

3.14

Children Learn From and About Variability Between People

DAVID LIU AND KIMBERLY E. VANDERBILT

Humans are the most social of all species. We have rich and complex social lives supported by an array of social-cognitive abilities and concepts to understand, predict, and explain each other's actions, thoughts, and emotions. How do children begin to grasp the many social understandings possessed by adults? Certainly there are some domain-specific innate endowments to jumpstart development, but children must also learn about people from their encounters with the social world (Wellman & Gelman, 1998). One view is that social-conceptual development involves the improvement of informal theories to better account for collected “data” on people (Gopnik & Wellman, 1992). If this view is correct, the nature of children's developing social cognition should reflect the nature of the data children collect about people. Yet students of social cognition have paid little attention to the specific nature of the data children use to develop their informal theories of people. In the current chapter, we explore one aspect of children's data on people: the incredible variability between individuals.

People are a varied bunch. Some smile at the mention of mustard, but others grimace. Some people can quickly change a flat tire, but others have no idea. A child learning about people has to recognize and learn from this rampant variability in people's actions. Although people are not the only entities that behave variably, we suggest that variability is a particularly dominant feature of people and their actions. Indeed, many have argued that human uniqueness includes having an incredible flexibility in thought and behavior (see, e.g., Hermer-Vazquez, Spelke, & Katsnelson, 1999; Tomasello, 1999). Therefore, children observe people behaving in a variety of different ways. We propose that this large variance in children's data on people shapes specific developmental trends in

several areas of social cognition. In developing an understanding of people, children learn from and about variability between individuals.

CHILDREN LEARN FROM VARIABILITY BETWEEN INDIVIDUALS

Across domains, observation and encoding of variability in the actions of entities motivates children to seek explanations. Consider two children, Cody and Eva, who repeatedly drop their cups off their highchair. Cody observes that all of his cups shatter (his parents are not the most safety conscious), but Eva observes that only some of her cups shatter. Because the cups in Eva's world are not as consistent and predictable, she is more motivated to construct theories to explain why some cups shatter but some do not (Wellman & Liu, 2007). People behave more like the cups in Eva's world than the cups in Cody's world, and as such, children are prompted early to explain the inconsistent actions of people.

Children Who Encounter More Variability Learn Earlier

If Cody observes that everyone smiles at the sight of mustard, but Eva observes that only some people smile, Eva would be more motivated to construct concepts to understand why. Previous studies have shown that variability or inconsistency from an established expectation prompts causal explanatory reasoning (Legare, Gelman, & Wellman, 2010; Weiner, 1985), but these studies did not precisely test our specific claim here. These studies examined situations in which one encounters data inconsistent with an already learned expectation, whereas our claim involves situations in which one is learning from inconsistent versus consistent data from the start. Nevertheless, we find support from these previous studies, as it

would only take a few encounters with events to establish expectations, even from the start.

Concepts Associated With Greater Variability Are Learned Earlier

Some social concepts are associated with greater variability than other social concepts, and children should be motivated to understand concepts with greater variability earlier in development. As shown in several studies, and confirmed in a meta-analysis, children develop an understanding that different individuals can have different desires roughly a year before they understand that different individuals can have different beliefs (see Wellman & Liu, 2004). For instance, 2-year-olds recognize that someone who likes a different food than them will choose a different snack, but they do not recognize that someone who thinks an object is in a different location than them will look in a different location (Wellman & Liu, 2004). Explanations for why children understand the subjectivity of desires before the subjectivity of beliefs include the additional need to understand representations for beliefs (Perner, 1991; Wellman & Liu, 2004) and the recruitment of different neural systems (Liu, Meltzoff, & Wellman, 2009). We propose that another contributing factor is the different degrees of variability data for desires and beliefs. That is, children encounter greater variability between individuals on desires than variability between individuals on beliefs.

There are several reasons for greater variability in children's data on people's desires than their data on people's beliefs. First, young children are more likely to have their own desires overtly contrasted than their own beliefs. Everyday infants and toddlers are thwarted from getting what they want. They reach for things that are taken away from them. They do things that bring smiles to their faces, but not to their parents'. Adults are always blocking them from their goals. However, it is much less apparent to infants and toddlers when they have contrasting beliefs with others about the identity or location of things. This is partly because it is easier for adults to nonverbally communicate their desires to infants and toddlers (with reaches, facial expressions, and movements toward) than one's beliefs (which rely more heavily on linguistic communication). In addition, children might hear adults talk more about contrasting desires than contrasting beliefs.

Second, there might simply be greater variability between individuals in people's desires than people's beliefs, and children's database reflects this state of reality. Direct measurements of the

average variability of the population's desires and the average variability of the population's beliefs are probably impossible, as the contents of people's desires and beliefs are near infinite and rarely overlap. Thus, we considered a proxy measure. From 5 million digitized books (roughly 70% in English), Google created a database of all 1-grams to 5-grams (five-word phrases) and how often each n-gram appeared in print each year (Michel et al., 2011). We searched the 4-gram database between 1900 and 2000 for the following phrases: "different people want different," "different people like different," "different people believe different," "different people know different," and "different people think different/differently" (in preliminary analysis, we observed that "different people think differently" is a phrasing often found for think, but not for the other verbs). In searching for these 4-grams, we left the contents of desires and beliefs open ended to sidestep the issue of nonoverlapping contents. As shown in Figure 3.14.1, we found that references in print to individual differences in desires (want and like) exceeded references in print to individual differences in beliefs (believe, know, and think). Furthermore, this pattern occurred across decades, which bolsters against the possibility of the pattern being an isolated publishing trend at some moment in history.

Explaining the developmental sequence of children's abilities and concepts is fundamental to understanding cognitive development (Flavell, 1971). Here we propose that part of what drives the developmental ordering of children's social conceptual insights is the degree of variability in the data associated with each social concept. In addition to desires and beliefs, other patterns of developmental sequences are also likely influenced by different degrees of variability for different social concepts.

CHILDREN LEARN ABOUT VARIABILITY BETWEEN INDIVIDUALS

In the previous section we argued that children's causal explanatory learning is prompted by differences between individuals. As a consequence, children are primed to recognize differences between individuals. For instance, as children develop an understanding of dispositional traits, they might be able to judge, in comparison, which of two people is more selfish before they start attributing this trait to isolated individuals. They might be able to decide, in comparison, which of two informants is more trustworthy before they become skilled at deciding whether to trust isolated informants.

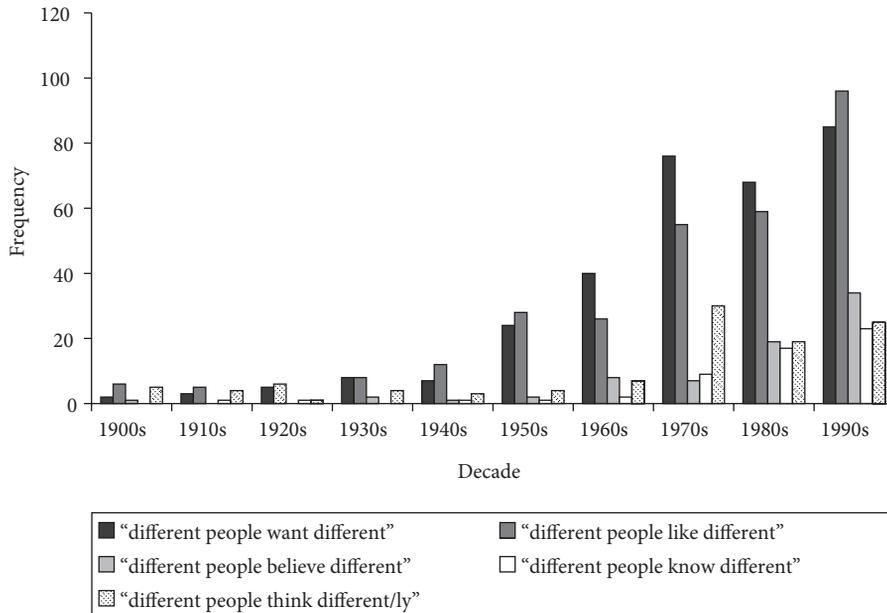


FIGURE 3.14.1: The frequency of each 4-gram per decade in the Google digitized books corpus. Overall increase in absolute frequency reflects the fact that more books from recent decades have been digitized. The key comparison is relative frequency of desire 4-grams (want and like) versus belief 4-grams (believe, know, and think) per decade.

Because variability between individuals is a particularly dominant feature of children’s data on people, their initial, nascent theories of people are constructed to differentiate between individuals.

Our approach assumes that children’s developing social concepts do not function in an all-or-none manner. Instead, children initially develop a nascent understanding that is just enough to reason about differences between individuals and only later learn to use that social concept to reason about isolated individuals. The development from a nascent to a more complete understanding of concepts includes higher functional maturity (Flavell, 1971), stronger activation of representations (Munakata, McClelland, Johnson, & Siegler, 1997), and mastery and selection of strategies (Siegler, 1981).

Recognizing Differences Between Individuals Before Attribution to Individuals

Our hypothesis is that across a wide variety of social concepts children’s initial understanding allows them to differentiate between individuals, but it is not sufficiently advanced to allow children to reason about isolated individuals. Thus, at first, children should be better at contrasting between two people than reasoning about a single person. We recently conducted several studies to test this prediction in different social domains.

Traits

Previous research has shown that children younger than 6 years do not use a person’s trait-relevant behavior to predict consistency in future behavior (e.g., Liu, Gelman, & Wellman, 2007). In a recent study, we presented to 4-year-olds trait-relevant stories with pairs of characters or a single character (Liu, unpublished data). In the pairs condition, children heard stories of two characters behaving in contrasting ways (e.g., one boy does not share his lunch, but the other boy does). In the singles condition, children heard stories of a single character behaving in a trait-relevant way twice (e.g., one boy does not share his lunch on two occasions). The results showed that 4-year-olds were more likely to predict trait-consistent behaviors in the pairs condition (70%) than in the singles condition (50%).

Knowledge

Around 3 years of age, children begin to understand that a person’s knowledge or ignorance depends on her perceptual access to relevant information (Pillow, 1989). We tested whether 3-year-olds would be better at judging knowledge-ignorance between two individuals than judging the knowledge-ignorance of a single individual. In the pairs condition, children were told about a boy who saw inside a nondescript container and a boy

200 IMITATION, MODELING, AND LEARNING FROM AND ABOUT OTHERS

who had not seen inside. In the singles condition, children were told only about a boy who had not seen inside. As with traits, the 3-year-olds were better at judging knowledge-ignorance in the pairs condition than the singles condition (Liu, unpublished data).

Trust

Recent research has shown that 3- and 4-year-olds are more likely to trust new labels for objects from speakers who had previously labeled objects correctly over speakers who had previously labeled objects incorrectly (Koenig & Harris, 2005). In a recent study, we explored whether 3- and 4-year-olds trust a previously inaccurate informant when the informant is not contradicted by anyone (Vanderbilt, Heyman, & Liu, unpublished data). In the pairs condition, children observed an inaccurate informant label objects incorrectly and an accurate informant label objects correctly. In the singles condition, children observed an inaccurate informant label objects incorrectly. The results showed that in the pairs condition, children trusted the inaccurate informant 20% of the time (and trusted the accurate informant 80% of the time). However, in the singles condition, children trusted the inaccurate informant 82% of the time. The children were willing to trust informants observed as having been inaccurate in the past when they were not contradicted by other informants.

These studies examined three different social concepts and involved different problem-solving situations for children. The results for each have concept- and task-specific explanations. Nevertheless, the results across all three domains show a pattern of children developing the ability to differentiate between individuals in relation to a social concept before the ability to attribute that social concept to individuals in isolation.

CONCLUSIONS

To understand children's developing concepts of people and the social world, researchers must consider the data children are collecting about people and the social world. We propose that a prominent feature of children's data on people is the variability between individuals. A consequence of constructing theories of people from variability data is the initial development of nascent theories that can only differentiate between people.

The current social-cognitive development literature is stocked with findings from paradigms that ask infants and preschool-age children to differentiate between two people. Given

our observations that the ability to differentiate between people does not always accompany the mature form of a social concept, we caution against ignoring (and argue for investigation of) the further developments of these social concepts. Researchers must recognize that early nascent social cognitions are sometimes far from what will eventually support children and adults' complex social lives. For example, is 3-year-olds' selective trust of an accurate informant over an inaccurate informant related to (or anywhere near) adolescents' attempt at critical consumption of mass media? Or is infant preference for in-group over out-group members related to (or anywhere near) actual dislike or hatred of out-group members? What are the developments in between? We hope our explorations in this chapter stimulate research into the nature of the data children collect to construct their views of the world and research into developments beyond nascent abilities to differentiate between individuals.

REFERENCES

- Flavell, J. H. (1971). Stage-related properties of cognitive development. *Cognitive Psychology*, 2, 421–453.
- Gopnik, A., & Wellman, H. M. (1992). Why the child's theory of mind really is a theory. *Mind and Language*, 7(1–2), 145–171.
- Hermer-Vazquez, L., Spelke, E. S., & Katsnelson, A. S. (1999). Sources of flexibility in human cognition: Dual-task studies of space and language. *Cognitive Psychology*, 39(1), 3–36.
- Koenig, M. A., & Harris, P. A. (2005). Preschoolers mistrust ignorant and inaccurate speakers. *Child Development*, 76, 1261–1277.
- Legare, C. H., Gelman, S. A., & Wellman, H. M. (2010). Inconsistency with prior knowledge triggers children's causal explanatory reasoning. *Child Development*, 81(3), 929–944.
- Liu, D., Gelman, S. A., & Wellman, H. M. (2007). Components of young children's trait understanding: Behavior-to-trait inferences and trait-to-behavior predictions. *Child Development*, 78(5), 1543–1558.
- Liu, D., Meltzoff, A. N., & Wellman, H. M. (2009). Neural correlates of belief- and desire-reasoning. *Child Development*, 80(4), 1163–1171.
- Michel, J. B., Shen, Y. K., Aiden, A. P., Veres, A., Gray, M. K., & Pickett, J. P. (2011). Quantitative analysis of culture using millions of digitized books. *Science*, 331(6014), 176–182.
- Munakata, Y., McClelland, J. L., Johnson, M. H., & Siegler, R. S. (1997). Rethinking infant knowledge: Toward an adaptive process account of successes and failures in object permanence tasks. *Psychological Review*, 104(4), 686–713.

- Perner, J. (1991). *Understanding the representational mind*. Cambridge, MA: MIT Press.
- Pillow, B. H. (1989). Early understanding of perception as a source of knowledge. *Journal of Experimental Child Psychology*, 47(1), 116–129.
- Siegler, R. S. (1981). Developmental sequences within and between concepts. *Monographs of the Society for Research in Child Development*, 46(2), 84.
- Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard University Press.
- Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review*, 92(4), 548–573.
- Wellman, H. M., & Gelman, S. A. (1998) Knowledge acquisition in foundational domains. In W. Damon (Series Ed.), *The handbook of child psychology*, D. Kuhn & R. Siegler (Vol. Eds.), *Cognition, perception, and language* (Vol. 2, pp. 523–573). New York: Wiley.
- Wellman, H. M., & Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Development*, 75(2), 523–541.
- Wellman, H. M., & Liu, D. (2007). Causal reasoning as informed by the early development of explanations. In A. Gopnik & L. E. Schulz (Eds.), *Causal learning: Psychology, philosophy and computation* (pp. 261–279). New York: Oxford University Press.

