

reassemble all the pieces that had been removed into a second ship, which would be the ship of Theseus? The results of experimental studies with children and adults confirm that most individuals infer that individuals that are gradually replaced by component parts retain their identity (Hall 1998). This is because we infer an essential element in addition to the material composition when we are asked to consider the unique nature of things. Hall's (1998) developmental study revealed a stronger essentialist perspective for living things compared to an artefact, but we will essentialize objects that we consider significant by virtue of their unique identity if they have sentimental value (Hood & Bloom 2008). I have conjectured that this holds especially true for emotional objects such as memorabilia associated with individuals that we revere, from celebrities to religious saints, as well as so-called murderabilia, which are the items associated with murderers (Hood 2009). The authenticity of an object is similarly conferred by essentialist beliefs so much so that the value we place on objects such as artworks or collectibles is shaped by what we believe the object to be (Bloom 2010). For many, a perfect forgery indistinguishable from an original lacks some property that is difficult to articulate, consistent with the placeholder function that essentialism provides (Medin & Ortony 1989).

The inherent bias in positing an inference heuristic

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Abstract: There are two problems with Cimpian & Salomon's (C&S's) claim that an innate inference heuristic is part of our cognitive makeup. First, some of their examples of inherent features do not seem to accord with the authors' own definition of inference. Second, rather than posit an inference heuristic to explain why humans rely more heavily on inherent features, it may be more parsimonious to do so on the basis of aspects of the world itself and our relationship to it.

Cimpian & Salomon (C&S) present some intriguing preliminary evidence for the existence of an inference heuristic, a basic cognitive tendency that leads people to explain patterns with reference to *inherent* features rather than *extrinsic* (i.e., relational or historical) features. While we find it plausible that people rely more heavily on inherent rather than relational properties in reasoning about many domains, we have doubts about the possibility of drawing the distinction between inherent and extrinsic properties unambiguously enough to enable us to conclude with confidence that participants are clearly tracking such a distinction in all the examples cited. But even if we set aside these doubts, the tendency that C&S are describing may not represent a cognitive bias of its own, but may instead emerge from the way the world is and our perceptual access to it.

C&S's account "classifies features as inherent if they can be said to characterize how an entity is constituted" (sect. 2.2.1, para. 1), and they add that these features tend to be stable and enduring. We take the distinction that they are tracking to be roughly that between intrinsic and extrinsic features – features that an individual object or entity has on its own and would continue to have in the absence of everything else, as opposed to those that an individual has in virtue of its relations to others. Paradigmatic cases of the former are perceptual features of an object, such as its size, mass, shape, or color. Clear examples of the latter are features that pertain to an object's location, position, relationships, or history, such as the fact that it is lying on top of the bookshelf, is located in Toronto, is my favorite toy, was manufactured in 2010, or

belongs to the public library. But though there seem to be many clear-cut cases, there are other features that may be trickier to classify in one or the other category.¹ This creates a few problems in the evidence that the authors rely upon, since a number of cases that they cite as instances of inherent features would seem in fact to be relational, extrinsic, or historical by C&S's own definition. For example, that orange juice has a tangy taste and that it is healthy, are both facts that pertain to the relation of orange juice to humans (or to some humans, since it may be unhealthy or taste differently to others). Thus, these features are arguably not inherent. Similarly, if Amy laughs at Beth's joke because Beth is funny, that fact is extrinsic to the joke (though it is an inherent feature of Beth). Meanwhile, in discussing extrinsic features of objects (such as historical features), C&S give the example of a router that stops working when accidentally stepped on. However, this episode in the history of the router presumably alters the inherent properties of the router, which is what prevents it from functioning. So it would be correct for a participant to say that the router stopped functioning due to an inherent defect, though that defect was caused by an event in its causal history.

The fact that some examples the authors cite of inherent features can be considered relational according to their own criterion, and vice versa, implies that it is hard to be sure what kinds of features participants are using in some of the experiments that are meant to support the authors' hypothesis. But if we set this worry aside and focus on those cases about which there may be little uncertainty, another concern emerges: If inherent features are roughly those that pertain to the individual or object taken in isolation, as opposed to ones pertaining to its relations, origin, history, and so on, then the former are the ones that tend to be perceptually salient to human beings and easily ascertainable. So it may not be a basic cognitive feature of humans, but rather a function of our relation to the world, that makes "inherent" features salient. Also, more often than not and in many domains, these features tend to be more explanatory than relational features. When it comes to the domain of physical objects, their motion, constancy, solidity, and so on (a domain that develops early in ontogeny), an object's length, width, shape, mass, density, material composition, texture, and other inherent features tend to be more explanatory of its patterns of behavior than its geographic location, ownership, and date of manufacture. This also holds to a large extent of the domain of living creatures. To be sure, when it comes to the domain of artifacts, extrinsic function tends to be more important than inherent features, and a chair can be made of a wide range of materials, can have various dimensions, material compositions, colors, and so on, yet remain a chair. But here, too, inherent features and function cannot drift too far apart. (How many chairs are made out of paper or are the size of a house?) Thus, given what is perceptually salient to human observers and given some broad features of the material world, it stands to reason that inherent features will be accessed more readily by cognizers and will have more explanatory power. If so, then there may be no need to posit a separate inference heuristic to understand why cognitive agents reach first for inherent rather than extrinsic features to explain patterns in the world around them.

Finally, we cannot help entertaining the possibility that C&S fall prey to the inference heuristic in positing an *innate* heuristic to explain certain human cognitive tendencies, rather than explaining them in terms of *relations* of human beings to the world. But then, wouldn't that be a dramatic confirmation of the very heuristic that the authors claim to observe? Not necessarily: We are arguing that, instead of a basic component of our innate cognitive endowment, our tendency to explain patterns on the basis of inherent features is instead a function of our relationship to the world and of features of the world itself.

NOTE

1. There is a debate in metaphysics on the proper characterization of the intrinsic–extrinsic distinction (e.g., see Langton & Lewis 1998; Lewis 1983; Vallentyne 1997). But that is not our concern here; rather,

we are concerned with whether people draw this distinction consistently enough to serve as the basis for a cognitive heuristic.

Is it about “pink” or about “girls”? The inference heuristic across social and nonsocial domains

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Abstract: The inference heuristic provides an intriguing and novel explanation for early thought in a variety of domains. Exploring similarities and differences in inherent reasoning across social and nonsocial domains can help us understand the role that inherent thinking plays in the development of human reasoning and the process by which more elaborate essentialist reasoning develops.

Our drive to understand observed patterns in the world is pervasive and supports powerful learning throughout life. The inference heuristic provides groundwork for this understanding both within everyday reasoning and across development, and has the potential to explain a wide range of psychological phenomena. We applaud the authors' thoughtful proposal. Yet, further specification of key aspects of the proposal—particularly regarding the domain specificity or the generality of inference thinking—will clarify further the theoretical underpinnings of the heuristic and generate related research.

Are inference beliefs about entities in the world (e.g., “pink as feminine”) at all different from inference beliefs about people or their psychological states (e.g., “girls like feminine things”)?) Cimpian & Salomon (C&S) state that both might be the case and may depend on the particular context at hand. We agree that understanding which patterns are subjected to the heuristic process is complex, yet we suggest that there may be important differences in the ways that people attend to, encode, and explain observed patterns in different domains. Are different kinds of evidence similarly susceptible to inference reasoning? For instance, is it easier or harder to learn a new conceptualization of “pink” or of “girls,” and are beliefs about people and non-person entities similarly resistant to change in the face of counter-evidence? One possibility is that information about people may be particularly easily viewed as inherent, and thus it may be relatively easier to update a belief about the femininity of “pink” as compared to the femininity of “girls.” Understanding how inherent reasoning is implemented across domains can be informative for understanding the development of children's reasoning about diverse concepts (e.g., people, animates, artifacts) and could also be informative about the functioning of the inference heuristic more generally.

Relatedly, an inquiry into the domain specificity or generality of inference thinking across social and nonsocial domains could shed light on the relationship between early inference beliefs and later essentialist beliefs. Although intriguing, the proposal for the nature of the developmental change of essentialist reasoning as stemming from the inference heuristic could be further specified. Is the change proposed to involve conceptual content that grows richer or conceptual content that is continuous over time yet whose exhibition requires the emergence of other supporting machinery? Social and nonsocial domains have the potential to differ not only in the way that observed patterns are weighed against existing inherent intuitions, but also in the way that inference explanations are incorporated into essentialist explanations across development. C&S propose that inherent reasoning may indeed be overridden by counterevidence. They discuss the example of artifact categories: Children initially believe that artifact

categories derive from inherent features, but they may abandon that belief in the face of evidence that objects are constructed by people for particular functions. This example raises the general question of what guides children toward or away from inherent or essentialist beliefs across development, and whether attention to the evidence presented, the weighing process of evidence against intuitions, or both, might differ across domains. Selectivity in the patterns that are noticed and explained could play a crucial role in the workings of the inference heuristic in and of itself and in the elaboration of some, but not all, inherent thinking into essentialist thinking.

We also question how critical to the theory is it that inference reasoning applies more for patterns of behavior than for specific instances (or for information about groups of people rather than specific individuals). In theory, couldn't the inference heuristic apply for both kinds of information? For example, if a child learned that someone is good at gorp, why not draw the inference that there is something intrinsic about him that allows him to gorp? Imagine an alternative pattern of results: Suppose children presented with both category-wide and individual-specific information endorsed inherent explanations—this hypothetical pattern of results could presumably also be interpreted as supporting the inference heuristic. Yet, given the reported evidence that information about groups of people is more compelling than information about specific individuals, this finding may provide an opportunity to explore the relationship between inference thinking and social categorization. It is plausible that persistent and coherent conceptual differences in reasoning across domains could result in differential explanations of patterns observed across people and patterns observed across objects.

Finally, the diversity of children's early environments and social experiences may have important influences on the development of the inference heuristic across domains. The authors note that context and culture could guide the types of candidate explanations that become accessible to the heuristic. There are at least two ways in which early experience could guide inherent reasoning: through the available evidence and patterns to be explained that may differ across cultures, and through more pervasive individual differences that may vary across cultural contexts and could in turn influence the workings of the heuristics. To give one example, evidence suggests that bilingual children are more likely to see word-to-referent pairings as arbitrary (Bialystok 1988). Given the proposed link between beliefs about nominal realism and inference, might children raised in diverse linguistic environments also be less susceptible to the inference heuristic? It seems possible that both the process of learning two languages, as well as the diverse social experiences that accompany bilingualism or biculturalism, may influence children's inherent thinking. If so, the influence of such cultural diversity might be explored for both social and nonsocial domains of reasoning.

Does the inference heuristic take us to psychological essentialism?

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Abstract: We argue that the claim that essence-based causal explanations emerge, hydra-like, from an inference heuristic is incomplete.