PROPER NAMES DO NOT ALLOW IDENTITY MAINTENANCE WITHIN THE BASIC LEVEL

by

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Abstract

A fundamental question in the study of concepts concerns the nature of the relationship between kinds and individuals. To what extent is our understanding of an individual’s persistence connected to the kind to which it belongs? The current research expands on previous research in the field by exploring how representations of individual entities are affected by transformations within and across basic-level kind membership.

In a series of five experiments, adults saw depictions of transformations of animals or artifacts via a machine called an “atom reassembler.” They were queried about the object’s persistence as an individual (as designated by its proper name) and as a member of its original kind. In Experiments 1 and 2, participants saw transformations of entities that either resulted in an identical object, retained subordinate kind membership (e.g., mallard to different-looking mallard), retained basic kind membership (e.g., mallard to white duck), retained superordinate kind membership (e.g., duck to fish) or crossed domains (e.g., duck to hat). A striking effect emerged: an entity seen to transform within a basic-level kind was less likely to be judged to retain its proper name than one that crossed a basic-level kind boundary. We interpret this result as a within-kind contrast effect: concepts of individuals, designated by proper names, pick out an entity from other members of the same basic-level kind. Thus, participants were unwilling to allow a name to carry through a within-basic kind transformation.

Experiments 3 and 4 explored this effect further by varying the extent to which participants were encouraged to consider kind membership while judging individual persistence. These studies revealed that explicit consideration of kind membership is necessary to elicit the effect, but that consideration could be either of basic-level kind or superordinate kind. Finally, in Experiment 5 individual persistence judgments were elicited via distinguishing properties, rather than names. Results revealed that properties are traced very differently across transformations than proper names. We interpret these data as evidence that concepts of individuals, as designated by proper names, are closely tied to basic-level kind membership.
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Introduction

A large body of research and theory has been dedicated to the study of concepts of kinds, how they are structured, and how people come to discover and understand them. Some theorists (e.g., Locke, 1690, III, iii, 9) have suggested that people form conceptions of kinds by first coming to know a group of individual exemplars, then extracting generalizations from those. Theories such as this presuppose that individual exemplars are easier to conceptualize because they are perceptible, and therefore they come prior to more abstract concepts. At first, this proposal might seem to make sense. For example, we cannot see the kind CAT, but we can see individual cats. It is a straightforward matter to pick out individuals in the world, so why should conceptual representations of those individuals contain anything more than simply a copy of the perceptual information afforded by the objects in the world? Yet further considerations raise questions about the simplicity of our representations of individuals. Contrary to appearances, these representations need to be quite complex to allow people to make common decisions about the identity of individuals in the world. Because individual entities endure through space and time, changing in all sorts of ways, it is necessary to have a complex set of principles by which to judge their identity. We know, for example, that Slinky the bald baby mouse can grow large and hairy yet continue to be Slinky, that Freddy the caterpillar can even continue to be Freddy as a butterfly, but Siamese twins are distinctly two people.

This work is concerned with the way in which people represent individuals as they go through changes. What changes do we allow to occur while still believing that individual identity persists? Specifically, the experiments presented here are focussed on exploring the manner in which representations of individuals are connected to representations of kind membership. In a series of experiments, artifacts and animals were depicted undergoing radical transformations that involved crossing kind boundaries at several different hierarchical levels. Aspects of people's reasoning about individual identity through change were revealed in the pattern of responses to questions about individual identity.

There are several conceivable grounds on which people might make judgments of individual identity. One obvious criterion is perceptual similarity: entities tend not to change drastically in their appearance from day to day. Thus, most often we can make good guesses as to the identity of individuals by recognizing their perceptual features. And, when something changes dramatically, it may be hard to recognize, and we may mistake its identity. While
perceptual appearance is a very salient cue to identity, however; it is neither necessary nor sufficient to determine individual identity. It is not necessary because entities can and regularly do change dramatically over time. Plants and animals can grow and change form radically over their lifespan, such that no part of them is recognizable from one time to another. Even artifacts can be painted, fixed, or otherwise have their appearance changed, all the while seeming to maintain their individual identity. Nor is perceptual similarity sufficient, for obvious reasons: two leaves, rocks, cups, or dogs that look exactly the same are nevertheless distinct entities. Simply sharing every perceptual feature is not a sufficient criterion for being the same individual.

A second criterion that people might use when judging the identity of an individual entity is spatio-temporal continuity. Perceptually, continuity is not always obvious, but it is perhaps the most important marker of individual persistence. Single entities cannot occupy more than one place at a single time, nor can they exist in different places at two different times without following a path through space and time connecting those places. Thus, two identical-looking coffee mugs each persist as individual entities and can be distinguished from each other because they occupy distinct locations and trace different paths through space and time, despite being otherwise indistinguishable. Continuity may in fact be the only necessary criterion for individual persistence, but alone it is insufficient to account for everyday judgments of individual identity. Specifically, judgments involving the beginning or end of an individual’s existence are often dependent on more than just continuity. The beginning of existence of a person is typically judged to be at some point when it is still in its mother’s womb, despite its being still physically attached to (and continuous with) its mother – spatio-temporal continuity alone cannot account for the fact that we consider an infant being birthed and not a group of skin cells to be a distinct individual. On the other hand, there are plants that undergo a similar process: new cells grow out of an old plant, then take its place as the original dies. In these cases, we typically consider the young plant to be the same individual as the original, though the causal processes are similar. Spatio-temporal continuity alone is similarly insufficient at marking the end of existence of an individual – when a turtle dies, for example, its body is continuous with its living self, but we do not judge a lump of decaying matter to persist as Tommy, the living animal it once was. All of these issues suggest that continuity alone is not a sufficient criterion to judge individual identity, and they also point toward another factor that matters, that is, kind membership. In each of the examples above, it is our knowledge of the kind of thing an entity is (i.e., person, plant, animal),
in conjunction with spatio-temporal continuity, that guides our judgments of identity. Kind membership is a third criterion that has been proposed to account for judgments of individual identity, though the nature of its relationship to individual identity is much less clear.

Any serious thought about the nature of individual concepts leads to a consideration of their relation to kind concepts, and raises the question of how our understanding of an individual’s persistence may be connected to the kind to which it belongs. One explanation of this relationship is given through an account of substance sortals (e.g., Wiggins, 2001; Hirsch, 1982). Sortal theorists have argued that in order to trace an individual through time and space, one must have an understanding of the kind of thing it is. One cannot answer the question, “Is it the same?” without knowing, “the same what.” For example, the same PERSON over time is not identical to the same GROUP OF CELLS. A substance sortal “gathers up a class of things that survive certain sorts of change, come into being in a certain specific way, tend to be qualified in certain specific ways, and tend to cease to be in certain specific ways” (Wiggins, 1997, p. 414). Thus, in conjunction with spatio-temporal continuity, substance sortals give us the information we need to make judgments of individual identity.

A sortal is a concept that maps onto a count noun in English, supplying people with knowledge of what constitutes one individual, continuous, countable thing. Thus, it allows classification, tracking of individuals, and individuation (Macnamara, 1986). There is much overlap between sortals, however, with the result that any individual entity can be conceived of in connection with more than just a single sortal. Some of these sortals are kind concepts that refer to a phase of the existence of an individual. For example, one does not grieve over the loss of a kitten when it grows into a cat, but one does grieve over the loss of a cat when it dies. KITTEN, then, is what Hirsch (1982) called a phase sortal – it is subordinate to a substance sortal (CAT), which is used to decide its life-course. There is also overlap between substance sortals at different hierarchical levels, though – a single creature can be mapped onto the sortals DUCK, MALLARD DUCK, and ANIMAL. Further, at a given moment in time, one individual could equally fall under the sortals DUCK and LUMP OF MATTER. These two representations would result in drastically different ways of reasoning about the individual. If someone mapped the name, “Marvin,” onto a LUMP OF MATTER instead of a DUCK, then he would reason very differently about Marvin. While ducks regularly replace their matter, presumably that would not be allowed under a LUMP OF MATTER conception. Thus, Marvin would cease to exist very quickly, if he were not conceptualized as a duck. Macnamara (1986) has argued that the only psychologically
relevant sortals are the ones corresponding to basic-level kinds – DUCK, then, is a sortal that people regularly make use of in their reasoning, but MALLARD DUCK, ANIMAL, and LUMP OF MATTER, are not.

One goal of this work will be to assess the conceptual salience of basic-level kinds to judgments of individual identity through change. Individual entities can be conceptualized at any hierarchical level, ranging from very specific to very general. A duck, Marvin, might be a member of the very specific kind WHITE DUCK WITH ONE BLACK FEATHER AND ONE CROOKED WING and also a member of WHITE DUCK, BIRD, ANIMAL and OBJECT. Many researchers have examined the possibility that there is a psychologically salient “basic-level” of categorization, which corresponds to the level at which we typically conceptualize objects (e.g., Rosch, Mervis, Gray, Johnson, and Boyes-Braem, 1976; Tanaka & Taylor, 1991; Coley, Medin & Atran, 1997; Coley, Hayes, Lawson, & Moloney, 2004). Perceptually, the basic-level is the level at which many physical features “[co-occur] and below which further subdivision [adds] little information.” (Rosch et al., p. 405). Typically, although the clearest diagnostics of basic-level kinds are perceptual properties, people tend to have the most knowledge about these kinds as opposed to more general (superordinate) or more specific (subordinate) kinds. Developmental psychologists have found that the basic level becomes salient early in life (Graham, Baker, & Poulin-Dubois, 1998), and is later differentiated into subordinate categories with gains in experience and knowledge. Hall (1993; Hall & Waxman, 1993) has shown that young word learners interpret count nouns as basic-level kind terms, rather than situation-restricted terms (e.g., “passenger”) or life-phase specific terms (e.g., “puppy”). Moreover, in teaching their children novel nouns, mothers also assume that an ostensive definition will be interpreted as a basic-level count noun, rather than a situation-restricted kind term (Hall, 1994). Because their linguistic input is replete with basic-level count nouns, children learn many more features corresponding to basic-level kinds than superordinate or subordinate kinds.

In light of the evidence regarding the basic level, if there is an effect of kind membership on reasoning about the persistence of individual entities, we might expect to see it primarily at the basic level. That is, while a duck and a spider are both animals, we would not expect people to think of them as the same kind of thing. A Mallard duck and a white duck, on the other hand, should be more typically conceived of as the same kind of thing. If the basic level is conceptually privileged, then it makes sense that we should trace individuals using a basic-level sortal, not a superordinate one, and not another such as LUMP OF MATTER.
One prediction that arises from a sortal account of individual identity is that individuals should be inextricably tied to sortals: it should be impossible to conceive of an individual that transcends sortal boundaries. Every individual is represented as a member of a kind; thus, if it ceases to be an X, then it should cease to be, period. There is, however, intuitive as well as empirical evidence that speaks against this hypothesis. Classical literature provides us with countless examples of metamorphoses: men who become wolves, a mermaid who becomes seafoam, a wooden puppet who becomes a boy, and a wife who becomes a pillar of salt. These fantastical stories are not quite convincing, because the kind-change in question is not complete. For example, is a wolf with a man’s brain and memories really a wolf? Or is a wooden puppet who can hope and speak and lie really so unlike a real boy? Despite these objections, transformations in literature pose a real problem to a psychology of concepts that insists on the impossibility of cross-kind transformations of individuals. It would be curious that we so readily accept fantastical metamorphoses as coherent stories about the world if our individual concepts were deeply opposed to them.

In one of the first empirical attempts to measure people’s reactions to fantastical transformations, Liittschwager (1995) asked participants to judge whether the identity of a person could persist through various levels of kind change. In her studies, participants were shown a person who was magically transformed by a fairy with a wand. There were nine degrees of transformation, which ranged from the very superficial (e.g., clean boy to dirty boy) to the more radical (baby to woman), to the cross-basic-level kind (girl to cat), to the cross-domain (woman to rain). Each character was described before the transformation with a proper name and a favourite activity. Participants were then asked if the transformed object retained the proper name of the individual, and if it still enjoyed the favourite activity of the original person. The results showed a gradual decrease across levels of severity: participants judged that when a person underwent a superficial change of role or appearance, her identity was retained. As the transformation became more radical (change of age or sex), participants were less likely to say that identity was retained, but the overall proportion of “yes” responses was still greater than 50 percent. As the transformation crossed the basic-level kind border, the percentage of “yes” responses dropped to around chance levels, and it decreased steadily as the transformed object was more and more removed from humanity. Liittschwager concluded that “people rely on criteria other than (or in addition to) basic-level kind when making judgments about identity” (p. 78).
There were a number of design issues in Liittschwager’s experiments which call into question her conclusions. Most importantly, all of the transformations were effected by a magic fairy, a process which left spatio-temporal continuity unspecified (e.g., did the girl become smoke, or was she simply replaced by smoke?). The fact that the transformation was effected by a magic fairy may also have meant that participants were unsure whether a true kind-change had occurred. Because magic fairies call to mind fairy-tales, where the resulting creature typically retains the mental capacity and memories of the original, participants may not have believed that true kind-change was occurring. Rather than believing that Jill turned into a cat, participants may have tended to believe that the new creature was still really a person, only in the external form of a cat. What people believed about kind change is unclear, because the experiments never asked participants to judge whether the result of the transformation belonged to a different kind. To address some of these concerns, Blok, Newman, and Rips (in press) used a more rigorous experimental paradigm to illuminate the conceptual relationship between kinds and individuals. In one of their experiments, participants were told a story of an accountant named Jim, who was in a very serious car accident, and was therefore the recipient of radical surgery. Jim’s brain was transplanted into either a human body or a robot body, and in each of these conditions either his memories were retained or they were not. Participants judged whether the resulting creature was still a person (kind judgment), and whether it was still Jim (identity judgment). The authors found that judgments of kind were dependent on the type of body that was used, whereas identity judgments were based on whether Jim’s memories were retained. People were willing to trace Jim’s identity beyond his persistence as a person, as long as his memories were retained.

Both Liittschwager’s (1995) and Blok et al.’s (in press) experiment involved a human being as the original individual in question. There are many reasons to believe that concepts of people are richer than those of other living or non-living kinds, and as such we might have a greater tendency to attribute individual persistence to a person through a kind-transformation than we would in the case of an animal or artifact. In a second experiment in Blok et al. (in press), this one involving non-human objects, the authors showed participants a variety of cross-kind transformations and asked them to make individual and kind identity judgments. Participants were shown a picture of an object (e.g., a cat) which was assigned a proper name (e.g., “Bob”), and they were given brief information about its history, appearance, and personality. The object was then depicted entering a “transporter” machine which disassembled the object particle-by-particle (destroying the object in the process), and reassembled those
particles elsewhere in a different form. Participants were shown a picture of the reconstituted object, which had the appearance of either the original object (e.g., the same cat), a related object (e.g., a fish), or an unrelated object (e.g., a hydrant). The related object was always from within the same domain (natural kind or artifact) as the original, though it was a member of a different basic-level kind. The unrelated object was from a different domain. Participants were asked to rate their agreement with identity statements ("the object in the assembler is Bob") and basic-level kind statements ("the object in the assembler is a cat") on a scale from 0 (strongly disagree) to 9 (strongly agree).

The results of this second experiment also revealed a stark dissociation between kind and identity judgments. Kind judgments were entirely dependent on whether or not the reconstituted object looked the same as the original. In the absence of any clues as to the deep internal properties of the object, kind judgments thus appeared to be based on surface properties: if the new object looked like it was a member of a different kind, participants said that it was. Individual identity judgments were more complicated. When the new object looked the same as the original, participants gave an average identity rating of 5.6 on their 9-point scale, significantly less than the average kind-statement rating of 8.4. When the new object was a different but related kind, its average identity rating was 2.2, significantly higher than the average kind rating of 1.0, though still well below the mid-point of the scale (i.e., 4.5). When the new object was of an unrelated kind, the average identity rating (0.5) was as low as the average kind rating (0.6). Blok et al.'s method is particularly useful because it allows direct comparisons between judgments of kind maintenance and individual persistence.

From their data, Blok et al. (in press) concluded that ratings of individual identity are unrelated to kind membership. The kind to which an entity belongs has no bearing on people's judgments of its identity. Instead, they proposed that individual identity is judged by appealing to the causes that sustain an individual throughout its existence. For example,

"an individual cat is the product of physical causes that bring the cat into existence and preserve her integrity across her life span.... Physical events bring about Cat-astrophe's [a proper name] birth, segregate her from other background objects, ensure her persistence over time and space, and eventually cause her demise. Although some of these events are obviously similar to those responsible for other cats, it is possible to follow Cat-astrophe's life course by following a
This position fits well with their data, and allows for the possibility of individual persistence across kind-change. By positing that individuals stand on their own, instead of being fixed to a kind representation, their proposal allows for individuals to move fluidly through membership in different kinds while remaining the same individual. While avoiding some problems, however, this proposal runs into different ones. For example, it is still unclear how physical causes specify the origins and endings of individuals without support of a kind. Certainly physical causes are responsible for the birth and death of animals, but those physical causes do not dictate that birth is the moment when an individual is conceived and death is the moment when it ceases to exist. Neither Blok et al.’s (in press) position nor sortal theory is able to explain fully the way in which people reason about individual persistence.

The two contrasting positions outlined above – complete sortal-dependence and complete sortal-independence of individuals – occupy two extreme positions regarding the dependence of individual concepts on kind membership. It is possible, however, that the true relationship between conceptions of individuals and kinds may be somewhat more complicated. The current experiments will explore the possibility that basic-level kind representations are central to people’s conceptions of individuals, and that that relationship manifests itself differently depending on the types of judgments people are asked to make. In particular, how much an entity transforms, and how that entity is labelled could influence the way in which individual concepts are affected by basic-level kind concepts.

Single entities can be conceived of in very different ways. Most generally, an entity can be represented as simply a member of a kind, not distinguished from other members of that same kind. One could think of a duck as just a duck, without attributing to it a unique identity as an individual. Such a representation affords no way to trace its persistence, or to know anything about it as a unique individual. As a result, it would be impossible to conceive of that duck becoming another kind of thing, given a mere kind-member representation.

When one has a reason to distinguish an entity, on the other hand, it can be thought of as a unique individual, a process that is facilitated by attributing to it a name. Kripke (1980) argued that, unlike traits, proper names are rigid designators of individuals; that is, they designate the same individual under all possible circumstances, in all possible worlds in which the individual
exists. This is in stark contrast to features of individuals, which are only contingently true; thus, a representation of a white clumsy duck as *Marvin* is a radically different representation than a representation of it as *white* and *clumsy*. Individuals are free to change their external features, internal traits, and even their kind membership all the while maintaining their individual identity. For example, even in cases where a kind is so specific that it only refers to a single individual, the conceptual implications of membership in such a kind are very different from a representation of that individual (Kripke, 1980). For example, the kind *HUNGRY FEMALE BRUNETTE EDMONTONIAN UBC PSYCHOLOGY GRADUATE STUDENTS* happens to apply to exactly one individual at this moment, but there is nothing about that kind that requires its extension to be just one person. Moreover, while that kind description applies to exactly one person right now, it will not follow her throughout her existence as an individual (in fact, it will lose her in just a few hours, once she has dined).

This distinction between representing an entity as a member of a kind, a carrier of a property, or an individual may have ramifications for the criteria that people use to evaluate the persistence of those entities. The current research will examine an aspect of this distinction by contrasting the way that people trace the persistence of distinguishing properties across transformations, as opposed to proper names. Hall, Waxman, Brédart, and Nicolay (2003) showed that even young children trace names differently than descriptors. In that study, children were shown a picture of a novel creature of a particular colour (e.g., red), and were either told “This is *Mr. Red,*” in the proper name condition, or “This is a red one” in the adjective condition. The children were then told a story where the creature fell into a puddle of green goo, changing its colour. Then, they saw two new pictures: one of a green creature that was otherwise identical to the first, and a red creature of a different shape. Children were then asked to choose the word’s referent (i.e., “can you show me the red one [Mr. Red]?”). In the adjective condition, children tended to choose the red creature, whereas in the proper name condition, they tended to pick the one that was the same shape and had followed a spatiotemporally continuous trajectory, despite its colour not matching the adjective in its name. Thus, even young children were able to follow a proper name across a property change, where they recognized that the descriptor no longer applied.

When we conceive of an entity as a unique individual, it is because there is a reason to distinguish it from other members of the same kind. *Fred* is not just any person, and *Fido* is not just any dog. The process of assigning a unique individual identity to an object is almost always
accompanied by assigning it a proper name. Proper names designate individuals, so there is good reason to believe that the conventional usage of names can potentially affect our reasoning about individuals. For example, both children and adults know that only certain kinds of things, like people, animals, and complex artifacts, are typically given names (Hall, Veltkamp, & Turkel, 2004). The things that we name, then, are the ones that we assign a special individual value to, above and beyond their status as a kind member. Thus, although most buildings are just buildings, and we do not give them names, others like the CN Tower have a special status beyond their status as buildings. Similarly, we do not assign proper names to most cars, but many people name their own car, a sign that they view it, alone, as worthy of an individual representation. Because the way we conceive of individuals is so closely related to our pattern of proper naming, our individual concepts may give rise to a pragmatic effect of proper names. The way we use names reflects that individuals are primarily thought of in contrast to other members of the same basic-level kind. For example, a study currently in progress in our laboratory is revealing that young children expect two contrasting proper names to refer to two members of the same basic-level kind, rather than two members of different kinds.

In the current research, we set out to discover patterns in judgments of kind and individual persistence across many levels of kind-change. In Experiments 1 and 2, we asked what the effect of cross-kind transformational distance would be on judgments of individual persistence: if the transformation preserved basic-level kind, preserved superordinate-level kind, or crossed ontological domains entirely, how might individual persistence ratings change? One straightforward prediction was that as transformational distance increased (and the change became more radical) people would be less likely to judge that an individual persisted. Such a result would be in line with Liittschwager’s (1995) and Blok et al.’s (in press) findings, where participants were less likely to judge that a proper name continued to apply as transformations became more drastic. Blok et al.’s study, however, did not include kind-preserving transformations, where an object transformed into a different looking object of the same basic-level kind. A consideration of this added condition resulted in a substantially different prediction. If contrasting two members of the same kind highlights their unique identities, then the closest transformations that retain basic-level kind membership would most likely actually be judged to extinguish individual identity. That is, faced with a transformation where the ‘before’ and ‘after’ pictures were different-looking instances of the same kind, participants would be particularly reluctant to allow that one proper name could apply to both. Experiments 3 and 4
examined more closely the impact of kind conceptions on reasoning about individuals, by manipulating whether and in which way participants were encouraged to think about the kind membership of the individuals whose persistence they were asked to judge. Finally, in Experiment 5 participants were asked to judge the persistence of identifying properties through transformations, rather than proper names. Comparing these results to those of the previous experiments allowed us to contrast two very different ways of conceiving of entities, via proper names (i.e., designators) or via traits (i.e., descriptors).

Experiment 1

Participants

One-hundred twenty adults were recruited from undergraduate psychology classes at the University of British Columbia, and they received course credit for participating. Participants were randomly assigned to one of six transformation conditions. Twenty-three males and 92 females participated; sex and language data were not collected for 5 participants. Approximately the same number of males and females participated in each condition. Participants were asked to rate their English fluency on a 6-point scale, where 1 corresponded to “just learning” and 6 corresponded to “native speaker.” Mean English fluency was 5.49 (SD = .68); all but 10 participants rated themselves at least 5.

Materials

The materials consisted of three main parts. First, participants were given a page depicting the machine by which the transformations were effected. Second, they were exposed to a series of slides on a computer screen showing a total of 10 objects undergoing stages of transformation. Finally, participants were given a paper answer sheet on which to record their responses.

Atom Reassembler. A picture of a machine called an “atom reassembler” was drawn, based on the transformation device described in Blok et al. (in press). See Figure 1. It consisted of two compartments connected by a hose; the one on the left was labelled, “disintegrater,” and the one on the right, “reassembler.” Each compartment contained a computer panel; the two panels were connected by a wire. A picture of the machine was presented to participants on a sheet of paper, below which was written the following description:
Figure 1: Atom Reassembler.
"This is an atom reassembler. An atom reassembler is a machine that transforms objects by disintegrating them into all of their atoms, moving the atoms through a small hose, and recombining those atoms in a different way. You put an object into the disintegrater, tell the computer what outcome you want, and watch it work."

Transformations. Each participant read through a series of scenarios on a computer screen, presented as a Microsoft PowerPoint slideshow. Three levels of transformational distance and two domains were manipulated to create six transformation categories. Transformational distance was either within the basic level (e.g., a duck turned into a different looking duck), within the superordinate level (e.g., a duck turned into a fish) or across domain (e.g., a duck turned into a helmet). The two domains were animal and artifact, and referred to the initial object entering the machine. The six categories, then, were within-basic animal, within-basic artifact, within-superordinate animal, within-superordinate artifact, cross-domain animal, and cross-domain artifact.

Every slideshow contained 10 transformations using different exemplars of the same transformation condition. Each transformation consisted of six slides. Figure 2 depicts the exemplars that were used. Twenty slideshow files were created for each of the six transformation conditions in order to counterbalance the order of the scenarios and the questions presented. The first slide of each transformation showed a picture of the initial object, accompanied by a count noun label corresponding to its basic-level kind, a general description of the object, and a proper noun label. For example, when the initial object was a duck, the slide read, "Look at this duck. It swims after floating breadcrumbs. This duck is known as 'V74'. Let’s put this duck in the atom reassembler." Alpha-numeric labels (e.g., "V74") were used instead of familiar names in order to reduce any familiarity effects of proper names. In particular, since half of the conditions involved transformations of artifacts, it was important to minimize the effect of naming objects which are ordinarily not named. Upon hearing an artifact given a proper name, participants may have assumed that it had some particular individual value on top of being "just a helmet," for example. Moreover, proper names that are typically human, such as "Johnny," may have led people to anthropomorphize non-humans and artifacts. The use of alpha-numeric labels does not completely circumvent this issue — "V74" is just as much a proper name as "Johnny" — but we expected that these labels would not call to mind special value as much as real (or real-sounding) names.
Figure 2: Animals and artifacts presented in Experiment 1.
The second slide of each transformation showed the same picture of the initial animal in the “disassembler” compartment of the atom reassembler, accompanied by the text, “Let’s tell the computer we want an X,” where X was the basic-level kind label of the object that would be the result of the transformation.

The third slide was a brightly-coloured pattern superimposed with the words, “Please wait while the machine works.” This slide stayed on the screen for five seconds and, unlike the other slides, could not be advanced by clicking the mouse.

The fourth slide showed a picture of the outcome-object in the “reassembler” part of the machine, accompanied by the phrase, “Look what came out!”

The final two slides were presented in counterbalanced order, and each contained one question. On the top portion of the slide was the same picture that was on slide 4. Under that picture, instructions read, “Please answer the following questions on your answer sheet regarding the object in the reassembler. Please answer on a scale of 1-7, where 1 is ‘definitely no’ and 7 is ‘definitely yes.’” Under that, one slide contained the individual identity question, which queried the persistence of the named individual (e.g., “Is this still V74?”), and the other slide contained the kind identity question, which queried the persistence of the kind to which the original individual belonged (e.g., “Is this still a duck?”).

Answer Sheet. Participants were given an answer sheet on which to record their responses. There were 20 rows, which corresponded to 20 questions asked – one individual identity question and one kind identity question for each of 10 trials. Instructions were printed at the top of the page: “Please complete the following when you see the questions on the screen. Circle one number for each question.” The numbers 1 through 7 were printed in columns down the page, after a column containing the question numbers. Above the 1 was printed “definitely no” and above the 7 was printed “definitely yes.”

Procedure

The experiment was conducted in a laboratory at the University of British Columbia. Participants were seated individually at a computer. They were given both an answer sheet and a page containing the picture and description of the atom reassembler. They were instructed to begin by looking at the picture and reading the description of the machine very carefully. They were further instructed that they would see a series of scenarios on the screen, which they were
to read by clicking the mouse to go on to the next slide. Participants were told to answer the questions by circling a number from one to seven, where 1 meant, “definitely no,” 7 meant, “definitely yes,” and a number in between those two extremes meant they were less certain. They were told that there were no right or wrong answers to any of the questions that they would see, and that the experimenter was simply looking for people’s intuitions about the scenarios presented. After the verbal instructions were given, participants were left to proceed at their own pace.

Explanations. Half the participants in each condition were asked to provide explanations for their responses after each scenario, as they completed the task. They were told to flip over the answer sheet and write very brief explanations of why they answered the questions the way they did. The other half of the participants were not asked to provide any explanation of their responses.

Results

Overall, the patterns of responses to the kind identity and individual identity questions were very different. While kind persistence judgments were straightforward, individual persistence ratings revealed a divergent and complex pattern, especially regarding transformations where basic-level kind membership was maintained.

Kind persistence. Ratings of kind persistence were straightforward and as predicted. When the post-transformation object maintained its basic-level kind, participants had no difficulty saying that it was, for example, “still a duck,” and when it changed kinds, our participants solidly judged that the post-transformation object was no longer “still a duck.” See Figure 3. A preliminary analysis explored the effects of having some participants explain their answers – recall that half of the participants in each condition were asked to write down why they chose the answers they did, as they completed the task. We conducted a two (domain: animal, artifact) by three (level: within-basic, within-superordinate, cross-domain) by two (explanations: elicited, not elicited) ANOVA with average kind persistence judgment as the dependent variable. This ANOVA revealed no interactions, and no main effect of explanations. Thus, we collapsed across explanations, and ran a two (domain) by three (level) ANOVA. There was no effect of domain, and no interaction. There was a significant main effect of level \([F(2, 108) = 1686.48, p < .001]\). Tukey post-hoc comparisons confirmed that mean kind judgments were higher in the within-basic level than the within-superordinate and cross-domain levels.
Figure 3: Results from Experiment 1. The height of the bars represents the mean rating from 1-7 to the two persistence questions. Kind persistence was queried in the form, “Is this still a duck?” and Individual persistence was queried in the form, “Is this still F57?” A response of 1 corresponds to “definitely no” and a response of 7 corresponds to “definitely yes.”
Individual persistence. Individual identity ratings presented a very different pattern of results, in line with previous empirical results that suggested a dissociation between individual and kind persistence judgments. A preliminary analysis explored the effect of asking participants to explain their answers. To this end, we conducted a three-way ANOVA with domain (animal, artifact), transformational level, (within-basic, within-superordinate, cross-domain), and explanations (explanations elicited, no explanations elicited) as factors. This analysis revealed a three-way interaction between domain, level, and explanations \(F(2, 108) = 3.35, p < .05\).

Whether or not participants were asked to explain their answers as they went through the trials affected responses differentially across the three levels. In the within-basic transformations, those who were asked to explain their answers tended to give higher persistence ratings than those who didn’t explain their answers if they saw animals, which pattern was reversed if they saw artifacts. Conversely, in the within-superordinate level of transformation, those who explained their answers tended to give lower individual persistence ratings than those who did not, if they saw animals. This pattern was reversed if they saw artifacts. In the cross-domain transformations, whether or not participants explained their answer had no effect on their individual persistence ratings.

This interaction was unpredicted, and difficult to explain conceptually. In order to shed further light on it, we conducted the same analysis with a different dependent variable: instead of using participants’ mean ratings of individual persistence across all 10 trials, we used their responses to just the first trial, that is, before any explanations were given. The same significant three-way interaction was found \(F(2, 108) = 3.12, p < .05\). In other words, before providing any explanations of their judgments, participants who would later explain their responses performed significantly differently than those who would not. Because it is very difficult to imagine a conceptual explanation for the interaction (i.e., a difference between explanation conditions before any explanations were provided), we tentatively attribute it to random sampling differences between conditions. As a result, we collapsed the data across explanation conditions in subsequent analyses.

The next analyses are of greater conceptual interest. To look into the effects of domain and transformational level, a second, two-way ANOVA was run. This analysis revealed no effect of domain \(p > .35\), and no interaction between domain and level \(p > .5\). Whether participants were presented with animals or artifacts made no difference to their reasoning. There was a significant main effect of level \(F(2, 114) = 8.92, p < .001\); these results are shown in Figure 3.
In the cross-domain condition, representing the most radical kind change, ratings of individual persistence fell at 2.1 on our 7-point scale. This value was significantly higher than the mean rating of kind-maintenance in the same condition, but it was still quite low. Thus, participants were fairly sure that, when an individual underwent a transformation across domains, its individual identity was extinguished. In the within-superordinate condition, the average response to the individual identity question, “Is this still V74?” was 3.82, which was significantly higher than in the cross-domain condition ($p < .05$).

The results thus far match those found by Blok et al. (in press) and Liittschwager (1995): as the transformations became less drastic, participants were more likely to judge that the individual persisted, lending credence to the idea that individual persistence is unrelated to kind persistence and instead varies independently, according to factors such as the severity of the transformation. Such a conclusion would be warranted if in the within-basic level condition we found even higher ratings of individual persistence than in the within-superordinate and cross-domain conditions. The obtained results, however, were quite different. In the within-basic level transformation condition, the average response to the individual identity question was only 1.91 on the 7-point scale. This value reflected an extremely strong tendency for people to pick “definitely no” when asked about persistence of the individual. Tukey pairwise comparisons revealed a significant difference between the mean individual identity persistence ratings in the within-basic and within-superordinate conditions ($p < .001$). The difference between the within-basic and cross-domain conditions did not reach significance ($p > .10$). In other words, when a dog turned into a helmet, people tended to judge that it was not still the same individual, and definitely not still a dog. When the same dog transformed into a lizard, people were uncertain, but more likely to judge that it was still the same individual, and definitely not a dog. When it turned into a different looking dog, however, the result was very clear: people judged that, though it was still a dog, it was definitely not still the same individual.

Individual participants’ response patterns. A potential problem with analyzing the individual identity judgments in terms of group means is that the reported means do not accurately reflect the responses that individual participants chose. While the means often tended to be somewhere in the mid-range of the scale, 73% of participants displayed a strong tendency to choose almost all ‘1’s or almost all ‘7’s on every trial. In itself, this tendency reflected an interesting aspect of people’s reasoning about individuals via proper names. That is, most people had strong opinions about the identity of individuals, and were not comfortable displaying
uncertain views. Obviously, the questions facing these participants were not straightforward and easy, since we found a wide range of responses. Despite that, almost every individual participant claimed to be quite sure of his answers. Rather than being normally distributed, then, almost no participants were in the middle of the distribution. The ANOVA technique is robust to departures from normality, so the nature of the distribution should not affect the validity of the ANOVA results. Further, the nature of the distribution resulted in very large group variances, making the ANOVA a conservative measure, because of the relative difficulty of achieving significant results. While we do not think, then, that the ANOVA procedure is an invalid way to analyze these data, in the next section we report the data analyzed in a different way. By comparing the response patterns of individual participants, we were able to confirm and clarify the results reported above.

Participants were classified into three groups, based on their response patterns. Identity deniers were those who chose ‘1’ (strongly disagree) or ‘2’ on at least 8 of the 10 trials. Out of 120 participants, 68 fell into this category. Identity maintainers chose ‘7’ (strongly agree) or ‘6’ on at least 8 of 10 trials. Twenty participants fell into this response category. The 32 participants who displayed any other pattern of responses were classified as mixed. For the following analysis, participants falling into the mixed category were excluded from the analysis; this exclusion applied to approximately 10 participants at each transformation level. Three Chi-square analyses were conducted, comparing the relative proportions of identity deniers and maintainers between categories. These analyses revealed that there were significantly more identity deniers in the within-basic condition (29/30) than in either the within-superordinate (16/28) \( \chi^2(1, N = 58) = 13.01, p < .001 \) or cross-domain (23/30) \( \chi^2 (1, N = 60) = 5.19, p < .05 \) conditions. There was no significant difference in individual response patterns between the superordinate and cross-domain conditions \( \chi^2(1, N = 58) = 2.51, p > .05 \). See Figure 4. These results were very similar to the ANOVA results reported above. When they witnessed transformations that retained basic-level kind membership, participants were very likely to display an identity-denying set of responses. Strikingly, at the within-basic kind level, only 1 participant out of 40 showed a strong identity-maintaining response pattern. The proportion of identity-deniers in both conditions that involved a cross-basic level transformation was significantly lower.
Figure 4: Proportion of participants in Experiment 1 who displayed identity-denying (chose mostly 1s and 2s) and identity-maintaining (chose mostly 6s and 7s) response patterns, excluding those who displayed a mixed pattern of responses.
Explanations. For the group of subjects from whom explanations were elicited (n = 20 in each transformational level), the content of their written explanations was examined and coded according to two broad factors. First, participants were coded as invoking traits if any of their comments made reference to either internal or external characteristics of the objects. This included mention of shape, colour, or other aspects of the physical appearance of the objects, and it also included internal traits, such as abilities (in the case of animals) or function (in the case of artifacts). For example, a representative response was, “the new item was still within the same category as the first item although the exact shape, form, colour might have changed.” Participants’ explanations were coded as invoking atoms if they alluded to the material composition of the objects. In most cases, this entailed a reference to the atomic makeup of an object. For example, a representative response was, “when the objects were put in the reassembler, although it is the same atoms it is no longer the original animal nor the name they are known as.” Some participants made reference to both of these factors in their explanations (N = 13), and some (N = 9) referenced neither. Figure 5 displays the number of participants at each transformational level who mentioned each factor. Most participants did not separate their reasoning for the kind identity and individual identity questions, so all written explanations were included in this analysis.

It was immediately striking that, though there appear to be few differences between the factors in the within-superordinate or cross-domain transformation conditions, the within-basic group showed a very different picture. While only one participant in the within-basic condition appealed to the material composition of the objects, more than half of the participants who witnessed the more drastic transformations did. Two Chi-square analyses confirmed the significance of this result: the number of explanations appealing to atoms differed significantly across the first two levels (i.e., within-basic and within-superordinate), [χ²(1, N = 40) = 15.82, p < .001]. Likewise, when the same factor was compared across the within-basic and cross-domain levels, the difference was also significant [χ²(1, N = 40) = 13.79, p < .001]. Rather than appealing to material composition, participants in the within-basic conditions tended to mention the appearance, function, or abilities of the changed object. Another two Chi-square analyses compared the proportion of ‘trait’ responses between the within-basic condition and the other two transformational levels. Both were significant: within-basic compared to within-superordinate resulted in a Chi-square value of 6.14 (p = .01) and within basic compared to cross-domain resulted in a Chi-square value of 9.23 (p < .01). This analysis suggests that people
Figure 5: Types of explanations cited in Experiment 1.
may reason differently about the persistence of individual identity, depending on whether or not basic-level kind membership is maintained. When basic-level kind stays the same, more particular changes in form and function seem to be most salient. When basic-level kind changes, however, the method of transformation, by which all the atoms stay the same, becomes more salient.

Discussion

Participants viewed a series of animals or artifacts being radically transformed at the atomic level. They were then asked to judge the transformed entity with regards to its identity as a member of the original basic-level kind, and its identity as the original individual. The variables of interest were domain and transformational level. Both the pattern of group means, as well as the response patterns of individual participants showed a strong effect of transformational level on judgments of kind persistence and individual persistence. Judgments on those two variables diverged strongly. There was no effect, however of domain on either kind persistence or individual persistence judgments.

Effect of domain. As in the current finding, Blok et al. (in press) also found no effect of domain on judgments of individual identity. Despite their finding, we were surprised not to find any effect of domain, based on previous research looking into this factor. In a series of three studies, Hall (1998) found that people reasoned differently about the persistence of individual animals and artifacts through transformations. Although his experiments did not involve any kind changes, Hall found that people were more likely to judge that an animal’s individual identity could survive through a dramatic change (i.e. a part-by-part replacement), whereas an individual artifact was less likely to survive. Thus, we had expected that participants in the current experiment would likewise have been more likely to believe individual animals to persist through transformations than individual artifacts. Another factor related to this hypothesis is complexity. Since animals have much more internal complexity than most artifacts (including all the artifacts included in this study), there was more potential for people to reason that, despite outward appearance being radically changed, internal features might remain the same. For example, some participants indicated in their written explanations that they believed the animals’ personality or memories to remain unchanged.

There are at least two plausible reasons, however, why we might not have found differences between reasoning across the two domains. First, the atom reassembler represented
an unnatural and unfamiliar method of transformation. Hall (1998) found a much stronger
tendency for people to judge that an animal continued to exist through a drastic change when that
change was represented as naturally occurring (e.g., growth and regeneration) than when it was
externally effected. The observed results here could be due to the mechanism of transformation,
which was also externally caused and perhaps may have been too unnatural for participants to
reasonably think that it would be any more likely to preserve the identity of an animal than an
artifact. In real-world situations, animals change in radically different ways than do artifacts.
Animals grow and change due to internal, biological causes. When artifacts change, it is due to
external causes, such as being painted, broken, or fixed. Artificial situations like this
experimental one, where both kinds of things were subjected to the same mechanism of change,
then, could remove the effect of domain from every day reasoning. In line with this, Hall also
found a smaller difference between the way that animals and artifacts were treated when animals
underwent a change that was externally caused rather than natural.

Another possible reason for the lack of difference across domain is the naming of the
objects. Despite procedural measures designed to minimize the effect of the proper names that
we used, the alpha-numeric indicators used in this study were still proper names, and as such
could have affected representations of the objects, particularly artifacts, which are not normally
given proper names. Thus, the artifacts may have been anthropomorphized, or participants may
have thought they were somehow special, because they warranted names. Participants in Hall’s
(1998) experiments judged the persistence of individual objects that were marked by possessive
noun phrases (i.e., “Sam’s quiggle”). Possessive noun phrases are a perfectly natural way to refer
to all objects, animals or artifacts. Unlike the current experiment, however, Hall’s
transformations did not involve changing kind boundaries, so the same count noun, “quiggle,”
applied at all stages of the transformation. Since two levels of the current transformations
involved cross-kind transformations, referring to individuals with possessive noun phrases would
have been incoherent. This is a critical difference between these two studies, which may account
in part for the different pattern of results seen here. Giving proper names to both the animals and
artifacts may have further attenuated any difference that would have otherwise been observed
across the two domains.

**Effect of transformational level.** Across three levels of transformational distance, there
were large differences in judgments of both kind identity and individual identity; most notably,
individual persistence judgments were *lowest* when the transformation was least drastic, in the
within-basic level transformation condition. This was in sharp contrast to kind persistence judgments, which were highest at the within-basic level, and low at the other two transformational levels. The pattern of results obtained suggests that, while people are more ambivalent about individual persistence through a radical cross-basic-level-kind change, they are more decisive about less radical, basic-level kind-preserving changes. Why would this be the case?

We propose that there is a strong effect on reasoning about named individuals that is brought about by considering basic-level kind membership. As suggested earlier, basic-level kind-preserving transformations provide an explicit contrast between two different-looking members of one basic-level kind, as participants are asked to consider whether two different-looking instances of the same basic-level kind could be one individual. This contrast highlights the uniqueness of the individuals, leading people to reject the idea that both could be the same individual. This hypothesis is supported by the findings from participants' written explanations. At the within-basic level, participants focussed on the features that differentiated the two instances they were comparing, like physical appearance and specific function. At the other two levels, people were much more likely to mention the shared aspect of the pre- and post-transformation entities, that is, the atoms composing them. It is possible that this within-basic contrast effect is heightened by the role of proper names. Because the role of proper names is to designate unique individuals, using names in this study should make participants more attuned to the characteristics of the individuals that differentiate them from other members of the same basic-level kind. Thus, when presented with two different-looking individuals of the same kind, participants should be very aware of the fact that one name should not apply to both. When asked to make judgments about a more radical transformation, on the other hand, the differentiating function of proper names is no longer directly challenged, so people might feel freer to conclude that, in some way, the individual persists through an even more drastic change, or at least not to be so strong in disallowing persistence.

The next experiment explored this hypothesis about the role of basic-level kinds in our task further by replicating and extending the scope of Experiment 1 with several changes. Experiment 2 also attempted to account for other possible explanations of the observed result. One of these possibilities is a simple response bias: it is possible that, when participants answered "yes" to the kind identity question (i.e., in the within-basic level condition), they felt pressure to answer "no" to the individual identity question, for the sake of contrast. Likewise,
they may have felt compelled to judge that *something* stayed the same, and *something* was different. If this were accountable for participants’ responses, it would signal a very uninteresting result. There is already one reason to believe this is not the case, given by the results in the cross-domain condition. In that condition, participants chose “no” in response to the kind identity question, and many were also quite consistent about choosing “no” in response to the individual identity question. Regardless, we could be more confident about this result if there were a condition where participants were willing to choose “yes” in response to both questions. Experiment 2 provides evidence that this effect is not attributable to simple response bias.

Experiment 2 had several goals. One goal was simply to provide a replication of the within-basic contrast effect documented in Experiment 1. Since the effect witnessed here has not been observed previously in the literature, it was important to rule out experimental anomalies. To this end, Experiment 2 was a replication and extension of Experiment 1, with several changes. First, the stimulus set was revised to remove items that yielded anomalous mean ratings in Experiment 1. For example, the cheetah was removed as a stimulus item because the two exemplars that were used looked so similar to each other that many participants in Experiment 1 judged them to be, in fact, the same individual. Second, the wording of the introduction to each object used in Experiment 1 was changed, to remove possible ambiguities. Third, artifacts were removed entirely from the paradigm, due to the finding of no differences between the animal and artifact conditions in Experiment 1. Finally, two conditions not conducted in Experiment 1 were added to the paradigm. A “within-subordinate” condition (e.g., involving a mallard duck transforming into a slightly different-looking mallard duck) was included, to test the effect of an even smaller change on individual identity persistence judgments. If the observed effect was due to basic-level kind membership, then we might predict that there would be no difference between the within-subordinate and within-basic conditions, as basic-level kind was preserved in both cases. Also, an “identical” condition was included, where the result of the transformation looked identical to the animal entering the machine. This last condition was of particular interest in exploring the within-basic contrast phenomenon witnessed in Experiment 1. One possibility was that, as the post-transformation object becomes more and more similar to the original, individual identity persistence ratings would stay very low. If this were the case, we would predict that persistence ratings in the identical condition would be the lowest of all transformational levels. If, however, the observed effect was due to change within a basic-level kind, as we have
proposed, then people should be more willing to allow individual identity persistence in the identical condition, and ratings should be higher than in the within-subordinate and within-basic conditions. If nothing is perceptually different about the object, we predicted that people would judge it to be the same individual, despite having gone through the same process of disassembly and reassembly as in all the other conditions. If we observed a tendency to judge that these objects maintain their individual identities, then this would restrict the within-basic contrast phenomenon observed here to objects that do actually change, even if only slightly, within their basic-level kind.

Experiment 2

Participants

Eighty adults were recruited from undergraduate psychology classes at the University of British Columbia, and they received course credit for participating. Participants were randomly assigned to one of four transformation conditions. Fifteen males and 62 females participated; sex and language data were not collected for 2 participants. There were approximately equal numbers of males and females in each condition. Participants were asked to rate their English fluency on a 6-point scale, where 1 corresponded to “just learning” and 6 corresponded to “native speaker”. Mean English fluency was 5.57 (SD = .62). Only 3 participants rated their proficiency below 5.

Materials

The materials used in Experiment 2 were very similar to those used in Experiment 1. The general set-up, including a page depicting the atom reassembler, a slideshow, and an answer sheet, was unchanged.

Atom reassembler. This device was unchanged from Experiment 1.

Transformations. Transformational distance was manipulated to create four conditions. Domain was not a factor in this experiment; all objects were animals. As in Experiment 1, we included a within-superordinate and a within-basic transformation condition. To these, we added two new conditions. In the within-subordinate condition, participants saw transformations involving two different-looking exemplars of the same subordinate-level kind (e.g., mallard duck to different-looking mallard duck). Finally, the identical condition involved the same photograph
representing both the before and after stages of the transformation (e.g., mallard duck to identical-looking mallard-duck).

The same animal exemplars were used as in Experiment 1, with two exceptions: person was eliminated, out of a desire to reduce variability by making all the animals non-human. Also, cheetah was eliminated, because there was evidence that participants in Experiment 1 thought the two exemplars were, in fact, the same animal. Our two exemplars did look very similar, and in general it was very difficult to find any examples of different-looking cheetahs. These two stimulus items were replaced with cow and cat. All stimuli are shown in Figure 6.

Two changes were made to the slideshow presentation from Experiment 1. First, rather than alphanumeric strings, the proper names were CVC nonwords, which were introduced using the locution, “This [basic-level kind label]’s name is [CVC nonword].” (e.g., “This duck’s name is Maf.”). The wording in Experiment 1 (e.g., “This duck is known as V74.”) had been expressly chosen to be most suitable for artifacts. This was no longer an issue in Experiment 2. Also, there was some evidence that one or two participants in Experiment 1 misinterpreted “This duck is known as V74” to mean that V74 was a subspecies of duck, so we switched to a phrasing more indicative of proper names. While most participants seemed to interpret the alphanumeric labels as we intended them to, the formulation “his name is” removes any possible ambiguity in the word’s carrier sentence. The second change from Experiment 1 was that a slide was inserted in each trial after the depiction of the transformation, before the test questions, providing a recap of the transformation. Participants saw both the pre-transformation and post-transformation pictures, side by side, with a large arrow between them. Below that was written, “Here is a review of what you just saw.” This slide was included to counter the possibility that participants would forget what the original animal looked like. In Experiment 1, many participants in the within-basic transformation condition provided higher ratings for the cheetah pair, indicating that they believed it to look identical before and after the transformation. We reasoned that this might have especially been problematic in the within-subordinate condition in Experiment 2, where two instances of the same sub-species often looked quite similar.

Answer sheet. The answer sheet used was the same as in Experiment 1.
<table>
<thead>
<tr>
<th>original animal</th>
<th>within-subordinate transformation</th>
<th>within-basic transformation</th>
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</table>

Figure 6: Animals presented in Experiment 2.
Procedure

Participants were given a page depicting the atom reassembler, then they watched the slideshow and provided answers on the answer sheet in the same manner as in Experiment 1. Participants were not asked to explain their answers.

Results

The results replicated and extended the findings from Experiment 1. Kind identity ratings were as predicted, that is, they respected the basic-level kind boundary. Individual identity judgments revealed that the tendency to deny individual persistence within a basic-level kind is specific to transformations that involve some perceptible change within a basic-level kind. There was no tendency to deny individual persistence when the change resulted in an identical entity, or when the change crossed the basic-level kind border.

*Kind persistence.* As in Experiment 1, ratings of kind persistence were straightforward. A one-way ANOVA confirmed a significant effect of transformational level on kind persistence ratings \[F(3, 76) = 158.40, p < .001\]. Kind persistence ratings across the three conditions where basic-level kind was unchanged were very high (identical, \(M = 6.87\); within-subordinate, \(M = 6.95\); within-basic, \(M = 6.84\)), compared to 1.68 in the within-superordinate transformation condition. Tukey's post-hoc tests confirmed that mean kind persistence ratings for the three levels where basic-level kind membership was maintained were significantly higher than the within-superordinate level where basic-level kind membership changed.

*Individual identity persistence.* Consistent with the within-basic results of Experiment 1, participants were likely to judge that, in the within-basic condition, individual identity was not maintained (\(M = 3.05\)). In contrast, the within-superordinate condition mean was 5.39, consistent with the relatively high persistence judgments for the analogous condition in Experiment 1. These conditions replicated the findings of Experiment 1. The within-subordinate condition extended the result of the within-basic condition, that is, participants in this condition were equally likely to judge that individual identity was not maintained (\(M = 2.46\)). In the identical condition, on the other hand, ratings were high: the mean in that condition was 5.08. A one-way ANOVA with transformational distance (4 levels: identical, within-subordinate, within-basic, within-superordinate) as the independent variable revealed a significant effect of level \(F(3, 76) = 10.48, p < .001\) on individual identity persistence ratings. Tukey post-hoc tests confirmed that
the identical and within-superordinate levels were significantly higher than the within-subordinate and within-basic levels. All results are displayed in Figure 7.

These persistence ratings replicated and extended the pattern of results observed in Experiment 1. When animals underwent a transformation where basic-level kind did not change, participants were unlikely to judge that identity could be maintained. This tendency was statistically the same in the within-basic and within-subordinate conditions, though the mean for the within-subordinate condition was slightly lower than the within-basic transformation condition. In the identical condition, however, where the transformation became so close that it involved no perceptible change, the suppression effect of kind-maintaining changes disappeared: ratings jumped back up to the same high level as when basic-level membership was lost. The within-basic contrast effect observed in these experiments, then, seems to be restricted to transformations that involve changes in appearance, but no change in basic-level kind.

Individual participants’ response patterns. We again categorized participants as being either identity deniers (at least 8 out of 10 1s and 2s), identity maintainers (at least 8 out of 10 6s and 7s), or mixed (any other pattern). The number of mixed participants did not significantly vary across groups \[\chi^2(3, N = 80) = 3.75, p > .25\], so those responses were removed for the subsequent analyses. The remaining proportions of identity deniers and maintainers are shown in Figure 8. Chi-square analyses revealed that individual participants’ responses followed the same pattern as the group means. The ratio of identity maintainers to deniers differed significantly between the two basic-level kind preserving groups (within-basic and within-subordinate) and the other two groups (within-superordinate and identical) (all \(p\)'s < .01). The within-basic and within-subordinate groups were not different from each other \[\chi^2(1, N = 25) = 1.04, p > .25\], nor were the identical and superordinate groups different from each other \[\chi^2(1, N = 28) = 0.53, p > .40\]. Thus, whether we compared group means or individual participants’ response patterns, the same pattern arose.

Discussion

The four levels included in Experiment 2 revealed a u-shaped curve of individual identity judgments. When participants witnessed an animal going through a process of disassembly and reassembly as either an identical animal or an animal of a different basic-level kind, they were more likely to judge that the resulting animal was the same individual. When the result of that transformation was a different-looking exemplar of the same basic-level kind, however, they
Figure 7: Experiment 2 results.
Figure 8: Proportion of participants in Experiment 2 who displayed identity-denying (chose mostly 1s and 2s) and identity-maintaining (chose mostly 6s and 7s) response patterns, excluding those who displayed a mixed pattern of responses.
were less likely to grant it the same individual identity.

There seems to be a specific window of transformation that occurs between the level of the individual’s unique appearance and up to the basic-level boundary, where sameness of basic-level kind impacts on people’s reasoning about individual persistence. We have suggested that this result relies on attention to the fact that the ‘before’ and ‘after’ figures are different-looking members of the same basic-level kind. This, in turn, highlights the unique properties of those individuals, suppressing the tendency that might otherwise be stronger to judge that they are the same individual. Indeed, when the pre- and post-transformation animals looked identical, participants had a greater tendency to judge that individual identity persisted. This result also speaks against the response-bias possibility raised earlier. In the identical condition, despite going through the same radical disassembly and reassembly as the other conditions, participants did not appear to feel pressure to answer one question positively and the other negatively.

The design of Experiments 1 and 2 may have facilitated the tendency to deny individual identity within a basic-level kind by asking participants to explicitly consider basic-level kind membership. Recall that every object was introduced by a basic-level label, for example, “Look at this duck!” Moreover, every transformation was specified by a basic-level kind label, for example, “Let’s tell the computer we want a duck!” Finally, in counterbalanced order with the individual identity judgments, participants were asked to judge whether the transformed object was still a member of the original basic-level kind. Each of those steps forced participants to consider the basic-level kind at play. As such, it is possible that, without so many explicit references to basic-level kind membership, we would not observe the same pattern of results in responses to individual identity persistence.

Experiments 3 and 4 explored in different ways how thinking about kind membership matters to individual identity judgments. Both of these studies used just two of the transformational levels used in Experiment 2, within-basic and within-superordinate. In Experiment 3, participants were only asked to judge individual identity, and were never queried at all about kind membership. In Experiment 4, kind membership was evoked only at the superordinate level, using only the superordinate-level noun, “animal.”
Experiment 3

Participants

Forty adults were recruited from undergraduate psychology classes at the University of British Columbia, and they received course credit for participating. Participants were randomly assigned to one of two transformation conditions. Eight males and 31 females participated; sex and language data were not collected for 1 participant. There was an approximately equal proportion of males and females in both conditions. Participants were asked to rate their English fluency on a 6-point scale, where 1 corresponded to “just learning” and 6 corresponded to “native speaker”. Mean English fluency was 5.34 (SD = .60). All but 2 participants rated their English proficiency above 4.

Materials

The materials used in Experiment 3 were very similar to those used in Experiments 1 and 2. The general set-up, including a page depicting the atom reassembler, a slideshow, and an answer sheet, was unchanged.

Atom reassembler. This device was unchanged from the first two experiments.

Transformations. Two transformational levels from Experiment 2 were used: within-basic, and within-superordinate. The PowerPoint presentations were unchanged, with one exception. In every trial, the slide asking for a kind identity judgment was removed. Thus, participants were only asked one question for every trial, resulting in 10 questions total, instead of 20.

Answer sheet. The answer sheet was reduced to include space to answer only 10 questions.

Procedure

The procedure was unchanged from Experiment 2.

Results

We found no difference between individual identity ratings in the two transformational levels [t(38) = .306, p > .5]. See Figure 9. Moreover, approximately equal thirds of each group fell were classified as identity-deniers, maintainers, and mixed, based on the patterns of response described in Experiments 1 and 2. Thus, there were no differences in ratings between groups, nor
Figure 9: Experiment 3 results.
were participants more likely to display identity-denying, mixed, or identity-maintaining response patterns [$\chi^2(2) = .47, p > .5$].

When participants were not prompted to explicitly consider kind membership by answering a question about the kind persistence of the animal, they no longer exhibited a tendency to suppress judgments of individual identity persistence when the transformation maintained basic-level kind membership.

Discussion

The only difference between Experiment 3 and the parallel conditions in Experiment 2 was the absence of one measure in Experiment 3, that is, participants were not asked to judge basic-level kind identity. This sole difference resulted in the disappearance of the main effect observed in Experiments 1 and 2, where a basic-level kind preserving transformation was judged much less likely to maintain individual identity than one that crossed a basic-level kind. Thus, something about reading or answering the kind identity question affected participants' responses on the individual identity question.

One straightforward possibility is that participants in the earlier studies were exhibiting a simple response bias, that is, in Experiments 1 and 2, people tended to alter their responses to the individual identity question based on how they responded to the kind identity question. Thus, if they judged that an entity continued to persist as a basic-level kind member, then they felt compelled to judge that its individual identity was disrupted. Likewise, if they judged that an entity ceased to exist as a basic-level kind member, then they felt compelled to judge that its individual identity persisted. This response pressure may have stemmed from a general feeling that, through the transformation, it was clear that something stayed the same and something was different. This was true: the transformation mechanism specified that form was changed but material composition was unchanged. It may not have been clear to participants how they should use that information to draw conclusions about individual identity persistence, so they may have answered in such a way that, if their answer to the kind identity question was positive, they compensated for that sameness by stipulating change in the individual, and vice versa. This would not be an uninteresting result, but it would speak against our hypothesis that the observed result reflects a tendency not to allow two different-looking instances of the same kind to be the same individual or share a name.
There are two results from the previous studies that contradict a response-bias interpretation. First, in the cross-domain condition in Experiment 1, participants tended to give low judgments of both kind and individual identity. Second, in the identical condition in Experiment 2, participants gave relatively high judgments of both kind and individual identity persistence. Arguably, though, those two conditions may have been easier to judge than the within-basic and within-superordinate conditions. That is, when a change is so severe that an entity crosses ontological domains, or when it is not a change at all, those conditions present less ambiguity to participants than the more intermediate conditions. If participants were more certain about their judgments in the identical and cross-domain conditions, then they may not have been affected by their own responses to the kind identity question. Experiment 4 will provide more support for the position that the difference between individual identity ratings in the within-basic and within-superordinate conditions is not due to a simple response bias.

A second possibility is a conceptual one. Answering a question about basic-level kind identity forced participants to think about the animals as basic-level kind members. That is, the contrast between members of the same basic-level kind is enhanced when participants are made to consider their basic-level kind membership. We have suggested that when an entity is richly conceptualized as an individual, especially when it is designated by a proper name, the contrast between it and other members of the same basic-level kind is most salient. The previous experiments took advantage of this contrast effect by forcing participants to explicitly consider the within-basic contrast between entities in conditions where basic-level kind membership was maintained. Reminding participants of the similarity of basic-level kind in this way may have been necessary to elicit the observed result in the previous experiments. In Experiment 3, where participants were not asked to judge kind membership, they may have simply been less likely to take into account the within basic-level kind contrast in making their judgments of individual persistence.

Experiment 4 provides a different test of the basic-level kind membership effects reported above. Until now, we have spoken of a basic-level kind effect, hoping to show that the basic level has a privileged impact on reasoning. In the preceding experiments, however, objects were introduced and queried about kind persistence (when they were queried) always at the basic level. In Experiment 4, the basic-level kind term was never mentioned. Instead, each animal was introduced and referred to only using the superordinate-level term, “animal.” Proper name references were unchanged.
There were three plausible outcomes that we could foresee in this version of the task. First, we might have found a similar result to Experiment 3, that is, no difference between groups and no strong tendency overall to judge individual identity persistence in a particular direction. This result could have occurred if mention of the superordinate kind term, "animal," is too general to foster any thought of kind membership at all.

A second possibility was that individual identity judgments in both conditions would be low. Such a result would lend support to the hypothesis that the basic-level kind effects really reflected a general effect of kind membership at any hierarchical level. That is, the within-kind effect appeared at the basic level in earlier experiments because we forced participants to reason at that level, but when forced to reason at a higher level, the effect would emerge at that level. Such a result would also be consistent with the conceptual response-bias possibility discussed above. That is, when participants judge that kind identity stayed the same, then something else had to change; by default, this was individual identity.

A third possibility was that the basic-level effect witnessed earlier is conceptually real. Querying about kind identity, even at a higher level, might be enough to encourage participants to think about kind at the most natural level, that is, the basic level. If this were the case, then individual identity ratings in Experiment 4 would look similar to those seen in Experiments 1 and 2.

Experiment 4

Participants

Forty adults were recruited from undergraduate psychology classes at the University of British Columbia, and they received course credit for participating. Participants were randomly assigned to one of two transformation conditions. Nineteen males and 18 females participated; sex and language data were not collected for 3 participants. Out of the 19 males who participated, 12 participated in the within-basic condition, and 7 in the within-superordinate condition. A Chi-square analysis revealed that this difference in proportion was significant [$\chi^2(1, N=37) = 12.77, p > .001$]. Participants were asked to rate their English fluency on a 6-point scale, where 1 corresponded to “just learning” and 6 corresponded to “native speaker.” Mean English fluency was 5.60 ($SD = .68$); all but 4 participants rated their fluency above 4.
Materials

The materials used in Experiment 4 were very similar to those used in Experiments 1 and 2. The general set-up, including a page depicting the machine, a slideshow, and an answer sheet, was unchanged.

Atom reassembler. This device was unchanged from the first two experiments.

Transformations. Two transformational levels from Experiment 2 were used: within-basic, and within-superordinate. The PowerPoint presentations were very slightly modified to remove all mention of basic-level kind terms. In every instance where a basic-level kind term was used in Experiment 2, that term was replaced by the word, “animal.” This included the term used in the kind identity question. Thus, instead of being asked, for example, “Is this still a duck?,” participants were instead asked, “Is this still an animal?”

Answer sheet. The answer sheet was unchanged from Experiments 1 and 2.

Procedure

The procedure was unchanged from Experiment 2.

Results

Though they rated kind membership to be unchanged in both conditions, participants produced a similar pattern of individual identity judgments to Experiments 1 and 2. See Figure 10.

Kind persistence. In both the within-basic and within-superordinate conditions, participants rated kind identity to be unchanged. The average kind identity rating in the within-basic condition was 6.80, and it was 6.49 in the within-superordinate condition. This difference was not significant \[ T(38) = 1.23, p > .20 \]. This result was unsurprising, because in both conditions, the kind identity question was framed at the superordinate level, that is, “Is this still an animal?”

Individual persistence. In their answers to the individual identity question, participants differentiated between the two conditions, paralleling the results of Experiments 1 and 2. In the within-basic condition, the average individual persistence judgment was again low, at 2.94, versus a significantly higher 4.46 in the within-superordinate condition \[ F(1, 38) = 4.07, p = \]
Figure 10: Experiment 4 results.
Thus, even when basic-level kind membership was never explicitly mentioned, the within-kind effect observed in the previous experiments still emerged at the basic level.

*Individual participants' response patterns.* Participants' responses were categorized into three groups, as in previous experiments. *Identity deniers* were those who chose at least 8 1s and 2s out of 10 trials. *Identity maintainers* were those who chose at least 8 6s and 7s, and any other pattern of choices was categorized as *mixed*. In both transformation conditions, 5 out of 20 participants displayed a mixed pattern. Those participants were excluded, and the remainder were submitted to a Chi-square analysis. The difference between the proportion of identity deniers and maintainers across the two groups did not reach significance \[\chi^2(1, N = 30) = 3.39, p = 0.07\], though the difference was in the same direction as in Experiments 1 and 2. See Figure 11.

**Discussion**

Despite the fact that basic-level kind terms were never mentioned in this experiment, participants' judgments of individual identity persistence were significantly lower when basic-level kind membership was maintained than when it was not. This finding provides our strongest evidence yet that people reason about individuals in association with their basic-level kinds. All cues present in the experiment encouraged participants to represent each exemplar as simply an *ANIMAL*. If they had restricted their thinking to only that level of representation, however, the observed results would not have appeared. Instead, we should have seen the same pattern of responses in both conditions. At the superordinate level of conceptualization, there was no difference between the events viewed in the within-basic condition and the within-superordinate condition. In both cases, participants witnessed changes that preserved the kind, *ANIMAL*. Indeed, in both conditions, they judged that superordinate kind was maintained, and yet they still responded differently depending on whether basic-level kind was maintained. This suggests that participants continued to conceptualize each animal as a member of its basic-level kind, without ever being told what that was.

It may seem curious that there was a significant result in Experiment 4 but not in Experiment 3, where participants were given basic-level labels but not queried about kind membership. In Experiment 4, on the other hand, a significant difference between individual identity judgments in the within-basic and within-superordinate conditions arose despite the absence of basic-level labels. The other methodological difference between Experiments 3 and 4
Figure 11: Proportion of participants in Experiment 4 who displayed identity-denying (chose mostly 1s and 2s) and identity-maintaining (chose mostly 6s and 7s) response patterns, excluding those who displayed a mixed pattern of responses.
was that participants only answered the kind identity question in Experiment 4. The difference between these two experiments, then, is most likely due to this factor. That is, answering a question about kind persistence, even at the superordinate level, seemed to encourage participants to think about individual identity in some relation to kind identity. It was most natural for people to think about kind identity at the basic level, so the basic-level effect re-appeared when a question about kind persistence was re-inserted.

All the preceding experiments have been concerned with people’s representations of individuals as marked by proper names. Unlike other ways of describing entities, proper names are designators, so they should follow an individual through the maximum amount of change that people will allow for that individual. A descriptor, on the other hand, should have different conditions under which it continues to apply to an entity. The within basic-kind effect that was explored in the previous experiments, we propose, should be restricted to individual persistence as marked by proper names. Descriptors, such as identifying properties of the exemplars, should not be subject to the same reasoning that affects proper names. Experiment 5 provided a test of this hypothesis.

In the next experiment, proper names were replaced by identifying properties, such as “is allergic to grass,” or “hates water.” The individual identity persistence question, then, queried the persistence of the property, rather than a proper name. We predicted that ratings of property persistence in the within-basic condition would not be lower than in the within-superordinate condition. Unlike proper names, properties do not distinguish one member of a basic-level kind from all others, thus it should not be inconceivable that two ducks, for example, share a property.

Experiment 5

Participants

Forty adults were recruited from undergraduate psychology classes at the University of British Columbia, and they received course credit for participating. Participants were randomly assigned to one of two transformation conditions. Nine males and 26 females participated; sex and language data were not collected for 5 participants. There was an approximately equal proportion of men and women in both groups. Participants were asked to rate their English fluency on a 6-point scale, where 1 corresponded to “just learning” and 6 corresponded to
"native speaker." Mean English fluency was 5.46 ($SD = .74$); all but 3 participants rated their fluency above 4.

Materials

The materials used in Experiment 5 were very similar to those used in Experiments 1 and 2. The general set-up, including a page depicting the machine, a slideshow, and an answer sheet, was unchanged.

Atom reassembler. This device was unchanged from the first two experiments.

Transformations. Two transformational levels from Experiment 2 were used: within-basic, and within-superordinate. The PowerPoint presentations were modified to replace each mention of a proper name with a description of a property. All properties are listed in Table 1. In Experiment 2, proper names were mentioned in two places: when the original animal was introduced, and when individual identity was questioned. Thus, in this experiment, the original animal was given an identifying trait when it was introduced (e.g., “this duck is allergic to grass”), and the persistence of that trait was questioned (e.g., “Is this still allergic to grass?”).

Answer sheet. The answer sheet was unchanged from Experiments 1 and 2.

Procedure

The procedure was unchanged from Experiment 2

Results

Kind persistence ratings were in line with previous experiments: participants distinguished between the within-basic and within-superordinate conditions in their judgments of kind persistence. Property persistence judgments were very different from past experiments. In both conditions, the average property persistence judgment was roughly in the middle of the scale. Furthermore, unlike previous studies involving proper names, very few participants showed a strong tendency to either say that properties were or were not maintained through the transformations.

Kind persistence. As in previous experiments, kind identity judgments were straightforward: in the within-basic condition, participants judged that basic-level kind identity was maintained ($M = 6.85$), and in the within-superordinate condition, they judged that it was not
maintained ($M = 1.83$). This difference was highly significant, $[t(38) = 16.77, p < .001]$. See Figure 12.

**Individual (property) persistence.** There were two interesting differences between judgments of property identity and judgments of individual identity in the previous experiments. The first difference is in the group means. In both transformation conditions, the average judgment was around the midpoint of the 7-point scale. In the within-basic condition, the mean property persistence judgment was 3.96, and it was 4.39 in the within-superordinate condition. This difference was not significant, $[t(38) = 1.11, p > .25]$. Thus, unlike in previous experiments where proper names were queried, participants were equally likely to judge that an identifying property persisted, whether or not basic-level kind membership was maintained.

**Individual participants' response patterns.** The second main difference that arose when properties were queried instead of proper names was reflected in individual response patterns. Participants were categorized into three groups based on their response patterns, as in previous experiments. *Identity deniers* were those who chose at least 8 1s and 2s out of 10 trials. *Identity maintainers* were those who chose at least 8 6s and 7s, and any other pattern of choices was categorized as *mixed*. Strikingly, almost every participant in this experiment, in both conditions, displayed a mixed pattern of responses. Seventeen out of 20 participants in the within-basic condition, and 16 out of 20 in the within-superordinate condition had mixed responses. In some cases, this meant a tendency to choose all 4s, in other cases participants' responses varied depending on the particular exemplars. Of the remaining 7 participants, there was no consistent tendency to display either an identity-denying or identity-maintaining pattern, and there were no differences between groups. This finding contrasts sharply with previous experiments querying proper names, where relatively few participants displayed a mixed pattern of response. This result is discussed further below.

**Item analysis.** Unlike previous studies, many participants in Experiment 5 varied their responses to individual trials, based on the particular animals or traits in question. To explore this effect further, a two-way ANOVA with exemplar (10 levels, within-subjects) and transformation condition (2 levels, between subjects) as factors confirmed that particular exemplars had a significant effect on response choices $[F(6, 230) = 3.53, p < .01]$. There was also a significant interaction between exemplar and condition $[F(6, 230) = 3.46, p < .01]$. In general, there was greater variance between exemplars in the within-superordinate condition than
Figure 12: Experiment 5 results.
in the within-basic condition, where choices were more consistent across particular animals. This may have been a reflection of participants’ beliefs that some traits were more or less transferable across species. For example, the property “loves the smell of grass” may have seemed more plausibly applied to a cow than the property “is very clumsy” applied to a snake. Mean responses for each trial (in both conditions) are shown in Table 1.

<table>
<thead>
<tr>
<th>original kind</th>
<th>property</th>
<th>within-basic: mean property persistence judgment (SD)</th>
<th>superordinate outcome</th>
<th>within-super: mean property persistence judgment (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>duck</td>
<td>“is allergic to flowers”</td>
<td>3.75 (1.83)</td>
<td>turtle</td>
<td>3.70 (2.03)</td>
</tr>
<tr>
<td>dog</td>
<td>“loves the smell of grass”</td>
<td>3.95 (1.39)</td>
<td>cow</td>
<td>6.05 (1.47)</td>
</tr>
<tr>
<td>turtle</td>
<td>“hates sand”</td>
<td>3.80 (1.51)</td>
<td>whale</td>
<td>4.75 (2.07)</td>
</tr>
<tr>
<td>cat</td>
<td>“hates the colour blue”</td>
<td>3.95 (1.67)</td>
<td>fish</td>
<td>4.15 (2.03)</td>
</tr>
<tr>
<td>snake</td>
<td>“loves rainy days”</td>
<td>4.15 (1.53)</td>
<td>duck</td>
<td>4.70 (1.89)</td>
</tr>
<tr>
<td>cow</td>
<td>“is quite violent”</td>
<td>3.80 (1.58)</td>
<td>spider</td>
<td>4.20 (2.04)</td>
</tr>
<tr>
<td>whale</td>
<td>“is afraid of loud noises”</td>
<td>4.15 (1.53)</td>
<td>dog</td>
<td>4.50 (1.96)</td>
</tr>
<tr>
<td>butterfly</td>
<td>“eats too much”</td>
<td>3.85 (1.42)</td>
<td>cat</td>
<td>4.50 (1.88)</td>
</tr>
<tr>
<td>fish</td>
<td>“is very clumsy”</td>
<td>4.00 (1.59)</td>
<td>snake</td>
<td>3.40 (1.70)</td>
</tr>
<tr>
<td>spider</td>
<td>“has trouble sleeping”</td>
<td>4.20 (1.44)</td>
<td>butterfly</td>
<td>3.95 (1.70)</td>
</tr>
</tbody>
</table>

Table 1: Properties used in Experiment 5, and mean property persistence ratings for each item.

Discussion

While judgments of kind identity in this experiment were consistent with previous experiments, a radically different pattern of judgments arose when participants were asked to trace the persistence of properties, rather than proper names. There was no tendency either in average responses or individual response patterns to judge that properties either should or should not persist across transformations:

These results suggest that proper names serve a very different role in denoting individuals than do properties. Specifically, proper names designate whole entities, while properties describe some aspect of an entity, one that can change or survive independently of that entity. It is not surprising, therefore, that people reason differently when asked about the persistence of a name as opposed to a property. The differences in people’s judgments may lend some insight into our representations of individuals, when designated by proper names.
The most obvious difference between these different ways of marking individuals is that people are unwilling to let a single proper name apply to two different-looking instances of a basic-level kind, whereas this effect does not hold for properties. This difference is consistent with at least two possibilities. First, it could be that people’s use of proper names simply reflects their underlying representations of individuals in a straightforward manner. In this case, the difference between using proper names versus descriptive phrases reflects a conceptual difference between the way that people think about whole individuals versus particular properties of individuals. On the other hand, it could be that different patterns of responding are attributable not to underlying concepts of individuals, but instead to the pragmatics of the words that were used. Under this interpretation, the within-basic contrast effect observed in the previous experiments may have arisen from a pragmatic feature of proper names. Proper names are commonly used to distinguish individuals of a basic-level kind from each other. It could be that this common use of proper names gives rise to a pragmatic effect; that is, the concept associated with a proper name distinguishes its referent from other members of the same basic-level kind. This interpretation would predict that another designator of individuals would not lead to the same results as those observed in Experiments 1 through 4. This possibility will be explored further in the General Discussion.

The other main difference between the responses elicited by the two ways of referring to entities was individual participants’ tendencies to choose extreme versus moderate persistence ratings. In their oral instructions, participants were told to choose a rating in the middle of the scale if they were less than definitely certain. Despite this, when proper names were queried (in Experiments 1-4), a large majority of participants (71%) chose extremes, and were classified as identity deniers or identity maintainers. This suggests, first of all, that people think that a proper name is an all-or-nothing designator – a name cannot just ‘sort of’ refer to an individual. Participants may have reasoned that the post-transformation animal either is or is not “Maf,” for example, but a mid-range response was incoherent. When questioned about the persistence of properties, on the other hand, people were content to choose numbers in the middle of the rating scale, suggesting that they felt less compelled to make a yes-no decision regarding the persistence of a property. Participants may also have reasoned that the persistence of properties is something that was empirically determinable; for example, one could watch a snake to see if it was clumsy, whereas the persistence of a proper name is a metaphysical question which participants may have felt more qualified to answer.
General Discussion

The goal of the experiments presented here was to explore people's representations of individual entities, and to look more closely at their connection to representations of kind membership. Previous research has suggested that concepts of individuals may be fluid, that is, individuals can persist or cease to exist independently of their identity as a member of a particular kind (Liittschwager, 1994; Blok et al., in press). The current research meant to challenge the conclusion that conceptions of individuals are totally unbound to kind concepts by examining more closely people's perceptions of individual identity through transformations that either take place within a basic-level kind, or cross that boundary.

In a series of experiments, artifacts and animals were depicted undergoing radical transformations via a machine that disassembled the objects into their component atoms and then reassembled those atoms. The entities in these scenarios maintained kind membership at several different hierarchical levels, from the most specific kind (where the outcome looked identical to the original) to a dramatic cross-domain change (where an animal transformed into an artifact, or vice versa). In all of the transformations, the atoms of the transformed entity were spatio-temporally continuous with the original entity. Judgments of kind identity and individual identity were elicited.

The findings from these experiments suggest that people's concepts of individuals do, in fact, have a strong connection to basic-level kind, though kind identity and individual identity are not inextricably bound together. It seems that there is a particular contrastive property of individuals, when designated by proper names, that makes people reluctant to allow a proper name to extend to two different-looking instances of the same kind. This effect emerged most strongly when participants were explicitly asked to consider basic-level kind persistence (Experiments 1 and 2), though it was also present when kind membership was queried at the superordinate level, instead of at the basic-level (Experiment 4). Transformational distance (within-basic or within-superordinate) ceased to make a difference when participants made no judgments of kind identity (Experiment 3). Finally, when judgments of individual continuity were elicited via a distinguishing property (Experiment 5), a completely different pattern of persistence judgments emerged, suggesting that it is a unique role of proper names to designate individuals.
Within-basic contrast effect. Across all five experiments, the lowest ratings of individual persistence appeared in the conditions where an entity was seen to transform into a different-looking entity belonging to the same basic-level kind. These judgments were lower than those of transformations that crossed the basic-level but retained superordinate kind, and were sometimes even lower than judgments of individual persistence across domains. This effect appeared to be contingent on people’s considerations of kind persistence, such that it only appeared when they answered a question about the kind membership of a transformed object. This finding lends support to the hypothesis that concepts of individuals are not unaffected by kind membership.

When people consider kind continuity, this affects their reasoning about individuals. We propose that this is because of a strong link between individual concepts and their basic-level kinds. That is, people tend to create rich concepts of individuals that they want to distinguish from other members of the same basic-level kind. This effect can explain our results in the following way: when basic-level kind membership is retained, participants are reminded that they are making a judgment about two different-looking exemplars of the same kind. Since a central part of people’s conceptions of individuals is the distinct status of an individual within a basic-level kind, in order to judge that an individual can become a different-looking instance of the same basic-level kind requires people to overcome this central feature of individual concepts. When people are asked to make judgments about a more radical transformation, the distinguishing function of individual concepts is no longer challenged, so people feel freer to conclude that, in some way, the individual persists.

There is some remaining ambiguity in this result. That is, it is still unclear whether the observed effect is a result of people’s representations of individuals, or whether it is instead due to a pragmatic function of proper names. It is perhaps even more likely that both of these are true, to some extent. People assign names to salient individuals whom we wish to pick out in the world. Thus, before assigning a name to an individual, there is some conceptual reason to want to separate it from other members of its basic-level kind. Because our underlying representations of individuals include that function of contrasting an entity with others of its kind, it is not surprising that proper names have the same function in language. The pragmatic function of a proper name may be to contrast an individual with other (differently-named) members of a basic-level kind, and certainly that pragmatic property would not have emerged were there no underlying conceptual reason for it. Thus, it seems most likely that the within-kind effect
observed in the first four experiments is the result of people’s concepts of individuals, overlaid with a pragmatic effect of proper names.

To test this hypothesis, it would be useful to conduct another version of these experiments using a different designator of individuals. One possibility would be to use a property that is typically thought of as deeply tied to individual identity, such as moral responsibility. One of the central reasons people care about the persistence of an individual is that moral responsibility seems to be rigidly tied to it. For example, if Jack lends money to Jill on Monday, no amount of change to Jack’s properties (e.g., wealth, trustworthiness, age) will convince Jill that he is a different person on Wednesday, and so no longer owes her money. Similarly, when an enchantress turns the Prince into a Beast, it is to punish him for his arrogance – it is crucial for the coherence of the story that he continue to be the same individual (though no longer a person) so that he can atone for his past flaws by learning to fall in love. Including a moral responsibility condition in the current experiment may introduce certain concerns, notably, is it unclear whether people think that it is possible for spiders and ducks to have moral responsibility in the same way that humans do. Still, this would be an interesting and informative avenue to pursue in future research.

*Individuals and basic-level kinds.* The present findings lend considerable support to the hypothesis that the basic-level is conceptually salient. When people explicitly considered kind membership, whether it was basic-level kind (Experiments 1 and 2) or superordinate-level kind (Experiment 4), they reasoned differently about individuals depending on whether the transformations preserved basic-level kind membership. This suggests that when people represent an individual, a part of that representation is the basic-level kind to which the individual belongs. It is because Maf is represented as a duck that he cannot turn into a different duck and still continue to be Maf. For the contrastive function of proper names to have appeared, it must be the case that individuals are represented in conjunction with their basic-level kinds.

The findings from this set of experiments extend previous research on individual persistence through transformations. By manipulating the specific distance of transformation with respect to basic-level kind membership, these experiments have revealed a connection between individuals and kinds that previous research left unnoticed. It is important, though, that this effect only seems to appear when people explicitly consider kind membership while judging individual persistence. In Experiment 3, where kind membership was not queried, there was no
effect of transformational distance. This result is consistent with Liittschwager’s (1994) studies, where participants were more likely to judge that a person who transformed into another person retained a proper name than if that person turned into a different kind of thing. In those studies, participants were not asked about kind identity, so they never explicitly considered kind membership. The current findings raise the question for future research of what role kind membership might play in our daily reasoning about individuals, since it only seems to affect individual persistence judgments when it is explicitly considered.

Persistence across the basic level. It is still unclear how representations of individuals allow people to judge that an entity can transform across a basic-level kind and still continue to be the same individual. It is possible that people have a belief in an individual essence, or a spirit that persists through a complete change in form. Alternatively, people might reason that the identity criteria for an individual can change depending on the circumstance; that is, while usually the basic-level sortal is sufficient to trace identity, in the case of radical, unnatural transformations people may switch strategies and rely on a sortal like group of atoms, instead. A limitation of this experimental paradigm is that it relies on the presentation and judgment of extremely unnatural and physically impossible events. A more naturalistic methodology would be a more valid way to investigate the manner in which people’s everyday judgments of individual identity through change allow cross-kind transformations.

Individual response patterns. There were no easy answers to the question of individual persistence that participants in these experiments were asked to judge. Participants were faced with unnatural scenarios, where no real-world experience could direct their responses. Indeed, there were good rational reasons to make all of the judgments that were witnessed here: one could reason that the atoms alone do not define an individual, so consistently choose “definitely no.” Or, one could reason that the condition of spatiotemporal continuity was not violated, as each of the component parts of the entities were disassembled and reassembled again. Just as a watch that is taken apart and reconstructed continues to be the same watch, participants were rationally justified in judging that reconstituted entities retained their individual identity, and choosing “definitely yes.” Of course, one would be equally justified in claiming uncertainty, and choosing any other number in-between. As such, there was large variance in participants’ individual persistence judgments.
Of great interest and importance to all of the issues raised here is the question of what factors influence individual participants' decisions. We have discussed significant trends in people's judgments in different conditions, whereby more participants in one condition or another are identity-deniers or identity-maintainers, but the fact remains that in almost every condition, there were some people willing to judge that individual identity persisted and others who were certain that it did not. This tendency for large variance in responses is not unique to this set of experiments. Indeed, most experiments that ask ordinary people to make tricky metaphysical judgments end up with a similar diversity of responses (e.g., Blok et al., in press; Hall, 1998). If we have the goal in mind of understanding what causes people to reason the way they do about individuals, future research must look closer at the factors leading to the individual differences observed here.

Conclusions. The current set of experiments set out to explore the relation between the way that people conceive of individuals and kind membership. Previous research has shown that people are willing to allow individuals to persist through kind-changes, and these researchers have concluded that concepts of individuals are self-sustaining, and unattached to kinds. The current findings suggest that the picture may be considerably more complicated. Concepts of individuals do include important information about basic-level kind membership, allowing those concepts to take on their central function of distinguishing an entity from other things in the world, most particularly other things of the same basic-level kind.
References


