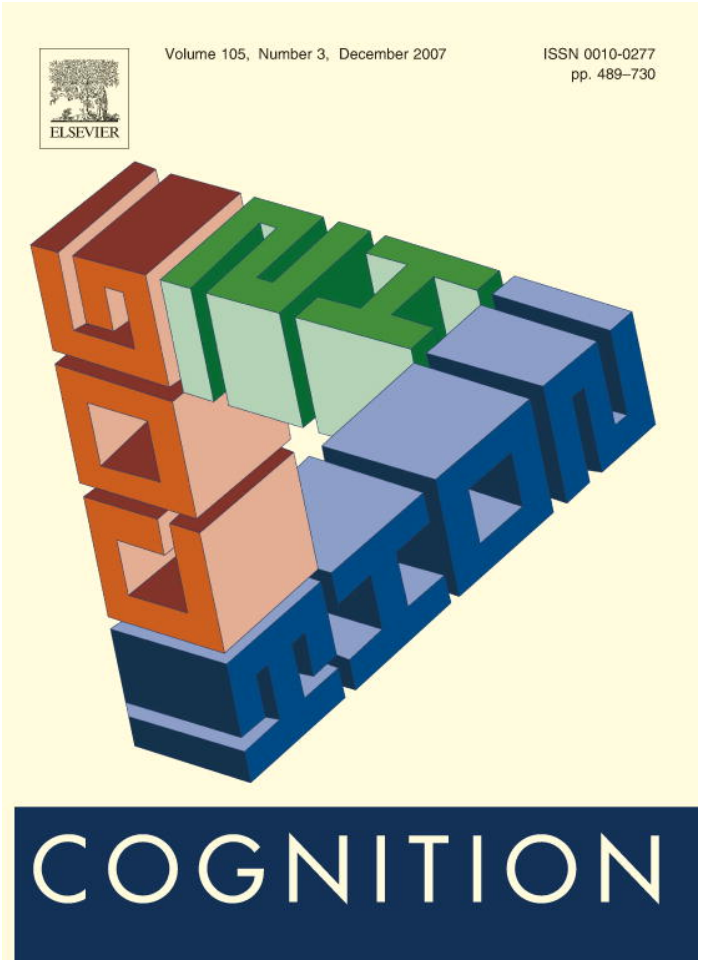

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Category essence or essentially pragmatic? Creator's intention in naming and what's really what ☆

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Abstract

Daily experience is filled with objects that have been created by humans to serve specific purposes. For such objects, the very act of creation may be a key element of how people understand them. But exactly how does creator's intention matter? We evaluated its contribution to two forms of categorization: the name selected for an artifact, and intuitions about what an artifact "really" is. To contrast the possibility that intention serves as an essence (Bloom, P. (1996). Intention, history, and artifact concepts. *Cognition*, *60*, 1–29; Bloom, P. (1998). Theories of artifact categorization. *Cognition*, *66*, 87–93.) determining an artifact's name with the possibility that it matters through its relevance to discourse goals, participants in three experiments read scenarios about people interacting with an artifact and then judged the suitability of different names for it. The intention of the creator was of differing degrees of relevance to the communication, and the relevance of other aspects of the entity varied in a complementary fashion. We found that name selection was altered by the communicative goals of a situation, and name choice was most consistent with creator's intention when the situation made

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intention relevant to achieving those goals. In a fourth experiment, we used the same scenarios to test the possibility that intention serves as an essence determining intuitions about what an object "really" is. The impact of creator's intention was modulated by the discourse context. These findings suggest that creator's intention influences both name choice and intuitions about what something "really" is by virtue of its impact on how communicative goals are best realized.

Keywords: Artifact categorization; Essentialism; Artifact concepts; Intentional-historical theory; Naming; Pragmatics

1. Introduction

People interact with all sorts of concrete objects in their daily lives, from other people to pets, foods, simple objects such as cups or chairs, and complex machines. Although interactions with entities from the natural world once dominated human experience, much day-to-day interaction in modern industrialized societies is with things made by humans – entities that have come into existence through willful acts of creation to serve aesthetic or functional purposes in human lives.

For such entities, that very act of creation may be a key element in how people understand them. For instance, Bloom and Markson (1998) found that when young children drew a balloon and a lollipop that were indistinguishable, the children later labeled each according to their intention in drawing them. That is, even though the pictures' properties matched balloons and lollipops equally, children referred to each one according to whatever they had originally intended it to be. Gelman and Bloom (2000) described artifacts as being either intentionally or accidentally created (e.g., a piece of newspaper was either deliberately folded into a hat shape or it accidentally acquired that shape), and they asked participants what the object was. Both adults and children had a tendency to label the artifact according to the type of object (calling it *hat*) rather than the material (*newspaper*) when the origin was intentional, but the reverse was true when the origin was accidental. Gutheil, Bloom, Valderrama, and Freedman (2004) altered a familiar object such as a paper cup (e.g., cut, crushed, or both) and asked participants if the transformed object were still a member of that artifact kind. Adults had a strong tendency to maintain that it was, although young children's bias was less strong.

How exactly does intention matter to people's understanding of artifacts? Bloom's (1996, 1998) intentional-historical theory provides an essentialist answer to this question. Below, we review his proposal and discuss difficulties with testing it in its original form as a theory of non-linguistic categorization. We then offer a version of the essentialist position focused on naming that is compatible with later descriptions of the proposal by Bloom and colleagues, and we provide an alternative account of the role of intention in naming based on speakers' goals. We report three experiments distinguishing between the two accounts. Finally, we raise another possible

interpretation of Bloom's proposal, one concerning intuitions about what an artifact "really" is, and we test it in a fourth experiment. Together, the experiments are consistent with an explanation of the role of intention in understanding artifacts that is pragmatic rather than essentialist in nature.

1.1. Artifact categorization and the intentional-historical view

According to Bloom's (1996, 1998) intentional-historical view, artifacts have essences in the Lockean sense (1690/1964, p. 26). That is, they have internal qualities that are causally responsible for the observable properties of the entities. Bloom argues that the creator's intended category membership for an artifact constitutes its essence, and furthermore, that such essences have psychological reality. He argues that people believe in such essences for artifacts, and, most critically, that they categorize artifacts according to their beliefs about the essence. If someone believes an object was successfully created to be a chair, she views this intention as constituting the object's essence and will consider the object to be a chair. If she believes it was created to be a stepstool instead, she views that intention as the essence and will consider it to be a stepstool.

To evaluate this proposal, it is necessary to specify what type of cognitive activity is meant by the term "categorize". Bloom originally framed his proposal as a proposal about non-linguistic, conceptual categorization. But identifying the conceptual categories that the proposal might account for is remarkably tricky. A variety of different cognitive activities involve grouping objects to treat them as equivalent in some way, and each is a form of categorization. The groupings created by these different cognitive activities are not the same (Malt & Sloman, 2007; Sloman & Malt, 2003). For instance, the English words *bottle*, *jar*, and *jug* delineate groupings through their application to certain objects and not others. Property projection creates other groupings: the things across which one would project the property "can hold liquids" includes objects called not only *bottle*, *jar*, and *jug* but also others called *bowl*, *cup*, and *sink*. Goals can create yet other groupings: The set of things one might grab to capture fireflies on a summer night is likely to be only a subset (having a certain range of sizes and shapes) of the things called *bottle* and *jar*. In principle, the most important conceptual groupings for artifacts could be ones created by beliefs in a shared essence. However, in the context of a proposal about the existence of such an essence, this suggestion would be circular (Sloman & Malt, 2003).

Alternatively, it might be suggested that the groupings picked out by names reveal the most stable and important or frequently used conceptual categories. In fact, Bloom (along with many other categorization researchers, e.g., Gelman & Wellman, 1991; Keil, 1989; Murphy, 2002) has often used the names given to objects as the indicator of the groupings of interest. But the groupings that the nouns of a language identify vary from language to language: the set of things called *bottle* in English, *botella* in Spanish, *bouteille* in French, and *fles* in Dutch only partially overlap with one another (Ameel, Storms, Malt, & Sloman, 2005; Malt, Sloman, Gennari, Shi, & Wang, 1999), and the same is the case for many other common nouns across languages (e.g., Graham & Belnap, 1986; Kronenfeld, Armstrong, & Wilmoth, 1985; Paradis, 1979). Evidence from similarity judgments suggests that the non-linguistic

understanding of common artifacts is more shared across speakers of different languages than naming patterns are (Ameel et al., 2005; Malt et al., 1999). Whether one agrees that speakers' conceptual understandings of artifacts may be independent of their linguistic categories (Ameel et al., 2005; Malt et al., 1999) or holds that conceptual knowledge is shaped by the speaker's language (e.g., Boroditsky, 2001; Levinson, 2003), it is clear that the categories delineated by common nouns are intimately tied to language rather than revealing language-independent conceptual groupings.

Although Bloom's initial proposal was phrased in terms of conceptual categories, in subsequent investigations he and his collaborators have framed questions in terms of word meaning and the names chosen to label an entity. For instance, Gutheil et al. (2004) pose their question as being what determines the names that children and adults give to artifacts, and they contrast historical with ahistorical accounts of naming. In doing so, they draw on the philosophical literature on the meaning of proper names, a literature directly addressing linguistic concerns. Gelman and Bloom (2000) and Diesendruck et al. (2003) ask how children extend names for artifacts, and Bloom and Markson's (1998) study of children labeling drawings is without doubt about how representations are named rather than about judgments of kindhood per se (since no one would argue that a picture of a balloon belongs to the same kind as an actual balloon). Further, the broader literature of which Bloom's work is a part frequently poses the issues in terms of a debate about how artifact names are extended (e.g., Smith, Jones, & Landau, 1996). More generally, Bloom himself (2000) has emphasized the important role that understanding intention may have in the acquisition of word meaning.

Our primary focus below is therefore on the specific essentialist claim that essences determine how artifacts are named. In contrast to the slipperiness of non-linguistic categories, linguistic categorization is readily observed via naming responses. Following evaluation of the naming version of the essentialist view, we take up one alternative possible interpretation of the essentialist view.

Our investigations concern whether beliefs about a creator's intention act as essences in their contribution to categorization. They do not speak to whether people *believe* that artifacts have essences or *believe* that creator's intention has a special role in categorization. People may well hold such beliefs (e.g., Malt, 1990). Whether such beliefs are an accurate reflection of the cognitive processes involved in categorization, though, is an independent and empirical issue. Folk beliefs about anything – from the role of parental reinforcement in language learning to whether the world is flat – need not correspond to the state of affairs revealed by scientific investigation.

1.2. Pragmatics and the relevance of creator's intention to communicative goals

The notion that intention serves as an essence for artifacts and drives name selection is difficult to reconcile with cases where a creator's intention does not seem to play a definitive role in artifact naming. For instance, at times one can sensibly name an object in direct contradiction to a creator's intention. If someone intends to make an omelet but does not turn it properly, his companion can reasonably exclaim, "You didn't make an omelet, you made scrambled eggs"! Likewise, if someone intends to

draw a picture of a dog but it looks more like a cat, an observer can comment, "That's no dog, that's a cat"! In addition, people will sometimes give objects artifact names in the clear absence of a creator's intention that they be called by that name. A path in the woods created by people tramping through it is still called *path* even if no one intended its existence (Sperber, 2007). In Bristol, Rhode Island, a rocky ledge where the Indian leader King Phillip used to sit is known as *King Phillip's seat* or *King Phillip's chair* (Haffenreffer Museum of Anthropology) (see also Bloom, 1996, pp. 20-22). In the laboratory, Clark and others (e.g., Clark & Wilkes-Gibbs, 1986; Krauss & Glucksberg, 1969) using abstract geometric forms (tangrams) in referential communication tasks have found that partners in the task readily adopt names for the forms that include artifact terms such as *the TV*. Finally, Bloom (1996) notes that despite their intentional origin, objects that are damaged beyond repair may no longer be called by the intended category name. A clock that has been smashed to bits, for instance, is no longer called a clock.

In contrast to the essentialist view, we suggest that the role of creator's intention in artifact naming is revealed by considering why people name. When people choose names for artifacts under most everyday circumstances, they are not doing so in order to inform themselves about the entity's kindhood (indeed, there is no reason to think that selecting a name for an object is a prerequisite to understanding the object non-linguistically; e.g., Fodor, 1975). People usually name artifacts for the same reason that they use words to label any other aspect of their experience: to communicate with someone else. What name is chosen is likely to depend on how the goals of the communication can best be achieved.

A central goal of naming in ordinary discourse is to refer (e.g., Clark & Marshall, 1981). When someone speaks to a conversational partner and in doing so calls an object *chair* or *stepstool* or *scrambled eggs*, she wants her addressee to understand what kind of thing she has in mind, and, if referents are physically present, to successfully pick out the intended referent from among possible ones. An additional goal of naming is to focus attention on attributes of the object relevant to the discourse. By calling an object *chair* rather than *hunk of fabric and wood* or *large heavy thing*, the speaker is drawing attention to the fact that it affords sitting on, not just to its composition or size and weight (Clark, 1997). Choice of names can also serve to provide feedback: In cases where one conversational partner has already introduced a name, using that person's name in return signals understanding and acceptance of the partner's interpretation of the object (Brennan & Clark, 1996). Naming may have other goals as well, such as conveying affect. Calling a building *hut* versus *hovel*, or *house* versus *McMansion*, not only highlights different properties but indicates the speaker's attitude.

Why would beliefs about the creator's intention be relevant to name choice? When an addressee has direct knowledge of the creator's intention, a speaker can achieve his or her goals efficiently by taking advantage of that knowledge. When someone has folded a newspaper into a hat shape with the intention of using it as a hat, a speaker referring to the object as *hat* will be coordinating her name choice with the way that the creator thought about the object, and so reference is easily achieved. Calling it *hat* also highlights properties relevant to the discourse. In saying, for

instance, "Will that hat fit you"? the speaker indicates that size is relevant, an attribute that was also relevant to the creator. If the speaker were to say instead, "Will that newspaper fit you"? reference would be less readily achieved and attention would not be focused on the relevant attribute. Finally, if the creator has introduced a name for the entity, adopting that name signals acceptance of the creator's perspective. If a child is making a wooden block zoom around a table, using the child's label *car* indicates participation in the game. If a friend announces that the mess in the skillet is an omelet, calling it *omelet* back acknowledges her intention that it have certain properties and implies perception of those properties. Rejecting the creator's name requires the addressee to engage in additional processing to determine the intended referent and infer the motivation behind the change, and it may also result in distress. Thus using a name that corresponds to the one the creator had in mind for the object will typically be the most effective way of achieving reference, of evoking properties relevant to the discourse, and, when the creator is the conversational partner, of signaling a willingness to share her perspective on the object.

Often the creator of an object is unfamiliar to the participants in the discourse and so the creator's intentions are not directly known. For many objects of conventional design, physical and functional properties of the objects will tend to lead to name choices compatible with the creator's intention (Bloom, 1996, 1998), although the cognitive processes involved in generating a name may not actually make contact with beliefs about the intention. For instance, a speaker who wants to sit down can talk about heading for a *chair* because this is the name that both she and other members of her linguistic community associate with the object properties she has in mind. As such, it is the name best suited to causing her addressee to identify objects of the type she has in mind and to highlighting properties relevant to the discourse. It is likely that the creator also intended the object to be used as things normally called *chair* are and expected it to be called *chair*, and so name selection in such cases will also often be compatible with creator's intent.[1]

When will beliefs about creator's intention be violated in name selection, then? Following from the first two goals of naming, they will tend to be violated when the name that reflects the creator's intention is not well-suited to causing an addressee to identify the intended referent, when it is not well-suited to causing an addressee to focus on attributes relevant to the discourse, or both. For instance, calling an object intended to be used as a radio but shaped like a can of Coke by the name *radio* may fail to pick it out for someone who has not seen it up close; calling it the *can of Coke* may be more effective at pointing an addressee to the right object. Calling a piece of newspaper that has been folded into a hat shape *the hat* may be the best choice for both identification and focusing on relevant attributes if it is being placed on someone's head, but it may be less useful for either goal than calling it *the newspaper* when

[1] Note that manufacturers and makers in distant locations whose language differ from that of the speaker may not have had any specific expectation about a name for an object in the language of the speaker. We suggest that what creators intend to do is create objects with certain physical and functional properties that happen to be associated with certain names in their language; their intention does not concern the kindhood of the object per se nor, usually, its name.

looking for a way to start a fire or line a bird cage. And, of course, following from the third goal of naming, when a creator has explicitly introduced a name, beliefs about her intention will be violated in name selection when the speaker wants to provide a clear signal of rejection of the creator's intention, as in calling a messy dish intended to be an omelet *scrambled eggs*.

This analysis also provides an explanation for why people are at times perfectly willing to use a name for an object as if it were an artifact when no creator intended to create one. In the case of King Phillip's chair, his habitual use of the rocky ledge as a place to sit makes calling it his *seat* or *chair* an effective strategy to bring to mind the appropriate referent (for those familiar with his habits), and doing so activates properties relevant to his use of it. Calling it *King Phillip's rock* or *King Phillip's ledge* may be less successful at either. In the case of the path trampled through the woods, there is no alternative mono-lexemic name, and alternative multi-word descriptions (e.g., *opening through the woods; line through the trees*) would less effectively convey the physical qualities and functional affordance of the entity than *path* does. In the case of the abstract tangrams forms (e.g., Clark & Wilkes-Gibbs, 1986), attempting to achieve reference by describing the geometric properties of the forms instead of naming according to the gestalt created by the configuration would likewise be tedious and perhaps ineffective at distinguishing one form from another. In contrast, calling the forms by names such as *the TV* can serve to cause the addressee to identify the intended referent and to do so efficiently by looking for the properties that the speaker is focusing on.

In Experiments 1–3, we test the hypothesis that intuitions about creator's intention matter to name choices for artifacts by virtue of their relevance to a speaker's goals on an occasion of naming. We contrast this possibility with the possibility that creator's intention matters because it serves as linguistic category essence. We expect that when intention is relevant to the goals, it will be used as the basis of naming, but when it is not, other names that better meet the goals of the communication will be chosen.

In each experiment, short paragraphs were presented describing a situation in which several people engage in an interaction that involves a human-made entity. The content of the scenarios was varied so that creator's intention differed in degree of relevance to the communication, and the relevance of other aspects of the entity varied in a complementary fashion. Experiment 1 scenarios involved artworks created by children, Experiment 2 involved household objects assigned new uses, and Experiment 3 involved materials either intentionally or accidentally transformed to have object-like properties. At the end of each scenario, one of the actors in the scenario wants to refer to the target entity by name. Participants saw two critical versions of the referential sentence, one using the noun that captures the intention of the creator and the other using a label relevant to other aspects of the discourse. Participants rated the suitability of both sentence options. If creator's intention serves as an essence for artifacts and people name in accordance with their beliefs about the essence, then intention should be the dominant factor determining the ratings. In contrast, if naming is determined by communicative goals, then preference between the two alternatives will depend on the goals implied by the scenario. The name

associated with the creator's intention should be favored when it is more relevant to achieving discourse goals, but the other name should be favored when it better serves the goals.

Together, the experiments provide an assessment of whether creator's intention matters to artifact naming because it constitutes an essence that is the primary determinant of name selection or whether its role in naming is less central and may be better described in terms of its contribution to communicative success. Following these experiments, we elaborate on an alternative interpretation of Bloom's view in terms of what an object "really is" and test it in a fourth experiment.

2. Experiment 1

Experiment 1 was motivated by Bloom and Markson's (1998) study of children naming their own drawings. Bloom and Markson asked three- and four-year-olds to draw pictures of a balloon, a lollipop, the experimenter, and the child him- or herself, entities chosen with the expectation that the first two and the second two pairs of pictures would be visually indistinguishable. Children were later asked to describe their drawings. Bloom and Markson found that both three- and four-year-olds tended to name the pictures in accordance with their intention in drawing them, despite the fact that the pictures were not uniquely identifiable and sometimes did not even look much like the target entity at all. This outcome highlights the relevance of creator's intent to the creator's own name choice. But in this case, children were assigned to draw particular kinds of entities. As a result, the communicative context strongly favors choosing names consistent with the original intent, and it provides no motivation for any other choice. This study does not reveal whether the children might have chosen a different name in some other communicative context or whether someone else who knows the creator's intent might choose a different name in some other context.

Experiment 1 was designed to ask whether an observer's choice of label for a child's artwork is driven entirely by an understanding of the creator's intention in making it or whether it may vary depending on communicative goals and constraints on achieving them. We presented short written scenarios describing a situation in which a child has created a piece of art and someone else subsequently needs to refer to it. In all cases, the child intends for the artwork to represent a thing associated with a particular name, and the speaker knows this intention but thinks that it looks more like something else. We manipulated the conditions under which the speaker was speaking.

Each scenario had four versions. In one version, the speaker was addressing the child who had created the artwork. In another, the speaker addressed a different person who had seen but not said anything about the object. In the third version, the speaker addressed a person whose perception of the object was reported as being different from the creator's intent, and in the final version, the person being addressed had overtly commented on the object, thereby indicating her interpretation of it and

introducing a new conversational precedent for naming it. In all three of the latter versions, the conversation took place out of earshot of the child creator (e.g., at a place of work).

In all cases, participants were asked to judge the sensibility of two versions of the final sentence: one using a name consistent with the creator's intention and the other using one consistent with what the artwork looked like to the speaker. If creator's intention dominates name selection for art regardless of its contribution toward achieving communication goals, participants should always prefer the sentence using the name honoring the creator's intention. We predicted that participants would also take into consideration how the communication goals that they infer for the speaker can best be achieved. When the creator is addressed, signaling acceptance of the creator's interpretation is a relevant goal, but in the remaining three scenario versions, the primary goal would be achieving reference. As such, we expected that participants would tend to honor the creator's intention for speaking to the creator but would prefer a name reflecting what they think the art looks more like for addressing someone else, especially someone who has already called it by the other name.

A secondary prediction concerns the acceptability of names other than the preferred one. The notion of creator's intention as an essence that determines an artifact's name implies that an entity should have only one name at a given level of abstraction.[2] That is, if people name artifacts according to their beliefs about what the creator intended the entity to be, they should believe that one name is the "right" name for the object and others are not. From the perspective of communication goals, however, there is no particular reason why only one name at a given level of abstraction should be useful for talking about an entity. One name may be the most effective means of achieving the current communication goal, but other names may also be viable. In our scenarios, both of the name choices presented referred to salient aspects of the entities in question. We therefore expected that, regardless of which name was preferred, the non-preferred name would generally still be judged moderately suitable. In the situation where the speaker addresses the original creator of the artwork, however, we expected that the non-preferred name would be judged lowest in desirability. In this case the addressee has indicated his or her naming preference and has introduced a naming precedent for the object. The discourse context is such that the speaker can be inferred to want to act cooperatively toward the creator, and so use of a name other than the creator's should be avoided.

[2] That is, when the names convey different sets of properties. Of course, objects can have more than one name conveying essentially the same set of properties; a given object might reasonably be called both *pen* and *marker* or *booklet* and *pamphlet* (Malt & Sloman, 2004). Our concern here, however, is with cases where the alternative names convey more distinctively different information that would be associated with different intentions on the part of a creator, e.g., *balloon* vs. *lollipop*. Likewise, it is a common observation that objects can have names at different levels of abstraction (e.g., *tea cup*, *cup*, *drinking vessel*); again, our concern here is not with these sorts of variations in naming, which do not imply different intentions by the creator.

2.1. Method

2.1.1. Participants

Forty-six Lehigh undergraduates participated for course credit.

2.1.2. Materials

Four basic scenarios were developed. In one, borrowing from Bloom and Markson (1998), a boy has drawn a picture that he intends to be a lollipop but his father thinks it looks more like a balloon. In the second, a girl has made a clay sculpture that she intends to be a dog, but her big sister thinks it looks more like a bear, and in the third, a girl paints a bowl of spaghetti but her mother thinks it looks more like worms. In the fourth, a girl has made a metal sculpture that she intends to be a teapot but her mother thinks it looks more like a watering can. In each case, the child creator names the creation in the course of bringing it to the attention of the older person, and the older person compliments it (using a more general name, e.g., "picture" or "sculpture".) In each scenario, subsequently, the older person wants someone to hand him or her the piece of art. The scenario ends with three choices of sentences to express the request. These sentences were identical except for the noun used to refer to the artwork, which was either the creator's name, the name that the older person thinks better describes the entity, or a filler name intended to be less relevant to the discourse than either of the others.

Each of the scenarios had four versions creating the four experimental conditions (communicative contexts). In the first, all actors in the scene are still in the original location at the time of naming, and the request for the entity is directed to the child creator. In the remaining three versions, the piece of art has been brought to a new location where the creator is not present. In one of these, the older person asks a new actor to hand him or her the object; in another, the new actor's perception of the object as different from the child's intention is reported before the request by the older person is made, and in the last, the new actor comments out loud on the object using the alternative name before the request is made. All four versions of the lollipop/balloon scenario are given in Table 1, and the complete set of stimuli is provided in Appendix A.

In addition to the target stimuli, six filler scenarios were written. Each was about the same length as the critical scenarios and also involved a child interacting with one or more older people. At the end of each, as in the critical ones, one of the actors in the scenario was about to speak, and that ending was followed by three potential final sentences that were identical except for an expression referring to an entity present in the scenario. Unlike in the target stimuli, however, no act of creation took place within the scenario, and the differences among the referring expression choices did not have to do with preserving or violating a creator's name (e.g., they might differ in level of abstraction; one set of name choices was "hot rod", "dark gray convertible", and "dark gray Mercedes Benz 540 SL").

Packets were constructed each containing one target scenario in each condition, with assignment of condition to scenario rotated across packets. Each packet also contained all six filler scenarios interspersed with the target scenarios. Half the packets had the three final sentences for each scenario in one order and half had them in a

Table 1
Sample stimuli for the four conditions of Experiment 1

Shared portion of scenarios:
Mikey, who is two and a half years old, decided to draw a picture. First he drew a vertical line and then he drew a circle on top of it, and then he colored it nice and red. "What did you draw"? his dad asked. "It's a lollipop"! Mikey said. Dad thought it actually looked more like a balloon, but he said to Mikey, "Thanks for the nice picture"! Mikey was happy and started to play with his blocks.
Ending, speaking to creator:
Then a repairman arrived to fix something with a cup of coffee in his hand. Dad did not want the man to spill coffee on Mikey's drawing, so he said to Mikey,
Ending, speaking to new addresee:
Then Dad went off to work and took the picture with him to hang on his office wall. Before he hung it, a repairman arrived to fix something with a cup of coffee in his hand. Dad did not want the man to spill coffee on Mikey's drawing, so he said to him,
Ending, speaking to new addressee who has thought about a different name:
Then Dad went off to work and took the picture with him to hang on his office wall. Before he hung it, a repairman arrived to fix something with a cup of coffee in his hand. The man looked at the drawing and thought that it was a nice balloon. Dad did not want the man to spill coffee on Mikey's drawing, so he said to him,
Ending, speaking to a new addressee who has used a new name:
Then Dad went off to work and took the picture with him to hang on his office wall. Before he hung it, a repairman arrived to fix something with a cup of coffee in his hand. The man looked at the drawing and said, "I see your kid drew a balloon"! Dad did not want the man to spill coffee on Mikey's drawing, so he said to him,
Final sentences for rating (All conditions):
— Hand me the picture of the lollipop.
— Hand me the picture of the balloon.
— Hand me the picture of the stick figure.

different order. At the top of each page in the packet was a 5-point rating scale, labeled with 1, very poor; 2, poor; 3, neither good nor poor; 4, good; and 5, very good.

2.1.3. Procedure

Participants, in groups of about 2–6, were given written instructions explaining that they would be reading paragraphs that each told a short story. They were told that after each paragraph, there would be three sentences that could finish the story, and they should rate how good a choice (how sensible and appropriate) each option was for the character speaking, using the scale that would appear on each page. Participants completed the packets at their own pace.

2.2. Results and discussion

For each communicative context, mean ratings were tabulated for the final sentence that used the creator's name and for the one that used the alternative name (the name reflecting what the older person thought the entity looked like). Table 2 presents means and standard errors for the communicative contexts. We expected that in judging the suitability of names, participants would take into consideration how

communication goals could best be achieved in the situations described. As such, their liking for the creator's name should decrease across conditions. The opposite pattern should occur for the alternative name because it better captures what the art looked like to the speaker and new addressee.

Table 2 presents means and standard errors for the four communicative contexts. The data show the predicted pattern. The overall means favored the creator's name slightly (mean = 3.56 for creator's name across the four conditions and 3.35 for the alternative name), but the main effect of name was not significant, $F(1, 45) = 1.89$. The creator's name was liked most for talking to the creator and was considered less suitable for speaking to a new addressee, especially when that person's thoughts or words make clear that person thinks the object looks like something else. Conversely, the alternative name was rated highest for speaking to a new addressee who had introduced a new name, and lowest for speaking to the creator. The cross-over pattern was confirmed by a 4 (communicative context) × 2 (name) ANOVA that showed no main effect of communicative context, $F(3, 135) = 1.59$, n.s., but a significant interaction of communicative context with name, $F(3, 135) = 53.43$, $p < .001$. The monotonic decrease in relative preference for the creator's name over the alternative moving from Conditions 1–4 held for three of the four individual scenarios, with the remaining one showing a reversal only between Conditions 3 and 4. Further, the alternative name was favored in absolute terms over the creator's name for speaking to the new addressee who has introduced a new name. These results thus argue against the possibility that the creator's intention has a special role in naming and in favor of the notion that aspects of the communicative context determine the extent to which the creator's name is preferred.

We also expected that, regardless of which name was preferred, the non-preferred name would generally still be judged moderately suitable. However, we predicted that in the situation where the speaker addresses the original creator of the artwork, the non-preferred name would be judged lowest in desirability because of the uncooperative nature of using an alternative in this case and the difficulty it might introduce for achieving reference. The results also support these expectations, with the lowest mean rating (just above "poor" on the rating scale) being for using the alternative name to the creator, and the other ratings for the non-preferred choice being at or above the midpoint of the scale.

Table 2
Means (and standard errors) for creator's intended name and alternative name as a function of communicative context, Experiment 1

	Communicative context			
	Creator as addressee	New addressee	New addressee + New name thought	New addressee + New name used
Name				
Original	4.48 (.14)	3.59 (.16)	3.30 (.17)	2.89 (.17)
Alternative	2.11 (.16)	3.41 (.17)	3.74 (.16)	4.13 (.15)

We do note, though, that participants did not like the alternative in any context as much as the creator's name when speaking to the creator, perhaps due to the particular communicative contexts used. All the entities named were works of art, and the scenarios established that the works were ambiguous enough to be interpreted in more than one way. In such cases, people may have some inclination to abide by the creator's intention not because they believe it constitutes an essence for artifacts, but because of the converse: they may believe that there is no objective reality to what an ambiguous work of art depicts so, as cooperative social beings, they are willing to follow the lead of the artist (as they do in accepting certain avant garde creations as art even if the entities violate their own idea of art; Levinson, 1989; see Bloom, 1996). In a related vein, the speaker in these scenarios knew what the child wanted the entity to be called and could suppose that the child would be unhappy at having it called something else. Participants may therefore have thought the speaker would tend to respect the child's preference. Finally, a more directly linguistic factor is that the creator has, in fact, introduced a name for the entity and thereby established a precedent for the name, the effect of which may persist (Barr, 2004a, 2004b; Garrod & Anderson, 1987; Garrod & Doherty, 1994; Malt & Sloman, 2004; Pickering & Garrod, 2004) even as other naming possibilities emerge. We will consider further whether there is a general bias toward creator's name independent of such contextual constraints after presenting additional data.

3. Experiment 2

Several past studies on artifact naming have directly or indirectly pitted the name intended by a creator against other properties of the objects to evaluate the relative weight given to various types of information in name preference. These studies have produced conflicting results, some favoring the primacy of creator's intention and others not. On the side of intention, Rips (1989) presented adult participants with descriptions of objects created with an intended function associated with one common name (e.g., *lamp*) but an appearance associated with another (e.g., *umbrella*) and found that they preferred the name associated with the intended function. Matan and Carey (2001) gave four- and six-year olds and adults ambiguous pictures of objects (pictures in which the object was partially hidden) and told them that the object was made for one purpose but was currently being used for another (for instance, an object made to be used as a watering can was currently being used as a teapot). All participant groups tended to favor the name associated with the original intended function.

Studies producing conflicting results include Keil's (1989) in which children were shown pictures of familiar artifacts (e.g., a coffeepot) and then told about alterations that gave the object both the appearance and function associated with a different type of object (e.g., birdfeeder). In this case, with both appearance and use changed, the children had a strong tendency to prefer the name associated with the current function and appearance. Chaigneau, Barsalou, and Sloman (2004) used scenarios describing familiar objects or variations of them to test the relative impact of several factors including intended category membership on name judgments. In one type of

scenario, the object had the usual properties of an object such as a mop, but it was created accidentally (not intended to be a mop). In another, the object was made by its creator to be a mop but it did not have typical mop features and would not function very effectively as a mop. In others, the object was made to be a mop but was used to perform other actions, or it was made to be a mop but was used to wipe up water only accidentally. Consistent with Keil's results, Chaigneau et al. found that intended category membership had some influence on judgments but mattered less than the current form and use of the object. Gutheil et al. (2004) manipulated the current status of objects by cutting or crushing them or both, to compromise the normal shape and function. They found that participants tended to consider objects still worthy of the original label even after a transformation, but the more severe the transformation, the less willing they were, indicating an effect of current status along with original intention.

Thus studies pitting creator's intention against other properties show conflicting results about whether intention dominates artifact name decisions and so should be considered to have a special status as artifact essence. However, most of the past studies include little or no explicit communicative context against which naming decisions can be made. The participant making a name choice is satisfying an experimental requirement for a response. In doing so, she must make some decision about what properties of the object are relevant to capture in the choice, but whatever the decision, it is made without clear guidance from specific communication needs (Malt & Sloman, 2007) (Indeed, some of the variability in responding across age groups may have to do with participants' interpretation of experimenter expectations rather than with developmental changes in the understanding of artifacts; cf. Gutheil et al., 2004). We suggest that in communicative contexts, when naming decisions are made about artifacts, selection among the names suggested by competing properties will be driven by the goals of the communication. At times, these goals may lead to preferences consistent with creator's intention, and at times they may not.

Experiment 2 is a variant of the Matan and Carey (2001) paradigm. Naming choices were made in the context of scenarios similar to those of Experiment 1 except that the entities described were common household artifacts, not works of art, and all of them were originally created by some unknown manufacturer, not by a nearby child. In the scenarios, an object is introduced that was created with the intention that it be used in one way and that has been named accordingly (e.g., an object for heating water for tea, referred to as a *teakettle*). That object is then used with a different intention (e.g., for watering plants), without any alteration of other properties. As previously, we elicited judgments about the suitability of possible names for the objects by describing a point at which one person wants to say something about the target object to another. We examined whether the preferred name for communicating about such objects would depend on the extent to which the new function represented a stable, on-going modification of the use of the object, making that use the dominant one. If creator's intention has primacy in name selection, participants should favor the name reflecting creator's intention regardless of the extent to which the new use has become established. In contrast, if names are selected to achieve communication goals, calling the object by an alternative name when it is being used for alternative purposes may

sometimes be preferred. In particular, we expected that the tendency to use the name reflecting creator's intent would diminish and the tendency to use an alternative would increase as the habitual and most salient use of the object becomes something other than the one intended by the creator. The alternative name in such cases may best allow reference to be established and best focus attention on discourse-relevant properties of the object. As before, we also expected that the original name would remain at least somewhat viable even when not preferred because it continues to capture aspects of the objects that would allow reference, albeit less readily.

3.1. Method

3.1.1. Participants

Thirty-six Lehigh undergraduates participated for course credit.

3.1.2. Materials

Six scenarios were developed. In each one, an adult needs an object to fulfill some standard household or office function (such as watering plants or storing photographs) and does not have available a conventional object. She uses an object that would normally serve a different function. In one version of each scenario, this use is one-time, in the second, it is a repeated use, and in the third, it has become a permanent use (replacing the previous use of the object). In each scenario, at the end, the person wants to speak to another person about the object. As in Experiment 1, the scenario ends with three sentences, identical except for the noun used to refer to the object. The three nouns are the name associated with the creator's intention, the name associated with the new function, and a filler name intended to be less relevant to the discourse than either. All versions of one scenario are given in Table 3, and the complete set of stimuli is provided in Appendix A.

Six filler scenarios were used. To help disguise the purpose of the experiment by creating some diversity in the types of naming options, three target stimuli and three fillers from Experiment 1 were used as fillers here. Packets were constructed each containing two target scenarios in each condition, and assignment of condition to scenarios rotated across packets. Each packet also contained all six filler scenarios interspersed with the target scenarios. Half the packets had the three final sentences for each scenario in one order and half had them in a different order. At the top of each page was the same 5-point rating scale as in Experiment 1. Instructions were the same as for Experiment 1.

3.1.3. Procedure

The procedure was the same that of Experiment 1.

3.2. Results and discussion

Mean ratings and standard errors for the three communicative contexts, for both the creator's intended name and the alternative name, are presented in Table 4. We had predicted that the judged suitability of the name reflecting creator's intent would

Table 3
Sample stimuli for the three conditions of Experiment 2

Shared portion of scenarios:
One day in May, Mary wanted to water the hanging flowers on her front porch. They needed water almost every day in the warm weather. Mary's old watering can had a hole in it, so she grabbed a tin teakettle from the kitchen.
Ending, temporary use:
"This will work", Mary exclaimed to her friend, Jane, who was visiting. She watered several plants with it, and then she put it down. Jane spotted another plant that was dry. She said to Mary,
Ending, repeated use:
"This will work", Mary exclaimed to her friend, Jane, who was visiting for the week. She and Jane watered her plants with it that day, and several more days after that, too. The following Sunday, while they were sitting on the porch, Jane spotted a plant that looked dry. She said to Mary,
Ending, permanent use:
"This will work", Mary exclaimed to her friend, Jane, who was visiting for the summer. "And I don't need it in the kitchen any more; we can keep it for the flowers". Each morning, she and Jane watered her plants with it. On a hot day in July, while they were sitting on the porch, Jane spotted a plant that looked dry. She said to Mary,
Final sentences for rating (All conditions):
— Hand me the teakettle.
— Hand me the watering can.
— Hand me the can.

Table 4
Means (and standard errors) for creator's intended name and alternative name as a function of communicative context, Experiment 2

	Communicative context		
	Temporary use	Repeated use	Permanent use
Name			
Original	3.44 (.17)	3.64 (.18)	3.36 (.14)
Alternative	3.81 (.13)	4.04 (.13)	4.04 (.11)

decrease and judged suitability for the alternative would increase as the habitual and most salient use of the object became something other than the creator's intended one. The pattern of data does not show a strictly monotonic decrease/increase, but, consistent with our expectations, liking for the original name is lowest with a permanent new use and liking for the alternative is higher for the repeated and permanent new uses than for the temporary use. The somewhat irregular pattern across the three conditions is reflected in a 3 (communicative context) $\times$ 2 (name) ANOVA that showed no main effect of communicative context, $F(2,70) = 2.18$, n.s., and no interaction of scenario version with name, $F(2,70) = .84$, n.s. Notably, however, the preferred name in absolute terms for all of the communicative contexts is the alternative. Participants appeared to view using a name based on the object's current function rather than creator's intention as appropriate even when the new use has occurred only a few times and there is no indication that it will be repeated. A significant main effect of name was present, $F(1,35) = 7.30$, $p < .01$, driven largely by a significant preference for the alternative over the creator's name with a permanent change in use, $t(35) = -3.34$, $p < .01$ (with the remaining two comparisons not significant,

$t(35) = -1.5$ for both). The preference for the alternative over the creator's name with a permanent change in use holds for all six of the individual scenarios, as well as for five when the change is temporary and three when it is repeated.

As previously, we also expected that the original name would remain at least somewhat viable even when not preferred because it continues to capture aspects of the objects that would allow reference, even if not optimally. The data are consistent with this prediction, with ratings for the non-preferred name above 3 ("neither good nor poor") for all three scenario versions.

The data from this experiment suggest that when people choose names for artifacts for purposes of communication, they do so taking into account how well the possible names serve the goals of the communication. In the case of an object that is being used for something other than its original intended function, a name reflecting its current function may best allow reference to be established and may also best focus attention on discourse-relevant properties of the object. Even when an object was used in a new way only briefly, participants appeared to believe that a name reflecting that current use would be at least as effective as the original name, and their preference for this name was even greater when the new use was well-established.

4. Experiment 3

Two sets of past studies have demonstrated the importance of creator's intention to naming using objects that came into their current state either accidentally or through a deliberate act of creation. As noted earlier, Gelman and Bloom (2000) described materials as being transformed into objects intentionally or accidentally (e.g., a piece of newspaper is deliberately folded into a hat shape or else is run over and ends up in the hat shape). Both children and adults were more likely to call the entity by the object name (*hat* in this case) if it had been intentionally created and by the material name (*newspaper*) if it had been accidentally created. Kemler-Nelson, Herron, and Morris (2002) investigated the effect of accidental or intentional change on what children would call an object. They presented objects that had alterations appearing to be either accidental damage or intentional change. For example, a damaged cup had an irregular piece taken out of its side, and an intentionally redesigned cup had a hole in its base edged with a metal ring. The children were more likely to call the object by the name associated with the original intention (*cup* in this case) when the alteration was accidental than when it appeared purposeful. Although Kemler Nelson et al.'s central concern was with the role that intended function plays in naming, because purposeful change to an object by definition indicates that someone intended the properties of the object to be different from before, this study is also consistent with the notion that people take into account what the creator intended an object to be like when they name it.

Again, one possible interpretation of such effects is that creator's intended category membership constitutes an essence for objects and therefore serves as the primary determinant of name choice. We suggest that the effects observed in such experiments may be better interpreted in terms of communication goals. As we argued earlier, when

a newspaper has been deliberately folded into a hat shape, calling the object *newspaper* would, in many communication situations, fail to coordinate the name with the way that the creator is thinking about the object and fail to capture properties of the object important to the current discourse, and so would not be a good choice of name. The same is true for a cup that has deliberately been changed so it cannot hold liquids; indeed Kemler Nelson et al.'s results indicate that participants were inclined to shift names in that case. In contrast, a cup that has been unintentionally damaged will typically have no role in the communicative situation other than being a less desirable instance of what it was called before, and so continuing to call it *cup* will be the best and perhaps only feasible option for achieving reference. On the other hand, if the discourse situation happened to be such that the role of the objects made different names more relevant, those names would likely be chosen. For instance, if someone has folded a newspaper into a hat shape, but later is gathering materials for recycling, she might call it *newspaper* as she does so. If the cup that has been accidentally torn is later used to scoop up birdseed, the user might call it a *scoop*.

Experiment 3 was loosely based on Gelman and Bloom (2000). We varied not only the nature of the origin of objects (accidental or intentional) as Gelman and Bloom did, but also the role of the entity in the discourse at the moment of speaking – its relevance was either as the object per se or as the material it was made of. We examined whether the preferred name would be influenced by the object's current role within the discourse as well as the nature of its origin. If intention functions as a category essence, then the origin should dominate naming. If names are selected to satisfy communication goals, then the role of the entity in the discourse should be important in name selection. We predicted that discourse role would affect name suitability as well as origin, and further, that under appropriate discourse conditions, the material name would be judged suitable even given an intentional origin, and the object name would be judged suitable even given an accidental origin.

4.1. Method

4.1.1. Participants

Forty Lehigh undergraduates participated for course credit.

4.1.2. Materials

Six scenarios were developed. Four were derived from scenarios used by Gelman and Bloom (2000) and two new ones were created. In each, a person named Jane is interacting with a piece of material that takes on a shape and potential function conventionally associated with a particular object name. Each scenario had four versions, reflecting the four combinations of object origin (accidental versus intentional) and discourse role (material versus object). For instance, in the knife/plastic scenario, a piece of plastic is either dropped and breaks into a knife shape (accidental origin), or Jane saws and sands it into the same shape (intentional origin). Then Jane either uses it to cut her sandwich (object role) or offers it to her husband to fill in a hole in their daughter's dollhouse (material role). Each scenario was accompanied by a small line drawing of the shape, compatible with the object implied (a knife in this case) but rough enough to be

consistent with the possibility of an accidental origin. Each scenario ended with Jane wanting to communicate to another person about the entity, with three sentences that could constitute her comment. The sentences were identical except for the noun, which was either the object name, the material name, or a filler name intended to be less relevant to the discourse than either. (For this experiment, because of the different scenario activities involved in making the material versus object use central, the final sentences of the different conditions required some adjustment in order to be sensible continuations of the scenarios. Thus the three final sentences were identical except for the noun used within a given condition but varied slightly across conditions. The variations were designed to contain no other information that could alter name choices, and the name choices themselves were always identical across the four conditions for a given stimulus.) All four versions of the knife/plastic scenario are given in Table 5, and the complete set of stimuli is provided in Appendix A.

Table 5
Sample stimuli for the four conditions of Experiment 3

Intentional creation, discourse role as material:
Jane bought a piece of plastic. She got out her saw and carefully sawed the plastic. Then she made it all smooth with sandpaper. She tested the edge carefully. Then she was done. This is what it looked like:

The next week, her husband was trying to repair their daughter's plastic dollhouse. There was an odd-shaped hole in the wall. She said,
Accidental creation, discourse role as material:
Jane had a piece of plastic. She dropped it and it broke into lots of different pieces. She said, "Oh no"! Then she picked up one of the pieces off the floor. This is what it looked like:

The next week, her husband was trying to repair their daughter's plastic dollhouse. There was an odd-shaped hole in the wall. She said,
Final sentences for discourse role as material:
"I have a knife just the right size for that hole".
"I have a piece of plastic just the right size for that hole".
"I have a pointy thing just the right size for that hole".
Intentional creation, discourse role as object:
Jane bought a piece of plastic. She got out her saw and carefully sawed the plastic. Then she made it all smooth with sandpaper. She tested the edge carefully. Then she was done. This is what it looked like:

She put it into her lunch bag, and at lunchtime, she used it to cut her sandwich in half. Her friend James said,
Accidental creation, discourse role as object:
Jane had a piece of plastic. She dropped it and it broke into lots of different pieces. She said, "Oh no"! Then she picked up one of the pieces off the floor. This is what it looked like:

She put it into her lunch bag, and at lunchtime, she used it to cut her sandwich in half. Her friend James said,
Final sentences for discourse role as object:
"I see you've got a new knife".
"I see you've got a new piece of plastic".
"I see you've got a new pointy thing".

Packets were constructed each containing three scenarios with accidental origin and three with intentional origin. For each packet, the three with accidental origin had one discourse role (either material or object) and the three with intentional origin had the other discourse role. Thus, each participant received two of the four cells of the design and pairs of participants represented one complete replication. (The difficulty of designing appropriate scenarios precluded constructing packets using eight scenarios, two for each condition.) Assignment of scenarios to conditions was rotated across packets so that each scenario appeared in each condition. There were no filler scenarios in these packets. At the top of each page was the same 5-point rating scale as in the other experiments.

4.1.3. Procedure

The procedure was the same as in the previous experiments.

4.2. Results and discussion

Mean ratings were tabulated for the object and material names for each condition. Table 6a presents the means and standard errors, and Table 6b presents a measure of bias toward the object name consisting of the difference between the ratings for the object choice and the material choice.

We had predicted that discourse role as well as origin (creation mode) would influence name suitability and that, given appropriate discourse conditions, the material

Table 6a
Means (and standard errors) for object name and material name as a function of creation mode and discourse role, Experiment 3

	Creation mode	
	Accidental	Intentional
Object Name		
Discourse Role		
Object	3.92 (.20)	4.37 (.17)
Material	2.38 (.17)	2.97 (.15)
Material Name		
Discourse Role		
Object	3.15 (.20)	2.78 (.20)
Material	4.53 (.10)	4.13 (.15)

Table 6b
Bias toward the object name as a function of creation mode and discourse role, Experiment 3

	Creation Mode	
	Accidental	Intentional
Discourse Role		
Object	0.77	1.59
Material	−2.15	−1.16

Note: the measure of bias is the rating for material names subtracted from the rating for object names.

name would be judged suitable even given an intentional origin and the object name would be judged suitable even given an accidental origin. Discourse role did contribute significantly to ratings of the suitability of the name, and, in fact, had a larger impact on ratings than creation mode. The object response was favored over the material name for both accidental and intentional creation modes when the discourse role of an entity was as the object. Conversely, the material name was favored for both creation modes when the discourse role was as the material. A 2 (creation mode) $\times$ 2 (discourse role) ANOVA for each name choice showed a significant effect of creation mode for both the object response, $F(1,38) = 9.41$, $p < .004$ and the material response, $F(1,38) = 6.0$, $p < .02$, a very large significant effect of discourse role for both, $F(1,38) = 75.90$, $p < .001$ and $F(1,38) = 75.25$, $p < .001$, respectively, and no interaction, $F(1,38) = .01$ and $F(1,38) = .15$, respectively. The pattern of bias toward the object name, with the Intentional Creation-Object Role condition showing the greatest degree of bias, the Accidental Creation-Object Role condition second, the Intentional Creation-Material Role third, and Accidental Creation-Material Role last, held fully for five of the siz individual stimuli, and held for the sixth with only a minor reversal in the latter two conditions.

As in the previous experiments, although one name was preferred to the other in all conditions of the experiment, the non-preferred name was still judged moderately suitable in most cases, with mean ratings of about 3 ("neither good nor poor") and above. Again, it appears that more than one name may be considered viable, if not optimal, for labeling the object and achieving communication goals. It is noteworthy, however, that in two instances, the non-preferred name was judged especially low in suitability: the object name when the origin was accidental and the discourse role was as material, and the material name when the origin was intentional and the discourse role was as the object. In these cases, it appears that the conjunction of both factors working against the relevance of the alternative name decreased its judged suitability for communicating about the entity.

The results thus support the hypothesis that intention does not serve as a category essence for linguistic categorization, but rather has relevance to designing communications to achieve goals and is traded off against other factors in determining what name is best suited to achieving those goals.

5. Experiment 4

The first three experiments evaluated Bloom's proposal about artifact categorization as an account of the role of creator's intent in naming. Although the proposal did not fare well as an account of naming, it may fare better as an account of categorization in some other sense. The data of the previous experiments reinforce the observation that naming choices cannot be taken as a measure of non-linguistic categorization. In the absence of a non-circular way of identifying conceptual categories along with an appropriate measure of categorization, it remains unclear how Bloom's proposal can be tested as a theory of non-linguistic categorization. What can be tested, however, is the possibility that creator's intent determines people's

intuitions about what an object "really" is, even when it is called by another name. For instance, if a person takes an object created to be a shoe and uses it to hammer a nail, both the user and observers would most likely say that the object is really a shoe and not a hammer (and would tend to say so even if the user has said shortly beforehand, facetiously or seriously, "Look at my hammer"). These intuitions may be driven by folk beliefs about ontology, perhaps the same beliefs that motivate the essentialist hypothesis. As we noted earlier, such beliefs need not be an accurate reflection of the cognitive processes involved in other forms of categorization. However, understanding how such intuitions arise is an interesting problem in its own right.

Although the intuition in the shoe/hammer case is clear cut, it is not inevitable that creator's intention actually does determine intuitions about what something really is. The intuition seems less clear in the case of a piano stool that is no longer needed at a piano and has been used as an end table for a long time. Is it really a piano stool and not really an end table? Might it be thought of as really an end table at that point, or really both? Intuitions about what something really is may reflect the extent to which the object's new role has become entrenched (and the old one abandoned), or, as was the case for names, the intuitions may reflect the pragmatic appropriateness of using the label to capture discourse-relevant features of the object (which itself may be driven in part by entrenchment). The final experiment was designed to evaluate whether the essentialist approach provides a useful account of intuitions about what an artifact really is. If so, judgments of what something really is should follow the creator's intention and should not be influenced by the discourse role variables manipulated in these experiments. Further, people should not be in favor of saying the object is really both types of thing.

In this experiment the scenarios from Experiments 1 to 3 were presented, but instead of making name appropriateness judgments, after reading each scenario, participants judged whether the object was "really" an instance of one linguistic category, "really" an instance of the other, or "really" an instance of both. To provide additional information about what kind of account explains intuitions about "really", they also judged whether the object was "sort of" an instance of one linguistic category, the other, or both. If participants were to judge that an object is more "sort of" an *X* than "really" an *X* when the creator intended it to be an *X*, the pattern would argue against the essentialist account.

5.1. Method

5.1.1. Participants

Ninety-three participants were recruited through advertising in a student-oriented on-line newspaper at Brown University and a web site for on-line psychology experiments. Participants were offered a lottery ticket giving them a small chance to win $50 in return for their participation. Each participant received stimuli from all three of the original experiments, but in contrast to Experiments 1–3, variables were manipulated between subjects so that all scenarios from a given experiment were in the same condition for a participant. Between 20 and 34 participants received each

condition of each experiment, with more participants in each condition for Experiment 2 scenarios, which had only three conditions, than for the Experiments 1 and 3 replications, which had four conditions each. Some number of participants began the experiment but did not finish it, although errors in the log make it impossible to know exactly how many.

5.1.2. Materials

The stimuli from the three original experiments were presented as a single study on the web using the Wextor web experiment program (Reips & Neuhaus, 2002). Each participant read four scenarios for the Experiment 1 replication and six scenarios each for the Experiments 2 and 3 replications. Each set of scenarios was presented on a separate web page. Unlike the previous experiments, no filler materials were used due to the larger numbers of target scenarios and sentences to rate.

The scenarios used were identical to those from Experiments 1 to 3 with one exception. In the original experiments, scenarios introduced an object using one type of descriptor (the name associated with creator's intended use in Experiments 1 and 2; the materials in Experiment 3). Then a different use was described, and the participant rated suitability of final sentences for the scenario (that called the thing by the original descriptor or that captured the new use). In the versions used here, the sentence using the name that captured the new use became the concluding sentence of the scenario so that the paragraph was complete. For the Experiments 2 and 3 scenarios, this concluding sentence also served to introduce the alternative name into the scenario. (For the scenarios from Experiment 1, the alternative name was also mentioned prior to the concluding sentence.) An example of a stimulus derived from each previous experiment is given in Table 7, and the complete set of stimuli is provided in Appendix A.

Each participant received a questionnaire that placed them in one condition of each of the three experiment replications. The questionnaire presented each target scenario once in that condition, with assignment of conditions to scenarios rotated across questionnaires.

At the beginning of the experiment, participants were given the following instructions: "In this experiment, you will read a number of short stories describing an interaction between two or more people. After each one, you'll be asked to make some judgments about how sensible it would be say certain things about an object in the story. There are no right or wrong answers to these questions. Just consider each question and respond according to your intuitions. You will be making judgments on a 5-point scale, where 5 means 'very sensible', and 1 means 'not at all sensible"'.

Each scenario was then presented. The scenario was followed by the further instruction, "Now imagine that you are explaining this thing to someone who wasn't part of the scene. How sensible would it be to say each of the following about this thing? You may feel only one is sensible, or you may feel that more than one is. Just rate each one according to your intuitions".

The six statements to be rated then followed. Three of the statements had the form "It's really an X" and the other three had the form "It's sort of an X". For scenarios from Experiments 1 and 2, the names in the statements were those associated with the

Table 7
Sample stimuli for Experiment 4

Shared portion of stimuli (between scenario and sentences to rate):
Now imagine that you are explaining this thing to someone who was not part of the scene. How sensible would it be to say each of the following about this thing? You may feel only one is sensible, or you may feel that more than one is. Just rate each one according to your intuitions.
From Experiment 1 (speaking to creator condition):
Mikey, who is two and a half years old, decided to draw a picture. First he drew a vertical line and then he drew a circle on top of it, and then he colored it nice and red. "What did you draw"? his dad asked. "It's a lollipop!" Mikey said. Dad thought it actually looked more like a balloon, but he said to Mikey, "Thanks for the nice picture!" Mikey was happy and started to play with his blocks. Then a repairman arrived to fix something with a cup of coffee in his hand. Dad did not want the man to spill coffee on Mikey's drawing, so he said to Mikey, "Hand me the picture of the balloon".
— It's really a lollipop.
— It's really a balloon.
— It's really both a balloon and a lollipop.
— It's sort of a balloon.
— It's sort of a lollipop.
— It's sort of both a balloon and a lollipop.
From Experiment 2 (temporary use condition):
One day in May, Mary wanted to water the hanging flowers on her front porch. They needed water almost every day in the warm weather. Mary's old watering can had a hole in it, so she grabbed a tin teakettle from the kitchen. "This will work", Mary exclaimed to her friend, Jane, who was visiting. She watered several plants with it, and then she put it down. Jane spotted another plant that was dry. She said to Mary, "Hand me the watering can".
— It's really a teakettle.
— It's really a watering can.
— It's really both a teakettle and a watering can.
— It's sort of a teakettle.
— It's sort of a watering can.
— It's sort of both a teakettle and a watering can.
From Experiment 3 (intentional creation, discourse role as object condition):
Jane bought a piece of plastic. She got out her saw and carefully sawed the plastic. Then she made it all smooth with sandpaper. She tested the edge carefully. Then she was done. This is what it looked like:

She put it into her lunch bag, and at lunchtime, she used it to cut her sandwich in half. Her friend James said, "I see you've got a new knife".
— It's really a piece of plastic.
— It's really a knife.
— It's really both a piece of plastic and a knife.
— It's sort of a piece of plastic.
— It's sort of a knife.
— It's sort of both a piece of plastic and a knife.

creator's intention, the new use, or both (in that order). For scenarios from Experiment 3, the names were those associated with the material interpretation, the object interpretation, or both (in that order). Approximately half the questionnaires had the three "really" questions first and half had the three "sort of" questions first.

Responses were made via a pull-down menu that followed each question and indicated "Please choose here" until participants had selected a response option. The options were the values 1 through 5. The questionnaire took between 15 and 30 min to complete.

5.2. Results and discussion

Mean ratings and standard errors for scenarios from the three experiments, for "really" and "sort of" judgments, are presented in Tables 8a, 8b, and 8c. If creator's intention is central to judgments of what something "really" is, ratings for "really" should strongly favor the choice associated with the creator's intention and should not be susceptible to the discourse role variables manipulated in these experiments. Further, ratings should not favor saying that the object is really both types of thing, and ratings that the object is "really" the type of thing associated with the creator's intention should exceed ratings that it is "sort of" that type of thing.

Several aspects of the results demonstrate a substantial impact of creator's intention in judgments of what something really is. First, the ratings of "really" for the name associated with the creator's intention are substantially higher than ratings of "really" for the alternative name for the Experiments 1 and 2 scenarios ($p < .01$ in each of the seven comparisons by paired-sample t tests). This occurred even though, in the original Experiment 2, liking for the alternative name for referential purposes exceeded liking for the name associated with creator's intention. Second, for these

Table 8a
Experiment 4 means (and standard errors) for "Really" and "Sort of" judgments as a function of communicative context for scenarios from Experiment 1

	Communicative context			
	Creator as addressee	New addressee	New addressee + New name thought	New addressee + New name used
"Really"				
Original name	4.25 (.22)	3.92 (.23)	4.05 (.25)	3.65 (.26)
Alternative name	1.94 (.18)	1.68 (.16)	2.09 (.24)	2.34 (.24)
Both names	2.22 (.24)	2.05 (.23)	2.42 (.29)	2.65 (.26)
"Sort of"				
Original name	2.88 (.24)	2.78 (.22)	3.08 (.25)	3.21 (.25)
Alternative name	2.61 (.24)	2.49 (.20)	3.03 (.24)	3.13 (.23)
Both names	2.79 (.29)	2.44 (.25)	3.28 (.31)	3.19 (.33)

Table 8b
Experiment 4 means (and standard errors) for "Really" and "Sort of" judgments as a function of communicative context for scenarios from Experiment 2

	Communicative context		
	Temporary use	Repeated use	Permanent use
"Really"			
Original Name	4.50 (.18)	4.64 (.13)	4.32 (.17)
Alternative Name	2.37 (.22)	2.75 (.21)	2.60 (.18)
Both Names	3.06 (.24)	4.02 (.15)	3.46 (.16)
"Sort of"			
Original Name	2.14 (.21)	2.38 (.27)	2.60 (.20)
Alternative Name	3.21 (.24)	3.63 (.20)	3.18 (.16)
Both Names	3.33 (.26)	3.84 (.20)	3.62 (.19)

Table 8c
Experiment 4 means (and standard errors) for "Really" and "Sort of" judgments as a function of creation mode and discourse role for scenarios from Experiment 3

	Creation mode	
	Accidental	Intentional
"Really"		
Discourse role		
Object		
Object name	3.15 (.20)	3.90 (.13)
Material name	4.24 (.23)	4.12 (.21)
Both names	3.72 (.19)	4.03 (.16)
Material		
Object name	2.08 (.18)	3.53 (.21)
Material name	4.54 (.21)	4.12 (.22)
Both names	2.81 (.23)	3.62 (.23)
"Sort of"		
Discourse role		
Object		
Object name	3.55 (.19)	3.49 (.19)
Material name	1.90 (.21)	2.44 (.26)
Both names	3.69 (.27)	3.65 (.25)
Material		
Object name	3.03 (.23)	3.06 (.25)
Material name	2.28 (.31)	1.99 (.24)
Both names	2.93 (.23)	2.78 (.24)

scenarios, ratings that the object is "really" the thing associated with creator's intention are always higher than ratings that it is "sort of" that thing, and higher than ratings that it is "really both" that thing and the alternative. All of these differences are statistically significant ($p < .05$) by a paired-sample t test except for the "really" versus "sort of" comparison in the Speaking to a New Addressee Who Has Used a New Name condition of Experiment 1 scenarios, $t(19) = 1.4$; n.s. Third, for Experiment 3 scenarios, ratings of the thing "really" being the object are higher when the creation of the object was intentional rather than accidental, $t(91) = 5.32$, SD = .97; $p < .001$. Finally, for Experiment 3, ratings that the thing is "really" the object exceed ratings that it is "sort of" the object when the creation was intentional (though not significantly, $t(24) = 1.67$; SD = 1.24; $p = .11$ for the object discourse role and $t(25) = 1.43$; SD = 1.64; $p = .16$ for the material discourse role). Conversely, ratings that the thing is "sort of" the object exceed ratings that it is "really" when the creation was accidental (again not significantly for the object discourse role, $t(21) = 1.50$; SD = 1.28; $p = .15$, but significantly so for the material role, $t(19) = 3.81$; SD = 1.12; $p < .01$). Clearly, creator's intention is weighted heavily in judgments of what something "really" is.

However, the results fall short of indicating that creator's intention is treated as an essence that determines these intuitions. The Experiment 1 scenario results show that the strength of conviction that something is really the type of object the

creator intended declines as the referential utility of the alternative name increases. Ratings that the thing is really the other type of thing increase, as do ratings that it is really both. The pattern for Experiment 2 scenarios is less straightforward, as was true in the original experiment (due to the apparently poor instantiation of the distinction between Repeated and Permanent Use), but ratings that the object is really what the creator intended decline with a permanent new use and ratings that it is really the alternative increase, and as do ratings that it is really both. In addition, for both Experiment 1 and 2 scenarios, participants were happier to say that the objects were really both than they were to say that they were really the alternative, indicating that the alternative name alone did not adequately capture the nature of the object, but it could be associated with both names. For Experiment 3 scenarios, the discourse role as well as creation mode clearly influenced ratings of to what extent the thing is really the object. Most strikingly, for the Experiment 3 scenarios, the absolute preference was to say that the thing was really the material rather than really the object in all the conditions, even those where the creation mode was intentional. Even though in Gelman and Bloom's (2000) experiment, people were inclined to call a piece of newspaper deliberately folded into a hat shape *hat* rather "*newspaper*", and in our original Experiment 3 people found "*hat*" to be an acceptable name in that case, participants judged that the crudely fashioned object was "really" a piece of newspaper more than it was "really" a hat. Further, this was true even though in the current versions of the Experiment 3 scenarios, a speaker actually used the object name in each case. In absolute terms, liking for the notion that the thing is "really" the object for these scenarios was lower than ratings for names associated with the creator's intention in the other two experiments' scenarios (Experiment 3 vs.1, $t(184) = 4.52$; SD = 1.13; $p < .0001$; Experiment 3 vs. 2, $t(180) = 8.43$; SD = 1.00; $p < .0001$).

Overall, across the three sets of scenarios, creator's intention has a substantial impact on judgments of what an artifact really is, but its impact is modulated by the communicative context. Together, the results suggest that even judgments of what something "really" is reflect not only what the creator might have meant it to be, but the role of the object in the discourse at hand and the pragmatic value of using a particular name. Results from the Experiment 3 scenarios suggest that pragmatic considerations may include the extent to which the object embodies the features normally associated with the name.

6. General discussion

We have tested two interpretations of Bloom's (1996) intentional-historical view of artifact categorization. Below, we first discuss implications of our investigation for the interpretation concerning how name are chosen for artifacts. We then consider implications for the interpretation concerning intuitions about what an object really is. Last, we return to the question of whether there is a viable interpretation of the view as a proposal about conceptual categorization.

7. The Intentional-Historical view and artifact naming

Experiments 1–3 contrasted two hypotheses about the role of creator's intention in artifact naming: first, that people treat intention as an essence and name artifacts according to their beliefs about the essence, and second, that intention is relevant to naming because of its contribution to achieving communication goals. The results indicate that discourse variables other than knowledge of intention have a major impact on artifact naming, and in doing so they provide evidence against the possibility that beliefs about intention uniquely determine artifact name selection. In addition, they provide evidence that name selection is altered by the communicative goals of a situation and that name choice will be most consistent with creator's intention when the situation makes that intention relevant to achieving the goals of a communication. Together, the results argue in favor of the idea that creator's intention plays a role in naming through its pragmatic relevance.

7.1. Does intention play a special role in artifact naming even if it does not serve as absolute determiner?

The notion that the creator's intended category membership for an artifact constitutes its essence, and that people name artifacts according to their beliefs about the essence, implies that intention fully determines naming. We have thus far contrasted this possibility with the simple alternative that it does not. If intention does not fully determine naming, however, we must still ask whether intention has a role in naming that is independent of discourse context. Some of our data could be taken as suggesting that it does. In Experiment 1, liking for the alternative name with a new addressee was substantially lower than liking for the creator's name except when the new addressee had introduced the alternative name. In addition, liking for the alternative name when speaking to the addressee who had introduced that name stayed slightly below liking for the creator's name when speaking to the creator. And in Experiment 3, creation mode did exert an influence that was independent of the effect of the entity's discourse role at the moment of speaking.

However, the results of Experiment 2 showed that creator's intention is not always critical. In this experiment, an object was used to serve a new function, and the preferred name in absolute terms for all of the scenario versions referred to the new function. Participants gave higher ratings to a name consistent with the new use even when the new use had occurred only a few times and there was no indication that it would be repeated.

The difference between strength of preference for the alternative name in Experiment 2 compared to the other experiments likely is due to the nature of the entities being named and the particular communicative situations described. In Experiment 1, several factors may have contributed to relative preference for the creator's name. One is that cooperative adults may be inclined to accept children's naming preferences in general in order to avoid unhappiness, confusion, or conflict. Another factor is the tendency to re-use a linguistic precedent once a name has been introduced (e.g., due to priming in memory; Malt & Sloman, 2004; Pickering & Garrod, 2004; Sloman, Harrison, & Malt, 2002). In Experiment 3, creator's

intent most likely exerted its modest effect regardless of discourse role because it provided a precedent for how to think about the entity. In each case, the description of the act of creation preceded the part of the scenario in which the discourse role was manipulated. Thus participants were not merely choosing a name to communicate about an object given a particular immediate context, but also given a particular preceding context that evoked a name focusing on a different aspect of the entity. In contrast, in Experiment 2, the creator of the objects was an unknown, distant manufacturer whose wishes the speaker had no reason to defer to, and no prior explicit naming event occurred within the scenario before the critical sentences. In addition, the discourse role that created a mismatch with the manufacturer's original intention came about through a separate act of (re-) creation by the person implementing the new function, and so there was no potential conflict between the desire of the new creator and the name selected. These factors would reduce the motivation to retain the creator's original name. Thus the experiments together suggest that although creator's intention will at times exert a strong effect on name selection, its influence is driven by the particular combination of factors constituting the context against which naming takes place. To the extent that there is "specialness" to the creator's intention, it seems to result more from the social and cognitive importance of the conversational partner in establishing naming precedents than from beliefs about essences.

7.2. Intention as a changeable essence

One way to account for some of our effects while preserving the notion of intention as artifact essence might be to take the essence of individual objects as something that can change over time. Under this proposal, an artifact's essence changes if the artifact is used with a new intention by its creator or by someone else (Bloom, personal communication). This move would require a notion of essence that is somewhat different from that widely held about natural kind concepts, in which the essence is taken to be a stable underlying trait that is not susceptible to change (e.g., Carey, 1985; Gelman & Hirschfeld, 1999). However, people do not necessarily think about artifacts in the same way that they think about natural kinds (e.g., Carey, 1996; Hirschfeld & Gelman, 1994; Keil, 1989; Malt, 1990) and it may be reasonable to argue that essences and beliefs about essences for the two types of entities can also differ. A more difficult problem would be to be able to specify when beliefs about the object's essence, and hence the name selected, will change. On the one hand, as Experiment 2 demonstrated, sometimes people will readily adopt a new name for an artifact used in a new way, which would imply a rapid change in belief about the essence. On the other hand, at other times, repeated use may still yield resistance to a name change. For instance, if someone irons shirts repeatedly on his desk at work, he may still name it *desk* (Bloom, personal communication). Accounting for the pattern of changes of essence and name seems to require appealing to factors such as whether the old use is maintained for the item along with the new one, what its more frequent use is, and what use is most relevant at the moment of the communication. Once these factors are involved in predicting when names will change, the account crucially

involves discourse salience and communication goals, and the role of creator's intention becomes secondary. As such, intention is hardly *essential.*

A further challenge lies in accounting for the flexibility that naming exhibits. At times, one can sensibly use either the name associated with the original intention of the creator or with the current intention, as Experiment 2 suggests. Consider a decorative object originally made to be a letter opener, which now cannot open letters because the tip is broken off, but which is kept for its aesthetic value. One can say of it either, "It used to be a letter opener, but now it's just a decoration" or "It's a broken letter opener that I keep for decoration". In addition, a given object may be called one thing by one person and another by a different person, both of whom understand its intended use in similar ways. Consider a container mounted on a post on the tarmac at the Philadelphia International Airport. It looks like a traditional rural-road mailbox with a drop-down door, but it has the word "WANDS" stenciled on it and holds the florescent sticks that airport personnel use to wave in planes. Casual observers may say "It's a mailbox that's being used to hold wands", while the airport personnel who use it daily might say "It's the wands box". An essence-based account of the letter opener case would have to assume that the essence is unstable for an individual speaker despite a single, stable understanding of creator's intention and current intention, and it must change depending on how one is thinking of the object at the moment. An essence-based account of the wands box case would have to assume that although both sets of people have a similar understanding of the intentional origin of the container and its subsequent use, they differ in which one they draw on, depending on their relation to the container. The notion of belief in an essence, then, does not seem to provide the crucial element of insight into the name choice. Again, a less ad hoc account is framed in terms of discourse context and communication goals and is better characterized as pragmatic than essentialist.

8. The Intentional-Historical view and intuitions about what an artifact really is

Experiment 4 asked whether creator's intention served as an essence driving judgments about what something really is. As with the naming data, results showed an important impact of creator's intention on judgments, but also a substantial impact of other discourse-relevant variables. Most notably, for scenarios from Experiment 3, even where people had favored the object name over the material name in the original Experiment 3, and even given that the object name was actually used by a speaker in the Experiment 4 versions of the scenarios, they favored saying the thing was "really" the material over "really" the object. This pattern seems to reflect the fact that the objects are only crude approximations to those typically called by the object name. A piece of newspaper folded so it can perch on someone's head is rather far from having all the properties associated with objects usually called *hat*.

This observation highlights the difficulty of articulating when any object should be said to "really" have earned a particular name. For instance, everyone would agree that a rectangular cardboard container holding shoes is "really" a box, but what about a small round cardboard container holding candies? What about a small

square one with a straw holding juice – is the thing commonly called *juice box* really a box? What about a plastic container in the shape of a bear, having a straw in it, holding juice, and labeled *juice box* by its manufacturer (see Malt et al., 1999)? Is this object really a box, sort of a box, metaphorically a box, or not a box at all? If it is not really a box (an intuition reported by many), then what *is* it really? Why did its manufacturer choose to name it *juice box* out of all possible names for purposes of communicating its properties to consumers? (And given that the creator did intend for it to be called *juice box*, if creator's intention is central to naming, why is it not really a box?) Intuitions about what something really is may not be driven by beliefs about the role of creator's intention in kindhood per se but instead by judgments about how well an object fits the usual description associated with an object name. One of the properties relevant to this judgment is creator's intention, and indeed our data show that people give it considerable weight, but it is not the only one. Intuitions about what is "really" an X may, in fact, reflect much the same sort of communicative considerations we have argued guide name selection.

9. The Intentional-Historical view and conceptual categorization

Our experiments have addressed whether creator's intention serves as an essence driving naming choices and intuitions about what something really is. Of course, creator's intention could serve as an essence in some other type of categorization behavior not tested here. However, two key difficulties remain for providing support for the possibility that that type would be conceptual categorization. One is defining exactly what kind of conceptual behavior is relevant. The second is identifying a measure of categorization that permits assessment of whether people do follow creator's intention in the decisions they make with respect to these groupings. One approach might be to suggest that the names people apply to objects in the absence of any particular discourse context provide a measure of the critical set of conceptual groupings (e.g., via the question "What is it"?). However, all requests for a name require some assumption on the part of the participant about what he or she should try to capture in name selection; even "neutral" contexts are not truly free of any assumptions about discourse goals (Malt & Sloman, 2007). Further, the complication remains that the sets of objects grouped together by artifact nouns are distinctly language-specific (Ameel et al., 2005; Malt et al., 1999), making naming responses a poor measure of non-linguistic categorization. In short, it is difficult to escape the conclusion that name choices are, in the end, about naming rather than, or at least in addition to, conceptual categorization. Answers to the question "What is it"? may be an interesting form of categorization behavior, but what exactly they reveal remains to be fully explicated.

An alternative approach might be to focus on non-linguistic behaviors such as problem-solving. In a study along such lines, Defeyter and German (2003) found that beliefs about intended function play an increasingly important role in elementary school aged children's problem-solving. However, Bloom's essentialist proposal concerns intended category membership, not intended function. It is less

clear how beliefs about intended category membership can be evaluated in such a context because one must again face the problem of how to provide an independent definition of the relevant categories.

10. Conclusion

We have argued that neither the names given to artifacts, nor intuitions about what artifacts "really" are, are well-explained by an essentialist account based on creator's intent. However, our view in no way discounts the importance of creator's intention in how people think about and talk about artifacts. Our data, those of past research (e.g., Bloom & Markson, 1998; Gelman & Bloom, 2000; Gutheil et al., 2004), and evidence from many anecdotal examples demonstrate that an understanding of the creator's intention is an important factor in naming choices and in judgments of what something really is. (See Chaigneau et al., 2004, for a theory of how creator's intention relates to other aspects of artifact knowledge.) The only question is what sort of framework is most helpful in understanding the role that creator's intention plays. We suggest that a more parsimonious account of how and when creator intention influences naming will be one framed in terms of how the goals of a particular communication are best realized. Such an account may also explain intuitions about what things really are. While there may yet be a form of categorization behavior that is best explained by an essentialist account, it remains to be identified.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.cognition.2006.10.001.

References

Ameel, E., Storms, G., Malt, B. C., & Sloman, S. A. (2005). How bilinguals solve the naming problem. *Journal of Memory and Language, 52*, 309–329.

Barr, D. J. (2004a). Establishing conventional communication systems: Is common knowledge necessary? *Cognitive Science, 28*, 937–962.

Barr, D. J. (2004b). The emergence of conventions in language communities. In J. C. Trueswell & M. K. Tanenhaus (Eds.), *Approaches to studying world-situated language use: Bridging the language-as-product and language-as-action traditions*. Cambridge, MA: MIT Press.

Bloom, P. (1996). Intention, history, and artifact concepts. *Cognition, 60*, 1–29.

Bloom, P. (1998). Theories of artifact categorization. *Cognition, 66*, 87–93.

Bloom, P., & Markson, L. (1998). Intentionality and analogy in children's naming of pictorial representations. *Psychological Science, 9*, 200–204.

Bloom, P. (2000). *How children learn the meanings of words*. Cambridge, MA: MIT Press.

Boroditsky, L. (2001). Does language shape thought? English and Mandarin speakers' conceptions of time. *Cognitive Psychology, 43*, 1–22.

Brennan, S. E., & Clark, H. H. (1996). Conceptual pacts and lexical choice in conversation. *Journal of Experimental Psychology: Learning, Memory, & Cognition, 22*, 1482–1493.

Carey, S. (1985). *Conceptual change in childhood*. Cambridge, MA: MIT Press.
Carey, S. (1996). Cognitive domains as modes of thought. In D. R. Olson & N. Torrance (Eds.), *Modes of thought: Explorations in cognition and culture* (pp. 187–215). Cambridge, UK: Cambridge University Press.
Chaigneau, S. E., Barsalou, L. W., & Sloman, S. A. (2004). Assessing affordance and intention in the HIPE theory of function. *Journal of Experimental Psychology: General, 133*, 601–625.
Clark, E. V. (1997). Conceptual perspective and lexical choice in acquisition. *Cognition, 64*, 1–37.
Clark, H. H., & Marshall, C. R. (1981). Definite reference and mutual knowledge. In A. K. Joshi, I. S. Sag, & B. Webber (Eds.), *Elements of discourse understanding* (pp. 10–46). Cambridge: Cambridge University Press.
Clark, H. H., & Wilkes-Gibbs, D. (1986). Referring as a collaborative process. *Cognition, 22*, 1–39.
Diesendruck, G., Markson, L., & Bloom, P. (2003). Children's reliance on creator's intent in extending names for artifacts. *Psychological Science, 14*, 164–168.
Defeyter, M. A., & German, T. (2003). Acquiring an understanding of design: Evidence from children's insight problem solving. *Cognition, 89*, 133–155.
Fodor, J. A. (1975). *The Language of thought*. Cambridge, Massachusetts: Harvard University Press.
Garrod, S., & Anderson, A. (1987). Saying what you mean in dialog: a study in conceptual and semantic coordination. *Cognition, 27*, 181–218.
Garrod, S., & Doherty, G. (1994). Conversation, co-ordination and convention: An empirical investigation of how groups establish linguistic conventions. *Cognition, 53*, 181–215.
Gelman, S. A., & Bloom, P. (2000). Children are sensitive to how an object was created when deciding what to name it. *Cognition, 76*, 91–103.
Gelman, S. A., & Hirschfeld, L. (1999). How biological is essentialism? In D. L. Medin & S. Atran (Eds.), *Folkbiology* (pp. 403–446). Cambridge, MA: MIT Press.
Gelman, S. A., & Wellman, H. M. (1991). Insides and essences: Early understandings of the non-obvious. *Cognition, 38*, 213–244.
Gutheil, G., Bloom, P., Valderrama, N., & Freedman, R. (2004). The role of historical intuitions in children's and adult's naming of artifacts. *Cognition, 91*, 23–42.
Graham, R., & Belnap, K. (1986). The acquisition of lexical boundaries in English by native speakers of Spanish. *International Review of Applied Linguistics in Language Teaching, 24*, 275–286.
Hirschfeld, L. A., & Gelman, S. A. (1994). *Mapping the mind: Domain specificity in cognition and culture*. Cambridge: Cambridge University Press.
Keil, F. C. (1989). *Concepts, kinds, and cognitive development*. Cambridge, MA: MIT Press.
Kemler-Nelson, D. G., Herron, L., & Morris, C. (2002). How children and adults name broken objects: Inferences and reasoning about design intentions in the categorization of artifacts. *Journal of Cognition and Development, 3*, 301–332.
Krauss, R. M., & Glucksberg, S. (1969). The development of communication: Competence as a function of age. *Child Development, 40*, 255–256.
Kronenfeld, D. B., Armstrong, J. D., & Wilmoth, S. (1985). Exploring the internal structure of linguistic categories: An extensionist semantic view. In J. W. D. Dougherty (Ed.), *Directions in cognitive anthropology* (pp. 91–113). Urbana: University of Illinois Press.
Levinson, J. (1989). Refining art historically. *Journal of Aesthetics and Art Criticism, 47*, 21–33.
Levinson, S. (2003). *Space in language and cognition: Explorations in cognitive diversity*. Cambridge: Cambridge University Press.
Locke, J. (1690/1964). *An essay concerning human understanding*. Cleveland: Meridian Books.
Malt, B. C. (1990). Features and beliefs in the mental representation of categories. *Journal of Memory and Language, 29*, 289–315.
Malt, B. C., & Sloman, S. A. (2004). Conversation and convention: Enduring influences on name choice for common objects. *Memory & Cognition, 32*, 1346–1354.
Malt, B. C. & Sloman, S. A. (2007). Artifact categorization: The good, the bad, and the ugly. In E. Margolis & S. Laurence (Eds.), *Creations of the mind: Theories of artifacts and their representation*. Oxford: Oxford University Press.
Malt, B. C., Sloman, S. A., Gennari, S., Shi, M., & Wang, Y. (1999). Knowing versus naming: Similarity and the linguistic categorization of artifacts. *Journal of Memory and Language, 40*, 230–262.

Matan, A., & Carey, S. (2001). Developmental changes within the core of artifact concepts. *Cognition, 78*, 1–26.

Murphy, G. L. (2002). *The big book of concepts*. Cambridge, MA: MIT Press.

Paradis, M. (1979). Language and thought in bilinguals. In W. McCormack & H. Izzo (Eds.), *The Sixth LACUS Forum* (pp. 420–431). Columbia, SC: Hornbeam Press Inc..

Pickering, M. J., & Garrod, S. (2004). Toward a mechanistic psychology of dialogue. *Behavioral & Brain Sciences, 27*, 169–226.

Reips, U.-D., & Neuhaus, C. (2002). WEXTOR: A Web-based tool for generating and visualizing experimental designs and procedures. *Behavior Research Methods, Instruments, and Computers, 34*, 234–240.

Rips, L. J. (1989). Similarity, typicality, and categorization. In S. Vosniadou & A. Ortony (Eds.), *Similarity and Analogical Reasoning* (pp. 21–59). New York: Cambridge University Press.

Sloman, S. A., Harrison, M., & Malt, B. C. (2002). Recent exposure affects artifact naming. *Memory & Cognition, 30*, 687–695.

Sloman, S.A. & Malt, B.C. (2003). Artifacts are not ascribed essences, nor are they treated as belonging to kinds. *Language and Cognitive Processes [Special Issue: Conceptual Representation]*, 18, 563–582.

Smith, L. B., Jones, S. S., & Landau, B. (1996). Naming in young children: A dumb attentional mechanism? *Cognition, 60*, 143–171.

Sperber, D. (2007). Seedless grapes: Nature and culture. In E. Margolis & S. Laurence (Ed.), *Creations of the mind: Theories of artifacts and their representation*. Oxford: Oxford University Press.