or gender endorsed a different toy, food or game, and participant children were asked which toy, food or game they would prefer for themselves (Shutts, Banaji & Spelke, 2010). By both measures, 3- and 4-year-old children showed preferences for other children of their own gender. This finding is consistent with longstanding findings that children of this age tend to associate with others of their own gender (Maccoby, & Jacklin, 1987), and it shows that children understood and were engaged by these questions. In contrast, children showed no race preferences at 3 years of age. A year later, race preferences emerged on some measures but not

others. Compared to language, race begins to influence social preferences considerably later in development.

Finally, Kinzler and Shutts tested for race preferences in 5-year-old children, using child photographs and the explicit preference method used in their studies of language-based social preferences. In contrast to the younger children, these White children reliably tended to choose target children of their own race as friends, when the target faces appeared with no language. These findings and others (Aboud, 1988; Hirschfeld, 1996) reveal that sensitivity to race develops by the end of the preschool years. Accordingly, Kinzler and Shutts conducted a final experiment that pitted race against accent. A new group of children saw photographs of the same Black and White children, now accompanied by voice clips in which the Black child spoke English with an American accent and the White child spoke English with a French accent. In this study, the White, American participants showed a reliable preference for the Black, native-accented child over the White, foreign-accented child. Accent trumped race in guiding the social preferences of these children.

Because all of the above studies were conducted on children living in primarily White, monolingual communities, further experiments by Shutts and Kinzler investigated the generality of their findings by testing multilingual children in South Africa, a country with 11 official languages, whose population was segregated, until recently, into four distinct racial groups. Contemporary South African children live in rich multilingual environments; the experience of encountering speakers of other languages therefore is far more familiar to them than to most American children. Because of the country's history of racial apartheid, moreover, children might be expected to show heightened awareness of race. Nevertheless, children in South Africa showed social preferences that were similar to those of their American counterparts. Like children in the U.S., South African children showed reliable preferences for speakers of their native language, relative to speakers of French, a language that is not native to South Africa (Kinzler, Shutts & Spelke, in press). Moreover, South African children of three different racial groups showed little evidence of favoring members of their own racial group (Shutts *et al.*, 2011). Interestingly, both language preferences and race preferences showed some effects of social class: South African children tended to prefer other children whose language or race suggested greater wealth or higher status (see also Olson, Shutts, Kinzler & Weisman, 2012). In South Africa as in the U.S., however, shared language was more powerful than shared race as an influence on children's social choices.

These findings offer a different perspective both on studies of young in-

infants' looking preferences between different faces and on the theory that social preferences are rooted in a predisposition to prefer that which is familiar. Young infants, we saw, look longer at faces of the more familiar race as well as at people who previously spoke in a more familiar language and accent. These different dimensions of familiarity do not, however, appear to have the same social meaning. Although White faces are more familiar than Black faces to the White infants in these studies, infants and young children show no social preference for people of the more familiar race: they do not accept toys more readily from same-race people, they do not place greater trust in the endorsements that same-race people give to objects or foods, they do not offer more gifts to same-race people, and, at 3 years, they do not express a greater desire to befriend same-race people. In contrast, children prefer speakers of their native language by all these measures. Their social preferences between unfamiliar individuals seem not to stem from a general tendency to orient to the familiar, but from something else.

What propels these children's social preferences? Here I focus on one possible reason for the power of language to convey social distinctions. Languages, dialects, and accents are learned from other people over the course of human social interactions. As I noted, infants do not readily learn languages presented outside a social context (Kuhl, *et al.*, 2003). Until the last century, moreover, people had no opportunity even to hear language from non-social sources such as a radio: languages were produced only by living people, and usually only when those people interacted with one another. Thus, a person's language and accent depends on the language and accent of the people with whom he or she has directly engaged, over the course of a lifetime. Language and accent are markers of one's social history. When an infant or child encounters another person who speaks like the members of his or her family and community, she may infer that a social chain connects this person to others who speak in the same way. Indeed, prior to the last century, a child could safely infer that a social chain of some length connected such a person directly to herself and her family.

If children are predisposed to favor unknown people who speak their language because such people are likely to know people that the child knows, then language may not be the only factor that modulates young children's social preferences. Children might also be predisposed to favor unknown people who share beliefs or practices that are learned from other members of their community. For example, children might show social preferences for others who share their knowledge of music. Like language, contemporary children learn songs primarily from other people who sing to them. Until the last century, moreover, children and adults throughout the

world learned music only from direct contact with other people who sang or played it. We have seen that infants show looking preferences for those who sing the songs sung by others in the infant's social world. Does music carry social meaning for young children, and if so, does its meaning stem from the status of music as a product of shared cultural knowledge?

Preferences of young children for those who share their cultural knowledge

Gaye Soley (2012) attempted to shed light on these questions through studies of the effects of music on the social preferences of 4-year-old children. In her first study, she presented children with photographs of two target children, accompanied by two songs. Both songs had melodies that are typical of western music, but one was chosen so as to be familiar to the participant child, whereas the other was not. Each song was described as the favorite song of one of the target children. Then children were asked which child they would rather have as a friend. These children chose the child whose favorite song was known to them.

Why did children do this? In describing a song as a child's favorite, this initial experiment conveyed both that the target child knew the song and that he or she liked it. Soley conducted three more experiments to tease apart these factors. In each of these studies, the experimenter presented children with photographs of two target children and played just one song. On half the trials, the song was familiar to the participating children; on the remaining trials, it was novel. Then the experimenter said that she had played the song to the two children in the photographs, and she described the reactions of each target child to the song. In one study, she reported that one child knew the song, and that the other child did not know it, but knew other songs. In a second study, she said that one child liked the song whereas the other child did not like it, but liked other songs. In the last study, she said that one child knew the song but did not like it, and that the other child had not heard the song before, but liked it. After each description, the experimenter asked the participant which child he or she would prefer to have as a friend.

Results were clear: children chose to be friends with the target children whose musical knowledge aligned with their own. In the first study, they preferred children who knew the songs they knew, and children who were ignorant of the songs they did not know. In the second study, the participating children did not differentiate between the target children who liked and disliked the songs that were familiar to them. Instead, children tended to like other children who liked any songs, familiar or unfamiliar. And in the third study, participant children preferred children who knew but did

not like the familiar songs, and children who liked but did not know the unfamiliar songs. Like shared language and accent, shared musical knowledge consistently influenced children's social preferences.

These findings suggest that children favor others who share their cultural knowledge. In turn, this finding accords with the hypothesis that children use music and knowledge not to divide the world of strangers into different groups, but rather to determine whether people whom they meet for the first time are likely to be members of their own immediate community, and to know the people that they know. Music and language influence children's social choices, I suggest, because a person who shares the accent or music of one's friends and family was likely, through most of human history, to be a part of the infant's social world, connected to the infant by a direct chain of social communication and interaction. In the last studies to be described, I turn to our newest work, asking whether this tendency extends from shared language and musical knowledge to shared beliefs. I focus on a powerful set of beliefs that, like language and music, pass from one person to another through social communication: beliefs at the center of formal religions.

Religion is an intense, multifaceted force in the lives of adults and children. Like language and music, it is both universal across human societies and variable across different human cultural traditions. Until recently, children's understanding of religious ideas, and their social preferences for people with differing religious faiths and practices, had received little study. Interest in the developmental psychology of religion recently has begun to increase, but it supports few firm conclusions at this time. My own studies, with Larisa Heiphetz and Mahzarin Banaji, support some tentative suggestions concerning the development of children's social preferences for others who share their religious beliefs and practices.

One series of studies, conducted with 6- to 8-year-old children, used a method similar to that of Shutts and Kinzler (Heiphetz, Spelke & Banaji, in press). Children were introduced to two target children, presented in photographs. One child was described as Christian and was said to engage in a series of Christian practices that are familiar to U.S. children (e.g., painting eggs on Easter). In one study, the other child was described as Jewish and was said to engage in practice that also were familiar to most of the children (e.g., lighting candles on Hanukah). In the other study, the second child was described as Hindu and was said to engage in practices that were not familiar to these children (e.g., lighting lamps on Diwali). Then children were asked whom they would prefer as a friend. Christian children showed no explicit preferences between the Christian and Jewish children, but they showed a weak preference for a Christian child over a Hindu child. Thus,

social preferences based on religion were beginning to appear at this age, distinctly later than preferences based on language or music.

In the next study, with Paul Harris, we asked whether 6- to 9-year-old children would show stronger preferences for those who shared their religion if they were told about target children's beliefs rather than their practices (Heiphetz, Spelke, Harris & Banaji, under review). Moreover, we investigated whether children responded to shared religious beliefs differently than to shared beliefs of other kinds. At the start of this study, we asked children questions so as to assess their own beliefs about matters of fact (e.g., Which do you think is the longer river: the Nile or the Amazon?), of taste (e.g., Which do you think is the better fruit, strawberries or bananas?), and of faith (e.g., When people pray, do you think that God hears them, or do you think that only other people hear them?). Next, we showed children pictures of pairs of target children, one of whom was described as holding the same belief as the child and the other as holding an opposing belief. Children showed reliable preferences for other children who shared their beliefs in all three domains, including the domain of religion. Religion did not appear to hold any special status for the children, however: children chose as a friend the target child who shared their factual beliefs and opinions as reliably as the target child who shared their religious beliefs.

Our studies provide no evidence, thus far, that shared religious beliefs have special importance for children. Moreover, the earlier emergence of a predisposition to endow expressions of belief with social meaning remains unexplored. Nevertheless, this research joins with the studies of shared musical knowledge to suggest that children value others who share their knowledge of the things that people typically learn from other people. For children, shared knowledge may be an indicator of a shared social history.

From family and community to larger social groups

In summary, research on infants and children suggests a developmental progression in children's social preferences between other people whom they do not know. Beginning in infancy, children prefer others who speak in the language and accent, and sing the songs, of the people they know best. At 4-5 years of age, children begin to prefer others who share the race of the people they know best. And by 6-9 years of age, they prefer others who share their beliefs in a range of domains. What aspects of our social nature might explain these findings?

I suggest that all these findings stem from a predisposition to favor unfamiliar others who are likely to be socially connected to the infant's own family and community. In ancestral environments, only other people who

knew members of a community would have spoken in the dialect and accent of that community. Moreover, only such people were likely to know the songs sung by members of that community, the stories and myths recounted by members of community, or the factual knowledge that members of that community gained through their collective experience. Shared language, music and beliefs may be socially meaningful to children because they have served throughout most of our species' history to indicate a direct social connection between the new, unfamiliar people that we encounter and the known, trusted members of our families and their friends. Shared language and music may gain social meaning for children earlier in development than do shared beliefs or rituals, because children begin to learn their native language and songs early in the first year, before they comes to master the community's beliefs.

As children grow, they may discover further attributes that distinguish members of their own community from others. To the degree that communities and social networks are racially segregated, children may learn to use race as an indicator of social allegiances (Cosmides, Tooby & Kurzban, 2003). When learned distinctions of race conflict with our more deeply rooted distinctions based on language, however, language trumps race not only for children, as we have seen, but for adults (Pietraszewski, personal communication).

In a contemporary context, language, music, and other forms of cultural knowledge no longer serve reliably to distinguish those who are, and are not, members of the child's immediate social world. With the development of long-distance travel, colonization, and telecommunications, languages and cultural products have spread far beyond the bounds of any personal social network. With recordings, books and other media, people from widely different cultures and social groups now learn the same languages, songs and stories. Thus, tendencies that could have evolved to allow humans to identify and favor those in their immediate families and communities now will tend to pick out larger groups of unknown individuals. Large-scale social groupings based on language, religion, or ideology might result in part from these tendencies.

Large-scale social groupings that bring together people who share few or no family and direct community ties also might be solidified when institutions use notions of family and community as metaphors. For example, some of the world's most successful and widespread religions use the language of family to unite their members, describing their adherents as brothers, sisters, or children of God. Nations may use the language of community, focusing on cooperation, obedience or mutual personal commitment, to

foster cohesion among their citizens. Much that is good has emerged from such large-scale human groups. Nevertheless, the extension of our natural, early-developing preference for and commitment to our families, friends, and immediate communities to larger groups of unrelated and unknown individuals also brings problems. I end by considering these problems, and the ways in which research on human nature and its development might help to mitigate them.

Core knowledge and human progress

Humans live in an increasingly interconnected world, in which we face common, pressing problems demanding world wide cooperative action. Such problems can best be addressed if people throughout the world recognize our common needs, values and outlook, beneath the divisions of language, race, and belief that direct the interests of one human group against those of others.

Numerous strands of research in the human sciences suggest that this ecumenical stance does not come easily to our species. I have focused on one such strand. A predisposition favor those who speak like the members of our families and community would, in past times, have oriented children toward other people who likely were socially connected to their friends and families. Today, however, it divides the social world into larger groups that sometimes fuel broader conflicts. Others have pointed to our evolutionary heritage as members of small, internally cooperative and externally competitive coalitions, as a source of social propensities that fostered our success in the past but are ill suited to the challenges we face in our contemporary, interconnected world. Can our human minds, shaped by our common history and prehistory in a very different social setting, rise to the challenges that we face today? Research on children's cognitive development suggests some grounds for optimism.

Although human knowledge builds on cognitive systems that emerge in infancy and were shaped by human evolution, the knowledge that we gain has served, again and again in our intellectual history, to carry us beyond these core systems. By constructing new systems of knowledge, spanning several core systems, we can overcome some of the limits of these systems and correct some of the misconceptions to which they give rise.

Consider, for example, historical changes in human conceptions of physical objects. Until the middle ages, conceptions of the physical world built on intuitions that adults share with human infants, and that spring from two core systems for representing manipulable objects and navigable places. According to the first of these systems, objects move only on contact with

other objects: they do not affect each other's motion at a distance. According to the second of these systems, objects and living beings are supported by the ground: a planar surface over which we move and within which we locate ourselves and other objects. These notions began to be overturned, however, when ancient explorers and astronomers discovered that the earth is not flat but round, and when more modern scientists discovered that the earth is a planet orbiting around the sun in response to its gravitational pull. Both the notion of movements on the earth as planar displacements and of causal interactions precluding action at a distance were supplanted by the development of Newtonian mechanics.

The pull of core conceptions still can be felt in children's learning about the physical world. Studies of elementary school children's conceptions of the shape of the earth provide an example (Vosniadou & Brewer, 1992). When such children are asked to describe the shape of the earth in words, they typically report that it is round, but what does this answer mean? Vosniadou and Brewer asked children to draw the earth or model its shape with clay, and to indicate where people stand upon it. Children inventively produced a variety of objects that one could describe as round, but that had a flat upper surface on which the people stood: a pancake-shaped earth, a flattened or hollow sphere with a horizontal top, or an arrangement of two earths: a round, uninhabited planet in the sky and a flat surface below it on which people stood and moved. Children who had been told that the earth is round assimilated that information to their core conceptions of objects and places, resulting in a variety of ingenious misconceptions. Just as clearly, however, children and adults eventually give up their misconceptions and embrace better ones. Good teachers, aware of both the strengths and the pitfalls of children's early developing intuitive conceptions, foster this process. Later in their education, these students will build on their conceptions of manipulable objects, navigable places, and number to embrace systems of knowledge, such as classical mechanics and its successors, that unify these systems and overcome some of the conspicuous misconceptions that arise spontaneously from core systems of knowledge.

As we are inclined to conceive of the earth as flat, we are inclined to conceive of the people who share the earth with us as importantly different from one another, depending on their history, culture, language, and systems of belief. Research in cognitive science suggests, however, that intuition exaggerates these differences, and that humans throughout the world share the same fundamental conceptions, values, and concerns.

Over the course of human history, we have been slower to recognize our misconceptions of the social world than to recognize our misconcep-

tions of the physical world. Two factors, I suggest, may have slowed the advance of progress in mutual understanding. First, social conceptions, even erroneous ones, tend to act as self-fulfilling prophecies. If the members of two groups each suspect that those in the other group reject and therefore threaten their values, they are apt to act in ways that will confirm the opposing group's suspicions. Second, the human mind is more complex than the apples and planets of classical mechanics. It has taken longer for brain and cognitive scientists to discern its outlines.

At present, however, the study of the human mind has progressed, as the research presented at this workshop attests. Moreover, the fates of all humans are ever more deeply interconnected, increasing the need for, and importance of, this new understanding. I believe that we can use our capacities for cognitive progress to recognize our social misconceptions, and to develop a sense of human nature that is both more accurate and more adequate to our current challenges. I hope that research in the human sciences will be helpful in this regard.

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