

## Generic Statements, Causal Attributions, and Children's Naive Theories

Andrei Cimpian

University of Illinois at Urbana-Champaign

### Acknowledgments

The research described in this chapter was supported by a Koppitz Fellowship from the American Psychological Foundation, research funds from the University of Illinois, and Spencer Foundation Grant #201100111. Many thanks to Joe Robinson, Cindy Fisher, and Vikram Jaswal for their helpful comments on previous drafts of this chapter.

Generic statements express generalizations about *entire categories* (e.g., “*Birds lay eggs,*” “*Boys like sports*”) and are thus a powerful means of transmitting and acquiring information. Above and beyond their role in information transfer, however, generic statements shape children’s causal inferences about the generalizations they express. In this chapter, I trace the influence of this process on children’s theories about the natural and social world, as well as on their motivation and performance in achievement contexts.

The ability to divide the world into discrete categories (e.g., chairs, dogs, teenagers) is a key feature of human cognition because it allows us to conceive of indefinite numbers of distinct individuals as being equivalent in some respects—as being the same kind of thing. This assumed equivalence reduces the informational complexity of our environments and, crucially, facilitates broad generalizations across individuals in a category. Such category-wide generalizations are pervasive in everyday thought and behavior. For example, every time people assume that it is safe to sit on a chair they’ve never used before or to approach a stranger’s dog, they are relying on category-wide, or *generic*, generalizations about chairs and dogs, respectively (i.e., that chairs are sturdy and that dogs are friendly).

Given the central role of these generic generalizations in our cognitive lives, it is natural to ask how they are formed or acquired in childhood. Undoubtedly, children’s own interactions with the world are a source. Seeing a particular dog’s friendly behavior, for instance, would provide a child with some grounds for extending this feature to the category *dog* as a whole. However, despite children’s apparent willingness to make projections of this sort (e.g., Gelman & Markman, 1986; Xu & Tenenbaum, 2007), inductive generalizations are by necessity uncertain, insofar as any set of observations can support an infinite number of alternative generalizations with equal legitimacy (e.g., furry, four-legged things are friendly; Goodman,

1965).

*Generic statements convey category-wide content knowledge and shape causal theories*

The uncertainty that is inherent in generalizing from firsthand evidence is, by comparison, negligible when children acquire generic facts from other people. In fact, *generic statements* (or generics) such as “Dogs are friendly” provide the most transparent means of learning generic generalizations because they unambiguously signal that a particular property (e.g., friendliness) applies to an entire kind (e.g., dogs; Carlson & Pelletier, 1995). Not only do generic statements have the right semantics to convey category-wide generalizations, but they are also (1) common in child-directed speech, accounting for approximately 4% of all utterances addressed to preschool-age children in everyday contexts (Gelman, Goetz, Sarnecka, & Flukes, 2008) and (2) comprehensible to children as young as 2 or 3 years of age (e.g., Cimpian & Markman, 2008; Cimpian, Meltzer, & Markman, in press; Gelman & Raman, 2003). This evidence suggests that generic statements may be a substantial source of knowledge about categories for young children.

However, the impact of generic statements on children’s conceptual systems is not limited to the transmission of generic facts. Generics also shape children’s inferences about the *causal source* of the novel generic facts conveyed, leading children to view these facts as inherent and natural—as direct byproducts of membership in the relevant categories. It is important to note that the causal attributions generated for a fact are part and parcel of how that fact is understood. For example, attributing dogs’ friendliness to the biology of their species frames it as a deeper, more essential (Gelman, 2003) feature than attributing it to some external cause such as their typical rearing conditions. In other words, how a new feature is integrated into the network of causal relationships pertinent to a concept (e.g., Murphy & Medin, 1985)

determines how the feature is ultimately understood (e.g., Ahn, Kim, Lassaline, & Dennis, 2000). The evidence reviewed next suggests that generic statements influence this process such that the novel facts they convey are, at least under certain circumstances, understood to be relatively deep, essential, and central to the category rather than superficial and peripheral.

For example, when 4- and 5-year-old children were presented with generic statements about novel properties of natural kinds (e.g., “Dolphins have a lot of fat under their skin”), the children often inferred that these properties must be enabling some important life-sustaining process (e.g., keeping warm: “‘cause they dive deep, and deep is cold, and it’s warm with big bellies”) and are thus an essential aspect of their kinds’ biology (Cimpian & Markman, 2009). In contrast, when the same novel properties were introduced via a non-generic statement about an individual (e.g., “She [a dolphin] has a lot of fat under her skin”), they were typically attributed to prior, often accidental, causes (e.g., overeating: “probably because it probably ate too much food”). A separate study established that children’s use of the generic vs. non-generic linguistic information was not automatic but rather flexible and context-sensitive: When the properties were ones children knew to be generic, presenting them in generic (e.g., “Apples have seeds inside”) or non-generic (e.g., “This apple has seeds inside”) statements had no effect on children’s causal attributions. It was only when the properties were novel that the generic vs. non-generic phrasing (e.g., “Apples have ovules inside” vs. “This apple has ovules inside”) caused children’s attributions, and thus their understanding of these novel properties, to diverge.

Along the same lines, when 5-year-olds were presented with generic statements about features of unfamiliar *artifact* kinds (e.g., “Ludinos have a bent tip”), they typically explained these features in terms of their supposed functions (e.g., “because to pour stuff out”; Cimpian & Cadena, 2010). Children’s responses in a follow-up experiment indicated that they also believed

these features to be a part of the artifacts' intentional design (e.g., ludinos were made with a bent tip), further reinforcing the conclusion that generically-conveyed information becomes part of the category core. Importantly, when the same properties were introduced via non-generic statements (e.g., "This ludino has a bent tip"), children's attributions gravitated towards accidental causes instead (e.g., "'cause something stepped on it"). Thus, the essentialist understanding children demonstrated for the generic versions of these properties could not have been a trivial consequence of the content of the properties per se.

Strikingly, generic language leads to the same types of essentialist inferences when it conveys information about social others. In Cimpian and Markman's (2011) studies, for example, children often attributed novel abilities introduced via generic statements (e.g., "Boys/Girls are really good at a game called *gorp*") to the inherent traits of the relevant social categories (e.g., "because girls are really, really smart" or "'cause boys grow up fast"). When introduced generically, novel biological properties of social others (e.g., "Boys/Girls have something called *fibrinogen* in their blood") were also attributed to inherent traits (e.g., "because they're sensitive"), or else they were thought to enable vital biological functions (e.g., "'cause it can help their blood"). Children's causal inferences diverged again from this pattern when the same information was presented in non-generic format: The novel abilities were ascribed to the effort of the individual who was said to possess them (e.g., "because he practiced a lot of times"), while the novel biological properties were often thought to be due to an illness or some external agent (e.g., "maybe the bunny bite her"). In sum, children tend to assume that socially relevant information learned from generic statements describes deep, stable, inherent aspects of other people's biological and psychological makeup.

One might wonder, however, if children's talk of deep, inherent causes truly reflects their

essentialized understanding of the facts learned from generic statements, or if it may simply be a side effect of having to explain a feature of an entire category. On this alternative view, being asked to explain a new feature of a category (e.g., why boys are good at gorp) might automatically trigger talk about other category-wide features, many of which are inherent and deep (e.g., boys grow up fast); however, such responses would not speak to children's understanding of this new feature per se. To test whether generic language truly shapes children's theories about the information learned, Cimpian and Erickson (in press) introduced novel information in either generic or non-generic format but then asked children to explain the same non-generic instantiation of this information. For example, although the information about gorp game ability was introduced in generic statements to half the children and in non-generic statements to the other half, the experimenter went on to show *all* participants a picture of a single child, tell them that this child was also good at the gorp game, and ask them why they think that is. Thus, the children in the generic and non-generic conditions were asked to explain exactly the same (non-generic) fact about a single child. As predicted, their understanding of this child's ability was shaped by how the ability had been originally introduced, such that children who learned about this ability from generic statements were significantly more likely to essentialize it. This result provides further evidence for the role of generic statements in the development of children's theories.

It is important to note, however, that the essentializing effect of generic language is not deterministic. Framing a new fact generically is not by itself sufficient to lead to attributions to deep causes. (After all, generic statements can also express facts that do not have a deep causal connection with their kinds, as in "Barns are red" [Prasada & Dillingham, 2006].) Among the additional factors that affect children's causal inferences about linguistically-conveyed generic

generalizations, two are particularly noteworthy: the nature of the *categories* that the generalizations are about and the content of the *properties* being generalized (Cimpian & Markman, 2011). Especially in the social domain, there is much variability in the extent to which categories are essentialized—that is, in the extent to which they are thought to reflect deep, natural distinctions (e.g., men vs. women) vs. more arbitrary or superficial groupings (e.g., Lady Gaga fans vs. Britney Spears fans; see Prentice & Miller, 2007). Categories that are relatively superficial are less likely to support inferences to deep, inherent causes. For example, because Lady Gaga fans are not typically conceptualized as having biological characteristics that distinguish them from fans of other pop stars, it may be less plausible to attribute some new generic fact about them to their biology. Analogously, there is variability in the extent to which properties are compatible with inferences to deep causes. For example, although success at some activity may plausibly be construed as the external manifestation of underlying traits or talents (e.g., Dweck, 1999), other properties may not lend themselves to such attributions—for example, properties that seem temporary or accidental (e.g., being dirty; Cimpian & Markman, 2008; Gelman, 1988). Four- and five-year-olds’ causal inferences are sensitive to both the nature of the categories and the content of the properties introduced via generic statements (Cimpian & Markman, 2011, Experiments 3 and 4), illustrating the flexibility of young children’s causal learning mechanisms.

### *Consequences for children’s achievement*

In the remainder of this chapter, I review recent evidence that exposure to generic statements affects children’s achievement-related theories and, consequently, their attitudes and behaviors in achievement settings. Children’s theories about what it takes to succeed undoubtedly influence their ability to do well in school: Those who believe that success is a

matter of possessing an inherent trait or talent (*entity* theorists) are often at a disadvantage relative to those who believe that success is a matter of effort and strategies (*incremental* theorists), especially when the material is challenging (e.g., Blackwell, Trzesniewski, & Dweck, 2007; Mueller & Dweck, 1998). Because generic language about ability typically leads children to infer that the source of the relevant ability is a trait (e.g., being smart or talented; Cimpian & Markman, 2011), it is possible that it would also induce the maladaptive feelings and behaviors associated with an entity theory. That is, children might worry about how much of this supposed trait they possess and thus become less likely to enjoy what they are doing; they may avoid challenges so that they can look competent and thus prove that they have the requisite traits; they may have strong negative reactions to mistakes or failures because such negative outcomes imply lack of talent; and so on. By promoting trait attributions, then, generic language may ultimately impair children's motivation and performance.

To test whether generics affect motivation, Cimpian (2010) asked 4- to 7-year-old children to play a novel game called *gorp*, in which they pretended to make different things out of paper. Critically, half of the children heard generic statements about gorp ability (e.g., "Girls/Boys are really good at the gorp game"), while the other half heard non-generic statements (e.g., "There's a girl/boy who is really good at the gorp game"). Children's motivation was assessed with a broad set of questions that probed, among other things, their perceived competence, their liking for the game, their emotional reactions, and their strategies for fixing mistakes (see Cimpian, Arce, Markman, & Dweck, 2007). In line with our prediction, generic language was clearly detrimental to children's motivation. Relative to children in the non-generic condition, those who were exposed to generics felt less happy and less competent, liked the game less, were less persistent, and so on. Also noteworthy was the fact that generic

language impaired motivation regardless of whether it conveyed negative or positive associations between the game and children's own group. That is, hearing generic sentences about the high ability of one's group (a positive association) led to lower motivation scores, just as did hearing generic sentences about the high ability of the outgroup (an implied negative association, as when a girl hears that boys are good at gorp). Although counterintuitive, the detrimental effect of generic statements about the high ability of one's own group is to be expected if, as we argued, these statements promote entity attributions to stable underlying traits. The inference that an inherent talent is the causal source of one's performance is likely to change the whole tenor of the activity, putting children under a spotlight and raising the question of whether they in fact have what it takes to succeed. Our data suggest that this charged atmosphere, which is responsible for the detrimental effect on children's motivation, is as likely to arise when one's group is said to possess the requisite talents as when one's group is inferred not to possess them.

Generic statements about ability affect not only children's attitudes towards a task but also their very ability to perform it. In a recent study, we taught 4- to 7-year-old children how to play the *Finding game*, a novel task consisting of multiple trials in which children have to find a complex target shape among a set of alternatives (Cimpian, Mu, & Erickson, under review). Children played a baseline round, after which they heard either generic ("Boys/Girls are really good at the Finding game") or non-generic ("There's a boy/girl who is really good at the Finding game") statements about ability at this game. They were then asked to play a test round. The results were compelling: Although the generic and non-generic groups were identical in their ability to find the target shapes at baseline, children exposed to generic language performed significantly worse in the test round than children exposed to non-generic language. Also, as in Cimpian (2010), the generic statements about the high ability of one's own gender seemed to be

at least as damaging as the generic statements about the high ability of the other gender. Thus, even a modest amount of generic language, coming from a person with whom children were unfamiliar, was sufficient to induce a maladaptive way of thinking about an unfamiliar task, which in turn led children to perform worse than they would have otherwise. In children's daily lives, where children have more of a rapport with the people providing such input and the tasks have higher stakes, the negative effect of exposure to generic statements may be even greater.

These findings also speak to children's vulnerability to stereotype information such as that expressed by generic statements about ability. Although the threatening effect of familiar societal stereotypes (e.g., about gender and math) has been documented in children around this age (Ambady, Shih, Kim, & Pittinsky, 2001), this is the first study to show that exposure to a few sentences conveying an *entirely novel* stereotype is likely to have a similarly debilitating effect on children's achievement. It is important to note that, in contrast to Ambady et al. (2001), the positive stereotypes set up by the generic statements in our study caused children to perform worse, not better. As explained above, this counterintuitive result is in fact predicted by our argument that generic statements induce entity-like beliefs that in turn interfere with children's ability to focus constructively on the task at hand. Moreover, this finding is compatible with the adult literature on the consequences of activating familiar positive stereotypes: Briefly, whether positive stereotypes debilitate or facilitate performance appears to depend on the manner of their activation. When they are activated indirectly and subtly (e.g., by subliminally priming participants with words associated with the positively-stereotyped identity), positive stereotypes often boost confidence and improve performance (e.g., Ambady et al., 2001; Shih, Ambady, Richeson, Fujita, & Gray, 2002; Shih, Pittinsky, & Ambady, 1999). However, when they are activated directly and blatantly (e.g., by telling Asian-American participants that the examination

they are about to take was designed to test the stereotype that Asians are good at math), positive stereotypes often cause participants to worry about whether they will live up to these stereotypes, which actually impairs their performance (e.g., Brown & Josephs, 1999; Cheryan & Bodenhausen, 2000; Shih et al., 2002; see also Baumeister, Hamilton, & Tice, 1985). Since our generic statements express the stereotype information quite directly, their negative effect on performance is entirely consistent with the pattern that emerges from this literature.

In the studies described so far, children's beliefs and behaviors were assessed in the context of the specific activities about which they had heard generic statements (Cimpian, 2010; Cimpian & Markman, 2011; Cimpian, Mu, & Erickson, under review). It is possible, however, that exposure to generic language about abilities has broader effects on children's theories about achievement. Specifically, the more generic statements children hear, the more likely they may be to *generalize* a trait-based conception of abilities to domains they have *never* heard described in generic language. This hypothesis was tested in a two-part study with 4- and 5-year-olds (Cimpian & Sutherland, in preparation). The first part consisted of a series of questions about familiar activities (e.g., riding a bike). Half of the children were asked these questions in generic form (e.g., "Are girls good at riding a bike?"), while the other half were asked the same questions in non-generic form, about a child they were familiar with (e.g., "Is Julie good at riding a bike?"). The goal of this phase was to prime, or activate, the explanatory framework associated with generic statements of ability. That is, when repeatedly asked whether boys or girls are good at various activities, the thoughts of children in the generic condition may be repeatedly drawn to the *traits* that would be needed to succeed in these activities. This trait-based explanatory framework may then "spill over" and be applied to other, novel activities as well. In the second part, we tested for the predicted generalization effect by asking children whether effort is needed

for success in several novel activities. This test phase, which was *identical* across the generic and non-generic conditions, consisted of introducing several novel abilities in the context of a single individual (e.g., “This girl is really good at a game called *gorp*”) and then measuring to what extent children thought that effort is important to the development of these novel abilities (e.g., “Does this girl have to practice this game, or is she just good at it?”). Our results were sobering: The children who had simply been asked whether boys or girls are good at various familiar activities were significantly less likely to endorse the importance of effort during the generalization test than children who were asked the non-generic versions of these questions. Arguably, children in the generic condition were primed by the questions in the first part to privilege traits over effort as the causal source of one’s abilities. The fact that even relatively little exposure to generic language may be sufficient to induce these general, and rather troubling, changes in children’s beliefs speaks to the power of this linguistic cue.

Generic statements give direct, unambiguous expression to people’s knowledge about categories. As such, they are an ideal means of learning about the world. Their influence, however, extends beyond the acquisition of content knowledge. The evidence reviewed here suggests that generic statements are also a major influence on children’s causal theories, with potential consequences for their achievement.

## References

- Ambady, N., Shih, M., Kim, A., & Pittinsky, T. L. (2001). Stereotype susceptibility in children: Effects of identity activation on quantitative performance. *Psychological Science, 12*(5), 385-390.
- Ahn, W., Kim, N. S., Lassaline, M. E., & Dennis, M. J. (2000). Causal status as a determinant of feature centrality. *Cognitive Psychology, 41*, 361-416.
- Baumeister, R. F., Hamilton, J. C., & Tice, D. M. (1985). Public versus private expectancy of success: Confidence booster or performance pressure? *Journal of Personality and Social Psychology, 48*(6), 1447-1457.
- Brown, R. P., & Josephs, R. A. (1999). A burden of proof: Stereotype relevance and gender differences in math performance. *Journal of Personality and Social Psychology, 76*, 246-257.
- Blackwell, L. A., Trzesniewski, K. H., & Dweck, C. S. (2007). Theories of intelligence and achievement across the junior high school transition: A longitudinal study and an intervention. *Child Development, 78*, 246-263.
- Carlson, G. N., & Pelletier, F. J. (Eds.) (1995). *The generic book*. Chicago, IL: Chicago University Press.
- Cheryan, S., & Bodenhausen, G. V. (2000). When positive stereotypes threaten intellectual performance: The psychological hazards of “model minority” status. *Psychological Science, 11*(5), 399-402.
- Cimpian, A. (2010). The impact of generic language about ability on children’s achievement motivation. *Developmental Psychology, 46*(5), 1333-1340.
- Cimpian, A., Arce, H. C., Markman, E. M., & Dweck, C. S. (2007). Subtle linguistic cues affect children’s motivation. *Psychological Science, 18*(4), 314-316.
- Cimpian, A., & Cadena, C. (2010). Why are *dunkels* sticky? Preschoolers infer functionality and intentional creation for artifact properties learned from generic language. *Cognition, 117*(1), 62-68.
- Cimpian, A., & Erickson, L. C. (in press). The effect of generic statements on children’s causal attributions: Questions of mechanism. *Developmental Psychology*. doi: 10.1037/a0025274
- Cimpian, A., & Markman, E. M. (2008). Preschool children’s use of cues to generic meaning. *Cognition, 107*(1), 19-53.
- Cimpian, A., & Markman, E. M. (2009). Information learned from generic language becomes

- central to children's biological concepts: Evidence from their open-ended explanations. *Cognition*, 113(1), 14-25.
- Cimpian, A., & Markman, E. M. (2011). The generic/nongeneric distinction influences how children interpret new information about social others. *Child Development*, 82(2), 471-492.
- Cimpian, A., Meltzer, T. J., & Markman, E. M. (in press). Preschoolers' use of morphosyntactic cues to identify generic sentences: Indefinite singular noun phrases, tense, and aspect. *Child Development*. doi: 10.1111/j.1467-8624.2011.01615.x
- Cimpian, A., Mu, Y., & Erickson, L. C. (under review). *Who is good at this game? Linking an activity to a social category undermines children's achievement*.
- Cimpian, A., & Sutherland, S. L. (in preparation). *Exposure to generic language induces rapid changes in children's naive theories about achievement*.
- Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development*. Philadelphia: Psychology Press.
- Gelman, S. A. (2003). *The essential child: Origins of essentialism in everyday thought*. London: Oxford University Press.
- Gelman, S. A. (1988). The development of induction within natural kind and artifact categories. *Cognitive Psychology*, 20, 65-95.
- Gelman, S. A., Goetz, P. J., Sarnecka, B. W., & Flukes, J. (2008). Generic language in parent-child conversations. *Language Learning and Development*, 4, 1-31.
- Gelman, S. A., & Markman, E. M. (1986). Categories and induction in young children. *Cognition*, 23, 183-209.
- Gelman, S. A., & Raman, L. (2003). Preschool children use linguistic form class and pragmatic cues to interpret generics. *Child Development*, 74, 308-325.
- Goodman, N. (1965). *Fact, fiction, and forecast*. Indianapolis, IN: Bobbs-Merrill Company.
- Mueller, C., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology*, 75, 33-52.
- Murphy, G. L., & Medin, D. L. (1985). The role of theories in conceptual coherence. *Psychological Review*, 92, 289-316.
- Prasada, S., & Dillingham, E. M. (2006). Principled and statistical connections in common sense conception. *Cognition*, 99, 73-112.
- Prentice, D. A., & Miller, D. T. (2007). Psychological essentialism of human categories. *Current*

*Directions in Psychological Science*, 16, 202-206.

Shih, M., Ambady, N., Richeson, J. A., Fujita, K., & Gray, H. M. (2002). Stereotype performance boosts: The impact of self-relevance and the manner of stereotype activation.

*Journal of Personality and Social Psychology*, 83(3), 638-647.

Shih, M., Pittinsky, T. L., & Ambady, N. (1999). Stereotype susceptibility: Identity salience and shifts in quantitative performance. *Psychological Science*, 10(1), 80-83.

Xu, F., & Tenenbaum, J. B. (2007). Word learning as Bayesian inference. *Psychological Review*, 114(2), 245-272.