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Artifacts and essentialism

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Abstract

Psychological essentialism is an intuitive folk belief positing that certain categories have a non-obvious inner "essence" that gives rise to observable features. Although this belief most commonly characterizes natural kind categories, I argue that psychological essentialism can also be extended in important ways to artifact concepts. Specifically, concepts of individual artifacts include the non-obvious feature of object history, which is evident when making judgments regarding authenticity and ownership. Classic examples include famous works of art (e.g., the Mona Lisa is authentic because of its provenance), but ordinary artifacts likewise receive value from their history (e.g., a worn and tattered blanket may have special value if it was one's childhood possession). Moreover, in some cases, object history may be thought to have causal effects on individual artifacts, much as an animal essence has causal effects. I review empirical support for these claims and consider the implications for both artifact concepts and essentialism. This perspective suggests that artifact concepts cannot be contained in a theoretical framework that focuses exclusively on similarity or even function. Furthermore, although there are significant differences between essentialism of natural kinds and essentialism of artifact individuals, the commonalities suggest that psychological essentialism may not derive from folk biology but instead may reflect more domain-general perspectives on the world.

In this paper, I propose that psychological essentialism, an intuitive folk belief that has most commonly been offered to characterize natural kind categories, such as dogs, oak trees, or gold (Gelman, 2003), can be extended in important ways to concepts of individual artifacts, such as Van Gogh's *Starry Night*, a child's favorite blanket, or a teacup from the Titanic. Although there are significant differences between essentialism1[1] of natural kinds and essentialism of individual artifacts, I will set forth what I believe to be two key phenomena involving artifacts that can be understood as involving essentialism, and review empirical support for these links. Finally, I will argue that these cross-domain commonalities have important implications for both artifact concepts and essentialism.

To preview the argument, this paper makes four primary claims:

- Essence-like reasoning applies to individual artifacts as well as natural kinds.
- Specifically, psychological essentialism is fundamentally rooted in a domain-general capacity to attend to object history.
- Thus, essentialism may emerge, in part, out of the capacity to track individuals through time and space (i.e., attend to history).
- Because artifact concepts require attention to object history, which is an inherently non-obvious construct, they cannot be contained in a theoretical framework that focuses exclusively on either similarity or function.

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[1]In this paper, I will sometimes use "essentialism" as shorthand for "psychological essentialism".

Background: Psychological essentialism

Psychological essentialism is an intuitive belief that, for certain entities (including animal kinds, plant species, and chemical elements, but potentially social categories involving gender, race, ethnicity, or personal characteristics, and other categories as well), there is a deep reality that extends beyond superficial features, and that there is some inner causal something (a quality or substance -- blood, DNA, perhaps something unknown) that is responsible for the item's identity and underlying features. This "causal something" is sometimes referred to as a placeholder (Medin & Ortony, 1989), as it is a belief *that* there is an essence, though not necessarily *what* that essence is (see Ahn, Kalish, Gelman, Medin, Luhmann, Atran, Coley, & Shafto, 2001; Meyer, Leslie, Gelman, & Stilwell, in press; Strevens, 2000 for debate regarding the nature of the essence placeholder). Psychological essentialism has several corollary assumptions: that appearances can be deceiving; that categories (and their features) are real and discovered, not arbitrary or invented, and thus new commonalities will be discovered as well; that categories are delimited by sharp boundaries, such that individuals fall wholly within or wholly outside of a given category, and it is wrong or monstrous for an item to cross category boundaries; and that category-typical properties are inherent, inborn, perhaps genetically imparted.

Essentialism has a wealth of empirically supported consequences for conceptual representations and implications for reasoning, such as inductive inferences (Gelman & Markman, 1986), word extensions (Diesendruck, 2001), judgments of inheritance (Dar-Nimrod & Heine, 2011), and categorization (Deeb, Segall, Birnbaum, Ben-Eliyahu, & Diesendruck, 2011; Rehder, 2007). (See Gelman, 2003, for more discussion).It is beyond the scope of this paper to detail this evidence, but several reviews note that psychological essentialism is empirically robust, developmentally privileged, culturally widespread, and difficult to eradicate (Dar-Nimrod & Heine, 2011; Gelman, 2003; Leslie, in press; McIntosh, 2009; Prentice & Miller, 2007; Waxman, Medin, & Ross, 2007).[2]

Note what this is not. Psychological essentialism is not a set of metaphysical claims about the structure of reality. Psychological essentialism is an intuitive folk belief, and as such is likely to depart from reality in important ways. For example, essentialism of social kinds tends to reify and attribute biological reality to classifications that are socially determined and fluid (Templeton, 1998). Even for biological kinds, such as animal species, essentialism leads to distortions, such as an overcommitment to an individual level of analysis rather than appreciating the crucial role of interbreeding populations (Gelman & Rhodes, 2012). Essentialism can even misrepresent the nature of chemical kinds (Leslie, in press). Thus, the claim that people are intuitive essentialists is importantly distinct from metaphysical claims regarding categories or the structure of reality.

Psychological essentialism is also distinct from the claim that categories have defining features that are both necessary and sufficient to delimit category membership. The notion that people represent concepts in terms of defining features has been criticized as failing to capture probabilistic features, exemplars, and theories in concepts (e.g., Murphy, 2002; Nosofsky, Little, Donkin, & Fific, 2011; Rosch & Mervis, 1975).

From the description provided above, it would seem that essentialism does not apply to artifacts. Standard examples of essentialized categories are natural kinds--categories of naturally occurring entities, such as tigers, gold, or water--not artifacts (Putnam, 1975;

[2]Debates regarding psychological essentialism are also beyond the scope of this paper; see the following for critiques and discussion: Malt (1994); Braisby, Franks, & Hampton (1996); Hampton, Estes, & Simmons (2007); Malt & Sloman (2007); Sloman & Malt (2003); Strevens (2000); Sloutsky (2003); Waxman & Gelman (2010).

Schwartz, 1977, 1979; Gelman, 2003). Artifacts lack the inherent, self-initiated qualities of natural kinds that, for essentialists, would be explained by an inner, causal source. In contrast to natural kinds, artifacts are mutable (a cup could be transformed into a flower pot; Keil, 1989), their category boundaries are fuzzy, not sharp (consider the distinction between cups and bowls; Labov, 1973), and they lack innate or genetic starting points. Artifact categories do not possess an inner essence to distinguish them from one another (e.g., there is no inner "cup-ness" that cups share but bowls do not).

Even the language of essentialism applies more readily to natural kinds than artifact categories. A universal linguistic device that seems especially suited to express essentialism is that of generics (e.g., *Birds lay eggs*; *Squirrels carry rabies*), which imply that categories are especially coherent and richly structured. Although generics can apply to any content domain, including artifacts (e.g., *Doors have hinges*), speakers consistently produce generics more frequently for animals than for artifacts (Brandone & Gelman, 2009; Gelman, Goetz, Sarnecka, & Flukes, 2008). Even when equating for item familiarity and perceptual features, children and adults were more likely to produce generics when an item was introduced as an animal than when it was introduced as an artifact (Brandone & Gelman, in press). This linguistic bias on the part of speakers may reflect a greater tendency to think about animals as having stable and inherent properties. Thus, "Dogs are four-legged" is a generic statement that refers to dogs as a category, because being four-legged is an inherent, natural property of the category of dogs (Prasada & Dillingham, 2006). Similarly, generics minimize within-category variability by glossing over exceptions. Thus, we can say "Boys play with trucks" because this is generally the case, even though not all boys play with trucks. We can say "Lions have manes", even though female lions and male lion cubs don't have manes, because manes are characteristic of lions as a category. We can even say "Mosquitoes carry the West Nile Virus", even though only a small subset of mosquitoes do so (Leslie, 2008). Experimental studies reveal that generic language promotes essentialist reasoning (Gelman, Ware, & Kleinberg, 2010; Rhodes, Leslie, & Tworek, 2012). Thus, if a novel category is introduced using multiple generics (e.g., "Zarpies hate ice cream", "Zarpies love to eat tulips", "Zarpies can bounce a ball on their backs"), those learning the category (whether children or adults) make more essentialist assumptions about the category.

And yet, despite these striking and important domain differences, I will argue that the divide between natural kinds and artifacts is neither absolute nor complete. The commonalities between the domains do not, however, involve natural kinds and artifact *categories*, but rather natural kinds and artifact *individuals*. Like natural kinds, individual artifacts are also understood in ways that reflect essentialism, specifically when people think about the core notions of authenticity and ownership.[3] Authenticity and ownership are pervasive and early-emerging concepts that apply readily to individual artifacts, and each deeply reflects an essence-like attention to non-obvious, hidden properties with potential causal consequences. Specifically both authenticity and ownership entail attention to *object history*. In the sections below, I flesh out in greater detail what I mean by object history, and how it is evident in both authenticity and ownership.[4]

[3]There is a third reason for suspecting that artifacts may be essentialized, which is that the boundary between natural kinds and artifacts seems to be increasingly porous, with advances in technology. Complex artifacts, such as computers, have a non-obvious basis and rich inductive potential, similar to natural kinds. Robotic pets can be programmed to respond in novel ways, and to learn from experience. Synthetic blood, industrial diamonds, artificial intelligence -- all are human artifacts yet potentially indistinguishable from natural kinds. Current research is exploring how our intuitive reasoning systems conceptualize these new entities (Jipson & Gelman, 2007; Kahn et al., 2012).

Authenticity

Artifacts clearly do not possess essences based on DNA or birth parents. Yet individual artifacts share with natural kinds an attention to history, not just superficial, functional, or even material qualities (see also Gelman & Hirschfeld, 1999; Nemeroff & Rozin, 1994). This is seen most clearly with a special kind of artifact, namely, works of art. Bloom (1996, 2011) notes that authentic works of art are distinguished from forgeries, fakes, or replicas by virtue of their history (see also Bullot & Reber, in press). The Mona Lisa and a poster of the same may look very similar, but only the first has special value.

Yet artwork is not special in this regard. Even mundane objects (a pot-shard; a set of used golf clubs; a piece of rock) derive value in part because of their history (an ancient Etruscan pot-shard; John F. Kennedy's golf clubs; a rock from the moon). Types of history that render an item authentic include objects associated with celebrities, beloved individuals (e.g., grandparent), one's own past, historical events, or remote locations or time periods. People collect objects that have special history, put them in museums, and pay more money for them. People have a belief that extended study may reveal new, hidden insights (e.g., study of archeological artifacts). An exact replica isn't good enough. In this sense, many individual objects--including artifacts--would seem to have an underlying reality.

Of course value also inheres in material, functional, and aesthetic aspects of an object: what it consists of (gold or tin?), to what uses it can be put (access the internet or hold down papers on a desk?), how pleasing is it to the eye (stunning beauty or utilitarian ugliness?). But material, functional, and aesthetic qualities are not all. For example, Frazier, Gelman, Wilson, and Hood (2009) found that U.S. and British college students consistently placed higher value on authentic objects (e.g., a 1920 penny; a tuxedo worn by Pierce Brosnan while playing James Bond) than matched inauthentic objects (e.g., a 2005 penny; a tuxedo from a rental shop). Authentic objects were not only ascribed greater monetary value, but also judged as more desirable to keep, more desirable to touch, and (for non-personal items) more appropriate for display in a museum. The extent of these effects, to include judgments of touching and keeping, suggest that the greater valuation of authentic objects reflects not just a rational assessment of economic value in the marketplace, nor a means of displaying one's social status (Pinker, 2002), but may also reflect an implicit belief in positive contagion.

Newman, Diesendruck, and Bloom (2011) conducted a series of studies with adults in order to examine three possible explanations for the increased valuation of one type of authentic object, namely, celebrity items: positive association (e.g., the object serves as a reminder of the admired celebrity), market demands (e.g., the authentic object could fetch more money or confer higher status), and positive contagion (e.g., essential qualities of the celebrity can be transferred to a new owner, via the authentic object). Only the positive contagion explanation would predict that directly touching the object would modify its value, by means of contagious transfer of the original owner's essence. Consistent with this prediction, the researchers found that increased contact with an item increased the perceived value and purchase intentions for items owned by positive celebrities (e.g., Albert Einstein) but decreased the perceived value and purchase intentions for items owned by negative

[4]There are other arguments in the literature suggesting that artifacts have essences. These include the idea that intended function is the essence of an artifact category, for example, that the essence of a chair is the creator's intent that it be a chair (Bloom, 1996; Chaigneau, Castillo, & Martínez, 2008; Kelemen & Carey, 2007; Xu & Rhemtulla, 2005). This is an important idea that has been the subject of much serious debate (e.g., Bloom, 1998; German & Johnson, 2002; Malt & Sloman, 2007), but it is distinct from the current proposal. That creator's intent may be an artifact essence is a specific claim regarding object history, with a focus on boundary conditions on classification (see Malt, in press). In contrast, as noted above, the current arguments apply to judgments of individual artifacts.

celebrities (e.g., Charles Manson). Furthermore, the extent to which a person is individually sensitive to contagion predicts the size of the valence effect. They conclude: "while market demands do play a role, contagion appears to be the critical factor affecting the valuation of celebrity possessions" (p. 215). In brief, this study indicates that people believe that individual artifacts contain special properties, by virtue of their history.

Increased evaluations of authentic artifacts are apparent even among individuals who are mostly ignorant of economic or market forces, namely, young children. Thus, 3- and 4-year-olds judged that celebrity possessions (e.g., the ruby slippers that Dorothy wore in the film *The Wizard of Oz*) are more appropriate than ordinary objects (e.g., a new pair of shoes) for display in a museum (Frazier & Gelman, 2009). Moreover, when asked to provide estimates of how much money people would pay for a series of items, 5- and 6-year-olds judged that celebrity possessions have higher monetary value than ordinary objects (Gelman, Frazier, Noles, Manczak, & Stilwell, 2013). The greater value attached to authentic objects cannot be attributed to any perceptible features of these objects. A particularly striking demonstration of this point was provided by a study in which children were convinced that the researcher possessed a duplicating machine that could make exact copies of objects. In this case, when provided a choice between a celebrity possession (e.g., a spoon owned by the Queen of England) and an exact duplicate of the same item (e.g., an identical spoon, created by the duplicating machine), children 6.5 years of age prefer the original celebrity possession over the exact duplicate (Hood & Bloom, 2008). Altogether, these studies indicate that authenticity has ineffable value, rooted in object history.

There is also a further sense in which authentic objects may be essentialized, namely, if this invisible essence (object history) is thought to have causal consequences. Recall that the essence of animal kinds is thought to have such consequences: internal substances, such as blood, DNA, or genes (i.e., the purported essence of an animal), are thought to give an animal its identity -- for example, tiger DNA is that which causes a tiger to roar, have stripes, to *be* a tiger (Dar-Nimrod & Heine, 2011). Moreover, lay adults also believe that internal organs have the capacity to exert effects on personality and behavior. This belief was studied by asking participants whether their behavior and personality could be influenced by receiving a bodily part, either heart or blood, from a donor who has either positive characteristics (e.g., someone with a high IQ) or negative characteristics (e.g., a murderer; Meyer, Leslie, Gelman, & Stilwell, in press). Participants in both the U.S. and India reported that such changes were indeed possible (e.g., the heart of a murderer can have subtly dangerous effects on a heart-transplant recipient).

For our purposes, then, an important question is whether the attention to artifact history demonstrated earlier is accompanied by a belief that an artifact's history includes an essential quality with causal effects. In other words, can the history of an authentic object (e.g., aspects of the owner) "rub off" on others? Some preliminary evidence for this implicit belief is that adults performed better on a golf putting task when they believed they were using a putter owned by a professional golfer (Lee, Linkenauger, Bakdash, Joy-Gaba, & Profitt, 2011), and believed they would took on qualities of the children’s television show host, Mr. Rogers, if they were to wear his iconic sweater (Johnson & Jacobs, 2001). Similarly, Nemeroff and Rozin (1994) report that adults judged that wearing a sweater would transmit qualities of the original owner: "…some how the object would pick up some negativeness [of an evil source]. I'm not saying it would smell or have dandruff on it, but it would be creepy because he's a creepy person" (p. 178). In the words of another participant: "I guess with evil people I feel the events have been absorbed by them, within their person, and they carry them around with them… like evil has the potential to be more infectious and more potent" (p. 178). More evidence is needed to determine the extent, basis, and developmental course of these effects.

Ownership

Ownership provides another illustration of how object history is central to concepts of individual artifacts. Several of the examples in the prior section on authenticity concerned ownership (e.g., celebrity possessions). More generally, object history is central to ownership concepts, even for ordinary objects. My iPad can be identified based on its history (it is the one that I bought at the store), not just its appearance or function. Object history is inherently non-visible and non-obvious, though it can be discerned by observing perceptual markers or cues (e.g., spatiotemporal movement; a smudge from yesterday's coffee). To the extent that ownership concepts evoke attention to object history, this would provide further evidence that concepts of individual artifacts incorporate non-obvious causal properties.

A striking example of the significance of object history to ownership concepts is reported by Bloom and Gelman (2008), who note that contemporaneous accounts of the discovery for the 14th Dalai Lama can be read as suggesting that there was a deep connection between the Dalai Lama and his possessions. A series of tests and signs determined which among a set of children was the true 14th Dalai Lama, who is the reincarnation of the 13th Dalai Lama. Some of the tests involved seeing if a young child could recognize some of his belongings from his earlier life. Thus, a series of choices were presented, in which the actual owned object was contrasted with another object (sometimes merely different, sometimes more attractive in appearance, and sometimes identical in appearance), and observers looked to see which objects the child would choose. The 14th Dalai Lama, at age two, was observed to select unerringly the possessions of the 13th Dalai Lama. Written accounts describe this as revealing the boy's "occult powers" and "super-human intelligence" (Bloom & Gelman, 2008, p. 243). At the very least, the test illustrates the deep link assumed to exist between an owner and his possessions.

Children's attachment objects also reveal that history is central to concepts of ownership. Anecdotally, parents often report that children refuse to accept a replacement object if a beloved attachment object gets lost. In one heartwarming example, a parent posted a video of a boy reunited several years later with his once-lost attachment object, a stuffed blue monkey named "Ah-ah" (http://www.youtube.com/watch?v=Lk34j3HUJbE). The parents decided that the ultimate test of the monkey's provenance would be whether their son would recognize the toy as his own. (He did.)

More systematic investigations confirm that ownership is an early-emerging concept (Ross & Friedman, 2011; Rossano, Rakoczy, & Tomasello, 2011). Young children care about the history of their owned objects, by carefully tracking which objects have been assigned as their own. I illustrate with a set of studies we conducted with preschool children (Gelman, Manczak, & Noles, 2012). In this work, children were shown sets of three objects, one set at a time. Some of the sets included three identical objects (e.g., three identical toy cars), some of the sets included three equivalent but distinct objects (e.g., a toy car, toy train, and toy motorcycle), and some of the sets included an undesirable object with two more desirable objects (e.g., plain wooden disk, toy car, toy train). For each set, children first received ownership information about two of the objects (e.g., "This is mine, this is yours"), and the third object was equally emphasized but was not identified as belonging to anyone ("Look at this"). The objects were then scrambled in full view of the child, such that the objects ended up in different locations on the table. Then children were asked to identify the owners ("Which is yours?" "Which is mine?"). If they care about object history, they should keep tabs on which object belonged to which owner, not only when the items were featurally distinct, but even when the items were identical and thus required tracking spatiotemporal movements. Results show that 2-year-olds succeeded only when the items were perceptually

distinct, whereas 3-year-olds successfully tracked ownership even when the items were identical. Thus, by 3 years of age, attention to the non-obvious feature of object history overrides perceptual and functional cues in children's representations of individual artifacts.

Another way in which object history seems to affect ownership concepts is with a phenomenon called the "endowment effect", in which giving someone an object results in a preference or increased value for that object (Reb & Connolly, 2007). In other words, ownership per se increases the value of an object for the owner.[5] The endowment effect can be considered a reasoning bias, because objectively, value should be a reflection of the object's material and functional properties, but the endowment effect demonstrates that one's personal history with an object also contributes to its value. Interestingly, an extensive body of research has demonstrated that adults consistently demonstrate an endowment effect. When asked to estimate object value, they would charge another person more to purchase an object (when they are the seller) than they themselves would pay to purchase it (when they are the buyer). For example, if someone gives you a mug, you think it's worth $7, but if someone else has a mug, you're only willing to pay $3 (Kahneman, Knetsch, & Thaler, 1990). Similarly, if you give someone a new keychain, and they are given the choice of either keeping it or trading it in for another object of similar value (e.g., a mug), people typically choose to keep the original object (e.g., Beggan, 1992; Gawronski, Bodenhausen, & Becker, 2007; Kahneman, Knetsch, & Thaler, 1990; Thaler, 1980). This effect has been obtained even with non-human primates, who prefer to hold onto an edible treat more than to exchange it for another edible treat (Brosnan et al., 2007; Lakshminaryanan, Chen, & Santos, 2008), although this effect does not extend to non-consumable products (Kanngiesser et al., 2011). In all of these cases, objects that an individual owns are assessed as having higher value than objects that an individual does not own.

The endowment effect, though well-documented, could reflect any of at least three distinct principles: loss-aversion (pain on losing something that you already have), category-endowment (greater evaluation of the category of objects that you own; e.g., if you get a mug, mugs become more attractive), and endowment reflecting object history (greater evaluation of the particular individual that you own, not just the kind; e.g., if you get a mug, that particular mug becomes more attractive). There is some debate in the literature regarding the extent to which the phenomenon is better characterized as loss aversion vs. an endowment effect (e.g., Morewedge, Shu, Gilbert, & Wilson, 2009). We therefore thought it would be useful to use a task that does not require participants to give up a current good, in order to block the possibility of loss aversion. Furthermore, most (perhaps all) prior work asked people to reason about exchanges involving *different kinds* of objects, such as mugs vs. keychains, thus leaving it unclear whether endowment effects demonstrate increased value of an object kind (e.g., mugs) versus increased value of an object with a special history (e.g., a particular mug). We thus wished to vary whether the task involved kinds versus individuals. Finally, although some prior work was conducted with children, the results were unclear as to when this understanding emerges in development (e.g., Harbaugh, Krause, & Vesterlund, 2001; Lucas, Wagner, & Chow, 2008), and none of this work demonstrated an endowment effect before 5 years of age.

We examined the endowment effect in children with a simple task that does not involve swapping and so cannot be explained in terms of loss-aversion. The set-up was identical to that of the object-tracking study described earlier (Gelman et al., 2012). Once again,

[5]Although many of the studies reviewed earlier also show that people place higher value on their own objects, such as a child with his or her attachment object, these studies do not demonstrate the endowment effect. In the examples discussed earlier, factors other than ownership per se may have been responsible for the increased liking (e.g., a child may like his or her attachment object because of its color or texture, or because it was a birthday gift and thus reminds the child of that special day). In contrast, demonstrations of the endowment effect must control for other factors and demonstrate increased value due to ownership assignment per se.

preschool children were shown sets of three objects, one set at a time, and heard ownership information about two of the objects in the set ("This is yours, this is mine"), as well as non-ownership information about the third object ("Look at this!"), in order to ensure that all three objects had equal attentional focus. Once again, the objects were scrambled and placed in new positions, in full view of the child. However, instead of being asked to identify ownership information, children were simply asked to indicate which one they liked, and which one the experimenter liked. We reasoned that an endowment effect would result in greater liking of the object assigned to the child, even in the strong case in which all three objects were perceptually identical. This is precisely what we found. Even 2-year-olds showed greater liking for objects assigned to the self, both when all three objects were distinct but equivalent (showing an endowment for object *kinds*), and when all three objects were identical (showing an endowment for object *individuals*--and hence, history). The only case in which assignment did not lead to above-chance liking was when the object assigned to the object was plain and objectively less desirable than the other two choices.

Thus, these data are consistent with the idea that ownership is accompanied by an early-emerging endowment effect. Once again, this finding indicates that representations of individual objects include the non-obvious feature of object history as a fundamental component. At the same time, more evidence is needed to determine the strength, scope, and basis of this effect. For example, asking participants which item they like the most requires relatively little investment in the owned object, compared to the swapping task, and thus may not reflect as strong a commitment as has been demonstrated in swapping-task studies with older participants. Furthermore, in the task we developed, each set provided a contrast between an object assigned to the self vs. an object assigned to another person, and it is possible that children's performance reflected avoidance of an object that another person owns, rather than preference for an object that children themselves own. These questions would need to be studied in future research.

Conclusions

Essentialism is domain-specific: only animal kinds are construed as possessing the full suite of essentialist features described earlier, including a wealth of shared features among members of the same kind, a genetic and inherited basis, and inherent, internal features that cause outward similarities. Categories of artifacts (cups, chairs, violins) share none of these qualities. However, essence-like reasoning applies to *individual* artifacts when we think about their history, both when considering "special" artifacts (e.g., artwork, celebrity possessions, objects linked to historically significant events) and when considering the significance of ownership. *Special subtypes* of artifacts may also have these qualities (e.g., Stradivarius violins; Rembrandt paintings). With both authenticity and ownership, children and adults think of physical objects as more than their material or functional qualities. They attend to non-obvious, hidden features. When we see a cup, we see more than color, shape, texture, or functional affordances (Gibson, 1982). We see the cup as it was and as it will be. We imagine its past and its future. An object's history often leaves subtle marks, such as coffee stains inside a mug (Leyton, 1992) -- but attention to object history does not require that there be any visible remnants or signs. Strikingly, even young children consider object history in evaluating and interacting with objects.

I suggest that attention to object history is a domain-general capacity that serves as one of the foundations for psychological essentialism of animal kinds as well as concepts of individual artifacts (Gelman, 2003). Indeed, attention to object history underlies a range of basic concepts that emerge early in development. Preverbal infants first privilege spatiotemporal cues --not featural cues such as shape or color -- to track object identity (Spelke, Kestenbaum, Simons, & Wein, 1995; Xu & Carey, 1996). Young infants apply

proper names on the basis of spatiotemporal cues as well (Sorrentino, 2001). Concepts of contagion and contamination also, fundamentally, implicate history: a seemingly pure glass of juice is undrinkable if a dog licked it (Legare, Wellman, & Gelman, 2009). Object history is implicated even in neurological disorder: Capgras syndrome--in which people believe that everyday objects (e.g., glasses, watch) have been replaced by exact duplicates and thus are imposters (Edelstyn & Oyebode, 1999)--can be construed as a decoupling of an artifact's appearance (this looks like my watch) from its history (but it is not truly my watch). Attention to history is broad, domain-general, and all-encompassing. I thus speculate that essentialism builds, in part, on a foundation of attention to history.

There is also a further sense in which the history of an artifact may be construed as an essence, in the same way that DNA and/or blood are essences for animal kinds. Specifically, there is some evidence that people believe that prior contact with an artifact transmits essential qualities of its owner. In other words, the historical contact itself carries with it special causal implications. For example, as noted earlier, one study shows that adults putt more accurately when using a golf club that they believe was owned by a professional golfer (Lee et al., 2011), and another study shows that children and adults think that "something" of Mr. Rogers is passed along when one wears his sweater (Johnson & Jacobs, 2001). Perhaps, too, the hand of Stradivarius imbues a violin with musicality. These intriguing results are provocative but incomplete, and deserve more sustained study.

Implications for artifact concepts

The present analyses suggest that artifact concepts cannot be contained in a theoretical framework that focuses exclusively on similarity (e.g., Sloutsky & Fisher, 2004), nor even on function. Artifact concepts extend beyond the bounds of the physical objects themselves -- they carry traces of their history. Standard accounts of artifact concepts do not consider historical information, and thus simply exclude such features from consideration on both a theoretical and a methodological level (e.g., Mervis & Rosch, 1981). For example, when participants are asked to categorize a set of items and are provided exclusively with shape, color, texture, and size as cues, there is no opportunity to demonstrate the importance of historical features.

Implications for essentialism

Some have proposed that essentialism is a domain-specific, biological adaptation to reasoning about the natural world. For example, Atran (1998) examines systems of naming and classification of plants and animals across widely divergent cultural contexts, and concludes that there is a universal tendency (which he refers to as a "folk biology") positing that "each generic species has an underlying causal nature, or essence, that is uniquely responsible for the typical appearance, behavior, and ecological preferences of the kinds" (p. 548). Similarly, Boyer (2001, p. 539) suggests that when reasoning about the environment, people employ “a causal-essence inference engine (probably evolved to afford quick induction about living kinds).” In short, essentialism has been argued to be a human response to the distinctive characteristics of living things, which maintain a fixed identity despite constant changes wrought by growth, metamorphosis, and decline. In contrast, the current framework argues that an essentialist perspective may reflect a more general outlook -- a domain-general approach that happens to fit better with certain domains than others (see also Keil, 1994, for similar argument). I have proposed that essentialism may reflect the important task of tracking individuals through time and space.

However, tracking individuals through time and space cannot account for other aspects of essentialism, such as treating members of a natural kind as deeply alike. Thus, other capacities are also required, which may also be domain-general. I have suggested that there

may be at least five core, domain-general capacities that emerge early in development that, individually and collectively, might promote essentialist reasoning (Gelman, 2003), including: (1) tracking identity over time (leading to attending to object history, as discussed in this paper), (2) an appearance-reality distinction (Flavell, Flavell, & Green, 1983; Deák, 2006), (3) the tendency to make novel inductive inferences on the basis of shared similarities (i.e., assuming that items that share observable properties will also share unobservable properties; Gelman, 2003), (4) causal determinism (the belief that all environmental regularities are caused; Schulz & Sommerville, 2006), and (5) deference to experts (e.g., accepting the testimony of knowledgeable others; Gelman, 2009; Harris & Koenig, 2006). These are schematically reviewed in Table 1. Each of these capacities is domain-general and applicable to artifacts. Collectively, however, they seem to find the best fit with natural kinds. This brief sketch provides a framework for how full-blown essentialism is domain-specific, yet emerges out of domain-general capacities.

Final thoughts

Although in this paper I have argued that attention to non-obvious, invisible features is characteristic of essentialism, one could argue that all higher thought entails going "beyond the information given", to use Jerome Bruner's (1973) phrase. Inferences (both inductive and deductive), abstractions, expectations, and imagination are all processes that extend beyond perceptible or tangible experiences (though richly informed by and intertwined with data from our senses). In this sense, essentialism is not a cognitive anomaly, but rather one more instantiation of how readily we search for origins and underlying causes.

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Table 1

Root capacities underlying essentialism. (from Gelman, 2003)

Root capacities		**Essentialist instantiations**
Appearance/reality distinction	→	Non-obvious properties as core
Induction from property clusters	→	Inferences about the unknown
Causal determinism	→	Causal properties as core
Tracking identity over time	→	Importance of origins
Deference to experts	→	Acceptance of category anomalies
ABOVE, COLLECTIVELY	→	Realist assumption about categories and names
		Boundary intensification
		Immutability; stability over transformations
		Importance of nature over nurture