

12—

## **How Biological Is Essentialism?**

Susan A. Gelman and Lawrence A. Hirschfeld

One of the most striking qualities of living things is their constancy over variation, both variation over time and variation over individuals. Thus a newborn infant becomes an adult, a sprout becomes an apple tree, a caterpillar turns into a butterfly—and these are not just accidental, idiosyncratic changes but ones that characterizes the life history of each and every adult human, apple tree, or butterfly. Similarly a hummingbird, ostrich, falcon, and sparrow differ to an extraordinary degree from one to another, yet they all share certain core properties that allow us to say that they are all birds (and that bats are not). An intuitive notion of "essence" has been posited to account for how humans understand this constancy. According to this view, humans are predisposed to notice that members of a biological kind have a hidden essence that remains unchanged across outward changes such as growth and reproduction (Atran 1990; Pinker 1994). It is thus perhaps not surprising that essentialism has been argued to be a central component of folkbiology, along with structured taxonomies (Atran 1990; Berlin 1978) and causal explanatory frameworks (chapter 11, this volume).

We resist tying essentialism too closely to folkbiology, however, for several reasons. First, the notion has a long history of links to other domains, and indeed much of the evidence for essentialism comes from outside the domain of folkbiology. People appear to attribute hidden essences to social categories such as race, gender, and personality (see Allport 1954, Banton 1987; Stoler 1995 for race; Fuss 1989 and Taylor 1994 for gender; and Gelman 1992 for personality). Racial, gender, or personality "essences" may be analogical extensions from a folkbiological notion (Atran 1990; Guillaumin 1980), but race, gender, and personality are not themselves biological categories. Similarly, claims of essentialism in language extend to words such as proper names (Kripke 1972) and artifacts (Putnam 1975). Given these controversies, the present chapter examines the evidence for essentialism and addresses whether essentialism is plausibly a core component of folkbiology: whether it is an untutored belief, universal, and/or biologically specific.

First, what is an essence? As noted above, in the realm of folkbiology, it is taken to be that hidden, identity-determining aspect of an organism that remains unchanged over growth, morphological transformations, and reproduction. Pinker (1994) refers to the essence as what determines that "a caterpillar, chrysalis, and butterfly are in a crucial sense the same animal" (p. 422). However, outside the realm of folk biology, the range of uses of "essence" and claims about its origins are staggeringly broad. When we co-taught a graduate seminar in 1996 on essentialism, and read sources from ancient Greek philosophers to postmodern feminist theorists, we were overwhelmed by the scope, richness, and variety in arguments about essentialism. We read authors who treated

essences as a property of the real world, others who treated essences as an inevitable product of the human mind, and still others who treated essences as a historical construction imposed on people for political ends. Some scholars asserted that essentialism is a core component of a naive-biology module; others, that it is domain-general property of language.

Reeling from the variability and seeming contradictions in these claims, the students in the seminar repeatedly and persistently asked us to define "essence," and to answer once and for all the question of whether the authors on the syllabus were all talking about the same thing. While struggling to address these questions, we also found ourselves being reminded of other curious phenomena *not* discussed in readings on essentialism yet sharing many of its features—including contagion, contamination, art forgeries, and the vast sums people pay to purchase Jackie Onassis's faux-pearl necklace. Are these phenomena interpreted within the same mode of reasoning, and if so, are they biological?

This chapter is, in a sense, a response to the seminar. We will argue for a notion of "essence" that is both broader and more contained than we have found in the literature. It is more contained in that some of the senses in the literature, though relevant to metaphysical discussions, have little relevance for psychological or anthropological portrayals. At the same time the interpretation we propose in this chapter is broader because biological essentialism appears to be one of a class of phenomena in which small causes are thought to have powerful, far-ranging effects. Examining essentialism within this broader set also has implications for the issue of domain specificity.

## 12.1— Containing the Notion of Essence

One of the reasons the notion of essence is interesting is that it is remarkably pervasive despite its conflicts with reality. It has been pervasive across time (discussed at least over the past 2,400 years), across radically different philosophical traditions (e.g., embraced by both Plato and Locke), and across cultures. However, biologists insist that biological species do not truly have essences (Sober 1994; Mayr 1982), and certainly other essentialized categories such as race lack biological coherence (Hirschfeld 1996). Still, despite the fact that essentialism may yield little insight about the nature of the world, it promises to yield insights on how the human mind constructs reality, a point to which we return later in the chapter.

Just how pervasive the notion (of essence) is depends largely on whether different people are referring to the same thing. There are at least three distinct types of "essence" in the literature: sortal, causal, and ideal (see also Hirschfeld 1996).

1. *Sortal essence.* The sortal essence is the set of defining characteristics that all and only members of a category share. Aristotle in *Metaphysics* makes a distinction between essential and accidental properties (see Keil 1989 on defining vs. characteristic properties) such that the essential properties constitute the essence. For example, the essence of a grandmother would be the property of being the

mother of a person's parent (rather than the accidental or characteristic properties of wearing glasses and having gray hair; see Landau 1982). Sortal essence is a restatement of this classical view of concepts. Meaning (or identity) is supplied by a set of necessary and sufficient features that determine whether an entity does or does not belong in a category (Smith and Medin 1981). Specific essentialist accounts provide arguments concerning which sorts of features are essential.

2. *Causal essence.* The causal essence is the substance, power, quality, process, relationship, or entity that *causes* other category-typical properties to emerge and be sustained and confers identity. Locke in his *Essay Concerning Human Understanding* (bk. 3, p. 26) describes it as "the very being of anything, whereby it is what it is. And thus the real internal, but generally . . . unknown constitution of things, whereon their discoverable qualities depend, may be called their essence." The causal essence is used to explain why things are the way they are. Whereas the sortal essence could apply to any entity (pencils, wastebaskets, tigers are all categories for which certain properties may be "essential," i.e., crucial for determining category membership), the causal essence applies only to entities for which inherent, hidden properties determine observable qualities. For example, the causal essence of water may be something like H<sub>2</sub>O, which is responsible for various observable properties that water has. Note that the cluster of properties "odorless, tasteless, and colorless" is not an essence of water, despite being true of all members of the category WATER, since the properties "odorless, tasteless, and colorless" lack causal force.
  
3. *Ideal essence.* The ideal essence is ideal in the sense of not having a real instantiation in the world. For example, the essence of "goodness" is some pure, abstract quality that is imperfectly realized in real-world instances of people doing good deeds. None of these good deeds perfectly embodies "the good," but each reflects some aspect of it. Plato's cave allegory (in which what we see of the world are mere shadows of what is real and true) exemplifies this view. The ideal essence thus contrasts with both the sortal and the causal essences, which concern qualities of real-world entities.

Accounts differ concerning the question of where the essence (of whatever type) is located. Is it located in the world (metaphysical essentialism) or is it a representation of some sort, either conceptual (psychological essentialism), embedded in language (nominal essentialism), or located in cultural practices (cultural essentialism)? Thus there are at least twelve different senses of "essence":

Table 1. Varieties of essentialism.

	Sortal	Causal	Ideal
Metaphysical	o	o	o
Representational			
Psychological	o	X	o

Nominal	o	<b>X</b>	o
Cultural	o	<b>X</b>	o

We focus on those senses of "essence" marked by the large bold **X**s. Metaphysical essentialism is beyond the scope of this chapter, both because there are compelling reasons to doubt the reality of essences from a biological perspective, as mentioned above, and because current psychological methods are not designed to shed light on these issues. The empirical studies reviewed here focus on beliefs about pigs, for example, not on pigs themselves. We also decline to consider sortal essences, primarily because they seem implausible from both a psychological and a linguistic perspective. Given the past thirty years of research on categorization, it is extremely unlikely that people represent features that can identify all and only members of a category (see Rosch and Mervis 1975 for review), regardless of how confident they are that such features exist (McNamara and Sternberg 1983; Malt 1994).

Ideal essences have been virtually ignored in studies of concept representation (but see Sperber 1975). If anything, people's representations of most object concepts seem to be based on the structure and variability of what they encounter rather than nonrealized ideals. That is, when people are asked to rate the typicality of various instances of a category, their ratings usually reflect central tendencies rather than ideals (Rosch and Mervis 1975). Interestingly, however, other kinds of categories do elicit ideals rather than central tendencies—such as the prototype of a rich person is fabulously rich and not "average" rich (Barsalou 1985), suggesting that it may be feasible to examine notions of ideal essence in some content domains.

## 12.2—

### How Essential Is Essentialism?

Distinguishing among sortal, causal, and ideal versions of essentialism allows us to better assess recent arguments *against* the claim that an essentialist presumption is part of our conceptual repertoire. Specifically, although various lines of evidence argue against essences as determining word use, the findings speak only against the attribution of sortal not causal essences.

For example, Malt (1994) demonstrates that speakers of English use the word "water" to refer to liquids that are not pure H<sub>2</sub>O. Because the most plausible account available for a metaphysical essence for water has been H<sub>2</sub>O, Malt interprets the evidence as damaging to an essentialist theory. <sup>1</sup> Specifically, she has shown that people do not endorse H<sub>2</sub>O as either necessary or sufficient for "water" when the word is used at a superordinate level (including pond water, polluted water, etc.; although her own data suggest that there is a subordinate-level usage, "pure water," which is more or less equivalent to H<sub>2</sub>O). Critically H<sub>2</sub>O represents a sortal not causal essence, and accordingly her study provides evidence only against the classical view of category meaning.

Braisby, Franks, and Hampton (1996) similarly question whether the empirical evidence supports essentialist predictions. The essentialist predictions they consider all target sortal

essences, as can be seen in how they characterize the essentialist view: "Essentialism's proposal [is] that actual essences alone determine a word's reference" (p. 249), and "classification of entities as members or non-members of the kind category will be determined according to their possession of the essence" (p. 251). They examine subjects' intuitions about the application of various category names (cat, water, tiger, gold, bronze, lemon, and oak) following a set of counterfactual demonstrations. For example, in one scenario subjects hear, "You have a female pet cat named Tibby who has been rather unwell of late. Although cats are known to be mammals, the vet, on examining Tibby carefully, finds that she is, in fact, a robot controlled from Mars." Subjects are asked to judge the truth or falsehood of statements such as "Tibby is a cat, though we were wrong about her being a mammal." If being a mammal is an essential feature of cats, then subjects should judge this statement as false. Overall, the results did conform to the essentialist predictions—despite the ambiguity in the questions (e.g., some subjects may have assumed that Tibby is a cat, despite not being a mammal, because this was stated in the first line of the scenario) and despite the heavy information-processing demands (e.g., essentialist responses required subjects to apply double negatives—judging a negative statement ["Tibby is not a cat . . ."] as false). However, the less-than-perfect responses led Braisby et al. (1996) to conclude that "words and concepts are not used in accordance with essentialism" (p. 247). On a *causal* essentialist view, the essence need not provide necessary and sufficient clues for determining reference (see also Medin, 1989), and accordingly the experiments are relevant to a sortal (not causal) essentialist view.

Another objection that has been raised to essentialism concerns the prediction that speakers should treat essentialized categories as having sharp boundaries—something either is or is not a member of the essentialized kind depending on whether or not it has the essential feature. Kalish (1995) conducted a series of experiments examining this question and found that, in general, subjects were willing to rate category membership as "graded" (nonabsolute). For example, subjects judged that a mule is neither entirely a horse nor entirely not-a-horse. Again, we have some disagreements with the specifics of how the study was conducted,<sup>2</sup> but the more general point is that the studies do not test causal essentialism. Specifically, subjects may believe that a certain inner quality or process of inheritance is needed in order for an animal to be a horse, but that in the real world different instances possess that quality or participate in that process to various degrees (e.g., a mule is half-horse because it is literally a hybrid, the offspring of a horse and a donkey). This possibility can be seen most clearly when one considers concepts that are essentialized yet graded, such as kinship. Siblings are more closely related than second-cousins, yet in both cases there is commonly believed to be a shared (family) essence.

### **12.3— Evidence for Essentialist Representations**

In order to make a convincing case for essentialism as a fundamental folk notion, it is obviously crucial to provide evidence regarding the beliefs of ordinary folk. (Here we distinguish between "ordinary folk" and such luminaries as Aristotle, Plato, or Locke.) Although philosophical insights help sharpen questions of what essentialism is, they do

not tell us whether people typically construe the world in these terms. Indeed, the notions sketched above may seem at first arcane and *counter to* common sense. What is commonsensical about invisible qualities that one can never know completely? Here it is important not to confuse the direct observability of the central construct with its status as common sense. Religious concepts provide an apt analogue: God is a mysterious concept, yet one that is readily embraced in folk theories (Boyer 1994).

Indeed essentialism is surrounded by a web of common sense, intuitive beliefs that are fully consistent with it. For example, the appearance- reality distinction posits that reality may be other than what the eyes perceive, and by 4 years of age children firmly grasp the distinction (Flavell, Flavell, and Green 1983). The notion of identity as persistent and resistant to change is also achieved early in childhood (by age 6 or 7 [Kohlberg 1966] if not earlier [Bem 1989]). Children by 2 1/2 or 3 years of age seem to share the belief that the world has natural discontinuities and that "natural kinds" are highly predictive of other properties (Markman 1989; Wierzbicka 1994; Gelman 1999). Furthermore there is evidence that throughout life, people expect and search for causes of events and regularities in the world (Bullock, Gelman, and Baillargeon 1982; Brown 1990). Even the seemingly sophisticated notion that unobservable entities can have massive effects is robust and early emerging, as can be seen with early beliefs about mental states (Gopnik and Wellman 1994). All of these ideas, though not necessarily constituting or causing essentialism, provide a framework within which essentialism can sit comfortably. Thus they provide a plausibility argument for suggesting that essentialism may draw on common sense. We now turn to the evidence, from research on social practices and individual performances, particularly of young children.

### ***Observations of Social Practice***

As already noted, the possibility that each biological species has a unique essence was entertained in literate Western cultures at least as far back as ancient Greece. There is further considerable literature suggesting that peoples the world over produce public representations that either explicitly or tacitly support the claim that essentialism is a widely recurrent strategy for thinking about many aspects of the world (Allport 1954; Guillaumin 1980; Stoler 1995; Fuss 1989; Rorty 1979). How to interpret this recurrence, however, is a matter of some controversy.

One school of thought is that essentialism is universally embraced, in cultures varying widely on dimensions of geography, technology, scientific sophistication, and economy. One form of support for this is indirect, from how people organize their knowledge of plants and animals into classification systems. Atran (1990) notes two distinct aspects of systems of folk biological classification: a taxonomic principle and a causal principle. On the one hand, people classify animals and plants into shallow and ranked taxonomies that exhaustively partition any local environment (Berlin 1978). These classifications are based in significant part on morphological and other structural similarities—as opposed to utilitarian or symbolic associations—between category members. Such taxonomies pull together diverse instances under a single label, thereby treating them as if the same—and this is not the only logical system possible (i.e., the universality is not required by logical constraints). On the other hand, an essentialist causal schema is universally

applied to thinking about the creatures sorted into these taxonomies. According to this schema, members of each taxon share an essence or "nature" or underlying propensity to develop the appearance, behaviors, and ecological proclivities typical of that category.

Atran (1995) suggests that the taxonomic and essentialist principles are related in two ways (indeed Atran et al. [in press] has recently argued that the essentialist principle may be derived from the taxonomic one). First, the essentialist presumption (that holds that any living kind, all things being equal, will develop in a species-typical way) explains how creatures fit into the supposedly well-bounded categories of folk biological taxonomies despite obvious physical aberrations (e.g., three-legged, albino tigers). Second, the categories of folk taxonomies (i.e., the taxa of any given taxonomic array) are generally good predictors of underlying shared properties. It is important to note, however, that though the evidence for universal taxonomic sortings is vast, the evidence for a universal essentialist presumption in folk biology is sparse, consisting of conjecture in Western philosophy and natural science, on the one hand, and vague and passing speculations in the ethnographic record, on the other.

Other sources suggest that whereas the predilection for essentialism may be universal, instantiations of essentialism are culture specific. Thus, although ethnographies report that widely different societies discuss entities that to our minds seem essencelike (e.g., Daniel's [1985] discussion of *kunam* among Tamil-speakers in southern India as compared to Yengoyan's (forthcoming) discussion of blood among the Aborigines of Australia), each system of essentialist belief seems significantly distinct. Still it is the task of ethnographers generally to highlight the distinctiveness of each cultural formation, and from ethnographic data alone it is not possible to determine how widespread these concepts are. More important, it is not yet known if each instance represents the same notion of essences (e.g., the Tamil *kunam* are obtained from contact with the land rather than from inheritance; the *bope* component, which Crocker 1979 describes for the Bororo, are generally found in all animals rather than differing by species). Nonetheless, such appeals to nonvisible, causally efficacious inner qualities are intriguing.

In contrast to universalist claims, relativist accounts posit that essentialism is culturally specific. One set of arguments attempts to demonstrate that essentialism emerged only at particular historical moments (e.g., Rorty 1979), often emphasizing the role that systems of essentialist belief play in supporting and furthering the political and economic aims of specific groups. (Guillaumin's 1980 discussion of racial essentialism and Fuss's 1989 of gender essentialism are good examples.) While acknowledging the specificity of each system of belief, Hirschfeld (1996) interprets the same historic specificity somewhat differently. He notes that while these ideological couplings may be historically unique, they nonetheless all represent cultural or political recruitments of a universal predilection for essentializing human difference.

Another important concern when examining different systems of social practice for universal properties is the possibility that common threads across systems of belief and practice are more apparent than real. Studies of kinship are a case in point. For many decades anthropologists analyzed kinship (i.e., systems of social practice and belief that

organize individuals into groups based on principles of descent and alliance) as if each kinship system were of a universal kind. The major empirical goal was to discover universal principles of kinship. Serious doubts, however, came to be raised about whether or not these various systems of belief and practice were in fact of a single kind (Schneider 1968; Needham 1974). Although this debate is not resolved, at the very least, it highlights the growing consensus among cultural theorists that phenomena may appear quite similar yet represent fundamentally distinct conceptualizations. In any event, we can conclude that while crosscultural investigations of essentialism have the potential to shed considerable light on questions of universality, at the moment the question remains understudied and unresolved.

### ***Individual Performances***

Taken together, the concerns raised in the previous section make clear that more precise data are needed in order to compare across essentialistlike phenomena. Happily such evidence exists. Psychological studies of individual performance provide compelling, although indirect, evidence consistent with an essentialist bias. On these tasks, subjects reveal that they look beyond surface similarity when reasoning about categories. Much of this work is with children, who provide an interesting and strong test, given the demonstrated attention young children pay to outward appearances on a broad spectrum of cognitive tasks (Inhelder and Piaget 1964). Despite their focus on superficial cues in a range of contexts (see Jones and Smith 1993), 2 1/2-year-old children appreciate that animal categories support inductive inferences regarding familiar properties (Gelman and Coley 1990), and 3- and 4-year-olds use categories (animals, plants, substances, and artifacts) to guide inferences about novel properties (Gelman 1988; Gelman and Markman 1986, 1987; Carey 1985)—even when surface appearances compete. Four-year-old children also appreciate the importance of internal, intrinsic causal mechanisms for living things and artifacts. For example, children report that a bird flies because of its heart and muscles, that a car moves uphill because of its motor, and that a flower blooms on its own (Gelman and Kremer 1991; see also R. Gelman 1990). Children also realize that human intervention has limited effects in the natural world (Gelman and Kremer 1991; Inagaki and Hatano 1993). The common thread running through all these findings is that children attribute unseen constructs to account for observable phenomena. See Gelman and Coley (1991) for a more detailed review of these lines of evidence.

Three more direct lines of evidence for essentialism demonstrate that (1) maintenance of identity over superficial transformations, (2) appeal to invisible causal mechanisms, and (3) assumption of innate dispositions or potential among living things.

### ***Maintenance of Identity***

The attribution of an underlying essence allows people to imagine that individuals undergo marked change yet retain their identity. We know that adults in our culture believe that radical changes, such as metamorphosis, are possible (Rips 1989; Rips and Collins 1993). Along the same lines, Keil (1989) found that second-graders (though not preschoolers) realize that animals but not artifacts can maintain identity over such

transformations. Children were shown pictures of animals, then told about transformations performed by doctors that changed the characteristic features of the animal into those of another animal. For example, a tiger had its fur bleached and a mane sewed on, so that it now resembled a lion. Children were then asked whether the post-transformation animal was a lion or a tiger. Second- and fourth-graders maintained that the animal's identity would not change. Importantly, when asked about artifacts, subjects did not show this pattern (e.g., coffee pot could readily be transformed into a bird feeder). This finding indicates an early-developing belief that animals (but not human-made objects) possess essences that are responsible for maintenance of identity.

Subsequent work with younger children demonstrates a similar kind of understanding. When the transformations involve costume changes, even 3- and 4-year-olds recognize that identity is maintained (Keil 1989). In the same vein Gelman and Wellman (1991) used a paradigm very similar to that of Keil but with simpler transformations: Each item had either its "insides" or its "outsides" removed. Test items were selected to be clear-cut examples (for adults) of objects for which insides, but not outsides, are essential. For example, blood is more important than fur to a dog; the engine of a car is more important than the paint. Four- and 5-year-old children treated removal of insides (e.g., blood and bones of a dog) as disastrous to the identity and functioning of an item (e.g., it is no longer a dog, and can no longer bark or eat dog food), whereas removal of outsides (e.g., fur) was not. Children also rely heavily on insides when learning new words; specifically, they are better able to overcome the mutual exclusivity error when learning that animals from contrasting subtypes share internal similarities with one another (e.g., that a flying squirrel has the same internal structure as a typical squirrel; Diesendruck, Gelman, and Lebowitz 1996).

An additional series of studies by Rosengren et al. (1991) examines children's understanding of maintenance of identity over, using the natural biological transformation of growth rather than more contrived situations. Rosengren et al. reasoned that an important piece that may be missing from past research is what *mechanism* is underlying the change. In other words, children may be sensitive to whether the mechanism is a natural biological transformation or one that defies biological laws. The implication is that even though children report that some transformations lead to identity change, they may realize that natural transformations (e.g., growth) do not. To examine this question Rosengren et al. showed 3-year-olds, 5-year-olds, and adults a picture of an animal and told, "Here is a picture of Sally when Sally was a baby. Now Sally is an adult." They were then shown two pictures: one identical to the original and one the same but larger, and were asked which was a picture of Sally "as an adult." At all age groups, subjects tended to choose the larger picture, showing that they expected the object to undergo change in size with growth. Results of another condition showed that by 5 years of age, children realize that growth is inevitable. In this condition children saw a picture of a juvenile of a species that undergoes radical metamorphosis (e.g., a caterpillar). They then saw a picture of the same creature, only smaller (e.g., a smaller caterpillar), and a picture of a larger animal differing in shape (e.g., a moth). Again, subjects were asked to choose which picture represented the animal after it became an adult. Three-year-olds were at chance, but 5-year-olds chose the metamorphosized animal significantly above

chance levels. By the age of 5 years, then, children believe that an individual can naturally undergo even substantial shape changes over time.

Do children have similar expectations about the immutability of social identity? The question is of interest because adults attribute racial and gender properties to hidden essences that are fixed at birth, presumably because adult common sense about race and gender is grounded in biology. It has been suggested, however, that children do not have similar expectations about the immutability of racial and gender identities because they tend to interpret these identities as social rather than biological phenomena (see Katz 1982; Aboud 1988 for reviews). In a series of studies Hirschfeld (1995a, 1996) explored whether preschoolers in fact believe that all social identities are equally changeable. Using children's expectation about natural changes in outward appearance over time, he asked 3-, 4-, and 7-year-olds whether a person's race or physique was likely to change as he or she grew older. Even 3-year-olds believed that race was less likely to change than physique (despite the fact that physique is both inherited and relatively constant over the life span). In another condition Hirschfeld asked children whether parents and offspring were more likely to resemble each other racially or in terms of body build. As they did in the growth condition, even 3-year-olds judged a person's race as more constant than his or her physique. In fact children's inferences about the inheritance of racial and body build were indistinguishable from their inferences about the growth of racial and body build properties, providing evidence that both causal processes (i.e., growth and inheritance) are governed by the same essentialist presumption.

These data are demonstrational in that they constitute an existence proof. The studies conducted by Gelman and Wellman (1991) and by Keil (1989) show that children realize that sometimes, the features most critical to an object's identity may be internal and nonobvious. The experiments of Rosengren et al. (1991) demonstrate maintenance of identity over changes wrought by growth. Hirschfeld's (1995a, 1996) findings reveal that racial identity is treated much like biological category identity, being both fixed at birth and impervious to change over time. In all three cases, children endorse the possibility that objects have important underlying properties. A further question is whether they believe these underlying properties have special causal force.

### ***Causal Explanations***

A critical aspect of essences is their causal force. Locke talks about the essence as the causal mechanism that gives rise to those properties that we can see. If children are essentialists, they should search for underlying causes that result in observable features (e.g., assuming some underlying nature that causes category members to be alike). "Features" include not only perceptual appearances but also behaviors and/or events that are shared by category members. For example, the essence of a tiger causes it to have stripes, large size, capacity to roar, and so on. There is some hint in the literature that children assume that events have intervening causal mechanisms (Bullock, Gelman, and Baillargeon 1982). There is also evidence that when explaining events with no observable cause, children appeal to underlying causes (Shultz 1982; Chandler and LaLonde 1994).

For example, on viewing a radiometer (a device that spins when light is beamed on it), children as young as 4 years of age typically said "yes" when asked if there was "some invisible thing that goes from the light to the propeller." Children impute underlying causes (particularly immanence) for self-initiated movement and do so in a domain-specific way (differently for animals vs. artifacts; Gelman and Gottfried 1996). Children regularly appeal to intrinsic factors even without knowing the internal mechanism (e.g., responding "it just did it itself"). Thus children seem to be displaying a belief in some underlying causal mechanism, without necessarily knowing how that mechanism works.

### ***Innate Potential***

Essentialism encompasses a commitment to a particular kind of underlying causal relation, that is, innate potential, the belief that a set of characteristics will unfold with maturation, even though they show no sign at birth. For example, a lion cub has the potential to grow into something large and fierce, even though it is small and helpless at birth. The fact that such characteristic attributes emerge so predictably suggests that the individual possesses nonobvious, intrinsic qualities. To explain developmental changes like this, we as adults might say that lions have an essential nature that is responsible for how they grow.

To test whether preschool children have an idea of innate potential, Gelman and Wellman (1991) conducted a study that can be thought of as pitting nature against nurture. On each of a series of items, 4-year-old children learned about a baby animal that was raised among members of a different species in an environment more suited to the adoptive species. For example, children first saw a picture of a baby kangaroo, learned that the baby kangaroo was taken to a goat farm when she was a baby, and raised by goats. Children were asked about how the animal would be after it grew up. In this case they heard, (1) Was she good at hopping or good at climbing? (2) Did she have a pouch or was she without a pouch?

Children nearly always answered on the basis of category membership or innate potential. For example, they said that a baby kangaroo raised among goats will grow up to hop and have a pouch. An analogous study with seeds showed similar results, indicating that the results with animals are not simply due to providing the category label—because specifying the origin of a seed does not entail stating its category identity (e.g., "comes from an apple" differs from its original identity of "apple seed" and its future identity of "apple tree"). In addition a seed looks nothing like its eventual end state (plant or tree). Finally the use of seeds allows examination of a very different kind of parent-offspring relationship, in which characteristics cannot be transmitted by means of modeling, reinforcement, or training. Results of this study showed that older 4-year-olds answered primarily on the basis of innate potential. The mixed performance of young 4-year-olds appeared to be due to a less developed understanding of the relation between seeds and plants at that age (Hickling and Gelman 1995). Nonetheless, it is striking that most of the children consistently reported that a seed has the innate potential to develop in accordance with the parent species. Four-year-old children act like essentialists,

assuming that members of a category share an innate potential and that innate potential can overcome a powerful environment.

Carey and her collaborators (Carey and Spelke 1994; Carey 1995; Solomon et al. 1996) cautioned that a biological notion of innate potential is not required to account for these findings and that at least some of them might be attributed to children's expectations that identity is maintained over time (in as much as the animal was labeled as being a member of a particular species, e.g., a kangaroo, children may have assumed that it would continue to have kangaroo properties without reasoning about the mechanism involved). In subsequent studies, however, Hirschfeld (1995a, 1995b, 1996) and Springer (1995) used a procedure in which subjects were *not* told the category identity of the infant. In one series of studies, Hirschfeld (1995a, 1995b) showed preschoolers pictures of two families, one black and the other white, whose newborns were inadvertently switched in the hospital. Each family took home and raised the other's infant. Children were then shown pictures of two school-aged children, one black and the other white, and asked which was the child when he/she grew up and began school. Three-year-olds chose at chance, but 4-year-olds relied overwhelmingly on a nativist (essentialist) reasoning strategy, choosing the child who racially matched the birth parents, not the adopted parents. In a subsequent experiment Springer (1995) replicated this finding and extended it, demonstrating that 5-year-olds believe that not only race but also a range of biological (though not psychological) properties are fixed at birth and immutable over the life span. Here again the data support the essentialist interpretation. Children reasoned that category identity is determined at birth and its development is impervious to environmental influences. Moreover both sets of studies show that an essentialist notion of innate potential governs children's expectations about racial identity.

In another study we asked preschoolers what social categories, including race, might be associated with differences in language spoken (Hirschfeld and Gelman 1997). Again the question is of interest because adults often link language differences with cultural and racial differences. Moreover anecdotal data suggest the possibility that adults believe that some aspects of language may also be "natural" in the sense of fixed at birth. In the study we found that children readily expect people of different *races* to speak different languages. However, they do not expect people of different *ages* to speak different languages; thus the inference is not simply that any social category differences will predict differences in language spoken.

We speculated that this specific pairing of language and race might occur because children treat both language and race as "natural" categories and thus might be similarly distributed across populations. To test this possibility, we conducted a switched-at-birth experiment using language as the contrast. Preschoolers were told about two couples, one who spoke English and one who spoke Portuguese. As in Hirschfeld and Springer's studies, children were told that the newborn of each couple was switched with the infant of the other couple. Children were then played two audiotape speech samples, one in English and the other in Portuguese, and were asked to choose which was the language that the switched-at-birth child spoke when it grew up. While 3-year-olds performed at chance, 5-year-olds consistently selected the language of the birth parents.

One intriguing aspect of the developmental work is how powerful children's essentialist interpretations are, at such a young age. Indeed for some domains they may be even more essentialist than those of older children and adults. Taylor (1996) examined essentialist beliefs about gender in subjects ranging from preschool to college age. The task was again a nature-nurture task similar to those described above. Subjects were told about an infant boy who was raised from birth by his aunt on an island populated entirely by girls and women. (Another item concerned an infant girl who was raised from birth by her uncle on an island containing only boys and men.) Subjects were then asked to infer various properties of the boy (or girl) when he/she was 10 years old (e.g., would he play with trucks or dolls?). There were two notable findings from this study: First, the youngest subjects inferred that gender-linked properties were inherent in the child and not determined by the environment (e.g., they typically inferred that the boy raised with females would play with trucks and be good at football). Second, the strongest evidence of essentializing was with the youngest subjects; by roughly 9 to 10 years of age, subjects began to incorporate socialization and interactionist explanations.

Thus by late preschool, children reliably use a nature over nurture strategy for reasoning about race, language, and gender, suggesting that an essentialist bias for innate potential may shape children's expectations about a broad range of phenomena, not simply living things under the guise of a folkbiology. On this account, biological kinds may be distinguished by the strict taxonomic hierarchies in which they are sorted (Atran 1990; but see Carey 1995, regarding lack of developmental evidence) but not by essentialist reasoning. We are not claiming that folkbiology does not encompass a coherent domain (nor are we denying that it might). Rather, we suggest that if it does encompass a coherent domain in early childhood it is not in virtue of a specific mode of essentialist reasoning.

The apparent early convergence between essentialist reasoning about nonliving kinds and about human kinds gains further support in an argument proposed by Hirschfeld (1989) concerning children's understanding of kinship. Notably kinship has some of the features of both category identity (i.e., type identity in the sense that one of us is a white, male, *Homo sapiens*) and individual identity (i.e., token identity in the sense that other of us is named Susan and was born in Bristol, Pennsylvania). Like category identities, kinship roles pick out groups of people (those who are my kinfolk versus those who are not). But unlike species identity (in which something is typically either an *X* or a *Y* but not some mix of both), kinship identity is graded. For instance, an individual and his or her sibling are typically thought to share more family "essence" than an individual and his or her cousin. Indeed a tension between category and individual aspects of kinship identity is fundamental to the domain of kinship. Kin *groups* are defined with respect to an *individual* ego such that the collectivity can never be logically separated from the individual (and its boundaries can never be fixed independent of some given individual). Biological identity, in contrast, is organized around category identities that are independent of individuals, to the extent that a plausible argument has been made for treating each species as a whole as an individual (chapter 13, this volume; Sober 1994).

Thus we find little support for the argument, cited above, that essentialism spreads by analogical transfer. There is scant development evidence to support the claim that essentialism is transferred from its "proper" domain (i.e., folkbiology) to other domains (e.g., race, language, gender, or kinship). Instead, the early and nearly parallel emergence of essentialist reasoning in these different domains is consistent with the maturation of a single conceptual bias for essentialist reasoning. An alternative interpretation of the convergence of essentialist reasoning about nonhuman living kinds, human races, language, gender, and kinship is that these all of these kinds could fall within a single domain of folkbiology (at the very least, the human races and gender are psychologically fundamental kinds of living things). Although the "proper" boundaries of folkbiology remain unsettled, human races and gender have not been considered part of folkbiology for three reasons. First, children seem to treat humans as ontologically distinct from nonhuman natural kinds (Johnson, Mervis, and Boster 1992; Jackendoff 1992; Carey 1985; Keil 1979). Second, by middle childhood, children's reasoning about biological properties such as heritability and growth differ for human races and animals (Hirschfeld 1996). Third, there appears to be no corresponding notion of taxonomic "rank" for humans, as there so clearly are for nonhuman living kinds.

#### 12.4—

#### **Sources of Essentialist Representations**

The question of whether essentialism is biological is embedded in larger questions regarding source. Put crudely, four major claims are that essentialism is in the world, in the mind, in language, or in culture. Of course, essentialism could result from an interaction of two or more factors (as with the evolutionary story that the mind is adapted so as to identify regularities in the natural world), and we suspect that any reasonable person is to some degree an interactionist. Nonetheless, there is considerable room for disagreement. Any answer to this question will have to satisfy two observations: there are remarkable similarities across domains—in how people essentialize animal species and human personality types, for example; yet there are compelling differences across domains—in how people construe animal species and artifacts, for example.

Assuming that one grants that children are essentialist (see Jones and Smith 1993, for a dissenting view), the major arguments against considering essentialism to be a childhood construction is that essentialism is imparted to children from elsewhere, either from the structure of the world or from the information that parents provide. Both of these simple scenarios seem insufficient, as briefly reviewed below.

#### ***Is Essentialism Provided by the Structure of the World?***

It may seem as if essentialism is compatible with scientific descriptions of the world, and even paves the way for scientific advances: Ordinary people thought all along that water, tigers, gold, for example, had nonobvious causal properties, and lo! science tells us that it's so (molecular structure of water as H<sub>2</sub>O; biological structure is governed by DNA; Putnam 1975). On this view, people's essentialist views may derive from real-world properties. However tempting it may be to suppose that the world provides us with real

essences, studies of essentialist construals and of biological species strongly suggest that essentialism does not reside in the objects of the world.

First, the strongest version of essentialism (in which species are immutable categories of existence) is incompatible with evolutionary theory, which posits continual change over time (Mayr 1991). Clearly one can be essentialist without believing that essentialized categories are unchanging (Sober 1994). However, Sober rejects a metaphysical reality to essentialism for another reason: essentialism assumes that the essence resides in each individual organism—that it is a property of each organism. In contrast, according to evolutionary theory, species cannot be characterized in terms of properties of individual members but rather in terms of properties of the population. To use familiar Kuhnian terminology, there was a paradigm shift in how biologists think about species, and essentialism revealed itself to be dependent on the old paradigm. Taking a somewhat different (and perhaps more controversial) approach, Dupré (1993) suggests that species are real, just not in the sense we usually assume. He argues that each organism belongs to numerous natural kinds, each with its own essence (a view he calls "promiscuous realism"), thus undermining the notion of a single real category (or single real essence) for each organism. Arguably the most striking evidence against the reality of essences is the evidence discussed earlier, that people essentialize nonbiological categories. In particular, a considerable literature documents the willingness, at least of modern folk, to apply an essentialist presumption to race (Allport 1954; Guillaumin 1980; Banton 1987; Goldberg 1993; Stoler 1995), despite the fact that racial categories do not capture reliable biological variation.

Indeed, even if the world were composed of real essences, this is a far cry from demonstrating that such essences are available to young children. What the world does seem to provide are natural perceptual discontinuities (Berlin 1978) which humans are predisposed to note. However, this falls far short of an *essence*—an invisible causal mechanism that accounts for such discontinuities. The child looking at and listening to the natural world will never see or hear an essence directly.

### ***Is Essentialism Provided by the Structure of the Input?***

If essentialism is not simply a reading off of regularities in the world, is it instead directly provided to children, at least in this highly technological culture? Essentialist accounts seem to be ubiquitous in middle-class adult causal explanatory accounts (ranging from scientific attempts to map out the genetic contribution to IQ, alcoholism, and shyness, to the play *The Bad Seed*). Furthermore, as noted earlier, commonsense interpretations of scientific biology often tend (erroneously) toward an essentialist reading. It seems plausible, then, that children learn their essentialist beliefs from the messages directed toward them by mass media (including educational books and TV programs as well as popular fiction) and by parents. However, to date little information is available concerning the sorts of messages provided to children related to this topic. Casual observation suggests that, at the very least, some powerful counter-essentialist imagery is provided in children's fiction. Dr. Seuss's *Horton Hears a Who* and the hit movie *Babe* are both highly popular examples of antiessentialist accounts provided to young children.

In order to gain a more systematic portrait of parental input in a highly essentialized culture, Gelman et al. (1996) studied how highly educated parents in a middle-class U.S. university town talk about essentialized and nonessentialized categories (animals and artifacts). The parents were talking to their 20- and 35-month-old children, as essentialist beliefs have been documented by roughly 30 months of age. The study was designed to examine whether parents directly teach children the content of essentialist beliefs. Do they teach them, for example, that insides are more important than outsides, that characteristics are inherited, or that for some categories all instances are alike in fundamental nonobvious ways?

Mother-child pairs were videotaped while looking through two picture books together. The books were created specifically for the study and were designed to elicit essentializing talk and explanations by providing appearance-reality contrasts in which superficial properties alone could not explain the basis of how items are classified (e.g., one page included a bird and two bats). Indeed, the books elicited frequent naming errors from the children, thus providing ample opportunities for parents to explain why and how, for example, a bat is not a bird. One book focused on animals, the other on artifacts, with the assumption that animals are more highly essentialized and that therefore domain differences in parental speech would be revealing of ways that parents convey essentialist notions.

Parents did talk differently about animals and artifacts, but not by alluding to essences. Parents gestured more toward same-category members for animal categories than for artifact categories, they produced more utterances that linked together multiple members of the same category for animal categories than for artifact categories, and they produced more generic statements (e.g., "Bats live in caves"; Carlson and Pelletier 1995) for animal categories than for artifact categories. These are all devices for drawing children's attention to animal categories, and arguably they imply a certain coherence to the animal categories. Still, they do not constitute essentialist explanations, nor do they provide causal mechanisms for why animal categories cohere.

In contrast, on the rare occasions when parents did talk about the topics one might consider essentializing (e.g., kinship, internal parts, origins, teleology, and inductive potential), they did so in sketchy, elusive ways. Here is a representative sample of what parents actually said concerning these topics: "Batteries go in the car and the other car and the clock" [insides]; "There's the mother cat and there's the baby" [kinship]; "These look like snakes, but they're called eels" [appearance-reality contrast]. As should be clear from the examples, parents' talk about these topics were rather vague. Appearance-reality statements were somewhat more common, and were significantly more frequent for animals than artifacts. But parents never resolved appearance-reality contrasts in terms of internal parts, inheritance, or the like. Altogether, mention of all these topics combined accounted for less than 2 percent of parents' speech; even this small proportion could not be said to be informative.

This study provides an initial glimpse into the kind of input children are receiving. If it turns out to be representative, it suggests that the input children receive about essentialist beliefs is indirect at best, thus affirming the importance of children's own constructions.

The role of children's own constructions is brought into even broader relief when we examine how children acquire knowledge of naturalized social categories such as race and possibly language. Although race is thought to be tethered directly and unproblematically to perceptual experience, there is considerable evidence that this is not the case. First, as just observed, the social category "race" is neither biologically coherent nor does it capture interesting or even consistent variation in biological properties. Second, the distribution of traits and features relevant to racial categorization (e.g., skin color or hair texture and color) are not associated with the distribution of "deeper" or hidden properties. Thus there is little opportunity for the external world to shape racial categorization in the unmediated sense that underlies virtually all work on the psychology of race (see Hirschfeld 1996, for an extended discussion). Finally, despite the tendency to view race as a visual ideology (i.e., an ideology rich in visual correlates and expectations), the attributions of the nonobvious and the unseen are much more central to racial reasoning than attributions of the perceptible (Stoler 1995; Hirschfeld 1996).

This is evident when we examine the development of children's beliefs about race. Many people (and most researchers) assume that (1) because adult racial discourse is so closely tied to the visual level and (2) because racial variation seems directly perceptible, children initially learn about race by focusing on differences in people's appearance. Yet in a direct test of this assumption, Hirschfeld (1993) found that preschoolers' first racial categories are actually not rich in perceptual information. In fact he found that young children's attention is centered less on visual cues than on verbal cues. This finding is consistent with the idea that adults, through their speech and customary practices, play a central role in the development of children's racial beliefs. Other studies, however, indicate that this sort of direct parental modeling is not the case. Parents very rarely speak to their children about race (Kofkin et al. 1995), and when they do—as when they directly intervene in attempts to shape their children's racial beliefs and attitudes—they have little effect (Spencer 1983; Branch and Newcombe 1980, 1986). Rather children seem to construct racial categories and elaborate racial beliefs in significant measure on their own.

## **12.5— Broadening the Notion of Essence**

The paradigm example of essentialism, particularly in the psychological literature, is that of a biological species: Tigers have in common an essence that causes a rich set of properties (both observable and unknown) to be shared among members of the kind. However, at least for adults, essentialism also appears outside the realm of biological species, to play a role in our understanding of what it means to be kinfolk and what it means to be an individual. Kinship essences and individual essences call into question the notion that essentialism is a biologically specific notion. On the other hand, some scholars propose that kinship and individual essences are *derived from* an understanding

of biological species essence (Atran 1990; Rothbart and Taylor 1990)—or at least that one should assume that biological essentializing and nonbiological essentializing are distinct unless provided with compelling evidence to the contrary.

Perhaps even more challenging to the notion of essence as a biologically specific notion is the observation that essentialism appears to fall squarely within a larger class of related phenomena. Consider first the properties that essences share:

1. There is a nonvisible part/substance/quality in each individual (as an individual or as a member of a category).
2. This part/substance/quality is inherent and very difficult to remove.
3. The part/substance/quality has the property of transferability—it is passed along from parent/host to offspring/client typically at a specific moment or brief period.
4. This transfer from parent/host to offspring/client does not diminish the amount of essence or its consequences for identity in the parent/host.
5. This nonvisible part/substance/quality has vast, diffuse, unknown causal implications.
6. The implications include authenticity and identity.

It is striking that, as a package, this causal <sup>3</sup> account differs markedly from those in most physical domains such as naive mechanics (e.g., energy can be transferred from one object to another, but the amount of energy in that case is diminished). These are not properties of the world at large.

At the same time the properties listed above are shared by a set of other phenomena quite distinct from the realm of biology, including contamination, fetishes, and blessings (see table 12.1). To illustrate, we compare contagion by germs to contamination. Germs, like essences, are nonvisible (see Au, Sidle, and Rollins 1993; Kalish 1996), are very difficult to remove (Rozin and Nemeroff 1990), are transferrable to others, and have broad, diffuse, unknown effects (including effects on identity; e.g., consider how one changes category by contracting cancer or AIDS). Although one could consider germs themselves to be biological entities, one finds precisely the same set of properties when considering the phenomenon of nonbiological contamination. Rozin and Nemeroff (1990) provide the example of people feeling uncomfortable with the notion of wearing Hitler's sweater. There is some quality in the sweater (let's call it "negative value"—intriguingly Rozin and Nemeroff call it "essence") that is nonvisible, very difficult to remove (e.g., the sweater is still noxious even after being sterilized in boiling water or gashed with scissors), transferrable to others (e.g., by wearing the sweater; although note that the transfer process does not remove the negative value from the sweater nor even from the previous wearer), and having broad, diffuse, unknown causal implications (e.g., vaguely,

that something bad may happen). Finally the invisible quality is central to the identity of the item.

**Table 12.1**

Phenomenon	Nonvisible agent	Embodied in:	Transfer process	Causal implications
Essentialism	Essence	Tigers	Inheritance	Morphology, behavior, etc.
Contagion	Germ	Sick person	Coughing	Illness
Contamination	Value	Hitler's sweater	Wearing	
Fetish	Value	Jackie O's pearls	Owning	
Blessing	Value	Pope	Touching	

We are not suggesting that essentialism is the *only* way to account for such evaluation. Indeed there are simpler possibilities. Consider the case of Jackie Onassis's faux-pearls that recently fetched a small fortune at auction. You might like Jackie Onassis and therefore assume that you'll like her faux-pearls, you might think that she had extraordinary taste, or you might note that lots of people hold Jackie Onassis in high regard and imagine that a well-motivated market strategy is to buy her things in anticipation of being able to sell them for a profit later. We acknowledge that essentializing her pearls is only one explanation for wanting to own them. Importantly, however, these alternative accounts are insufficient, particularly to explain the peculiar significance of direct physical contact with the objects in question.

Consider once again the Pope's robe or Hitler's sweater. The value of these objects is contingent on *touching* them, not simply owning them. Moreover touching them is more valuable (or more negatively valuable in the case of Hitler's sweater) than just seeing them or standing next to them. The importance of physical contact makes sense only on an essentialist account; it is wholly unpredicted by accounts that involve common liking, confidence in another's judgment, or principles of market speculation. And we suspect that this will be true of Jackie O's pearls.

### ***How Are These Phenomena Related?***

There are at least three possibilities for explaining how these diverse phenomena converge: (1) They may be wholly distinct entities that are only coincidentally similar. (2) One of these phenomena may be conceptually prior, with the others being similar because they borrow or analogize from the central example. (3) They may all be instantiations of a single framework for causal interpretation.

In favor of the first possibility, there are certainly differences among the phenomena. They differ in whether they involve a category (species essence), an individual (contagion), or something intermediate (kinship essence). They also differ in their gradedness (e.g., species essence is presumably nongraded, but see Kalish 1995), whereas kinship essence and fetishizing admit of degrees (e.g., seeing vs. touching vs. owning the Pope's robe). And they differ in terms of which domains are implicated (e.g., species essences seem relevant for living or natural things, not artifacts, whereas contamination, fetishizing, blessing, and contagion may all involve artifacts somewhere along the causal chain). These phenomena are thus not identical. Nonetheless, the strongest argument against treating these as distinct is that none of these examples is independently motivated from evidence in the world. Given the lack of an *external* source, it is plausible to hypothesize some sort of common cognitive motivation.

As noted earlier, this common motivation might involve analogies from a base to more peripheral domains. Indeed a frequently encountered explanation for the recurrence of essentialist reasoning across content areas in *adult* cognition is analogical transfer. On this interpretation, essentialism is a domain-specific assumption which then is "borrowed" by other domains via analogical transfer (see Allport 1954, Atran 1990, Boyer 1990, and Rothbart and Taylor 1990, for cognitive versions of this view; see Guillaumin 1980, and Banton 1987, for historical versions).

Atran (1990) proposes that this is the best *developmental* account as well: Essentialism begins (ontogenetically) as a domain-specific biological assumption and then is adopted by other domains. Thus, "apparent morphological distinctions between human groups are readily (but not necessarily) conceived as apparent morphological distinctions between animal species" (Atran 1990: 78), causing essentialist principles initially limited to folk biology to transfer to social cognition. This explanation is supported only if essentialism in fact develops first in folkbiology and subsequently emerges in other domains.

While no one yet has done the sorts of careful studies needed to examine children's reasoning *across* domains, the available evidence strongly argues *against* the transfer-by-analogy account. Children appear to construe several phenomena in essentialistlike ways quite early. Au et al. (1993) showed that by 3 years of age, children appeal to invisible particles in explaining how a substance can continue to exist despite visual disappearance (e.g., when explaining why water in which sugar has been dissolved still tastes sweet). Fetishizing also emerges early with many children's attachment to transitional objects (e.g., a particular soft blanket; Litt 1986; Passman 1987). Although the meaning children associate with such attachments is unclear, it is worth noting that the traditional interpretation is that children conceive of the object as taking the place of the mother, in a sense invested with the mother's essence (Winnicott 1969). While such a claim clearly speculates about the child's conceptualization far beyond the evidence, intriguingly a major cultural determinant of children's attachments to transitional objects is whether the young child and the mother sleep together or in separate beds (Wolf and Lozoff 1989).

Similarly evidence supports the idea that essentialist beliefs about contamination and contagion emerge early in the preschool years, at much the same age as essentialism in biology, race, and gender. For example, Siegal and Share (1990) found that 3-year-olds discriminate contaminated from safe substances, even when the outward appearances of the two substances are identical (e.g., moldy bread with jam concealing the mold vs. unmoldy bread with jam spread on it). In a study examining children's explanations for disease, Springer and Ruckel (1992) found that most children, even those who appear to be relying on a notion of immanent justice, attribute illness to germs and other unseen agents (see also Kalish 1996). The similarities between disease and inheritance explanations did not escape Springer and Ruckel's notice: Although the "transmission" of disease from one person to another is very different from the genetic "transmission" of properties from parents to offspring, children's reasoning about inheritance and disease may nonetheless reflect the same underlying belief system, and these beliefs may (or may not) be specific to the domain of biology (1992: 440–41).

Together, these data suggest a close developmental convergence in the emergence of essentialist reasoning in several independent content areas. By 3 to 4 years of age, children appeal to essentialism or essentialist-like notions in reasoning about biological species, race, gender, and kinship, on the one hand, and contamination, contagion, and (perhaps) fetishes, on the other. This pattern is more likely to reflect the multiple instantiation of an essentialist bias across several domains rather than the penetration of biological reasoning into other conceptual systems.

### *Architecture of Multiple Instantiations*

Gelman et al. (1994) suggest at least two readings of early cross-domain instantiations of essentialism. First, essentialism might emerge in several domains more or less independently. They caution that for reasons of parsimony, the appeal of this interpretation is limited if too many distinct kinds of domains were implicated. If our proposal here is correct—that essentialist reasoning about biological species, gender, race, kinship, contagion, contamination, fetishization, and the like, cannot in structure or development be clearly distinguished—this concern is well-grounded. The second reading they propose is that essentialism is a domain-general assumption that is invoked differentially in different domains depending on the causal structure of each domain. They argue that, while speculative, this is the more compelling account in part because it predicts a broad yet not promiscuous application of essentialism.

Sperber (1994), Leslie (1994), and Keil (1994) provide a view of cognitive architecture that is consistent with this suggestion. On their view, many domain differences lie neither at the level of perceptual structure nor conceptual organization of the domain itself, but at the level of more abstract mechanisms or modes of understanding that come to be incorporated in different domains. To date a relatively small number of modes of understanding (or modes of construal) have been proposed: an intentional mode, a mechanical mode, a teleological mode, an essentialist mode, perhaps a vitalistic mode (Inagaki and Hatano 1993), and a deontological mode (Atran 1996). Importantly these modes are distinct from specific causal principles.

There are explanatory networks for steam-heating systems known only to plumbers, with many unique terms that are functionally defined in terms of other terms unique to boilers, such as the Hartford loop which is a special convolution of pipe designed for certain pressure gradients. Cardiologists have similar clusters of terms and laws for hearts, as do myriad other professionals and experts. In most of these cases some terms can only be understood by knowing how they are embedded in the larger system of causal relations of that domain. Are wide-ranging areas of expertise to be considered on the same terms as a naive psychology, physics, or biology? An alternative model would maintain that the handful of fundamental modes of construal has a distinct status that makes these importantly different from local areas of expertise. The plumber's expertise sits inside a more basic framework of causal understandings involving fluids and containers, which must be presupposed for the more specific beliefs to be meaningful (Keil 1995: 259).

The same issue arises when considering the specific causal relations associated with a particular conceptual domain as well as those associated with local expertise. For instance, American folk biology captures a number of related but independent causal relations concerning growth, inheritance, contagion, and the like. There is no a priori reason to assume that patterns of causal reasoning about growth will be much like those about inheritance, yet as already observed, even 3-year-olds treat the two causal relations as having similar outcomes (Hirschfeld 1995a). In part, this finding is surprising because the mechanisms underlying growth and inheritance are poorly understood on a commonsense level (and were poorly understood on a scientific level until relatively recently). One plausible explanation for this convergence in reasoning about growth and inheritance is that children apply an essentialist assumption to both causal relations. There is patterned resemblance over time in growth because of continuity in an individual's essence. By the same token there is patterned resemblance between parent and offspring because of shared species (or racial or family) essence.

It is also not the case that a specific inventory of causal principles (or the phenomena that they are meant to interpret) <sup>4</sup> necessarily requires a particular framework for causal interpretation (or mode of construal). Indeed the controversy about when folkbiology becomes a distinct domain relative to folk psychology illustrates the fact that many causal principles, including those that explain continuity in inheritance and growth, can have both intentional (i.e., psychological) and essentialist (i.e., biological) interpretations (compare Gelman and Wellman 1991; Hirschfeld 1995a; Springer 1995 to Carey 1985, 1995; Carey and Spelke 1994; and Solomon et al. 1996; see also Schult and Wellman 1997; Hickling 1996).

### ***How Does a Mode of Construal Become Associated with a Particular Domain?***

In several publications Keil suggests that the linkage between mode of construal and domain occurs as children and adults search for resonances between modes of construal and the "real world structure" (1994: 252). Elsewhere he elaborates, proposing that "much of our adult intellectual adventures involve trying to see which mode of construal best fits a phenomenon, sometimes trying several different ones, such as thinking of a

computer in anthropomorphic 'folk-psychology' terms, in fluid dynamic terms, or in physical-mechanical terms" (1995: 260). Gelman et al. (1994) make a similar point about essences and living kinds:

In the case of an animal, the child would notice the animal moving on its own, would see no apparent external cause (either human or mechanical), and so would conclude that some inner, inherent nature is responsible for its movement . . . In contrast, in the case of a wastebasket, any behaviors or functions of the object could be readily traced to the people who made and use the wastebasket; hence there would be no need to appeal to properties inherent in the object or a wastebasket essence" (1994: 358–59).

It seems plausible that resonance with "real world structure" provides the motivation to link a domain with an essentialist mode of construal for some domains (as has already been noted, the natural discontinuities in morphology, behavior, and ecological proclivities in nonhuman living things are good predictors of many other underlying shared properties). However, it is not obvious that "real world structure" directly motivates an essentialist interpretation of contaminants, disease, or fetishes.

What accounts for the attribution of an essentialist mode in these cases? The answer is not obvious. We agree with Gelman et al.'s speculation that domains are essentialized to the extent that other causal accounts are poorly supported. But we believe that more is involved; otherwise, essentialist accounts would emerge wherever knowledge is sparse (e.g., to explain garage-door openers, TV remote control devices, and light switches).

We acknowledge that a fully specified set of conditions on an essentialist mapping remains to be determined, but we offer some speculation. An essentialist mode of construal is likely to be recruited under at least two conditions: first, when the entities of a domain undergo regular and radical transformation, inexplicable with reference to any other causal mode, and second, when the event being explained is unpredicted or causally anomalous with respect to other events in the same domain.

### **First Condition: Regular and Radical Transformation**

Consider living kinds as an example of the first condition. The most compelling reason to essentialize living kinds lies in the regular changes in outward appearance and behavior that an individual creature undergoes during growth. All living kinds of interest to humans grow and transform themselves substantially over their lifetimes. Virtually all have immature and mature forms. Moreover many plants have variants that flower, bear fruit, or otherwise change in appearance depending on the time of year or conditions of growth (e.g., levels of sun and water).

A further motivation for essentializing living things is the variation encountered within any given living kind category. On the one hand, dodos and robins are both birds, yet the two sorts of creatures are very different on most attention-demanding dimensions. On the other hand, there is also marked variation among individuals within a living kind category: Three-legged tigers are still tigers, bonsai maples are still maples, bleached skunks are still skunks. <sup>5</sup>

## ***Race***

Perhaps a better illustration of this condition is race. The major task that essentialism performs in racial thinking is to resolve the paradox between two fundamental aspects of racial concepts. On the one hand, race is a visual phenomenon, rooted in the way people look. On the other hand, we cannot assign people to racial categories simply on visual inspection alone: the way people look is often racially misleading, so that in at least some systems of racial thinking "passing" is a possibility. The insufficiency of the visual is an important theme in much racial discourse, and it concerns how to integrate the visual with the system of classification that dominates much colonial writing (Stoler 1995). Racial discourse is so concerned with the marginal cases and anomalous appearances because neither are predictable from the center. Races don't merge into one another in people's minds (though they do in fact). Rather, they contain seeming anomalies that are difficult to predict and explain without reference to something like hidden racial essences.

It is important to keep in mind that it is not the essentialization of race that causes visually atypical members to be put in the same categories with visually more typical members. Rather, it is the existence of such hybrid categories that causes an essentialist presumption to be recruited, as a means of *explaining* these sorting choices. The reason one encounters anomalies to begin with, discussed in detail in Hirschfeld (1996), is that racial categories are about two things: beliefs about human physical variation (and its supposed causes) and the distribution of power and authority. Race indexes the way power and authority are distributed, but only imperfectly. Thus the distribution of people (agents of power and authority) is often peculiar from the perspective of the system of racial belief itself (e.g., the one-drop of blood rule for deciding the racial status of mixed-race individuals). What essentialism does is give a coherent explanation for the imperfect mapping of race to power. That is, essentialism does not cause race to be visually incoherent; visual incoherence causes essentialism to be triggered.

The point here is that learning about living things and learning about races is much easier given an essentialist assumption. With it, learning systems of exception becomes learning a causally coherent, if perceptually surprising, story. Whales are mammals not because of some shared mammalian essence; whales are mammals because they possess certain relevant properties with other mammals. We *explain* this with reference to a whale essence that causes it to develop these properties and sustain them over time. We readily think this because we are willing, indeed even eager, to believe that essentialist causality is a good explanation for why the marginal cases are included at all. We don't learn these things because they are essentialized (recall that there is little evidence that essentialization is socialized explicitly or directly); rather, we essentialize these things because we have learned something about them that becomes particularly explicable under an essentialist interpretation.

## **Second Condition: Causal Anomaly**

The second condition that may trigger an essentialist presumption—when an event is unpredicted or causally anomalous with respect to other events in the same domain—is more difficult to convey, in part because the notions of "unpredicted" and "causally anomalous" suggest intuitions that are broader than we have in mind.

It might be easier to characterize this condition by pointing out at least one kind of anomaly that we do *not* have in mind here. Beanbag chairs are admittedly anomalous in many respects: they lack legs, rigid seats and backs, and so on. However, they are not anomalous from the perspective of the teleological causal logic that defines artifact categories: a beanbag chair *looks* anomalous but is a perfectly functional seating device. Contrast this with Jackie Onassis's pearls. We speculate that these pearls are essentialized because they gain their special value through contact with Jackie Onassis, a contact that is thought to endure somehow in the object. That is to say, this particular string of pearls is hypervalued with respect to others. But this hypervaluation is not a function of those things that typically determine variation in value among members of an artifact category: nothing about the materials from which they are manufactured gives them special value, their intrinsic aesthetic value is not particularly great, and presumably they are no more a "success" as accessories than other faux-pearls. Instead, they are causally anomalous. Explaining their value is facilitated by imagining that they are imbued with something of Jackie O's essence (just as Hitler's sweater has high negative value because some part of Hitler's being, his nature, indeed his essence, infects it).

### ***Hypervaluation***

The argument sketched out above is missing a crucial piece, namely, why it is that Jackie O's pearls are hypervalued to begin with if not as a result of essentialism. Plausibly the initial impetus is associationist: The pearls are attractive because they have come into close contact with her (an attractive, famous person). Similar sorts of associative preferences and avoidances are found in a variety of species as in classical conditioning, and they are often difficult to modify. However, vague associations do not provide satisfying causal accounts, so the story does not end there: The associative preference then calls out for a causal explanation (in this case, an essentialist one), which then leads to even greater valuation, in an increasing spiral. This search for a causal account may be further heightened by Onassis's prominence in the public sphere. In a moment we will discuss a number of ways in which a celebrity's possession might become especially highly valued. For now, we want to suggest only that as this value became more recognized, it *demand*ed a causal explanation. The "best" one available, we further suggest, is essentialist.

An alternative account is that person-to-artifact essentialism is a version of biological essentialism, one in which either species or individual essences are thought to be so highly contagious and permeable that they could be transmitted by incidental contact (as well as by inheritance). Some evidence does indicate that inheritance is not, according to folk belief, the sole means by which species (and possibly individual) essences pass from individual to individual. Jacques Guillemeau, a seventeenth-century French physician, provided an anecdote of an often encountered notion: "It is an accepted thing that milk . . . has the power to make children resemble their nurses in mind and body, just as

the seed makes them resemble their mother and father" (quoted in Fairchild 1984: 195). Similarly there is evidence that the Dutch colonial administration in the nineteenth-century was convinced (or worried) that too long an exposure to Javanese culture and climate would cause Dutch settlers to become Javanese in some sense (Stoler 1995). While these essential transmissions are clearly outside the framework of biological reproduction, Hirschfeld (1996) has argued that they are not outside the framework of *natural* reproduction. Nonetheless, we are unaware of any data, anecdotal or otherwise, suggesting that a natural or biological essence regularly transmigrates from persons to objects. Cases in which it occurs are, as we contend, limited to fetishization, contamination/pollution, or blessings.

An important correlate to the importance of the hypothesized triggering conditions is that essentialism may not map cleanly onto domains. Events and specific entities (with specific biographies) may be essentialized without essentializing the larger domain of which it is part. Thus the fact that something is essentialized cannot (or cannot solely) be a function of the domain to which it belongs, nor to the closeness between that domain and another, more basically essentialized domain, as Atran (1990) has proposed for the essentialization of race.

## **12.6— Conclusions**

The question we posed with this chapter—how biological is essentialism?—was meant to provoke discussion of several issues. First, how well-motivated is the attention that folkbiology has received in research on essentialist reasoning? And conversely, how well-motivated is the attention that essentialism has received in research on folkbiology? We would probably have to conclude that the motivation is better with respect to the latter than the former. Essentialism is an essential part of folkbiology. A crucial aspect of the way living kinds are organized and reasoned over in our mind's eye is explicable only when an essentialist presumption is acknowledged. Adults construct highly articulated essentialist discourses about biological things. Children seldom if ever articulate their essentialist assumptions about living things (or other domains, for that matter), yet the discovery that their reasoning is imbued with essentialism has been a striking finding.

However, this does not mean that folkbiology is critical to understanding essentialism. Indeed, assuming that essentialism is fundamentally biological may have limited our understanding of what psychological essentialism is. By speculating that essentialism is not uniquely tethered to the folkbiological, we are not suggesting that it is a domain-general effect. Again, not every domain is essentialized or even potentially essentializable. Essentialism is a mode of understanding invoked when onto-logical commitments (e.g., that caterpillars and butterflies are the same creature) or biographical saliences (e.g., Jackie Onassis's prior possession of certain objets d'art) are otherwise causally unexplained. Essentialism is an instrumental doctrine. It provides coherence to folk theories, explains consistency in otherwise diverse folk collections, and invests importance in events where the world fails to deliver.

## Notes

Support for writing this chapter was provided by NSF grant BNS-9100348, NICHD grant R01-HD36043, and a J. S. Guggenheim fellowship to Gelman and by NSF grant SBR-9319796 to Hirschfeld and NSF grant SBR-9319798 to Atran, Hirschfeld, Medin, and Smith. We thank the members of our graduate seminar (Winter 1996), "Essentialism in cognition and culture"—Todd DeKay, Gil Diesendruck, Martie Haselton, Gail Heyman, Melissa Koenig, Barlow LeVold, Brian Malley, Ivelisse Martinez, Janet McIntosh, John Opfer, Tom Rodriguez, and Julie King Watson—for their insightful discussions. We are particularly grateful to Janet McIntosh for her important contributions, several of which we have tried to develop here. We also thank Scott Atran, Doug Medin, and Dan Sperber for their helpful comments on an earlier draft.

1. The claim that H<sub>2</sub>O is the essence of water has been most clearly elaborated in an influential paper by Putnam (1975). However, it is important to keep in mind that in Putnam's view, H<sub>2</sub>O is the *metaphysical*, not psychological, essence of water. Furthermore Putnam notes that this metaphysical essence is known (or at least understood) only by experts, not most layfolk. This scientific claim is itself corrigible and so may turn out in the final analysis not to be the "true" essence of water. Thus Malt's experiments do not constitute a test of Putnam's arguments—and to our view do not provide a compelling test of psychological essentialism more generally.
2. For example, Kalish included neither positive examples (e.g., three-legged horse, two-foot-high horse) nor familiar subtypes (e.g., penguins or ostriches as kinds of birds), although our intuitions suggest that subjects would have supplied more absolute responses in such cases.
3. One question that arises is whether all of these examples should be considered causal. Certainly in all of the examples listed above, the causal mechanism is unknown: we don't know exactly how essences result in morphology and behaviors, why eating dirt leads to illness, or precisely what happens after we kiss the hem of the pope's robe. Thus these phenomena are similar to what Au and Romo (chapter 11, this volume) call "input-output relations" rather than articulated causal mechanisms. Why, then, call these causal, as opposed to stimulus-response pairings of the sort that lead to "superstitious" behavior in pigeons (as Skinner has shown)? Whereas the pigeons' "superstitions" were based on observable stimulus-response pairings, the causal links discussed here are theorized even in the absence of evidence. Moreover people start building stories to fill in the gaps: they attribute theorized causal agents (essences, germs, personality, gods) to do the work. These theorized components are neither observed nor known (e.g., we don't know what the essence is, and we don't know what happens if we own Jackie O's necklace). That people appeal to these causal chains nonetheless suggests that people may have a propensity to invoke unobservable causal constructs (Tomasello, personal communication).

4. Depending on the level of specificity, the causal principle may commit one to a particular mode of construal. Here, however, we have in mind phenomena such as inheritance rather than specific causal principles such as gene transmission or socialization.
5. Bear in mind that recognizing token identity constancy for species that undergo radical transformations or individuals across the lifespan does not require essentialization. Many primate species seem to recognize both, presumably without adopting an essentialist presumption.
6. Faculties, competencies, and task-specific algorithms do not map cleanly or directly on to other dimensions relevant to domain specificity. For instance, faculties include structures that have been described as both modules (e.g., language) and theories (i.e., theory of mind or folk psychology); competencies include both areas of expertise as well as some specific aspects of modules (e.g., certain color memory proclivities), while task-specific algorithms are generally not discussed as domains in and of themselves but rather are seen as constituent devices within a domain. Jackendoff (1992) distinguishes two sorts of modules: the first, input-output modules (which would fall under our "task-specific algorithms"), target and process specific kinds of information; the second, central modules (which would fall under our "faculties"), "integrate information provided by disparate input modules into a unified modality-independent conception of the world" (p. 70). The importance of our third type of domain-specific device, competencies, is evident when we consider the various proclivities and capacities that are included in the domain of color. First, the domain of color perception might reasonably be thought to fall under a faculty of vision. Second, some aspects of color perception presumably involve task-specific algorithms (e.g., the mnemonic salience of focal colors). Third, and most important, other aspects of color processing (e.g., constraints on the order in which basic color terms enter a language) don't seem to fall under either task-specific algorithms or faculties but represent distinct competencies.

## References

- About, F. E. 1988. *Children and Prejudice*. Cambridge, MA: Basil Blackwell.
- Allport, G. 1954. *The Nature of Prejudice*. Reading, MA: Addison-Wesley.
- Aristotle. 1924. *Metaphysics*. Oxford: Clarendon Press.
- Atran, S. 1990. *Cognitive Foundations of Natural History*. Cambridge: Cambridge University Press.
- Atran, S. 1996. Modes of thinking about living kinds: science, symbolism, and common sense. In D. Olson and N. Torrance, eds., *Modes of Thought: Explorations in Culture and Cognition*. Cambridge: Cambridge University Press.

- Atran, S. 1995. Classifying nature across cultures. In D. Osherson and E. Smith, eds., *Invitation to Cognitive Science: Thinking* vol. 3, 2nd ed. Cambridge: MIT Press.
- Atran, S., P. Estin, J. Coley, and D. Medin. 1999. Generic species and basic levels: essence and appearance in folk biology. *Journal of Ethnobiology*, in press.
- Au, T., A. Sidle, and K. Rollins, 1993. Developing an intuitive understanding of conservation and contamination: Invisible particles as a plausible mechanism. *Developmental Psychology* 29: 286–98.
- Banton, M. 1987. *Racial Theories*. Cambridge: Cambridge University Press.
- Barsalou, L. W. 1985. Ideals, central tendency, and frequency of instantiation as determinants of graded structure in categories. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 11: 629–54.
- Bem, S. 1989. Genital knowledge and gender constancy in preschool children. *Child Development* 60: 649–20.
- Berlin, B. 1978. Ethnobiological classification. In E. Rosch and B. Lloyd, eds., *Cognition and categorization*. Hillsdale, NJ: Lawrence Erlbaum.
- Berlin, B. 1992. *Ethnobiological Classification*. Princeton: Princeton University Press.
- Boyer, P. 1990. *Tradition as Truth and Communication*. New York: Cambridge University Press.
- Braisby, N., B. Franks, and J. Hampton. 1996. Essentialism, word use, and concepts. *Cognition* 59: 247–74.
- Branch, C., and N. Newcombe. 1980. Racial attitudes of black preschoolers as related to parental civil rights activism. *Merrill-Palmer Quarterly* 26: 425–28.
- Branch, C., and N. Newcombe. 1986. Racial attitude development among young black children as a function of parental attitudes. *Child Development* 57: 712-21.
- Brown, A. L. 1990. Domain-specific principles affect learning and transfer in children. *Cognitive Science* 14: 107–33.
- Bullock, M., R. Gelman, and R. Baillargeon. 1982. The development of causal reasoning. In W. J. Friedman, ed., *The Developmental Psychology of Time*. New York: Academic Press, pp. 209–54.
- Carey, S. 1985. *Conceptual Development in Childhood*. Cambridge: MIT Press.

- Carey, S. 1995. On the origins of causal understanding. In D. Sperber, D. Premack, and A. J. Premack, eds., *Causal Cognition: A Multi-disciplinary Approach*. Oxford: Clarendon Press, pp. 268–308.
- Carey, S., and E. Spelke. 1994. Domain specific knowledge and conceptual change. In L. A. Hirschfeld and S. A. Gelman, eds., *Mapping the Mind: Domain Specificity in Cognition and Culture*. New York: Cambridge University Press.
- Carlson, G. N., and F. J. Pelletier, eds., 1995. *The Generic Book*. Chicago: University of Chicago Press.
- Chandler, M. J., and C. E. Lalonde. 1994. Surprising, magical and miraculous turns of events: Children's reactions to violations of their early theories of mind and matter. *British Journal of Developmental Psychology* 12: 83–95.
- Crocker, J. C. 1979. Selves and alters among the Eastern Bororo. In D. Maybury-Lewis, ed., *Dialectical Societies: The Ge and Bororo of Central Brazil*. Cambridge: Harvard University Press, pp. 249–300.
- Daniel, E. 1984. *Fluid Signs: Being a Person the Tamil Way*. Berkeley: University of California Press.
- Diesendruck, G., S. A. Gelman, and K. Lebowitz. 1996. *Conceptual and Linguistic Biases in Children's Word Learning*. Unpublished manuscript. University of Michigan.
- Dupré, J. 1993. *The Disorder of Things: Metaphysical Foundations of the Disunity of Science*. Cambridge: Harvard University Press.
- Fairchild, C. 1984. *Domestic Enemies: Servants and Their Masters in Old Regime France*. Baltimore: Johns Hopkins Press.
- Flavell, J. H., E. R. Flavell, and F. L. Green. 1983. Development of the appearance - reality distinction. *Cognitive Psychology* 15: 95–120.
- Fuss, D. 1989. *Essentially Speaking: Feminism, Nature, and Difference*. New York: Routledge.
- Gelman, R. 1990. First principles organize attention to and learning about relevant data: Number and the animate-inanimate distinction as examples. *Cognitive Science* 14: 79–106.
- Gelman, S. A. 1988. The development of induction within natural kind and artifact categories. *Cognitive Psychology* 20: 65–96.
- Gelman, S. A. 1992. Children's conception of personality traits—Commentary. *Human Development* 35: 280–85.

- Gelman, S. A. 1999. Developing a doctrine of natural kinds. *Psychology of Communication and Language*, in press.
- Gelman, S. A., and J. D. Coley. 1990. The importance of knowing a dodo is a bird: Categories and inferences in 2-year-old children. *Developmental Psychology* 26: 796–804.
- Gelman, S. A., and J. D. Coley. 1991. Language and categorization: The acquisition of natural kind terms. In S. A. Gelman and J. P. Byrnes, eds., *Perspectives on language and thought: Interrelations in development*. Cambridge: Cambridge University Press, pp. 146–96.
- Gelman, S. A., J. D. Coley, and G. M. Gottfried. 1994. Essentialist beliefs in children: The acquisition of concepts and theories. In L. A. Hirschfeld and S. A. Gelman, eds., *Mapping the Mind: Domain Specificity in Cognition and Culture*. New York: Cambridge University Press, pp. 341–66.
- Gelman, S. A., and K. E. Kremer. 1991. Understanding natural cause: Children's explanations of how objects and their properties originate. *Child Development* 62: 396–414.
- Gelman, S. A., and E. M. Markman. 1986. Categories and induction in young children. *Cognition* 23: 183–209.
- Gelman, S. A., and E. M. Markman. 1987. Young children's inductions from natural kinds: The role of categories and appearances. *Child Development* 58: 1532–41.
- Gelman, S. A., and H. M. Wellman. 1991. Insides and essences: Early understandings of the nonobvious. *Cognition* 38: 213–44.
- Gelman, S. A., J. D. Coley, K. S. Rosengren, E. Hartman, and A. Pappas. 1996. *Beyond Labeling: The Role of Parental Input in the Acquisition of Richly-Structured Categories*. Unpublished manuscript. University of Michigan.
- Gelman, S. A., and G. M. Gottfried. 1996. Children's causal explanations of animate and inanimate motion. *Child Development* 35: 28–34.
- Goldberg, T. 1993. *Racist Culture: Philosophy and the Politics of Meaning*. New York: Basil Blackwell.
- Gopnik, A., and H. Wellman. 1994. The theory theory. In L. A. Hirschfeld and S. A. Gelman, eds., *Mapping the Mind: Domain Specificity in Cognition and Culture*. New York: Cambridge University Press.

- Guillaumin, C. 1980. The idea of race and its elevation to autonomous scientific and legal status. *Sociological Theories: Race and Colonialism*. Paris: UNESCO, pp. 37–68.
- Hickling, A. K. 1996. The emergence of causal explanation in everyday thought: Evidence from ordinary conversation. Unpublished PhD dissertation. University of Michigan.
- Hickling, A. K., and S. A. Gelman. 1995. How does your garden grow? Evidence of an early conception of plants as biological kinds. *Child Development* 66: 856–76.
- Hirschfeld, L. 1989. Discovering linguistic differences: Domain specificity and the young child's awareness of multiple languages. *Human Development* 32: 223–36.
- Hirschfeld, L. 1993. Discovering social difference: The role of appearance in the development of racial awareness. *Cognitive Psychology* 25: 317–50.
- Hirschfeld, L. 1995a. Do children have a theory of race? *Cognition* 54: 209–52.
- Hirschfeld, L. 1995b. Anthropology, psychology, and the meanings of social causality. In D. Sperber, D. Premack, and A. Premack, eds., *Causal cognition: A multidisciplinary debate*. New York: Oxford University Press, pp. 313–50.
- Hirschfeld, L. 1996. *Race in the Making: Cognition, Culture, and the Child's Construction of Human Kinds*. Cambridge: MIT Press.
- Hirschfeld, L. A., and S. A. Gelman. 1994. Toward a typography of the mind: An introduction to domain-specificity. In L. A. Hirschfeld and S. A. Gelman, eds., *Mapping the Mind: Domain Specificity in Cognition and Culture*. New York: Cambridge University Press.
- Hirschfeld, L. A., and S. A. Gelman. 1997. What young children think about the relation between language variation and social difference. *Cognitive Development* 12: 213–38.
- Inagaki, K., and G. Hatano. 1993. Young children's understanding of the mind-body distinction. *Child Development* 64: 1534–49.
- Inhelder, B., and J. Piaget. 1964. *The Early Growth of Logic in the Child*. New York: Norton.
- Jackendoff, R. 1992. *Languages of the Mind: Essays on Mental Representation*. Cambridge: MIT Press.
- Johnson, K., C. Mervis, and J. Boster. 1992. Developmental changes within the structure of the mammal domain. *Developmental Psychology* 28: 74–83.

- Jones, S., and L. Smith. 1993. The place of perception in children's concepts. *Cognitive Development* 8: 113–39.
- Kalish, C. 1995. Essentialism and graded membership in animal and artifact categories. *Memory and Cognition* 23: 335–53.
- Kalish, C. 1996. Causes and symptoms in preschoolers' conceptions of illness. *Child Development* 67: 1647–70.
- Katz, P. 1982. Development of children's racial awareness and intergroup attitudes. In L. Katz, ed., *Current topics in early childhood education*, vol. 4. Norwood, NJ: Ablex, pp. 16–54.
- Keil, F. 1979. *Semantic and Conceptual Development: An Ontological Perspective*. Cambridge: Harvard University Press.
- Keil, F. 1989. *Concepts, Kinds, and Cognitive Development*. Cambridge: MIT Press.
- Keil, F. 1994. The birth and nurturance of concepts by domains: The origins of concepts of living things. In L. A. Hirschfeld and S. A. Gelman, eds., *Mapping the Mind: Domain Specificity in Cognition and Culture*. New York: Cambridge University Press.
- Keil, F. 1995. The growth of causal understandings of natural kinds. In D. Sperber, D. Premack, and A. Premack, eds., *Causal cognition: A multidisciplinary debate*. Oxford: Oxford University Press.
- Kohlberg, L. 1966. A cognitive-developmental analysis of children's sex-role concepts and attitudes. In E. Maccoby, ed., *The Development of Sex Differences*. Palo Alto: Stanford University Press.
- Kofkin, J., P. Katz, and E. Downey. 1995. Family discourse about race and the development of children's racial attitudes. Paper presented at the Biennial Meetings of the Society for Research in Child Development. Indianapolis.
- Kripke, S. 1972. Naming and necessity. In D. Davidson and G. Harman, eds., *Semantics of Natural Language*. Dordrecht: Reidel.
- Landau, B. 1982. Will the real grandmother please stand up? The psychological reality of dual meaning representations. *Journal of Psycholinguistic Research* 11: 47–62.
- Leslie, A. 1994. ToMM, ToBy, and agency: Core architecture and domain specificity. In L. A. Hirschfeld and S. A. Gelman, eds., *Mapping the Mind: Domain Specificity in Cognition and Culture*. New York: Cambridge University Press.
- Lieberman, A., and I. Mattingly. 1989. A specialization for speech perception. *Science* 243: 489–94.

- Litt, C. J. 1986. Theories of transitional object attachment: An overview. *International Journal of Behavioral Development* 9: 383–99.
- Locke, J. [1671] 1959. *An Essay Concerning Human Understanding*, vol. 2. New York: Dover.
- McNamara, T. P., and R. J. Sternberg. 1983. Mental models of word meaning. *Journal of Verbal Learning and Verbal Behavior* 22: 449–74.
- Malt, B. 1994. Water is not H<sub>2</sub>O. *Cognitive Psychology* 27: 41–70.
- Markman, E. M. 1989. *Categorization and Naming in Children: Problems in Induction*. Cambridge: MIT Press.
- Mayr, E. 1982. *The Growth of Biological Thought*. Cambridge: Harvard University Press.
- Mayr, R. 1991. *One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought*. Cambridge: Harvard University Press.
- Medin, D. 1989. Concepts and conceptual structure. *American Psychologist* 44: 1469–81.
- Needham, R. 1974. *Remarks and Inventions: Skeptical Essays about Kinship*. London: Tavistock.
- Passman, R. H. 1987. Attachments to inanimate objects: Are children who have security blankets insecure? *Journal of Consulting and Clinical Psychology* 55: 825–30.
- Pinker, S. 1994. *The Language Instinct*. New York: Morrow.
- Putnam, H. 1975. The meaning of "meaning." In H. Putnam, ed., *Mind, Language and Reality: Philosophical Papers*, vol. 2. New York: Cambridge University Press.
- Rips, L. J. 1989. Similarity, typicality, and categorization. In S. Vosniadou and A. Ortony, eds., *Similarity and Analogical Reasoning*. New York: Cambridge University Press, pp. 21–59.
- Rips, L. J., and A. Collins. 1993. Categories and resemblance. *Journal of Experimental Psychology: General* 122: 468–86.
- Rorty, R. 1979. *Philosophy and the Mirror of Nature*. Princeton: Princeton University Press.
- Rosch, E., and C. Mervis. 1975. Family resemblances: Studies in the internal structure of natural categories. *Cognitive Psychology* 8: 382–439.

- Rosengren, K., S. Gelman, C. Kalish, and M. McCormick. 1991. As time goes by: Children's early understanding of growth in animals. *Child Development* 62: 1302–20.
- Rothbart, M., and M. Taylor. 1990. Category labels and social reality: Do we view social categories as natural kinds? In G. Semin and K. Fiedler, eds., *Language and Social Cognition*. London: Sage.
- Rozin, P., and C. Nemeroff. 1990. The laws of sympathetic magic: A psychological analysis of similarity and contagion. In J. Stigler, R. Shweder, and G. Herdt, eds., *Cultural Psychology: Essays on Comparative Human Development*. New York: Cambridge University Press.
- Schneider, D. 1968. *American Kinship: A Cultural Account*. Englewood Cliffs, NJ: Prentice-Hall.
- Schult, C. A., and H. M. Wellman. 1997. Explaining human movements and actions. *Cognition* 62: 291–324.
- Siegal, M., and D. Share. 1990. Contamination sensitivity in young children. *Developmental Psychology* 26: 455–58.
- Smith, E. E., and D. L. Medin. 1981. *Categories and Concepts*. Cambridge: Harvard University Press.
- Sober, E. 1994. *From a Biological Point of View*. New York: Cambridge University Press.
- Solomon, G. E. A., S. C. Johnson, D. Zaitchik, and S. Carey. 1996. Like father, like son: Young children's understanding of how and why offspring resemble their parents. *Child Development* 67: 151–71.
- Spencer, M. 1983. Children's cultural values and parental child rearing strategies. *Developmental Review* 3: 351–70.
- Sperber, D. 1975b. Pourquoi les animaux parfaits, les hybrides et les monstres sont-ils bon à penser symboliquement? *L'Homme* 15: 5–24.
- Sperber, D. 1994. The modularity of thought and the epidemiology of representations. In L. A. Hirschfeld and S. A. Gelman, eds., *Mapping the Mind: Domain Specificity in Cognition and Culture*. New York: Cambridge University Press, pp. 39–67.
- Springer, K. 1995. The role of factual knowledge in a naive theory of biology. Paper presented at meeting of the Society for Research in Child Development, Indianapolis.
- Springer, K., and J. Ruckel. 1992. Early beliefs about the cause of illness: Evidence against immanent justice. *Cognitive Development* 7: 429–43.

Stoler, A. 1995. *Race and the Education of Desire: A Colonial of Foucault's History of Sexuality*. Durham: Duke University Press.

Taylor, M. 1996. The development of children's beliefs about social and biological aspects of gender differences. *Child Development* 67: 1555–71.

Wierzbicka, A. 1994. The universality of taxonomic categorization and the indispensability of the concept "kind." *Rivista di Linguistica* 6: 347–64.

Winnicott, D. W. 1969. *The Child, the Family, and the Outside World*. Baltimore: Penguin Books.

Wolf, A. W., and B. Lozoff. 1989. Object attachment, thumbsucking, and the passage to sleep. *Journal of the American Academy of Child and Adolescent Psychiatry* 28: 287–92.

Yengoyan, A. 1999. Essentialisms of aboriginality: Blood/race, history, and the state in Australia. In R. Grew and A. Burguière, eds., *The Invention of Minorities*. Ann Arbor: University of Michigan Press.