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Cognitive “Category-Based Induction” Research and Social “Persuasion” Research Are Each
About What Makes Arguments Believable

A Tale of Two Literatures

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Abstract

Social and cognitive psychologists each study factors that influence the believability of arguments, but they have worked mostly in parallel. We briefly examine and compare the dominant theories explaining argument believability in the social persuasion literature and the cognitive category-based induction literature. Although the two areas ask similar questions, they use different paradigms to study different aspects of the issues. We describe each area’s major paradigms and questions and then examine the conclusions that each area draws regarding the role of five variables important to argument believability: (a) the number of sources/premises, (b) the similarity between sources/premises, (c) individual differences in characteristics of the

reasoner, (d) the available resources, and (e) the reasoner's background knowledge and beliefs. Comparing the two literatures provides a more complete picture of the factors influencing argument believability and provides fruitful new avenues for integration and exploration.

Keywords

XXXXXXXXXX

Suppose a student asks you whether research exists on what makes an argument compelling. There is, of course, plenty of research on this topic, but the answer you give, and the words you use in giving it, will very much depend on whether you were trained in a more cognitive or social tradition. While recently investigating the issue of argument believability,¹ we recognized that there are two relevant literatures that address this issue: cognitive (category-based induction) and social (persuasion). The two areas ask questions that are, for the most part, quite similar, but they use very different paradigms to test them. However, the literatures do not reference each other, and the language difference between them is so great that a PsycINFO search using the language of one area will yield no results from the other.

In this article, we briefly describe the basics of each area's typical experimental paradigm, extract some of the similarities and differences in findings, and suggest areas for integrative future research.

COGNITIVE CATEGORY-BASED INDUCTION PARADIGM

The cognitive answer to what makes an argument believable would focus mostly on the qualities of the statements that comprise the arguments—for example, the number of premises and the relation of the premises to each other and to the conclusion.

There are two cognitive research paradigms that are typically used to investigate what makes arguments believable. One involves deductive reasoning (Johnson-Laird, 1983), and the other involves category-based induction (Osherson, Wilkie, Smith, López, & Shafir, 1990). Although we will mention work with syllogisms, it is the latter work on similarity-based category induction that is most analogous in method and conclusions to the social persuasion work.

In category-based induction tasks, participants see an argument: a list of sentences consisting of any number of premises and one conclusion. Often the premises involve members of a category, and the conclusion is about a generalization across the category.² For example, Argument 1 consists of two premises and one conclusion:

1. Horses have a merocrine gland

Cows have a merocrine gland

Therefore, all mammals have a merocrine gland

The predicates in the premises (e.g., “have a merocrine gland”) are usually meant to be “blank” in that most reasoners have no preexisting basis for assigning truth or probability to them. Argument 2 consists of different premises but the same conclusion as Argument 1:

2. Horses have a merocrine gland

Monkeys have a merocrine gland

Therefore, all mammals have a merocrine gland

In this typical paradigm, participants might be asked to rate the strength of a single argument on some scale, or they might be asked to compare two arguments (such as 1 and 2

above) and choose the one that is stronger. Psychologically stronger arguments are ones in which the premises are more likely to cause participants to believe the conclusion. Note that, as described below, the usual finding with arguments like those above is that people will rate Argument 2 as stronger than Argument 1, which demonstrates the “diversity effect” (e.g., López, 1995; Spellman, López, & Smith, 1999).

The most influential theory of how people make these judgments has been the similarity-coverage model (Osherson et al., 1990). To evaluate the strength of a general argument:

1. Generate a list of all exemplars of the conclusion (i.e., mammal) category (e.g., gorillas, dolphins, llamas).
2. Rate the similarity between each of the premise exemplars and each of the generated conclusion exemplars (e.g., horses/gorillas, horses/dolphins).
3. For each conclusion exemplar, find the maximum similarity rating when comparing it against the set of premise exemplars (e.g., for Argument 1, the maximum of horses/gorillas, cows/gorillas),
4. Take the average of all the maximum ratings.

What happens with Arguments 1 and 2 is that horses and cows are perceived to be quite similar (within the context of mammals), and they thus provide comparable similarity ratings when compared with most other mammals, so there is not much benefit from the step of taking the maximum ratings. (That is, having the two premises does not give much of an advantage over having only one.) However, because horses and monkeys are quite dissimilar from each other, but are each similar to many other mammals, the maximum similarity ratings will benefit, so the average maximum similarity rating will be higher for horses and monkeys than it would be for horses and cows. Thus, premise items that are very different from each other but are each similar

to other members of the category will lead to the strongest arguments. Note that the model leaves room for individuals to differ in which category members come to mind and in how much similarity they perceive between exemplars.

More recent work, however, shows that people don't always use taxonomic similarity in category-based induction tasks. For example, consider these two arguments:

3. Fleas have Property X
Butterflies have Property X
Therefore, sparrows have Property X

4. Fleas have Property X
Dogs have Property X
Therefore, sparrows have Property X

Although people rate fleas and butterflies as far more similar to each other than fleas and dogs, they believe that Argument 3 is better than Argument 4. The relevance theory of induction states that reasoners will assume, extract, and use relevant relations between the premises and conclusion when evaluating category-based inductions. So, rather than use the distant evolutionary–taxonomic relation between fleas and dogs as the basis for the induction, they will see similarity in an ecological–causal relation (e.g., fleas live on and bite dogs; Medin, Coley, Storms, & Hayes, 2003).

In this article, we primarily refer to experiments in which similarity is judged on a taxonomic basis; the Osherson et al. (1990) model works well for this type of judgment (see Tenenbaum, Kemp, & Shafto, 2007). Recently, Tenenbaum and colleagues (Kemp &

Tenenbaum, in press ; Tenenbaum, Griffiths, & Kemp, 2006) have developed Bayesian models of inductive learning and reasoning that assume that people bring to bear both knowledge about the structure of specific domains (e.g., that animals are “related” in an evolutionary-based taxonomy; that diseases are transmitted from the bitten to the biter) and prior beliefs about how features will be distributed in those domains. These models are successful in accounting for a variety of inductive phenomena in addition to those of similarity-based category-based induction (e.g., including category-based induction based on relations other than similarity, word learning, and causal learning).

SOCIAL PERSUASION PARADIGM

The social answer to what makes an argument believable, or what social psychologists would call persuasive, would, like the cognitive answer, include qualities of the information. However, it would also include qualities of the source(s) of the information; the context in which the information is presented; and the interests, abilities, and motivations of the reasoner³ (see Petty & Briñol, 2008, and Petty & Cacioppo, 1986, for reviews).

In a typical persuasion study, participants learn information about an issue and later report their attitudes towards that issue. An important factor in this research is the subjects’ motivation to process the information—so the issue may be one that is relevant to them (e.g., students learn that their university might adopt a new type of comprehensive exam) or the subjects may be told that later they will have to tell the information to others. The information may be presented by one or multiple sources, be they similar or different sources, and may include more similar or diverse facts. The sources may vary on attractiveness, expertise, and other qualities that (rightly or wrongly) may affect credibility. And the quality of information supporting the various sides of the issue may vary. The dependant variable is usually a type of

self-report scale (semantic differential, rating scale, etc.), which serves to assess the individual's attitude toward the issue at the end of the experiment.

The dominant model of persuasion is the elaboration likelihood model (ELM; Petty & Cacioppo, 1986),⁴ which claims that communications are evaluated somewhere along an “elaboration continuum” that ranges from no thought at all about the content of the message to deep analysis of the content that includes integrating it with existing beliefs.

Although elaboration is a continuum, it is useful to think of the ends of the continuum as representing two different routes to persuasion (Petty & Cacioppo, 1986). Deeply processed messages are said to go through the central route in which people focus on the content of the message and use both prior knowledge and experience to evaluate information. Careful and deliberative cognitive processes are used—therefore, attitudes developed by this route are generally resistant to change and are predictive of behavior. In contrast, the peripheral route does not require the reasoner to focus on the content of the message. Instead, the peripheral route persuades the listener by appealing to heuristics (including qualities of the source) or associations of the message. Less deliberate cognitive effort is expended and, as a result, attitudes changed through this route are sometimes referred to as temporary shifts and tend to be less accurate predictors of behavior.

One goal of social persuasion researchers has been to describe the factors that determine whether people will use the central route or the peripheral route. How deeply a communication is processed depends on both situational and dispositional factors (Petty & Cacioppo, 1986).

CONTRASTING (AND NONCONTRASTING) EMPHASES

Before describing some analogous findings across the literatures, we address three important issues that sometimes create confusion in this research.

Normativity

Is there a “right” answer? It is an illusion to believe that the cognitive literature is about reasoning regarding logical truth and that the social literature is about beliefs for which there is no real answer. Syllogisms, or any deductive arguments, can be judged as to logical truth: If a syllogism has a valid form, then the conclusion must be true if the premises are true. Reasoners can therefore be assessed as being right or wrong about their judgments. However, in inductive reasoning, no such guaranteed rules apply. In inductive reasoning, premises support but do not guarantee the truth of the conclusion; how strongly they support the conclusion depends not only the form of the argument and the relations between the premises, but also on the meaning of the words. For example, consider the following deductive argument:

5. All *As* are *Bs*
 All *Bs* are *Cs*
 Therefore, All *As* are *Cs*.

Given the deductive form of the argument, if the premises are true then the conclusion must be true, regardless of what *A*, *B*, and *C* mean. Now consider the following inductive argument:

6. *A1* is a *C*
 A2 is a *C*
 Therefore, All *As* are *Cs*.

In induction, whether you believe all *As* are *Cs* will depend on the meaning of *A* and *C*. If the *As* are each an ancient Greek philosopher and *C* means “wearing a wine-stained toga,” you might be less convinced that it is true of all *As* than you would if *C* means “is mortal.”⁵ Thus, category-

based inductive reasoning is similar to the social persuasion literature in that it is about believability, not about logical truth.

Source of Information

In the social persuasion literature, the source of the information is almost always stated explicitly and may be a key experimental variable. The researcher wants to understand (among other things) which sources people will believe and which they will doubt and why. A source's reasons and motives for providing the information, and the source's accuracy, may be suspect. In the category-based induction literature, the information is almost always provided as "given fact." However, as described below (in the section on number of premises), there are data suggesting that reasoners in category-based induction tasks may assume that experimenters obey the Gricean maxim of giving information that is maximally informative (Medin et al., 2003).

Dual-Processing Accounts

In the social persuasion literature, both major accounts of persuasion (the ELM and the heuristic-systematic model) are dual-processing accounts of social cognition. For purposes of this article, we talk about the two processes as System 1—automatic, low effort, pragmatic, and rapid (like the peripheral route)—and System 2—controlled, high effort, analytic, and slow (like the central route; see Evans, 2008; Smith & DeCoster, 2000). ELM is a type of dual-process model that assumes elaboration is a continuum; however, other types of dual-process models may assume that there are two distinct processes that work in parallel (with or without some "override" function).

Dual-process accounts are now frequently applied to deductive and inductive cognitive tasks involving argument believability. For example, in syllogistic reasoning, people show a "belief bias" such that, regardless of the validity of the argument, they are more likely to accept a

conclusion if it is believable rather than unbelievable. To illustrate, reasoners are likely to (incorrectly) evaluate the following argument as valid:

7. All boys like to play in the mud
Some people who like to play in the mud also like to throw rocks
Therefore, some boys like to throw rocks

However, when the second premise and conclusion are replaced as follows, the identically structured, but now less-believable, argument will be correctly evaluated as invalid:

8. All boys like to play in the mud
Some people who like to play in the mud are girls
Therefore, some boys are girls

One interpretation is that System 1 and System 2 come up with different answers to these “all/some/some problems”. When the conclusion is believable, reasoners go with the System 1 answer; however, when the conclusion is unbelievable, System 2 logical processing kicks in and overrides the invalid System 1 answer.

SIMILARITIES AND DIFFERENCES IN FINDINGS ACROSS LITERATURES

We begin our discussion of similarities and difference in the findings across literatures by noting that our tale of two literatures is told in two different languages. In the cognitive tale, an argument is a list of sentences: the first ones are premises and the last one is its conclusion. In the social tale, an argument is the information that a source provides; thus, a participant might be the recipient of many arguments all related to one issue. Further, the cognitive literature directly measures participants’ belief in the goodness of the arguments by asking for judgments of

support or argument strength, whereas the social literature indirectly measures participants' belief in the goodness of the arguments by measuring persuasion or attitudes. These language differences no doubt contribute to the lack of cross-referencing between the literatures.

Across the procedural and linguistic differences the cognitive and social areas have much in common with regard to how they might answer the student's general question about what makes an argument believable; however, there are substantive differences in each area's specific variables of interest, and even in cases when they answer the question the same way, they differ in their explanation of why. We next examine each area's response to five questions about specific variables that affect argument believability.

Does the Number of Sources/Premises Matter?

Cognitive Answer: Yes, (Usually) More Is Better

For example, three premises lead to more believable arguments than do two premises (Osherson et al., 1990). An argument that ravens, sparrows, and eagles have X and, therefore, all birds have X is a stronger argument than one stating that sparrows and eagles have X , so all birds have X .

The explanation focuses on the idea that three premises provide more diverse information than two; adding "raven" will probably increase (and cannot decrease) the mean maximum similarity ratings between the premise and category exemplars (see Step 3 earlier in this article).

However, recent studies have shown that there can be violations of the more-is-better rule. Consider these two arguments:

9. German Shepherds have X

Therefore all dogs have X

10. German Shepherds have X

Dobermans have *X*

Rottweilers have *X*

Therefore all dogs have *X*

People will rate the former as being stronger than the latter (Medin et al., 2003).⁶ Why? One explanation is relevance: If you believe that the experimenter is giving you maximally informative information, then the property probably is one belonging only to large aggressive dogs and not all dogs (Medin et al., 2003). A second explanation is sampling: If you believe that the information comes from a randomly sampled set of all dogs having the property, and the random set turns out to include only large aggressive dogs, then (under certain statistical assumptions) it becomes unlikely that all dogs have the property (Kemp & Tenenbaum, in press.) Thus, assuming random sampling, people should prefer smaller but more specific conclusions (Tenenbaum et al., 2006). Note that one explanation is therefore social (about speakers and listeners), whereas the other is probabilistic.

Social Answer: Yes, Both Number of Arguments and Number of Sources Matter

The number of arguments would seem to be a heuristic cue as to which side of an issue is stronger. Thus, when subjects read about an issue that was irrelevant to them (presumably using peripheral route processing), the number of arguments but not the quality of arguments affected their attitudes (having nine arguments was more persuasive than having three arguments).

However, when the issue was relevant (thus presumably engaging central route processing) both the number of arguments and the quality of arguments affected judgments; stronger arguments were more persuasive overall, but whereas adding more strong arguments increases persuasion, adding more weak arguments lessens persuasion (Petty & Cacciopo, 1984).

Although this study varied number of arguments, we believe that the work varying number of sources is even more analogous to the category-induction work. Harkins and Petty (1981a) found an interaction between the number of sources and the quality of arguments. Having three human sources each give a (different) high-quality argument is more persuasive than having one human source give the same three high-quality arguments. That is, even though the same amount of (and same) information is presented, people find the multiple-source presentation more persuasive when the arguments are of high quality. However, when the arguments are of low quality, the multiple-source presentation is less persuasive than the single source. Harkins and Petty (1981b) claim that people become more attentive and more analytical when there are multiple sources. Thus, multiple-source arguments are more likely to be processed through the central route creating more deliberation about the content. When content is more closely scrutinized, high-quality arguments become more persuasive and low-quality arguments become less persuasive, thus creating the Source \times Quality interaction.

Does the Similarity Between Sources and Premises Matter?

Cognitive Answer: Yes, More Diverse Is Better

The “diversity effect” (as described in the example at the beginning of the article) is that more diverse premises (e.g., horses and monkeys vs. horses and cows) lead to stronger general conclusions because the exemplars in the diverse premises are more similar to a wider range of the exemplars of the general category (Osherson et al., 1990). When the basis for the induction is taxonomic similarity, then the diversity effect holds.

Social Answer: Yes, More Diverse is Better

When sources are perceived as being similar to each other, they are less persuasive than when they are perceived as being different from each other (which appears to be the default). For

example, three sources each giving a different argument become less persuasive when participants are told that the sources form a committee. The loss of the multiple-source advantage occurs whether or not participants are told explicitly that the members of the committee are similar; however, if they are explicitly told that the committee members are dissimilar, the multiple-source advantage is retained (Harkins & Petty, 1987). In addition, information about source similarity only matters if it is given prior to hearing the arguments; if that information is given after the arguments are processed, there is no decrement in persuasiveness.

These results can be explained by assuming that people are using careful and deliberative central-route processing to consider message content (because they are evaluating multiple sources). Implicit in having three disparate sources is the assumption that the information is coming from different and separate sources of information that each have independent pools of knowledge. When people become aware that the sources are similar they can (correctly) devalue its persuasiveness. However, they can only do so if the information about similarity is presented early; once careful analysis of the argument through the central route is complete, its impact cannot be lessened by new information about source similarity (Harkins, & Petty, 1987).

Do Individual Differences in Reasoner Characteristics Matter?

Cognitive Answer: Yes, Intelligence Matters

The cognitive literature has begun to examine intelligence as an individual difference predictor of normative behavior in deductive tasks for which there are right and wrong answers. General intelligence is related to performance on syllogistic reasoning tasks, including those involving belief bias (in which logical validity is set in opposition to the believability of the conclusion). People higher in cognitive ability do better overall on syllogistic reasoning and may be better at

correctly ignoring content to facilitate correctly evaluating validity (Stanovich & West, 2000). People with greater working memory span (a measure highly correlated with IQ) have also been shown to do better on belief-bias syllogism tasks than have those with low working memory spans (De Neys, 2006). With respect to category-based induction tasks, people higher in cognitive ability produce fewer conjunction fallacies in similarity-based category-induction tasks (Feeney, Shafto, & Dunning, 2007) and are more sensitive to premise diversity (Feeney, 2007). These results suggest that people with more cognitive ability are more likely (or more able) to invoke System 2.

Social Answer: Yes, Need for Cognition Matters

People who are high in need for cognition (NFC) are more sensitive to argument quality than are those low in NFC; that is, stronger arguments are needed to persuade high-NFC people (Cacioppo, Petty, Kao, & Rodriguez, 1986). For example, participants read a high-quality or low-quality essay explaining why the University of Iowa should institute senior comprehensive exams. Participants high in NFC agreed more with the high-quality essay than they did with the low-quality essay, whereas participants low in NFC were not differentially persuaded by the two essays (Cacioppo, Petty, & Morris, 1983).

NFC affects persuasion because people high in NFC are more likely to use the central (System 2) route, and those low in NFC are more likely to use the peripheral (System 1) route (Cacioppo et al., 1986). High-NFC individuals will think more about the relevant issues and content of the message (and spend more time doing so) than will those low in NFC.

We note that whereas IQ reflects cognitive ability, NFC reflects cognitive style preference—that is, one is about what people can do and the other is about what people are inclined to do. Typically, there is a moderate correlation between them (Frederick, 2005; Woo,

Harms, & Kuncel, 2007) but there are suggestions that thinking style can explain some of the residual variance beyond that explained by ability in a variety of reasoning tasks (Stanovich & West, 1998).

Do Available Resources Matter?

Because System 1 is automatic and rapid whereas System 2 is slow and controlled, reductions in the amount of available attention and time should shift responses from the logic-based System 2 to the heuristic-based System 1.

Cognitive Answer: Yes, Attention and Time Matter

In syllogistic reasoning tasks, performing a secondary task hurts performance when logic and belief conflict but not when they support the same answer (De Neys, 2006). The interpretation is that dividing attention takes resources away from the resource-demanding System 2 processing. Similarly, when people are forced to rapidly decide whether a syllogism is valid, they are more likely to fall prey to the belief bias than if they have an unlimited time to respond (Evans & Curtis-Holmes, 2005). In a category-based induction task, people (or at least college undergraduates) are more likely to use taxonomic rather than ecological bases for induction when they are forced to respond quickly (Shafto, Coley, & Baldwin, 2007).

Social Answer: Yes, Attention Matters

Social psychologists have often used divided attention manipulations to study the effect of different variables on persuasion (see Petty & Briñol, 2008). With respect to the advantage of multiple independent sources, that advantage disappears if participants are simultaneously performing a distracter task, such as addition problems (Harkins & Petty, 1981b). The explanation is that the multiple-source effect depends on processing information using the central route; the distracter task takes away the resources to do so. Without explicitly manipulating

attention, elderly participants (who are more alert in the morning), were more persuaded by argument strength in the morning than they were in the evening and were more persuaded by irrelevant content in the evening than they were in the morning (Yoon, Lee, & Danziger, 2007).

Do Background Knowledge and Beliefs Matter?

Cognitive Answer: Yes, Expertise Matters

The issue of background knowledge has focused largely on what “experts” do and shows that experts come to different conclusions in category-based induction reasoning tasks than do undergraduates—presumably because of the influence of their background knowledge of the causal relationship between argument premises and conclusions. For example, the number and diversity of sources in an inductive reasoning task involving trees did not influence tree experts (landscapers, taxonomists, and parks maintenance personnel) as they do college-student participants. The tree experts used expertise-relevant domain-specific information in their judgments that the college students did not have (Proffitt, Coley, & Medin, 2000). There are also cross-cultural differences in category-based induction that may be due (at least in part) to different kinds of expertise (López, Atran, Coley, Medin, & Smith, 1997).

Social Answer: Yes, Background and Beliefs Matter

Social psychologists have examined the effect of background knowledge on persuasion almost entirely in the context of the reasoner’s background attitudes and beliefs. Arguments tend to be accepted to the extent that their conclusions agree with one’s existing opinions (Vallone, Ross, & Lepper, 1985). When individuals are invested or have a strong attitude about an issue, the ELM states that persuasion occurs more through the central route than through the peripheral route (Petty, Cacioppo, & Goldman, 1981).

ACROSS THE DIVIDE

Beyond the five findings that are easy to compare, there are other variables and findings that are not easily aligned. Overall, cognitive psychology focuses more on properties of the stimuli. Social psychology considers more exogenous variables, including the motivations of the reasoner, the context of reasoning, and qualities of the source (e.g., trustworthiness; Priester & Petty, 2003). Social psychology has long been concerned with qualities of the reasoner, but that issue has recently become of more interest to cognitive psychologists as well. Both domains are currently actively engaged in looking at the role of emotion in reasoning, however, as far as we know, emotion has not been investigated in category-based induction.

There are obviously fruitful avenues for integration and exploration. For example, in our laboratory we are currently pitting diversity and quantity of information against each other and asking which matters more. Our preliminary results indicate that premise diversity matters more than premise quantity, but only to a point. For example, participants believe that a conclusion derived from two diverse arguments is stronger than a conclusion derived from three similar arguments but not four similar arguments.

Social psychology could look more carefully at the dimensions of similarity that matter to evaluation, and cognitive psychology could look more carefully at other factors that affect evaluation. Each could do more to find out what participants believe about the potential set of information the given information is coming from and how it was generated. Just as category-based induction now looks at relations other than similarity relations between the premises, so too could social psychologists examine what other relations between the sources are important to consider. And, of course, more could be done to explain just how multiple premises and sources do or do not evoke the same cognitive mechanisms and whether the dual processes from each field are really manifestations of the same pair of underlying processes.

CONCLUDING REMARKS

We certainly do not wish to claim that that this brief review has provided an exhaustive account of all of the findings in these two literatures. Nor do we wish to claim that these two literatures exhaust the field of what is known about believability. There is, for example, related work in the judgment and decision-making literature on information redundancy (e.g., Maines, 1990; Soll, 1999) and on source trustworthiness (e.g., Schul, Burnstein, & Bardi, 1995) that addresses similar issues. What we do wish to acknowledge is that just as having diverse information produces stronger inferences, making connections between diverse research findings should produce better science. We hope that *Perspectives in Psychological Science* will provide a forum for more researchers in different fields who address similar issues to share their cross-disciplinary insights with others.

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Competing Interests

The authors have declared that no competing interests exist.

Notes

¹“Believability” could have two components: what makes an argument logically stronger and what makes it seem psychologically stronger. We are concerned only with the latter.

²In particular, it is category-based induction using general arguments—that is, arguments in which all the premise categories are subsets of the conclusion category (e.g., premises about horses and cows with a conclusion about mammals)—that are most analogous to the social research. Such general arguments are also used more in the cognitive literature than are specific arguments in which the premise and conclusion categories are at the same level (e.g., premises about horses and cows with a conclusion about llamas).

³The cognitive literature typically avoids topics in which the reasoner is invested.

⁴The other major attitude change theory, the heuristic-systematic model, is similar and would likely account for the same findings and make the same predictions we describe here (see Petty, Wheeler, & Tormala, 2003).

⁵This example is a cross between the famous “All men are mortal” argument and the stimuli in Nisbett, Krantz, Jepson, and Kunda (1983).

⁶The Medin et al. (2003) data actually refers to a conclusion set of “poodles” rather than “all dogs.” But we believe that the justification would work for the general arguments as well.

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