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The intention-to-CAUSE bias: Evidence from children's causal language

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ABSTRACT

The current study explored causal language in 3.5- to 4-year-old children by manipulating the type of agent (human acting intentionally or unintentionally, or inanimate object) and the type of effect (motion or state change) in causal events. Experiment 1 found that the type of agent, but not the type of effect, influenced children's production of causal language. Children produced more causal language for intentionally caused events than for either unintentionally- or object-caused events, independent of the type of effect. Experiment 2, which tested children's judgments of descriptions for the events, found a similar pattern. Children preferred causal descriptions more for the intentionally caused events than the unintentionally- and the object-caused events. Experiment 3 found no evidence of bias in children's non-linguistic representations of the events. Taken together, these results suggest an intention-to-CAUSE bias in children's mapping of conceptual representations of causality into linguistic structure. We discuss the implications of these results for the acquisition of causal language and for the development of conceptual representations of causality.

1. Introduction

Human adults have the remarkable ability to represent the causal structure of a seemingly infinite set of events. Adults can reason about the effects of their own actions and about the effects of other people's actions. Furthermore, when making causal judgments, the intention of the agent is of no consequence – regardless of whether a person intentionally turned off the television or unintentionally sat down on a remote control, adults will still judge that the person *caused* the television to turn off. Additionally, causal reasoning is not restricted to judgments about human agents – adults are equally capable of causally reasoning about the effects of both animate and inanimate objects – and adults can causally reason about many types of effects, such as object motion, lights turning off, balloons popping, or plant growth. Thus, causal representations extend to a wide range of events – events that crosscut conceptual classes.

The breadth and apparent intricacy of causal reasoning in adults poses a fundamental question concerning the developmental origin of this vast capacity in human cognition. Are human infants and young children able to reason causally about a wide variety of events (Gopnik et al., 2004)? Or, is causal reasoning initially biased towards a certain class of events, such as events of motion (Michotte, 1963) or events involving animate agents acting intentionally (Piaget, 1954)? If early causal representations emerge from a restricted class of events, then biases may not only emerge in the way young infants represent causal events, they may also emerge in the way older children use causal language, since linguistic representations interact with non-linguistic representations early in development (e.g., Bloom, 1973; Clark, 2004; Landau, Smith, & Jones, 1988; Mandler, 1992; Slobin, 1973, 1985). Specifically, children may show a bias to map a certain class of events (e.g., motion events, intentional events) more often into causal linguistic structures than other classes of events.

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The question of whether factors such as the animacy and intentionality in an event influence children's causal language is motivated not only from developmental theories regarding the origin and nature of conceptual representations of causality (Piaget, 1954; White, 1995, 1999), but also from research exploring causal language in adults (Wolff, 2003; see also Song & Wolff, 2005). Such research suggests that while adults use causal language to describe a wide range of causal events, the animacy and intentionality of the agent influences the specific type of causal language adults use to describe causal events. Given the significance of these factors in theorizing about the ontogeny of causal representations, as well as in adults' causal language, the current study explores whether and how these conceptual factors play a role in children's linguistic encoding of causal events.

1.1. Conceptual representations of cause

Two prominent theories of the development of causal representations provide insights into the types of biases that may emerge in children's developing causal language. According to both theories, although later in development causal representations can be applied to all events, early in development a more limited class of events serves as the prototypical schema for causality. The theories differ, however, in which class of events serves as the basis for causal representations. According to one theory, mature causal representations emerge from representations of human actions causing specific effects in the world. Although this idea is closely associated with the ideas of Piaget (1954), its main tenets are also found in philosophy (Maine di Biran, see Michotte (1963)), and more recently in the work of White (1995, 1999). Piaget believed that the child was initially born without any representations of causality. Then, over the first 6 months of life, the infant begins to construct causal representations that are initially limited to his or her own actions. Over development infants' concept of causal action broadens to include other people's intended and unintended actions, and eventually children include objects and other nonhuman agents, such as the weather, as causal agents.

In contrast, Michotte (1963) emphasized the importance of the *type of effect*, rather than the type of agent, in representations of causality. According to Michotte, the initial causal event is a caused motion event. Through extensive psychophysical experiments exploring adult causal perception, he showed that the ability to perceive one object as causing an effect in another object is (1) influenced only by the spatiotemporal parameters of the event (spatial contact, temporal continuity) and (2) limited to events in which the second object was caused to move (rather than, for example, change color). Michotte indeed acknowledged that adults can readily represent nonmotion, change of state events (hereafter called "state change events") as causal. To account for this ability, Michotte proposed that adults' causal representations of state change events are generalizations from an initially domain-specific module dedicated to causal perception of motion events (for a more complete review of both theories, see Muentener & Carey, 2010).

Thus, these two theories make very different claims about the *origin* of causal representations – one emphasizing events involving intentional agents and one emphasizing motion events. In the current paper, we explore how early conceptual representations of causality may influence conceptual and linguistic representations of causality later in development. Our working linking hypothesis is that if causal reasoning is restricted early in development, then later in development, even if causal reasoning becomes unrestricted, biases may remain in children's construal of causal events. If in infancy causal representations are restricted to events involving intentional agents, then later in development when children view a causal event, they may be more likely to encode the event as causal if it is caused by an intentional agent than if it is caused by a nonintentional agent. This conceptual bias may, in turn, increase the likelihood that causal events involving agents acting intentionally are mapped into causal linguistic structures. However, if in infancy causal representations are restricted to events involving caused motion, then, later in development, children may be more likely to encode an event as causal if it is a motion event than if it is a state change event, which may, in turn, increase the likelihood that causal motion events are mapped into causal linguistic structures. The current study aims to bring evidence to bear on these alternatives, and to shed light on children's use of causal language and the mapping of children's conceptual representations into causal linguistic structures. If any differences emerge in children's causal language, this may also provide some insights into the possible origins for conceptual representations of causality.

1.2. Linguistic representation of CAUSE

The unitary causal nature of different types of events (caused motion, caused state change, intentionally caused, unintentionally caused, object-caused, etc.) is captured by linguistic theory, which posits that there is a primitive CAUSE that defines the semantic structure of all causal events (Jackendoff, 1983, 1990, 2002; Levin & Rappaport-Hovav, 1995, 2005; Pinker, 1989). For example, consider a motion event of a golf ball rolling as a result of (1) a boy intentionally moving the ball with a putter, (2) a boy accidentally moving a golf ball by unintentionally hitting the ball with the putter, or (3) a green ball rolling into a red ball, which then contacts the golf ball, making it move. Amongst many other alternatives, we can describe all these events with causal language, such as (1) "the boy moved the ball," (2) "the boy accidentally moved the ball"/"the boy made the ball move", and (3) "The green ball moved the golf ball"/ "The green ball made the golf ball move". Furthermore, CAUSE is not restricted to motion events, but extends also to change of state events. Consider an event in which the boy turns on a light, rather than moves a ball. We can describe this event as "the boy turned on the light," an event that carries the same notion of causality as motion events.

The first step in encoding any of the above causal events in language is choosing a verb, and the choice of verb constrains the syntactic encoding of the event components (Gleitman, 1990, 1965; Jackendoff, 1990; Landau & Gleitman, 1985; Levin & Rappaport-Hovav, 1995, 2005).