COGNITIVE SCIENCE
A Multidisciplinary Journal

Cognitive Science 43 (2019) e12725

ISSN: 1551-6709 online
DOI: 10.1111/cogs.12725

Teleological Essentialism

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Received 31 December 2018; received in revised form 25 February 2019; accepted 27 February 2019

Abstract

Placeholder essentialism is the view that there is a causal essence that holds category members together, though we may not know what the essence is. Sometimes the placeholder can be filled in by scientific essences, such as when we acquire scientific knowledge that the atomic weight of gold is 79. We challenge the view that placeholders are elaborated by scientific essences. In our view, if placeholders are elaborated, they are elaborated by Aristotelian essences, a telos. Utilizing the same kind of experiments used by traditional essentialists—involving superficial change (study 1), transformation of insides (study 2), acquired traits (study 3), and inferences about offspring (study 4)—we find support for the view that essences are elaborated by a telos. And we find evidence (study 5) that teleological essences may generate category judgments.

Keywords: Placeholder essentialism; Scientific essentialism; Aristotelian essence; Teleology

1. Introduction

Psychological essentialism is the view that people think that members of certain categories, like *skunk,* share an essence. The essence is not directly observable, but it is the true nature shared among category members and it is responsible for similarities among members of a category. That we represent categories in terms of essences is a substantive psychological thesis, one that is supported by decades of research in psychology (see, e.g., Gelman, 2003; Keil, 1989; Medin & Ortony, 1989).

What do we associate with the essence of a category? The standard account of essentialism holds that the essence is represented with a "placeholder" (e.g., Gelman, 2003; Medin & Ortony, 1989). This view—placeholder essentialism—suggests that "a person believes that there is some causal essence that holds a category together, without knowing just what that essence is" (Gelman, 2004, p. 405). This view traces at least as far back to

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Locke (1959), who maintained that "[Essence is] the very being of anything, whereby it is what it is. And thus the real, internal but generally ... unknown constitution of things, whereon their discoverable qualities depend, may be called their essence" and is explicitly endorsed by Gelman (2003) and Keil (1989).

Placeholder essentialism does not suggest that we can never elaborate the placeholder. Indeed, Gelman (2003) suggests that, though rare, at least one way the placeholder can be elaborated is with the acquisition of relevant scientific knowledge. Gelman (2003) maintains that we might, for instance, come to fill out the placeholder of "gold" once we acquire scientific knowledge that the atomic weight of gold is 79. This view—what we call scientific essentialism—is associated with Kripke (1980) and Putnam (1975). One of Kripke's (1980) leading suggestions was that: "[C]onsiderations ... about an object having essential properties, can only be regarded correctly, in my view, if we recognize the distinction between a prioricity and necessity. One might very well discover essence empirically" (p. 110). That is, there are some a posteriori necessary truths and so science sometimes uncovers essences. One important example, due to Putnam (1975), is that the empirical discovery that water is composed of H_2O revealed that the essence of water is H_2O. So, according to scientific essentialism, such essences are sometimes uncovered by science. The placeholder can thus be elaborated, replaced, with the acquisition of relevant scientific knowledge. Scientific essentialism can fill the placeholder.

But there is reason to doubt that the placeholder is elaborated by a scientific essence. For instance, Malt (1994) finds that people say that tea is 91% H_2O but not water and that pool water is 81.6% H_2O and is water. So a liquid, such as tea, can have more H_2O than another liquid, such as pool water, yet not be categorized as water. This is not at all what we would expect if the scientific essence fills the placeholder.

What then might fill in the placeholder? Our proposal is that people tacitly regard essences in terms of a telos. Teleological thinking begins in childhood, with children maintaining that lions are for "going to the zoo," that clouds are "for raining" (Bloom, 2007, p. 150), that "mountains exist to give animals a place to climb," and that rocks are pointy "so that animals won't sit on them and smash them" (Kelemen, 1999, pp. 1444–1445; see also Piaget, 2017). These childhood tendencies toward teleological thinking are not simply outgrown. Rather they extend into adults. For instance, college-educated adults think that "the sun radiates heat because warmth nurtures life," that "fungi grow in forests to help decomposition," and that "lightening occurs to release electricity" (Kelemen & Rosset, 2009). Perhaps even more surprisingly, teleological thinking is not supplanted by the acquisition of scientific knowledge: Even professional physicists display a tendency to endorse inappropriate teleological explanations (Kelemen, Rottman, & Seston, 2013).

Teleological thinking also plays a core role in our judgments about both existence and persistence. Rose and Schaffer (2017) found that people tended to say that a collection of parts forms a whole when those parts serve a collective purpose. For example, they found that when an agent superglues some mice together, and the plurality of mice serve the function of detecting bombs, participants were significantly more inclined to think that

the arrangement of mice composed a larger object in comparison to a case where mice were superglued together but had no function. And Rose (2015) and Rose, Schaffer, and Tobia (forthcoming) found that we tend to think that something persists through part alterations provided it preserves its purpose. To take just one example, Rose, Schaffer, and Tobia (forthcoming) found that participants who read about a gardening tool that underwent changes which resulted in the thing either still working or not working as a gardening tool were significantly more inclined to think the original thing still existed when it worked as a gardening tool.

These findings indicate a robust role for teleological thinking in commonsense. This raises the intriguing possibility that teleology is also central to our essentialist inclinations. In particular, people might be inclined to associate the essence with a kind of telos. If so, then perhaps the placeholder for an essence is elaborated by a telos. That would then suggest that the standard view of the elaboration of the placeholder—scientific essentialism—be replaced by an Aristotelian conception of essence.

For Aristotle, the essence is what defines the category. More important for our purposes, for at least many categories, the essence is given by the telos. With respect to, for instance, living things, the essence of a category is the same as the end or telos of the creature. This is made vivid in the following:

> Advancing bit by bit in this same direction it becomes apparent that even in plants features conducive to an end occur—leaves, for example, grow in order to provide shade for the fruit. If then it is both by nature and for an end that the swallow makes its nest and the spider its web, and plants grow leaves for the sake of the fruit and send their roots down rather than up for the sake of nourishment, it is plain that this kind of cause is operative in things which come to be and are by nature. And since nature is twofold, as matter and as form, the form is the end, and since all other things are for sake of the end, the form must be the cause in the sense of that for the sake of which. (Phys. 199a20–32)

The key point, for present purposes, is that what matters for Aristotle is the final cause —the end—not an entity that produces the end. This view—what we call teleological essentialism—is in sharp contrast to the standard view of the elaboration of the placeholder, that placeholders are elaborated by scientific essences, endorsed by many psychologists.

Our question is whether manipulating a thing's telos affects categorization judgments. And our strategy for addressing this was to use the same procedures typically used in the essentialism literature and simply vary the original thing's telos.

But how do we determine whether telos plays a role in essentialist thinking? One option would be to stipulate the telos of a thing, vary whether it preserves or changes its telos, and see whether that affects categorization judgments. Our approach, however, was to simply ask people what they associate with the telos of a thing. In a pilot study, we asked people, for instance, "What is the true purpose of bees?" and "What is the true

purpose of spiders?" and gave them an open-ended response. The results indicated that 82% of participants thought that the true purpose of bees is to either make honey, pollinate flowers, or both. And 77% of participants thought that the true purpose of spiders is to either spin webs, catch and eat insects, or both. The results from our pilot study will thus serve as a guide for varying telos.

Accordingly, in study 1 we utilize cases—inspired by work from Keil (1989)—where a bee undergoes superficial transformation. Scientists remove its wings, antenna, lengthen its legs, and so forth. The original thing, then, ends up looking like a spider. In addition to the superficial transformation, we varied whether the thing preserved or changed its telos. In study 2, we utilize a different approach: transformation of the insides of a thing while holding the superficial similarity fixed. To accomplish this, participants were told that a bee had its insides replaced with the insides of a spider. Yet the thing still looks like a bee. We then varied whether the thing preserved or changed its telos. In our third study, we investigated the role of "nature/nurture." Here, we told participants that a newborn bee was placed in a cage full of spiders and again varied whether the thing preserved or changed its telos. In our fourth study, we utilized the same cases as used in study 1, but added the additional variation that the thing after the special operation had its eggs fertilized by a bee or spider. The key question here is whether preservation or change of telos will guide people's judgments about what will hatch from the eggs. Finally, in study 5 we test whether teleological essentialist judgments generate category judgments.

In addition to investigating whether the placeholder for an essence is elaborated by a telos, we had another goal. Different approaches to investigating essentialism sometimes turn up conflicting results. For instance, studies investigating essentialist judgments in the context of a thing that undergoes superficial transformations—for example, a racoon that is made to look like a skunk—sometimes turn up results that conflict with those in studies investigating the role of nature/nurture—for example, a baby cow that is raised by pigs—in essentialist judgments. But if we are right that the placeholder for an essence is elaborated by a telos, then we should expect that these different ways of investigating essentialism will turn up converging results. In short, teleological essentialism should yield unification.

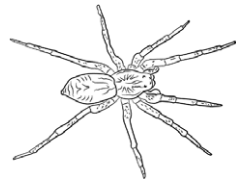
2. Study 1: Superficial transformation

Two-hundred and fifty participants (aged 18–68 years, mean age = 30 years; 115 females; 97% reporting English as a native language) were recruited from Amazon Mechanical Turk and tested in Qualtrics. Participants were randomly assigned to one of two conditions [marked by brackets]:

> Some very talented and skilled scientists, Suzy and Andy, decide that they are going to perform a special operation on a bee. They removed its wings and antennae, lengthened its legs, and added a new pair of legs. They also inserted into the back of it

something for making webs and trained the animal so that it would eat insects. Here is an image of the bee that they perform the special operation on:

After the special operation, it looked like this:



[*Telos Changed*: After running some tests, they found that the thing after the special operation didn't pollinate flowers or make honey. Instead, it only spun webs to catch insects and eat them./*Telos Preserved*: After running some tests, they found that the thing after the special operation didn't spin webs to catch insects and eat them. Instead, it only pollinated flowers and made honey.]

After reading one of the two cases, participants responded to two comprehension questions:

Comprehension Check: Suzy and Andy performed a special operation on a bee. (Yes/No)

Comprehension Check: The thing after the special operation only spins webs to catch insects and eat them. (Yes/No)

They were then asked the key test question:

Category: To what extent do you think that the thing after the special operation is a bee or spider? (1 = it is definitely a bee, 7 = it is definitely a spider)

In order to ensure that our manipulation was effective, we included a question about whether the thing retained the true purpose of bees:

Purpose: To what extent do you think that the thing after the special operation retains the true purpose of bees? (1 = it definitely does not retain the true purpose of bees, 7 = it definitely retains the true purpose of bees)

Twenty-one participants failed one or more of the comprehension checks and were excluded from analysis. Data were analyzed for the remaining 229 participants.

Independent sample t test indicated two things. First our purpose manipulation was highly effective, Telos Preserved (M = 5.58, SD = 1.82, 95% CI [5.23, 5.92]), Telos Changed (M = 1.69, SD = 1.27, 95% CI [1.45, 1.91]), $t(227) = -18.91$, $p < .001$, d = 2.48. Second, our manipulation of whether the bee preserved or changed its purpose produced a very large effect on categorization judgments, with participants agreeing that the thing was a spider when its telos was changed (M = 5.73, SD = 1.54, 95% CI [5.44, 5.99]) and with participants agreeing that the thing was a bee when its telos was preserved (M = 2.57, SD = 1.69, 95% CI [2.25, 2.88]), $t(227) = 14.720$, $p < .001$, d = 1.96 (see Fig. 1). Follow-up one sample t tests indicated that categorization judgments were significantly below the neutral midpoint in Telos Preserved, $t(107) = -8.73$, $p < .001$, and significantly above the neutral midpoint in Telos Changed, $t(120) = 12.31$, $p < .001$.

The findings from study 1 indicate that despite superficial dissimilarity, preservation or change of telos had a massive effect on categorization judgments. Even though the thing looks like a spider, participants were significantly more inclined to categorize the thing as a bee when it preserved its telos: pollinating flowers and making honey. When it changed its telos and instead spun webs to catch and eat insects, participants categorized the thing as a spider. And our manipulation check indicated that our manipulation was indeed tapping into people's view that the telos of bees is to make honey and pollinate flowers. Thus, in subsequent studies we will omit the manipulation check.

Another important test of our tendency to essentialize categories comes from studies investigating categorization judgments in the context of a thing having its insides altered. For instance, Gelman and Wellman (1991) gave children a case involving a dog that either had its outsides altered (e.g., fur removed) or its insides altered (e.g., blood and bones removed) and asked whether the thing after the change is still a dog. Participants were significantly more inclined to think that the thing was no

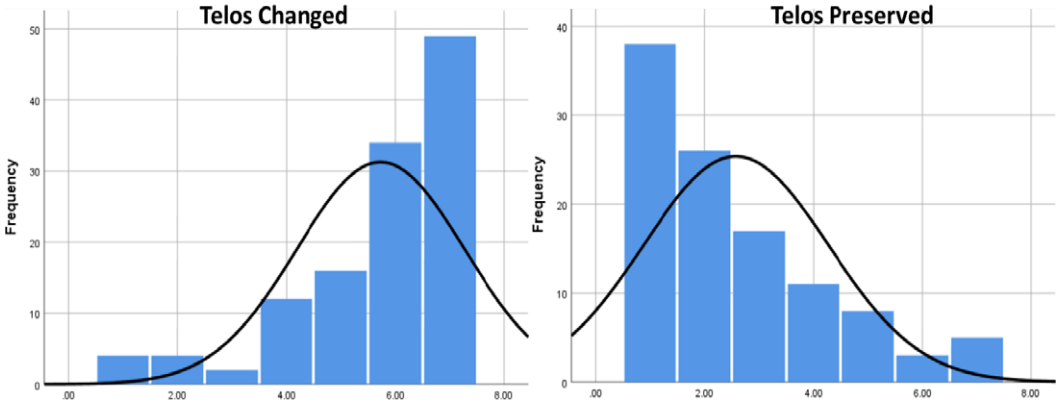


Fig. 1. Distributions in categorization judgments for telos changed and preserved.

longer a dog when its insides had been altered. But what if the insides of a thing were not simply removed but rather replaced with the insides of some other thing? Our question is thus whether preservation or change of telos will continue to affect categorization judgments even when the insides of a thing have been replaced with the insides of some other thing.

Study 1 involved only superficial transformation, not transformation of internal parts. In study 2, we address whether preservation or change of telos has an effect even when internal parts are replaced. Moreover, in study 1, there was superficial dissimilarity between the things. In study 2, we thus hold fixed superficial similarity: The thing continues to look like a bee despite having its insides replaced with the insides of a spider.

3. Study 2: Transforming insides

We again recruited 250 participants (aged 18–63 years, mean age = 33 years; 97 females; 98% reporting English as a native language) from Amazon Mechanical Turk who were tested in Qualtrics. Participants were randomly assigned to one of two conditions [marked by brackets]:

> Some very talented and skilled scientists, Suzy and Andy, decide that they are going to perform a special operation on a bee. They decide to remove the insides of the bee and replace them with the insides from a spider. Here is an image of the bee that they perform the special operation on:

> After the special operation, the insides were changed but it still looked like this:

[*Telos Changed*: After running some tests, they found that the thing after the special operation didn't pollinate flowers or make honey. Instead, it only spun webs to catch insects and eat them./*Telos Preserved*: After running some tests, they found that the thing after the special operation didn't spin webs to catch insects and eat them. Instead, it only pollinated flowers and made honey.]

Participants were then asked the same two comprehension questions as in study 1 and also asked the same test question about categorization.

Twenty participants failed one or more of the comprehension questions and were excluded from the analysis. As in study 1, our manipulation of whether the bee preserved or changed its telos produced a very large effect on categorization judgments, with participants agreeing that the thing was a spider when its telos was changed (M = 5.00, SD = 1.55, 95% CI [4.72, 5.28]) and with participants agreeing that the thing was a bee when its telos was preserved (M = 1.97, SD = 1.26, 95% CI [1.74, 2.19]), t (228) = 16.55, $p < .001$, d = 2.15 (see Fig. 2). Follow-up one–sample t tests indicated that categorization judgments were significantly below the neutral midpoint in Telos Preserved, $t(120) = -17.658$, $p < .001$, and significantly above the neutral midpoint in Telos Changed, $t(118) = 7.01$, $p < .001$.

Despite superficial similarity and despite the bee having its insides replaced with the insides of a spider, preservation or change of telos continued to have a very large effect on categorization judgments. People were significantly more inclined to think the thing was a bee when it made honey and pollinated flowers, despite having the insides of a spider. And despite looking like a bee, people were significantly more inclined to think the thing was a spider when it spun webs to catch and eat insects. Thus, studies 1 and 2 indicate that preservation or change of telos plays a role in categorization judgments even when things have superficial similarity or dissimilarity and even when things have their insides replaced. Study 3 investigates whether preservation and change of telos would continue to affect categorization judgments when a bee is raised by spiders.

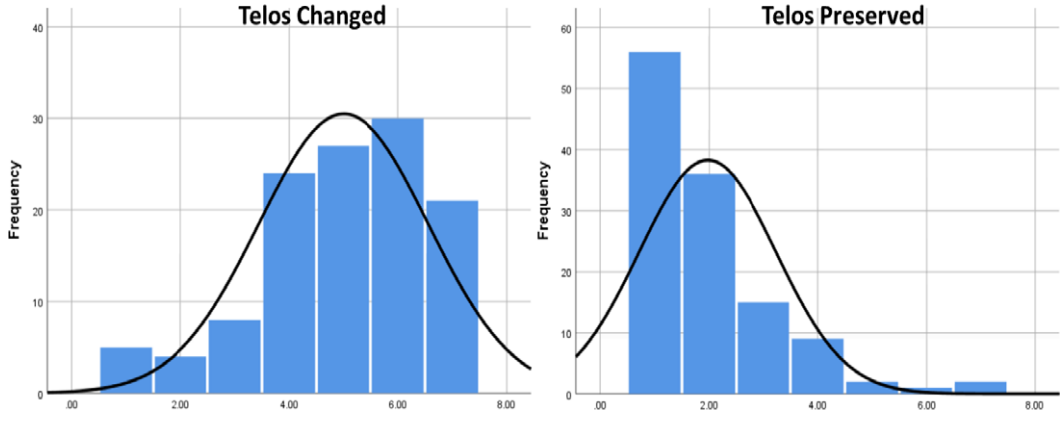


Fig. 2. Distributions in categorization judgments for telos changed and preserved.

Work by Gelman (2003; see also Keil, 1989) suggests that people tend to default to innate potential in categorization. Thus, children will say that a baby kangaroo raised by goats will end up having a pouch and hopping (Gelman & Wellman, 1991). But if, for instance, a newborn bee is raised by spiders and either preserves its original telos or changes its telos, this might override inferences about innate potential in categorization judgments.

4. Study 3: Inheritance

As in the first two studies, we again recruited 250 participants (aged 18–71 years, mean age = 37 years; 116 females; 98% reporting English as a native language) who were randomly assigned to one of two conditions (marked in brackets):

> Some very talented and skilled scientists, Suzy and Andy, decide that they are going to perform a special experiment with a newborn bee. After an egg hatches, they place the newborn bee in a cage full of spiders. [*Telos Changed*: After two weeks, Suzy and Andy found that the thing that was placed in the cage full of spiders didn't pollinate flowers or make honey. Instead, it only spun webs to catch insects and eat them./*Telos Preserved*: After two weeks, Suzy and Andy found that the thing that was placed in the cage full of spiders didn't spin webs to catch insects and eat them. Instead, it only pollinated flowers and made honey.]
>
> They were then asked two comprehension questions:
>
> *Comprehension Check:* Suzy and Andy performed special experiment with a bee.
>
> *Comprehension Check:* The thing that was placed in the cage full of spiders only spins webs to catch insects and eat them.
>
> Then they were asked the key test statement:
>
> *Category:* To what extent do you think that the thing placed in the cage full of spiders, after two weeks, is a bee or spider? (1 = it is definitely a bee, 7 = it is definitely a spider)

Twenty-four participants failed one or more of the comprehension questions and were excluded from the analysis. Yet again, our manipulation of whether the bee preserved or changed its purpose produced a very large effect on categorization judgments. Participants agreed that the thing was a spider when its telos was changed (M = 4.52, SD = 2.28, 95% CI [4.09, 4.94]) and participants agreed that the thing was a bee when its telos was preserved (M = 1.48, SD = 1.24, 95% CI [1.25, 1.70]), $t(224) = 12.42$, $p < .001$, $d = 1.66$ (see Fig. 3). Follow-up one–sample t tests indicated that

categorization judgments were significantly below the neutral midpoint in Telos Preserved, $t(112) = -21.54$, $p < .001$, and significantly above the neutral midpoint in Telos Changed, $t(112) = 2.43$, $p < .05$.

Preservation or change of telos played an important role in categorization judgments. Though some work suggests that innate potential plays a key role in categorization, nobody has investigated whether this might be overridden by information about whether the thing preserves or changes its telos. Our findings here indicate that continuity of telos may indeed be more heavily weighted, overriding innate potential: A newborn bee, raised by spiders, that ends up spinning webs and catching insects is categorized as a spider.

Our claim is that telos plays a key role in the kind of categorization we see in essentialist research. Our results show that people rely on the telos to make judgments about persistence through (1) outer transformations, (2) inner transformations, and (3) acquired characteristics. But one issue is that these results might be explained by people using an enriched prototype for bees and spiders in making categorization judgments, where the prototype includes teleological features. If that is right, then perhaps essentialism is not guiding people's categorization judgments in these cases. This would be interesting in its own right since it would suggest that telos is part—indeed, perhaps even the central part—of the prototype.

That said, our strategy for assessing essentialism follows that of Keil (1989) and Gelman (2003). And across all these ways of probing for evidence of essentialism, we find evidence that telos plays a central role. The fact that we find that telos plays a crucial role in categorization judgments utilizing the same procedures that are used to provide evidence of essentialist thinking lends credence to our claim that we are indeed tapping into essentialists judgments. But there is a more pointed test of essentialist thinking.

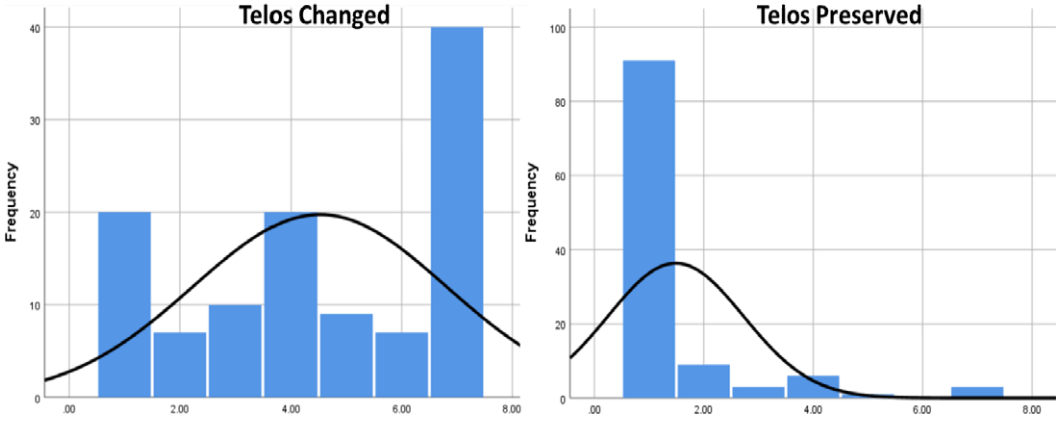


Fig. 3. Distributions in categorization judgments for telos changed and preserved.

Suppose the essence of being a bee is understood as some hidden factor within each bee that causes observable features of bees. A natural candidate for this hidden factor might be DNA. If a queen bee were then to lay eggs, we might naturally think that bees would hatch from the eggs. And it would seem that the best explanation of this would not be that we are using something like a prototype. Instead, it would seem that this judgment would be based on an inference that the essence would be transmitted via unobservable features—for example, DNA—and thereby give rise to further bees. This raises the possibility that if people associate an essence with a telos, then we should expect them to think that a telos can be transmitted to offspring. If that is right, then even if a bee undergoes superficial transformation, then provided it preserves its telos, people should judge that its offspring will be bees. Thus, we explore next whether telos predicts judgments of inherited characteristics.

5. Study 4: Offspring

We recruited 350 participants (aged 18–69 years, mean age = 29 years; 156 females; 97% reporting English as a native language) who were assigned to one of two conditions (Telos Preserved, Telos Changed), which were the same as in study 1 except that we indicated that the bee was a queen bee. After answering the same comprehension questions and answering the same categorization question as in study 1, participants were given one of two cases (marked by brackets):

> After the special operation, the scientists now want to know what the thing's offspring will be like. So they devise a special technique to have its eggs fertilized by a [bee/spider].

After reading that the thing had its eggs fertilized by a bee or spider, participants were then asked:

> *Offspring*. To what extent do you think that things that will hatch from the eggs will be bees or spiders? (1 = they will definitely be bees, 7 = they will definitely be spiders)

Thirty people were removed for failing one or more comprehension questions. Data were analyzed for the remaining 320 participants.

First, we replicated the findings from study 1 on category judgments, with participants agreeing that the thing was a spider when its telos was changed (M = 5.34, SD = 1.82, 95% CI [5.07, 5.62]) and with participants agreeing that the thing was a bee when its telos was preserved (M = 2.63, SD = 1.99, 95% CI [2.31, 2.94]), $t(318) = 12.679$, $p < .001$, $d = 1.42$. Second, and more important, a two-way ANOVA indicated a main effect of telos for the parent, Telos Preserved (M = 2.79, SD = 1.69) and Telos Changed (M = 3.98, SD = 1.98), $F(1, 316) = 35.13$, $p < .001$, $\eta p^2 = 0.100$, and a main effect of

whether a bee (M = 2.76, SD = 1.88) or spider (M = 4.03, SD = 1.78) fertilized the eggs, $F(1, 316) = 41.10$, $p < .001$, $\eta p^2 = 0.115$. There was no interaction between telos of the parent and whether the parent's eggs were fertilized by a bee or spider. Follow-up t tests indicated that when the eggs were fertilized by a bee, participants were more likely to think that spiders would hatch from the eggs when the telos of the original bee was changed to conform to the telos of a spider (M = 3.41, SD = 1.96, 95% CI [2.98, 3.83]) than when the telos was preserved (M = 2.10, SD = 1.55, 95% CI [1.76, 2.44]), $t(158) = 4.74$, $p < .001$, $d = 0.74$ (see Fig. 4). And when the eggs were fertilized by a spider, participants were more likely to think that spiders would hatch from the eggs when the telos of the original bee was changed to conform to the telos of a spider (M = 4.51, SD = 1.87, 95% CI [4.11, 4.91]) than when the telos was preserved (M = 3.51, SD = 1.53, 95% CI [3.16, 3.85]) $t(158) = 3.63$, $p < .001$, $d = 0.59$ (see Fig. 4).

The key finding here—that in both the bee-fertilized condition and the spider-fertilized condition, participants were more likely to say the offspring would now be a spider when the telos of the original bee was changed to conform to the telos of a spider—casts doubt on the claim that people are using an enriched prototype for bees and spiders in making

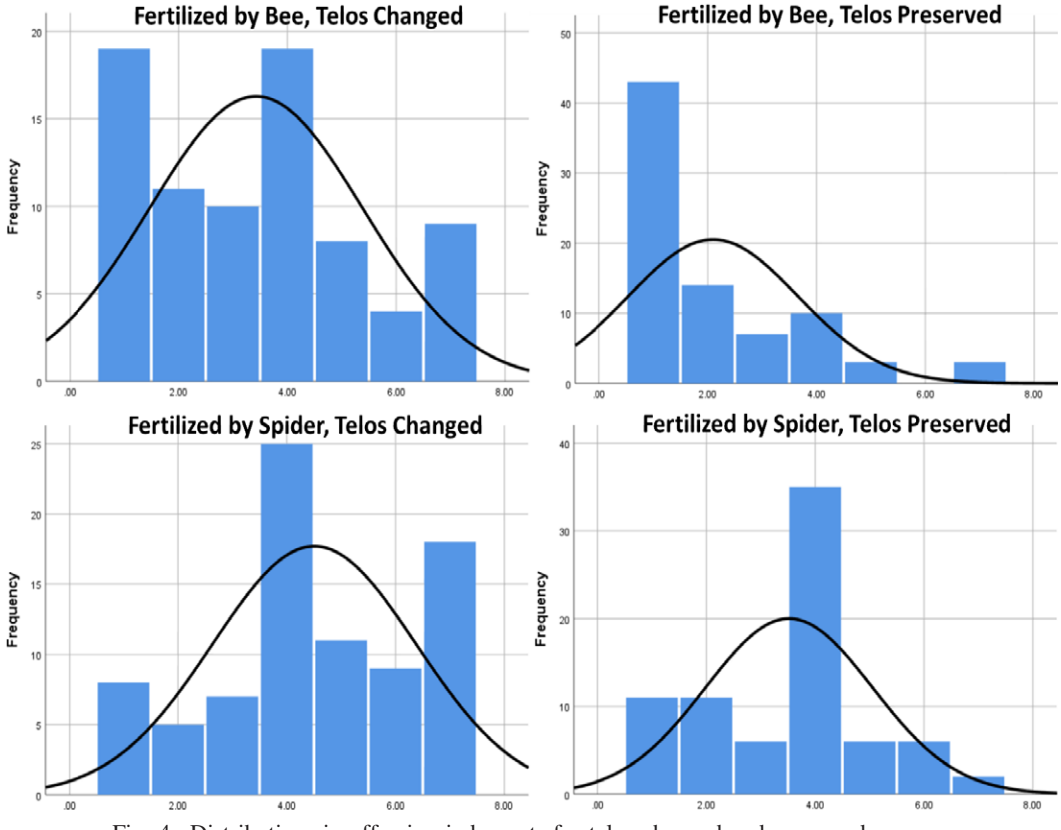


Fig. 4. Distributions in offspring judgments for telos changed and preserved.

categorization judgments. Instead, these results suggest that people associate a telos with an essence. People think that a telos can be transmitted to offspring. When the telos changes, people are more likely to think the offspring will be members of the species that has that telos. And the most plausible explanation of this is that people operate with an Aristotelian conception of essences. That is, they are teleological essentialist in that they associate the essence of a thing with a telos.

Our findings here suggest that people are not operating with an enriched prototype that centrally features teleological considerations in making category judgments. But a stronger test of the claim that people do indeed associate the essence of a thing with a telos involves testing whether teleological essentialist judgments generate category judgments. We investigate this in our final study.

6. Study 5: Teleological essentialism and generation

We recruited 120 participants (aged 18–62 years, mean age = 31 years; 49 females; 97% reporting English as a native language) who were assigned to one of two conditions (Telos Preserved, Telos Removed), which were the same as in study 1. Participants answered the same two comprehension questions used in study 1. They then made category judgments, using the same probe as in study 1, and were also asked:

> *Essence:* The thing after the changes no longer has the true essence of the original bee. (1-strongly disagree, 7 = strongly agree)

The essence probe was based on a similar probe used by De Freitas, Tobia, Newman, and Knobe, 2017 (see also Newman, Bloom, & Knobe, 2014; Newman, De Freitas, & Knobe, 2015). The presentation of both the category and essence probes was randomized.

Two participants missed one or more comprehension questions and so data were analyzed for the remaining 118 participants.

Preservation ($M = 3.03$, $SD = 1.76$, 95% CI [2.57, 3.48]) or loss ($M = 4.97$, $SD = 2.00$, 95% CI [4.46, 5.47]) of telos again has a significant effect on category judgments, $t(117) = 5.58$, $p < .001$, $d = 1.03$ (see Fig. 5). Similarly, preservation ($M = 3.38$, $SD = 2.05$, 95% CI [2.85, 3.90]) or loss ($M = 5.57$, $SD = 1.53$, 95% CI [5.18, 5.93]) of telos has a significant effect on essence judgments, (117) = 6.63, $p < .001$, $d = 1.21$ (see Fig. 5).

To determine whether essence judgments generate category judgments, we tested for mediation. We found that a regression model with Telos as a predictor of Category was significant, $t(118) = -5.58$, $\beta = -0.458$, $p < .001$, a regression model with Telos as a predictor of Essence was significant, $t(118) = -6.63$, $\beta = -0.523$, $p < .001$, a regression model with Essence as a predictor of Category was significant, $t(118) = 9.61$, $\beta = 0.664$, $p < .001$, but that in a multiple regression model with both Telos and Essence as predictors of Category, the effect of Telos on Category was no longer significant, $t(118) = -1.91$, $\beta = -0.153$, $p = .059$.[1]

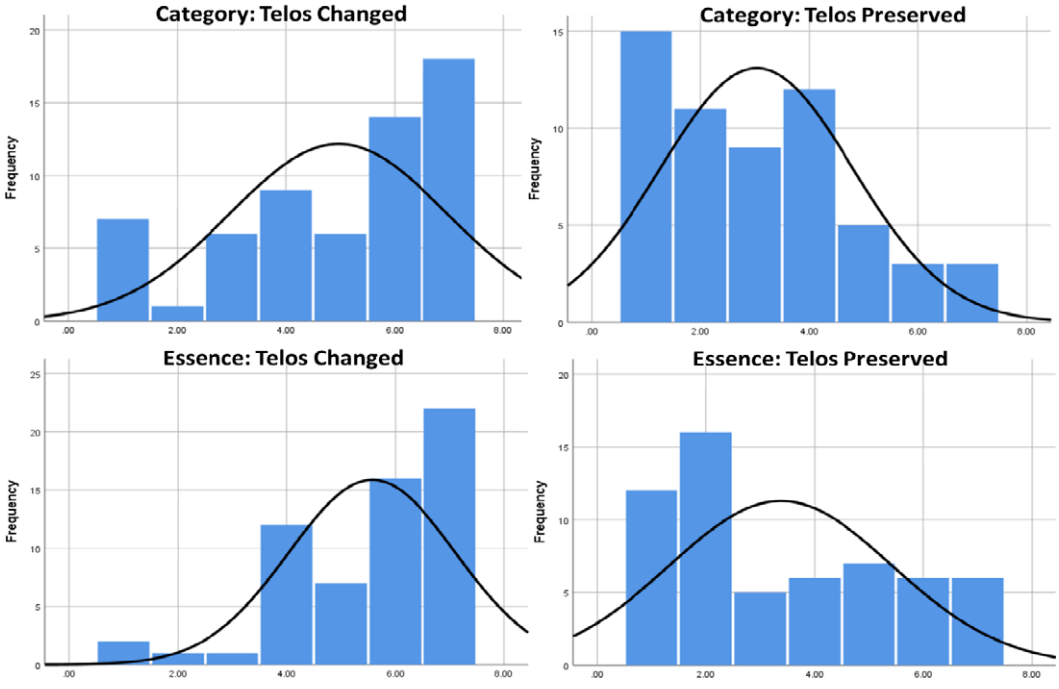


Fig. 5. Distributions in categorization and essence judgments for telos changed and preserved.

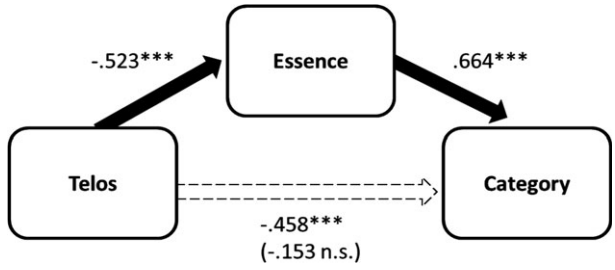


Fig. 6. Standardized regression coefficients for the relationship between Telos and Category mediated by Essence.

We, thus, take these results, coupled with our findings from study 4, as providing strong evidence against the claim that people are operating with an enriched prototype that centrally features teleological considerations in making category judgments. Our findings indicate the people associate the essence of a thing with a telos.

7. Conclusion

We found that people operate with a teleological view of essences. People tend to categorize a thing on the basis of whether it preserves or changes its telos. This arises despite

superficial similarity or dissimilarity, inside replacement, acquired characteristics, and inheritance. Whereas studies of essentialism that utilize these various approaches sometimes turn up conflicting results, we found that manipulating telos generated a unified pattern of results. And we found evidence that teleological considerations affect essentialists' judgments, which in turn drive categorization judgments.

Our results cohere with and extend a wide range of research indicating that teleology plays an important role in judgments of whether some collection of parts compose a further object (Rose & Schaffer, 2017) and in judgments of whether some object persists through part alterations (Rose, 2015; Rose, Schaffer and Tobia, forthcoming). The current results extend the role of teleology to our conception of the essences of things.

In light of our results, we propose that the idea that the placeholder for essences is sometimes elaborated by scientific essences should be replaced with the view that the placeholder for an essence is elaborated by a telos. This elaboration is neither rare nor exceptional. It may even be the case that teleological essentialism is in place from the start or that the placeholder is very short-lived, elaborated, and replaced by tele from a very early age. Kelemen's (1999) finding that, for instance, children claim that "mountains exist to give animals a place to climb" might, at least, suggest that essences are associated with tele rather than mere placeholders from an early age. The extent of the life of the placeholder is a further empirical question. For present purposes, our claim is simply that if there is a placeholder that gets elaborated, the elaboration is in terms of teleological essentialism, not scientific essentialism.

It might be objected that our findings only indicate that behavior, not telos, plays a key role in categorization judgments (see e.g., Hampton, Estes, & Simmons, 2007). All of our cases involve the thing engaging in some behavior (e.g., spinning webs). So it could be that behavior, and not telos, is having a major impact on essentialist judgments. If that is right, then perhaps essence is not elaborated by a kind of telos. Instead, it may be the case that our results only show that people operate with an enriched prototype where behavior plays a central role.

We doubt that it is simply behavior and not telos guiding people's essentialist judgments. Instead, telic relevant behavior, such as spinning webs, is evidence for the possession of a telos. As we saw above, Aristotle maintains that it is by nature and for an end (i.e., a telos) that a spider makes its web (Phys. 199a, 30). Aristotle also allows that tele can be unfulfilled. A spider could be externally prevented from spinning webs, which would frustrate its end. However, on Aristotle's view, it would not, thereby cease to be a spider, provided it still possessed the telos (NE. 1.5, 1.7). In concert with Aristotle's view, it is easy to imagine a case where a spider is prevented from spinning webs, but nonetheless, possessed the spider telos. And it is natural to think that it would still be a spider.

We also think our current results begin to speak to the idea that telos and not behavior is playing a role in essentialist judgments. In our pilot study, we asked people, for instance, "What is the true purpose of spiders?". And the vast majority of people said that the true purpose of spiders is to either make spin webs, catch insects and eat them, or both. It seems that people naturally identify telic relevant behavior as evidence of telos.

Moreover, in our fourth study, preservation and change in the original thing's telos had a major impact on people's predictions about what would hatch from some eggs. There was no behavior to guide these judgments. The eggs had not even hatched. Instead, it seems that people expect the telos to be transmitted and that this, and not the behavior, is what guides people's predictions in this case. That said, we take it that it is a further empirical question whether telos or behavior plays a central role in these kinds of judgments. And we hope for further work on this matter.

One further important objection to our findings, is that, as Hampton et al. (2007) have shown, "essentialist categorization is highly dependent on the parameters of the task" (p. 1797). It could, thus, be that the kind of teleological essentialist judgments we find are highly dependent on the specific tasks we have utilized. But there is reason for thinking that our findings are not simply due to features of our tasks. Teleology, using very different tasks and measures, has been found to play a central role in judgments of both object composition and persistence (Rose, 2015; Rose & Schaffer, 2017; Rose Schaffer & Tobia, forthcoming). Moreover, these various studies have varied a range of additional features, alongside teleological considerations, and in every single case teleology emerges as playing a major role both in judgments of object composition and persistence. For instance, teleological considerations play a major role in persistence judgments even if a thing undergoes minor (e.g., denting) or major (e.g., smashed) changes (Rose, 2015); teleological considerations play a major role in personal identity judgments, even when moral considerations—such as whether the person becomes good or bad (see, e.g., Strohminger & Nichols, 2014)—are made salient (Taylor, Kalbach, & Rose, 2019); teleological considerations play a major role in judgments of object composition, even when varying whether the parts are fused, in contact, or scattered (Rose & Schaffer, 2017); and teleological thinking also emerges early and persists through adulthood, even being retained despite professional training in physics (e.g., Kelemen, 1999; Kelemen et al., 2013). We, thus, suspect that the role of teleology in essentialist judgments is not simply incidental to the tasks used here but instead reflect a deep, robust feature of human cognition.

Our view might also bear on recent theoretical work on essentialism. Based on several recent papers, George Newman and Joshua Knobe argue that there are two kinds of essentialism that fall under a broader *General Essentialism* (Newman & Knobe, forthcoming). On their view, there is the Lockean kind of essentialism that applies to natural kinds, and there is a Platonic kind of essentialism that applies to kinds like *scientist* or *punk rocker,* which are value-laden. According to Newman and Knobe, what these two kinds of essentialism have in common is that "people appear to believe that what binds together the different features of the category is the fact that they are all ways of embodying the same deeper value" (Newman & Knobe, forthcoming, p. 2; see also Tobia, Newman, & Knobe, forthcoming). General Essentialism is, thus, the view that the *essence of essentialism* is that there is some abstract structure that people both posit and draw on to explain how category members are related. Lockean and Platonic essentialism are two forms that this abstract structure can take (Newman & Knobe, forthcoming, p. 3).

The results from our studies suggest an alternative. It might be that what unifies natural kinds (like *spider*) and value-laden kinds (like *scientist*) is that in both cases, essences

are tele. This would provide a different, and perhaps even more unified, form of general essentialism. Indeed, it may even provide a more compelling developmental account of essentialist thinking. Our findings indicate that people operate with an Aristotelian view of essences when it comes to natural kinds. It remains to be seen whether a similar approach will work for value-laden kinds. But there is reason to be optimistic that there is a deep and general way in which the way essences guide our judgments is best captured by teleological essentialism.

Finally, we conclude by noting that there are a number of further questions to be addressed. To mention just one, there is a question concerning the connection between teleological properties and other properties of a thing. We hope that future work will investigate this as well as the range of new questions that arise in light of teleological essentialism.

Acknowledgments

We would like to thank David Danks, Joshua Knobe, Jonathan Schaffer, John Turri, and Jonathan Weinberg for providing useful feedback on earlier versions of this paper. We would also like to thank Rachana Kamtekar for her helpful discussion on Aristotle.

Notes

1. Iacobucci, Saldanha, and Deng (2007) suggest that testing mediation using structural equation modeling is always superior to running a series of regressions. So we conducted a causal search on the data using Greedy Equivalence Search (GES). Roughly, GES operates by considering the possible models available given the different variables. GES begins by assigning an information score to the null model (i.e., a disconnected graph). GES then considers various possible arrows ("edges") between the different variables. It begins by adding the edge that yields the greatest improvement in the information score (if there is such an edge) and repeats the process until additional edges would not further improve the information score. GES then considers deletions that would yield the greatest improvement in the information score (if there is such an edge), repeating this procedure until no further deletions will improve the score. In all cases, the orientation of the edges is given by edge-orientation rules in Meek (1997). Chickering (2002) shows that, given enough data, GES will return the true causal model of the data. GES is often interpreted as returning the best fitting causal model, given the data. This model returned by the search fits the data well $X^2(1) = 3.63$, $p > .05$, BIC = -1.14. Following Iacobucci et al. (2007) and Rose and Nichols (2013), we also tested an alternative model with category judgments mediating the effect of telos on essence judgments. This model is a poor fit of the data, $X^2(1) = 13.51$, $p < .001$, BIC = 8.73. For further details and some applications of GES, see Chickering,

2002; Rose, Livengood, Sytsma, & Machery, 2011; Rose & Nichols, 2013, forthcoming; Rose, 2017; and Turri, Buckwalter, & Rose, 2016.

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