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Cognitive Development



Toddlers view artifact function normatively

Krista Casler*, Treysi Terziyan, Kimberly Greene

Franklin & Marshall College, P.O. Box 3003, Lancaster, PA 17604, United States

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ABSTRACT

When children use objects like adults, are they simply tracking regularities in others' object use, or are they demonstrating a normatively defined awareness that there are right and wrong ways to act? This study provides the first evidence for the latter possibility. Young 2- and 3-year-olds ($n=32$) learned functions of 6 artifacts, both familiar and novel. A puppet subsequently used the artifacts, sometimes in atypical ways, and children's spontaneous reactions were coded. Children responded normatively to non-designed uses (e.g., protesting, tattling), although the effect was stronger among older children. Reactions were identical for novel and familiar items, underscoring how rapidly tool-function mappings are formed. Results depict toddlers as already sensitive to the uniquely human, normative nature of tool use.

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When we pick up a fork at dinner, we do it at least in part because forks nicely accomplish the job of getting food to one's mouth. Of course, forks could accomplish other jobs quite nicely too (say, combing hair), and likewise, other objects could be used as eating utensils. But most of us admit that we rarely contemplate – let alone execute – such alternatives, and this selectivity suggests something important about artifact use: It is not objectively stipulated based on features alone. If it were, all feasible possibilities and objects should be considered viable. Instead, we view alternative uses of objects as creative at best, as outright violations at worst, using objects narrowly and “properly” the vast majority of the time.

How, then, do we decide on an object's “proper” function? The answer is simple: We look at what everyone else is doing. A hallmark of humanity is solving coordination problems, as they have been called, most notably by Lewis (1969), where we mutually agree with one another and do what others expect us to do in order to facilitate successful social interactions. Often the stakes are high and coordination is essential: I must say “dog” and not “tree” if I want you to think of a dog, for example, and

* Corresponding author. Tel.: +1 717 291 3828.
E-mail address: krista.casler@fandm.edu (K. Casler).

I must drive on the right side of the road and not the left in Philadelphia if I want to get across town alive. Conventions, Lewis argued, emerge as solutions to coordination problems. Of course, artifacts are not conventionally defined in this strongest sense (Searle, 1995), as it is surely not a matter of life and death whether you use a toothbrush like everyone else. Yet community agreement over function is nonetheless expected and arguably underpins social harmony in fundamentally similar ways; indeed, it might be a matter of life and death after all if your roommate discovers you have been using his toothbrush to clean the bathroom grout!

With respect to artifact use, there appears to be an especial social trump card for deciding how to use things in the “right” way. Research suggests that we give particular deference to an object’s creator when determining functions; adults generally believe that what an object was intentionally *made* for is, in fact, what it is for (Bloom, 1996; German & Johnson, 2002; Kelemen, 1999; Matan & Carey, 2001). There are occasions when the conventionally agreed upon function of an artifact can shift away from its designed purpose over time, in circumstances where many people adopt a new way of using an item (Siegel & Callanan, 2007; but see Defeyter, Hearing, & German, in press). Likewise, the conventional meaning and use of an object may vary across cultures, as Callanan, Siegel, and Luce (2007) point out (e.g., nose rings in the United States and India are perceived very differently). Across all circumstances, however, object function reflects general community agreement that ultimately there is a “right” way “we” use things (German, Truxaw, & Defeyter, 2007; Seston, Kelemen, & DiYanni, submitted for publication).

Like adults, children share the intuition that design intentions should dictate function (Diesendruck, Markson, & Bloom, 2003; Kelemen, 1999), although until early school age, their beliefs may be somewhat more malleable than those of adults (Defeyter & German, 2003; Matan & Carey, 2001). Even earlier, toddlers and preschoolers show evidence of being teleo-functional thinkers: They believe human-made objects exist *for* something, even if they do not yet consistently choose the original design function as the function. For example, by age 3, children who briefly see a particular tool demonstrated as a bell ringer will, like adults, consistently use that tool – and, notably, only that tool – subsequently to ring bells, despite knowing that other salient and available options could do the job perfectly well (Casler & Kelemen, 2005). They show a basic form of this understanding by 24 months (Casler & Kelemen, 2007).

This fixity in object-function mappings is a crucial – and so far, apparently unique – component of human tool use (Searle, 1995). Whereas other tool-using animals appear generally opportunistic in their tool use, our human “function compunction” (Kelemen & Rosset, 2009) makes us fast, efficient, and prolific tool users. But fixity, especially in children, may also suggest something about children’s understanding of others. We argue that by using objects in exclusive ways, preschoolers are demonstrating early sensitivity to the *conventional* nature of artifact function (Casler & Kelemen, 2005). More than idly reproducing observed behaviors, they are demonstrating tacit awareness that there is a typical and agreed upon way – a conventional way – that “we” do things (Rakoczy, 2007; Rakoczy, Warneken, & Tomasello, 2008; Seston et al., submitted for publication). This hypothesis has empirical support in two aspects of the bell-ringing study mentioned earlier (Casler & Kelemen, 2005). First, an imitation task showed that toddlers and preschoolers did not blindly imitate any demonstrated behavior with an artifact, suggesting that they selectively recognized only certain aspects of tool use as conventionalized. Second, and more important, on some test trials preschoolers and adults had to choose which tool *someone else* would use to ring the bell. At all ages, participants expected others to use the objects like themselves.

While children’s apparent conventional knowledge is impressive, it may tell an incomplete story about the depth of social learning required to be a human tool-user. To get at the behavior described earlier, individuals could simply monitor regularities in object usage and follow suit (e.g., “This is how forks usually get used; I’ll do so too”). And while this behavior basically satisfies Lewis’ (1969) requirements for a convention, theorists have eloquently argued for a *normative* aspect to many human activities that specifies behavior with more force (Gilbert, 1989; Guala, unpublished; Rakoczy, 2007). This is seen paradigmatically in the realm of games, where in particular situations, otherwise innocent or arbitrary actions become strict rules to be followed. For instance, if a soccer player touches the ball with her hands while it is in play, this otherwise innocuous action is penalized. Note the contrast: While it may be a socially agreed upon convention to eat lunch at noon, it is surely not sanctionable if someone chooses to eat his at half past two.

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