Children hold the belief that social categories have essences. We investigated what kinds of properties children feel licensed to infer about a person based on social category membership. Seventy-two 4–6-year-olds were introduced to novel social categories defined as having one internal – psychological or biological – and one external – behavioral or physical – property. For half of the participants, the internal property was described as causing the external one; for the others, no causal relationship between properties was mentioned. Children were asked to choose as a novel exemplar of a category one with only the internal or only the external property. Children inferred that exemplars had a psychological property irrespective of causal status, but they inferred the presence of a biological property only when described as causal. Children did not draw systematic inferences regarding either of the two external properties. These findings indicate that children treat psychological and causal properties as central – and perhaps essential – to human kinds.

Extensive evidence coming from the anthropological (Gil-White, 2001), as well as the social (Keller, 2005) and developmental (Astuti, Solomon, & Carey, 2004) psychology literature, suggests that adults and children around the world hold essentialist beliefs about certain human groups. Namely, people believe that certain social group distinctions mark fundamental differences between group members, and that these differences are inherent, permanent, exclusive, and causally predictive of group members’ characteristics. Thus, studies have found that children believe membership in racial categories to be established at birth and stable throughout life (Hirschfeld, 1996), that gender innately disposes people towards certain behavioral preferences (Taylor, 1996), that certain social categories reflect objectively truthful classes of the world (Rhodes & Gelman, 2009), and that ethnic categories
are inductively powerful (Birnbaum, Deeb, Segall, Ben-Elyiahu, & Diesendruck, 2010; Diesendruck & haLevi, 2006).

Although these lines of work provide evidence for the existence in children of a belief that social categories have essences, very little attention has been devoted to what children consider to be the essence of social categories. In a sense, this state of affairs was envisioned in Medin and Ortony’s (1989) original definition of psychological essentialism as a “placeholder belief”; namely, a belief that categories have essences, without commitment to a particular instantiation of essences. This stipulation notwithstanding, in the present study we attempt to provide indirect clues as to what children believe constitutes the essential properties of human kinds.

In fact, in the domain of natural kinds, similar attempts have been made. One line of this work has focused on the “causal status” of properties. For instance, studies have found that, in determining an animal’s category membership, children treat properties described as causal to the definition of an animal kind as more important than properties described as effects (Ahn, Gelman, Amsterlaw, Hohenstein, & Kalish, 2000; Opfer & Bulloch, 2007). A second line of work has attempted to identify the “content domain” of properties that children find as definitional of animal categories. Dating back to Keil’s (1989) “transformation” studies, it has been found that from a young age, and in different cultures, children believe that internal, non-obvious, biological properties define animal category membership (Diesendruck, 2001; Newman & Keil, 2008). In a recent study, Meunier and Cordier (2009) integrated these two lines of work and found that 5-year-olds relied on causal properties for categorizing animals only when these were described as internal, as opposed to surface, properties of the animals. Altogether, these findings about the nature of essentialist beliefs about animals have supported the claim that children’s categorization of animals is governed by a naïve biological theory (Atran, 1990; Gelman, 2003).

In the present study, rather than asking which properties children take as definitional of category membership, we ask the complementary question: Given an exemplar’s category membership, which properties do children infer the exemplar must have? As Gelman (2003) noted, “when given the category label [for a category in an essentialized domain], you can be certain that the instances have the category essence” (p. 44). Following this reasoning, we were interested in what children believed they could infer about a person, based on knowledge of that person’s social category membership. If children believe that a certain property is central to category membership, and they are given a choice between an exemplar that lacks that property vs. another one that has it, children should select the latter as a member of the category.

This strategy is similar to the one pioneered by Gelman and Markman (1986) in their studies on category-based induction in the domain of living kinds and later extended to the domain of human kinds (Diesendruck & haLevi, 2006; Heyman & Gelman, 2000). A crucial difference between these previous studies and the present one is that the former focused on the kinds of similarity relations that children privilege for drawing inferences (e.g., perceptual vs. taxonomic similarity), the goal of those studies being to uncover whether and which categories children essentialize. For instance, Diesendruck and haLevi asked children to infer the novel psychological property of a character based on ethnic vs. gender status or ethnic vs. religiosity status. In other words, the properties to be inferred were always psychological, and what varied was the category membership of the target characters.

The present study, instead, targets the kinds of properties children feel licensed to infer based on social category membership. Specifically, we investigate whether children’s inferences vary depending on the causal status and the content domain of the to-be-inferred properties. In this respect, the design and logic are similar to those used by Kalish and Lawson (2008). In their study, children were told about the category membership of a character and were asked to select which property the character was likely to have. As Kalish and Lawson describe, this method allows one to determine how central to the representation of social categories different types of properties are. They found that already by kindergarten age, children view “obligation”-related properties (what one has to do) as more central to social categories than “preference”-related properties (what one likes to do). The present study extends this question to additional types of properties and property relations.

To investigate the role of both property domain and causal status, we adapted the method developed by Ahn et al. (2000). They presented 7–9-year-olds with pictures of a novel animal category, told children about properties descriptive of the category, and asked children to decide which novel
exemplar was a member of the category: one missing property \( X \) or another missing property \( Y \). The crucial manipulation was that for some children property \( X \) was defined as causing the other properties (i.e., \( Y \) was an effect-property in this condition), while for others \( X \) and \( Y \) were simply listed as two of the properties of the animal category. Ahn et al. found that children were more likely to choose as another exemplar of a target category, an animal missing a non-causal property than one missing a causal property.

We used a simplified version of this task with younger children, asking children to infer which property a category exemplar had rather than which category a particular combination of properties defined. Also, instead of targeting animal categories with pertinent properties, we presented children social categories with additional kinds of properties. Guided by theoretical positions in the relevant literature, most studies of animal categorization have presented children with the possibility of drawing inferences about internal/biological, visual/superficial, or behavioral properties. In light of theoretical debates regarding the domain of human kinds, however, an additional type of property seemed crucial – social/psychological properties.

Researchers debate whether social categorization is governed by domain-specific conceptual schemes or by analogy to a natural domain. Some argue that children construe social categories in social/psychological terms by kindergarten age (Heyman & Gelman, 1998; Hirschfeld, 1996; Kalish, 2002). Thus, they should treat social/psychological properties of human kinds as proxies for essences. Consequently, provided the definition of a social category, and being informed about the category membership of a novel exemplar, children should feel licensed to draw inferences primarily about the exemplar's psychological properties. Others argue that concepts of social categories derive from beliefs about animal kinds (Atran, 1990). In this case, children should treat internal/biological properties as central to social categories. Additionally, children might hold a “performative” view of human kinds, i.e., you are what you do, leading them to draw inferences about behavioral properties based on category membership (Astuti et al., 2004). Finally, if children’s categories are defined by perceptual similarity, they should feel licensed to draw inferences primarily about physical features.

In sum, the present study extends Ahn et al.’s (2000) study to address a number of questions. First, we target social rather than animal categories, allowing us to assess whether causal status impacts children’s category-based inferences in that domain as well, and which property domain children most strongly believe is determined by social category membership. Second, and related, we add another content domain of properties to those typically included in studies on animal categorization – social/psychological properties. Doing so permits evaluation of the broad conceptual theories that underlie children’s social categories. Third, we simplified the procedure slightly for kindergarten children, to examine category-based reasoning at the age at which social essentialism becomes evident. Moreover, given debates regarding the age at which children develop firm conceptual distinctions between naïve psychological and biological understandings (Carey, 1995; Gelman, 2003), kindergarteners seemed relevant and potentially different from the 7–9-year-olds examined by Ahn et al. In fact, in their studies on social-category based property inferences, Kalish and Lawson (2008) found differences in the response patterns of children from these two age groups.

1. Method

1.1. Participants

Participants were 72 middle-class kindergarten children (36 girls, \( M = 5 \) years and 5 months, range 4 years and 7 months to 6 years and 5 months). Only children with signed parental permission participated.

1.2. Design

The study employed a 2 (Causality condition: causal vs. correlational) \( \times \) 2 (Internal-Property type: biological vs. psychological) between-subjects design (\( n = 18 \) per cell). In addition, External Property type (physical vs. behavioral) varied within-subjects. Each child, in each Causality condition, partici-
Table 1
List of categories and respective properties used in the present study.

<table>
<thead>
<tr>
<th>Novel labels</th>
<th>Internal Property</th>
<th>External Property</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biological</td>
<td>Physical</td>
</tr>
<tr>
<td>Olmecs</td>
<td>Have melanin in their blood</td>
<td>Have dark skin</td>
</tr>
<tr>
<td></td>
<td>Believe the sun is their God</td>
<td>Leave home only at night</td>
</tr>
<tr>
<td>Fomoires</td>
<td>Have chiasm behind their eyes</td>
<td>Have purplish eyes</td>
</tr>
<tr>
<td></td>
<td>Like looking pretty</td>
<td>Spend time looking at mirrors</td>
</tr>
<tr>
<td>Bororos</td>
<td>Have collagen inside their skin</td>
<td>Have round bones</td>
</tr>
<tr>
<td></td>
<td>Believe they are fish</td>
<td>Swim really fast</td>
</tr>
<tr>
<td>Vanirs</td>
<td>Have protein in their muscles</td>
<td>Love eating apples</td>
</tr>
<tr>
<td></td>
<td>Have long hands</td>
<td>Jump really high</td>
</tr>
</tbody>
</table>

pated in 4 trials: either 2 biological–physical and 2 biological–behavioral, or 2 psychological–physical and 2 psychological–behavioral.

1.3. Materials

Four novel social categories were created. The categories were initially introduced via a 10 in. × 6 in. picture including various category exemplars depicted as black-on-white silhouettes. The category properties were illustrated in 7 in. × 2.5 in. color pictures. These category and property pictures strongly resembled those used by Ahn et al. (2000). A 10 in. × 6 in. color picture of a location represented the place where a member of the target category was found. The complete list of the categories and their respective properties is provided in Table 1. We attempted to generate properties that (a) were novel to children, (b) were easily understandable, (c) did not have a definite affective valence, and (d) could be combined to form coherent pairs.

The materials were arranged in a picture album, such that each category occupied 2 pages of the album. For each category, the first page included the picture of the category silhouette and a place beneath it for the two property illustrations. The next page included a picture of the location, and next to it were two pairs of the two pictures of the properties to be used at test. In one of these pairs, the Internal property was crossed with a large red “X” to indicate that the exemplar did not have this property, while the External property was intact (External-property-match). In the other pair, the External property was crossed with a large red “X” while the Internal property was intact (Internal-property-match). See Fig. 1 for a depiction of the procedure.

1.4. Procedure

The session began with three training items, similar to those employed by Ahn et al. (2000). In the first two items, children were told two properties about a familiar category and were subsequently asked recall questions. Children were corrected when providing wrong properties. In the third training item, children were told two properties about a category, were shown a location picture in which an exemplar of the category presumably was spotted, and were then shown two pairs of property pictures: one with both property pictures crossed out with large red “Xs” and the other with both property pictures intact. The child was asked to choose which pair of property pictures corresponded to the exemplar in the location. This trial helped familiarize children with the meaning of the red X. If children answered incorrectly, the experimenter repeated the question. Most children answered correctly after the first question, and all children did so after the question was repeated. In sum, these training items ensured that children (a) were capable of recalling two properties ascribed to a target category, (b) understood that they should refer only to the mentioned properties in answering the task, and (c) understood that when a property-picture was crossed, it meant that the item did not have that property.

After the training items, participants were exposed to the four experimental trials in a fixed order, one at a time (see Fig. 1). Each trial started with the experimenter showing children the black-on-white category silhouette, and naming the category with an unfamiliar label (e.g., “These are Olmecs”). The
**Causal Condition**

"These are Olmecs. Olmecs have stuff called melanin in their blood. Because of that, Olmecs have dark skin."

**Correlational Condition**

"These are Olmecs. Olmecs have stuff called melanin in their blood. Olmecs have dark skin."

"Look at this place. There’s a person who lives here. He’s an Olmec. Do you think he doesn’t have stuff called melanin in his blood, but has dark skin?"

or that he has stuff called melanin in his blood, but doesn’t have dark skin?"

---

**Fig. 1.** A graphic illustration of the stimuli and procedure.
experimenter then described the two properties assigned to the category, attaching the property illustrations beneath the category picture. First properties were internal, either biological or psychological depending on condition. Second properties were external and alternated between physical and behavioral within subjects (two trials of each kind, in counterbalanced order). The manner in which the two properties were introduced varied according to Causality condition. In the Causal condition, the experimenter noted a causal relationship between the Internal and External properties (e.g., “Olmecs have a stuff called melanin in their blood. Because of that, Olmecs have dark skin”). In the Correlational condition, the two properties were simply mentioned one after the other (i.e., the expression “because of that” was omitted). Internal properties were mentioned before External properties in the Causal condition so as to match the common-sense understanding that causes precede effects. For equivalence, we kept this same ordering of properties in the Correlational condition.

Following the description of the category and its properties, the experimenter turned the page of the album revealing the picture of a novel location. The experimenter said that a member of the target category is known to live in that location and then pointed to the two test property pictures – the External-property-match and the Internal-property-match – and asked which of the two pairs represented what the category exemplar living in the novel place had (see Fig. 1 for wording). Order of presentation of the pairs was counterbalanced across trials within- and between-subjects. After the child pointed to one of the pictures, the experimenter turned the page to reveal a new category.

2. Results

Children’s responses in each type of Internal–External pair were scored according to the number of trials in which they selected the Internal-property-match. These scores ranged from 0 (selected the Internal-property-match on neither trial) to 2 (selected the Internal-property-match on both trials of that type). These scores were the dependent measures in a repeated-measures analysis of variance (ANOVA), which included Causality condition (causal vs. correlational) and Internal Property-type (biological vs. psychological) as between-subjects factors, and External Property-type (physical vs. behavioral) as a within-subjects factor. Preliminary analyses revealed no significant effects of gender.

The analysis yielded significant effects of Causality condition, $F(1,68) = 6.38, p < .05, \eta^2_p = .09$, and of Internal-Property type, $F(1,68) = 4.43, p < .05, \eta^2_p = .06$. These effects were qualified by a significant interaction between Causality condition and Internal-Property type, $F(1,68) = 11.33, p < .005, \eta^2_p = .14$ (Fig. 2). t-Tests comparing between conditions for each Internal-Property type revealed that whereas
condition did not have a significant effect when the internal property was psychological, condition
did have a significant effect when the internal property was biological, \( t(34) = 3.57, p < .005 \). Namely,
children were more likely to choose the biological properties in the causal than in the correlational
condition. Analyses against chance responding (chance = 2 choices of the Internal-property match
across the four trials) revealed that children selected at above chance rates the psychological property
match in the causal and correlational conditions, \( t(17) = 3.11, p < .01 \), and \( t(17) = 6.19, p < .001 \), respec-
tively, and the biological property match in the causal condition, \( t(17) = 5.24, p < .001 \). Rate of selection
of the biological property match in the correlational condition, however, did not differ significantly
from chance. In sum, children systematically inferred the presence of psychological properties on a
category exemplar, independently of how the properties were presented. In turn, they inferred the
presence of biological properties only when these were presented as causal.

The ANOVA also revealed no significant effect of External-Property type, but a significant interaction
between Internal- and External-Property type, \( F(1,68) = 5.31, p < .05, \eta^2_p = .07 \). Paired \( t \)-tests comparing
External-Property types for each Internal-Property type revealed no significant difference in frequency
of selection of psychological properties when these were paired with behavioral (\( M = 1.39, SD = .49 \)) vs.
physical (\( M = 1.50, SD = .61 \)) properties (\( p > .3 \)). However, children were more likely to select biological
properties when paired with behavioral (\( M = 1.31, SD = .82 \)) than when paired with physical (\( M = 1.03,
SD = .88 \)) properties, \( t(35) = 2.14, p < .05 \). In other words, here too reliance on psychological properties
was more robust than reliance on biological properties.

In a final set of analyses, we assessed children’s absolute tendencies by comparing against chance
(chance = 1 choice) children’s selection in each of the eight cells of the design (i.e., the crossing of
Causality condition, Internal-Property type, and External-Property type). These analyses revealed
that only when the internal property was biological and not causal, were children’s selection of the
Internal-property-matches not significantly above chance (for Physical External Properties: \( p > .1 \), for
Behavioral External Properties, \( p > .6 \); for the other 6 cells, \( p < .05 \)). In other words, when a category
was described as having a psychological property, or a causal-biological property, children identified
category exemplars by these properties, independent of the external property associated with them. A
further implication is that under no circumstance did children select either Physical or Behavioral
properties more often than expected by chance.

3. Discussion

Our goal was to assess whether in drawing inferences based on human categories, young children
are sensitive to the content domain and causal status of the to-be-inferred category properties. The
findings reveal that they are.

Regarding the content domain of properties, children could draw inferences regarding four types
of properties – each mapping onto a broad conceptual theory hypothesized to underlie children’s
social categories: physical properties (e.g., have dark skin), behavioral properties (e.g., leave home
only at night), biological properties (e.g., have melanin in their blood), and psychological properties
(e.g., believe the sun is God). Overall, the findings revealed that the most central type of property was
psychological.

We cannot be certain how generalizable this finding is. For instance, we did not differentiate, as
Kalish and Lawson (2008) did, between deontic properties and preferences, and some of our psycho-
logical properties may have been interpreted either way (e.g., “believe the sun is God”). Moreover,
while we attempted to present affectively neutral properties – as the one in the above example – we
cannot be certain that all children interpreted them as such. Future studies may control these factors
more systematically. For instance, it is possible – even likely – that children are more willing to infer
the presence of positive psychological properties than negative ones (see Lockhart, Chang, & Story,
2002, for the possibility of such an “optimistic bias” in children’s trait reasoning).

These possible limitations notwithstanding, it was revealing that children inferred that exemplars
of a novel category had the psychological properties associated with the category, irrespective of which
external property the exemplar did not have, and of whether or not the properties were defined as
causal. This finding argues against a strong role of affective value on children’s judgments in this
task and instead points to the robustness of psychological properties as plausible inferences based on
social category membership. In fact, psychological properties may be so intuitively central to children's social category concepts that the experimenter's explicit marking of them as causal may have appeared redundant to children and thus did not add to the properties' weight.

In contrast to this relative robustness of psychological properties, inferences about biological properties varied according to the external properties associated with them, and more substantially, to their causal status. In particular, children selected biological-property matches at above chance levels only when these properties were described as causal of external properties, and not when they were simply presented as descriptive. On the one hand, this finding indicates that in themselves, biological properties are not intuitively taken by children as central to social categories. That is, the sheer presence of biological properties in an exemplar did not suffice for children to extend category membership to it. On the other hand, the fact that describing biological properties as causal led children to change this pattern vouches for the importance of causal status in kindergarteners' social concepts. This is not a trivial matter given that biological properties were the only ones presumably including novel words to children (e.g., "melanin"), and that there were relatively easy alternatives for children to rely on – i.e., physical markers or behavioral patterns. We take this result as an extension of Ahn et al.'s (2000) findings regarding the existence of a causal status bias in 7–9-year-olds' categorization of animals, to 5-year-olds' categorization of humans. Moreover, in combination, the findings from these two studies reveal that, while children may have a general causal status bias, this bias operates differently depending on children's prior knowledge about different domains and properties (Gopnik et al., 2004; Saxe & Carey, 2006).

Overall, the differences in the relative centrality of properties to children's social categories seem mostly consistent with theories arguing that children's social concepts do not derive from an analogy to the biological domain (Atran, 1990), from performative theories, or from sheer perceptual similarity. Rather, they seem to derive from an intuitive sociology (Hirschfeld, 1996) or psychology (Heyman & Gelman, 1998; Kalish, 2002). For instance, the findings are consistent with an evolutionary argument that social groups are organized by attitudes and values, and that consequently, such psychological attributes are more reliable markers of social categories than salient physical features (Cosmides, Tooby, & Kurzban, 2003). In the present study, whenever psychological properties such as beliefs and values were presented, children ascribed a central role to them in their representations of social categories.

As noted earlier, most studies addressing inductive potential have focused on the kinds of categories that children treat as reliable sources for induction. These studies have thus provided a relative ranking of categories, both in the social (Diesendruck & haLevi, 2006) and non-social domains (Gelman & Markman, 1986) in terms of their inductive potential. Moreover, given that inductive potential is often considered an "index" of essentialist thinking, these studies have provided additional evidence of the extent to which various categories are essentialized (Gelman, 2003). By focusing not on the potential sources of induction, but rather on the contents of the induction, the present study provides evidence not so much as to whether or not children essentialize, but rather on what children may treat as proxies to essential properties of social categories.

Such evidence is indeed indirect. We did not determine whether children believe psychological properties constitute the essence of social categories. For that, we would have had to show, for instance, that given an item with the psychological property of category X and the behavioral property of category Y, children would categorize the item as X – what Kalish and Lawson (2008) refer to as the diagnosticity of properties. What we can determine is that children are less willing to admit as category members exemplars lacking the category's psychological properties than those lacking any other kind of property. Nonetheless, we would like to postulate that the fact that the present study used novel categories and properties allows for this stronger – essentialist – interpretation regarding the status of psychological properties in children's social concepts. When children are asked to infer the presence of properties in familiar categories (e.g., gender), such inferences are potentially influenced not only by the definitional centrality of the property to the category (i.e., is it essential or not), but also by the properties' typicality (e.g., typically, boys are more likely to play contact sports than girls). In such cases, then, inferred properties may not be strongly indicative of their status as definitional of category membership. In contrast, when children are asked to draw inferences based on novel categories – as was done here – specific typicality considerations cannot influence their reasoning. In this case, the
relation between the centrality of properties as revealed by inferences and the essential status of properties to category definition may be much tighter. Further studies are needed to examine this hypothesis.

To conclude, there is a vast literature indicating that by kindergarten, children hold a belief that human kinds have essences. The present study is suggestive regarding what children believe this essence is – namely, causal and psychological properties. These suggestions are circumstantial and invite further inquiry. At the very least, however, the study reveals that causal and psychological properties are ones children are most comfortable inferring about a person, simply from knowing the social category to which the person belongs.

References


