Cause and *fault* in development

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Abstract

Responsibility requires causation. But there are different kinds of causes. Some are connected to their effects; others are disconnected. We ask how children's developing ability to distinguish causes relates to their understanding of moral responsibility. We found in Experiment 1 that when Andy hits Suzy with his bike, she falls into a fence and it breaks, 3-year-old children treated "caused", "break" and "fault" as referring to the direct cause, Suzy. By 4, they differentiated causes: Andy "caused" the fence to break, it's his "fault", but Suzy "broke" it. We found in Experiment 2 that when the chain involved disconnection, 3-year-olds focused only on the direct cause. Around 5 they distinguished causes, saying that the disconnecting cause "caused" an object to break, it's their "fault", but the direct cause "broke" it. Our findings relate to the outcome-to-intention shift in moral responsibility and suggest a more fundamental shift in children's understanding of causation.

Keywords: causation; responsibility; language; conceptual development; outcome-to-intention shift

Introduction

Responsibility requires causation. This is part of philosophical orthodoxy (e.g., Driver, 2007; Sartorio, 2007; Sytsma et al., 2023), embodied in the law (e.g., Hart & Honoré, 1959), and reflected in psychological theories of responsibility (e.g., Cushman et al., 2013; F. D. Fincham & Jaspars, 1980; Heider, 1958; Lagnado et al., 2013; Samland, Josephs, Waldmann, & Rakoczy, 2016; Schleifer et al., 1983; Shaver, 1985; Shultz & Schleifer, 1983). Even models suggesting that blame and praise influence causal judgment (e.g., Alicke, 1992, 2000; Alicke et al., 2011; Rose, 2017) presuppose that causation must be established before such biases can operate.

The connection between responsibility and causation is also reflected in children's judgments: They don't blame someone merely associated with an outcome; causal involvement is necessary (F. Fincham & Jaspars, 1979). Young children prioritize the magnitude of the outcome that was caused, regardless of intent, while older children also consider intentions (Piaget, 1932). This "outcome-to-intention shift" may stem from distinct processes: one focused on mental states for judging intentionality, the other on causation (Cushman et al., 2013, though see Margoni and Surian, 2016; Nobes et al., 2017). While one of the central questions concerning this shift is how, and when, mental states become integrated, it is usually assumed that causation is established first. But there are different kinds of causes that children reason about, which may influence their developing understanding of responsibility.

Different kinds of causes

Causation is often thought of in terms of production through direct contact, like billiard balls colliding (Dowe, 2000; Wolff, 2007). Indeed, many studies on the outcome-to-intention shift involve an agent directly producing an outcome. The situations Piaget (1932) presented to children, someone spilling ink or knocking over cups and breaking them, for instance, involve direct, production-based causation. However, causes can also indirectly produce effects, as in a causal chain when Andy hits Suzy with his bike, she falls into the fence, and it breaks. Here, Suzy is the proximal (direct) cause, and Andy the distal (indirect) cause. In addition to these productive causes, some causes, like absences, don't involve any production (Gerstenberg & Stephan, 2021; Wolff et al., 2010). If Billy forgets sunscreen and gets sunburned, the lack of sunscreen is a cause, not by producing the burn, but because the burn depended on its absence.

Adults and children distinguish these different causes and understand different causal verbs—lexical causatives like "break" and "burn", and periphrastic causatives like "caused"—to refer to them (Rose et al., 2021; Rose et al., 2025). Even four-year-olds demonstrate sophisticated understanding of the mapping between different causes and the causal verbs that refer to them. They recognize that lexical causatives like "break" refer to direct causes (e.g., Suzy), while "caused" can refer to indirect causes (e.g., Andy). Later, they understand that "caused" can even refer to absences (e.g., sunscreen). As children develop an understanding of causal relations and causal language, how does their understanding of responsibility develop? For instance, is Suzy, who "broke" the fence, or Andy, who "caused it to break", responsible?

Our Question

We ask how children's expanding conception of what causes what affects their responsibility judgments. While much research, particularly work examining an outcome-to-intention shift in moral judgment, focuses on assessing this shift with respect to judgments of wrongness, naughtiness and punishment (e.g., Cushman et al., 2013; Margoni & Surian, 2016; Nobes et al., 2017; Piaget, 1932), here we focus more closely

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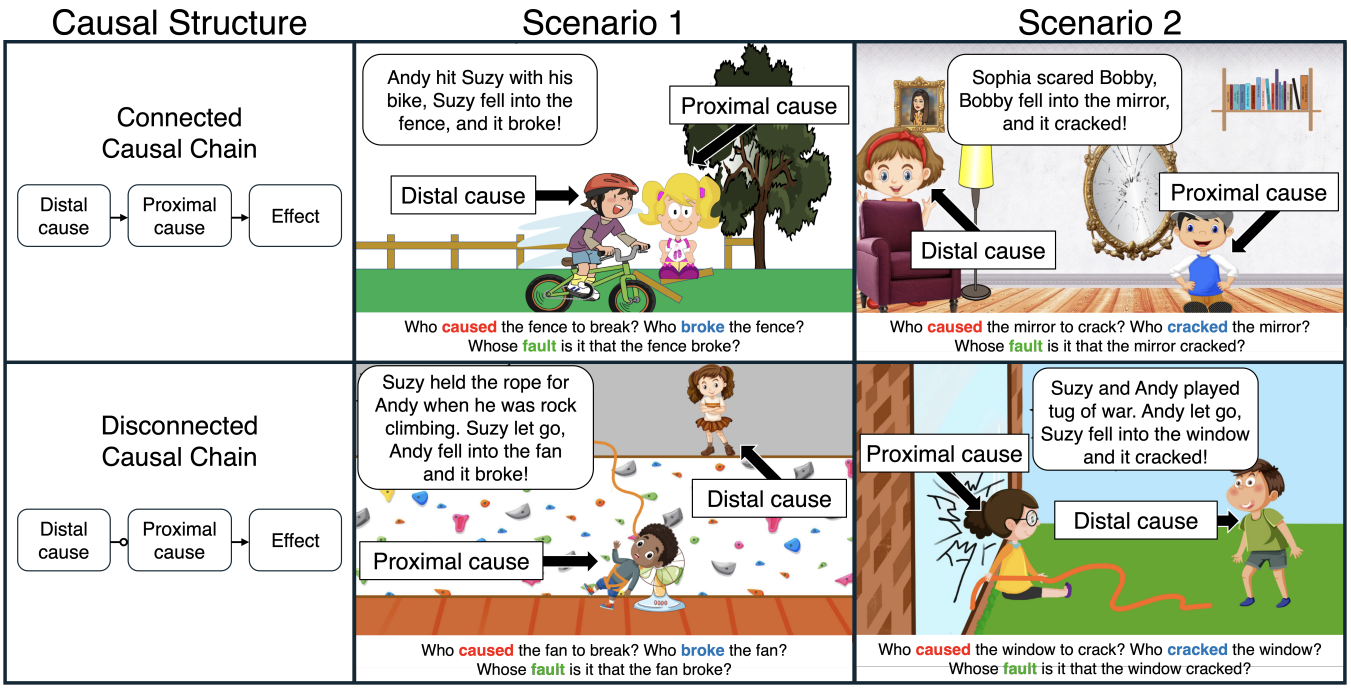

Figure 1: **Experiment overview.** Abstract causal structures and illustrations of the final stage in different scenarios. The top row shows the chain cases from Experiment 1, and the bottom row shows the chain cases involving disconnection from Experiment 2. Participants were asked two questions about causation, one that used a lexical causative (e.g.,"broke"), the other that used the periphrastic causative "caused", and a question about moral responsibility that used "fault".

on the relationship between causation and responsibility, using judgments of fault to probe moral responsibility (see also Mulvey et al., 2020).

Our Approach

We address our question in the following way. First, we focus on connected causal chains, such as Andy hitting Suzy with his bike, Suzy falling into the fence, and the fence breaking (see Figure 1, top panel). And we focus on causal chains that involve disconnection, where the disconnecting cause is related to the effect by an absence (Schaffer, 2000)—such as Andy climbing a wall, Suzy letting go of his safety rope, Andy slipping, falling into a fan and breaking it (see Figure 1, bottom panel). These situations, in contrast to typical work on the outcome-to-intention shift, involve the same outcome. Moreover, in contrast to situations where an agent directly produced an outcome, such as spilling ink or knocking over and breaking cups (e.g., Cushman et al., 2013; Nobes et al., 2017; Piaget, 1932), our situations involve direct and non-direct causes. Second, in addition to asking who, for example, "caused the fence to break" and who "broke the fence", we also ask children whose "fault" it is that the fence broke. Third, we focus on two lexical causatives, "break" and "crack", contrasting those with a periphrastic construction (e.g., "caused to break"), as well as "fault". Fourth, we examine how children understand these expressions in situations where the cause is connected versus disconnected from the effect. Fifth, since 4-year-olds already map different causal verbs to different events in connected causal chains (Rose et al., 2025), we examine whether 3-year-olds might do so too, and how this relates to their judgments of "fault".

Experiment Overview

Experiment 1 looks at connected causal chains, and Experiment 2 at chains involving a disconnection. For all results reported, we fit Bayesian logistic mixed effects models. We will refer to a statistical result of interest as "credible" when the 95% credible interval excludes 0 (except when reporting odds ratios, which we will interpret as credible when the credible interval excludes 1).

We pre-registered separate analyses for each selected referent (e.g., "Andy"—distal cause; "Suzy"—proximal cause) and report these results in the Appendix (see here). Here, we focus on directly comparing which referent was selected for a given causal verb.

All experiments, data, analyses, and links to pre-registrations are available here: https://github.com/davdrose/cause_fault_dev.

Experiment 1: Connected Causal Chains

The goal of this experiment was to determine whether children understand "cause", "fault" and lexical causatives to refer to different events in connected causal chains.

Methods

Participants We recruited 413 children (*gender:* 232 female, 181 male).[1] Children were recruited through Lookit (Scott & Schulz, 2017) and families were paid $5 for their participation.

Procedure Children were tested asynchronously and began with warm-up trials, which were included to help children become comfortable with saying their answers out loud. After being introduced to a puppet named Maggie, and being told that they would help her learn English, children were then presented with two pairs of sentences—"I live in Maple Street/I live on Maple street" and "I put socks on my feet/I put socks on my feets"—and for each one asked whether it is right or wrong for Maggie to say that.

Children then proceeded to the test scenarios. In one (see Figure 1 top row), Andy hits Suzy with his bike, she falls into a fence and it breaks; in the other (see Figure 1 top row), Sophia is hiding behind a chair, jumps out, scares Bobby, and he falls into a mirror and it cracks. Children were asked after the fence scenario "Who caused the fence to break?", "Who broke the fence?" and "Whose fault is it that the fence broke?". After the mirror scenario, they were asked "Who caused the mirror to crack?", "Who cracked the mirror?" and "Whose fault is it that the mirror cracked?". Children said their responses out loud.

Design We counterbalanced the order of the scenarios and questions ("fault" was either first or last). We also counterbalanced which character was in which causal role (e.g., either Suzy or Andy was the one on the bike).

Response Coding We pre-registered coding responses into two categories: "distal" if the character on the bike (or behind the chair) was mentioned, and "proximal" if the character who fell into the fence (or the mirror) was mentioned. Our coding scheme was not mutually exclusive. It was possible for a participant to refer to both a distal and proximal cause in the same response, or to neither of the two.

Results

Figure 2 shows the results. Figure 2a shows the relative proportion with which children selected the distal cause versus the proximal cause depending on whether the speaker used a lexical causative, "caused" or "fault". For these we included all responses except those where participants selected "neither" a distal nor a proximal cause. We report the results for each question and then report age effects (Figure 2a).

Effect of question Children were more likely to select the distal cause for "fault" (70.8%, 95% confidence interval (CI) [67.7%, 73.9%]) and "caused" (60.2%, CI [56.8%, 63.5%]) compared to lexical causatives (11.6%, CI [9.41%, 13.9%]). Specifically, children were 38.34 times more likely to do so for "fault" compared to lexical causatives (95% credible interval (CrI) [26.02, 52.41]), and 18.19 times more likely to do so for "caused" compared to lexical causatives (CrI [13.12, 24.48]). We also found that children were more inclined to select the distal cause for "fault" compared to "caused" (odds ratio: 2.11, CrI [1.63, 2.68]).

Effect of age The effect of age on children's responses varied depending on the question type. For "fault", the effect of age was positive (estimate: 0.589, CrI [0.477, 0.704]), indicating that as children become older they become increasingly likely to select the distal cause. We also found that the effect of age for "caused" was positive (estimate: 0.266, CrI [0.173, 0.357]). In contrast, for lexical causatives, the effect of age was negative (estimate: -0.210, CrI [-0.339, -0.077]), indicating that as children become older they become less likely to select a distal cause. Interestingly, the age effect for "fault" was stronger than for "caused" (difference: 0.323, CrI [0.195, 0.453]).

Individual participant response patterns Figure 2b shows the individual response patterns. Most participants selected the proximal cause only for the lexical causative (blue regions), and the distal cause for both "caused" and "fault" (brown regions). Some participants selected the proximal cause for both "caused" and "lexical" (purple regions), and some participants selected the distal cause only for "fault" (green regions). Noticeably, three-year-olds tended to choose the proximal cause for all three causal expressions (white region).

Discussion

When considering connected causal chains, such as Andy hitting Suzy with his bike, Suzy falling into the fence, and the fence breaking, 3-year-old children think that the proximal cause, Suzy, "caused" the fence to break, "broke" it, and that it is her "fault" that it broke. Around 4, children begin to distinguish these different causes and accordingly make different judgments of who is at "fault": Andy—the distal cause—"caused" the fence to break, it's his "fault" that it broke, but Suzy "broke" it. Interestingly, once children distinguish these kinds of causes, their understanding that it is the distal cause who is at fault develops faster than their understanding that the distal cause is the one who "caused" the outcome.

The situations in Experiment 1 involved causal chains where there was transference from the distal cause to the proximal cause and from the proximal cause to the effect. Production is involved at each step in the causal chain. How might children understand causation and responsibility for causes that don't produce their effects? For instance, if Cindy lets go of Billy's hand as he is climbing onto the roof, he falls on a car windshield and it cracks, there is a lack of connection, no transference, between Cindy and the windshield cracking. Instead, Cindy is a disconnecting cause. She let go of Billy's hand, and as such, an absence is involved is relating Cindy to the effect (see Schaffer, 2000; Schaffer, 2012, for a discussion of disconnections involving absences).

[1] We preregistered that we would collect data from 420 children. Data collection is still ongoing.

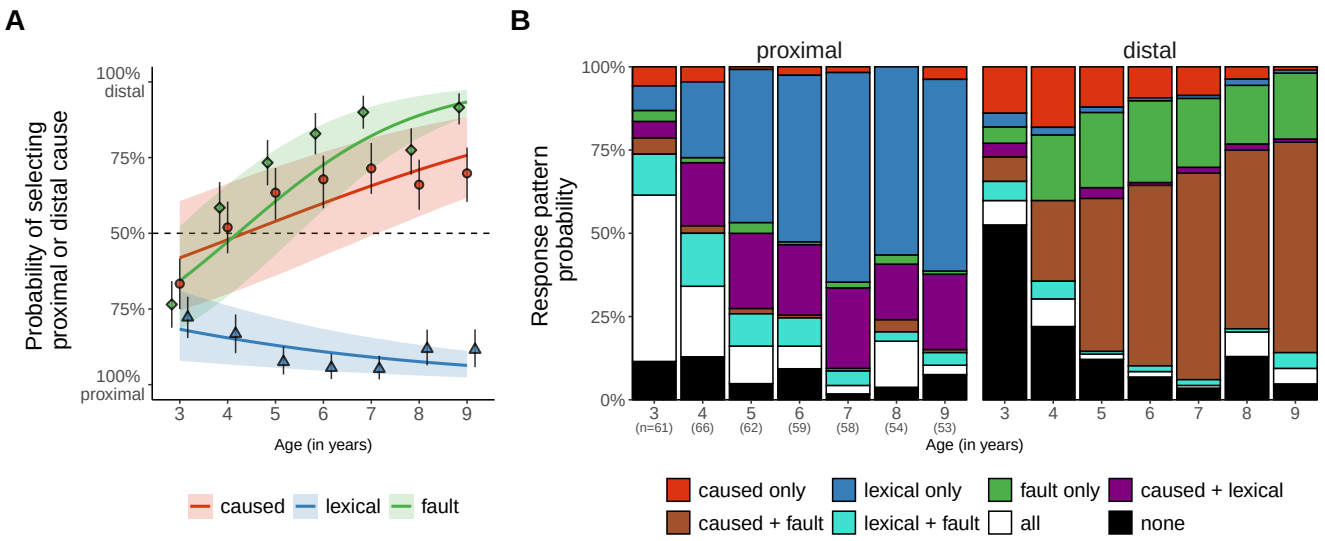

Figure 2: **Experiment 1 results**. **A** Probability of selecting the proximal or distal cause in a causal chain when asked questions about causation that used either "caused" or a lexical causative, like "break", and when asked a question about moral responsibility using "fault". Large points show the percentage with which each age group selected either referent. Error bars show 95% bootstrapped confidence intervals. Regression lines show the fits of Bayesian logistic mixed effects models with 80% credible intervals. These estimates exclude "neither" responses. **B** Individual response patterns for proximal and distal cause selections for each age group. "caused only", "lexical only", and "fault only" means they mentioned that cause (e.g., distal) for that question; "caused + lexical", "caused + fault", "lexical + fault" means they mentioned that cause (e.g., distal) for both those questions; "all" means they mentioned that cause (e.g., distal) for all questions; "none" means they didn't mention that cause (e.g., distal) for any of the questions.

Experiment 2: Disconnected Causal Chains

The goal of this experiment was to determine whether children understand "cause", "fault" and lexical causatives to refer to different events in causal chains involving disconnection.

Methods

Participants We recruited 384 children (*gender*: 205 female, 178 male, 1 no response/other).[2] Children were recruited through Lookit (Scott & Schulz, 2017) and families were paid $5 for their participation.

Procedure The procedure was the same as in Experiment 1, except that participants saw different scenarios involving two people holding a rope, one letting go and the other falling either onto a fan or into a window (see Figure 1 bottom row).

Design The design was the same as in Experiment 1.

Response Coding We pre-registered coding responses into two categories: "distal" if the character who let go of the rope was mentioned and "proximal" if the character who fell into the fan or window was mentioned. As in Experiment 1, our coding scheme was not mutually exclusive.

[2]We preregistered that we would collect data from 420 children. Data collection is still ongoing.

Results

Figure 3 shows the results. Figure 3a shows the relative proportion with which children selected the absent cause versus the direct cause depending on whether the speaker used a lexical causative, "caused" or "fault". For these we included all responses except those where participants selected "neither" a distal nor a proximal cause. We report the results for each question and then report age effects (Figure 3a).

Effect of question Children were more likely to select the distal cause for "fault" (65.6%, CI [62.1%, 69.0%]) and "caused" (57.6%, CI [54.1%, 64.1%]) compared to lexical causatives (8.28%, CI [6.28%, 10.3%]). Specifically, children were 67.18 times more likely to do so for "fault" compared to lexical causatives (CrI [41.17, 101.00]), and 36.46 times more likely to do so for "caused" compared to lexical causatives (CrI [22.76, 53.50]).

We also found that children were more inclined to select the distal cause for "fault" compared to "caused" (odds ratio: 1.84, CrI [1.38, 2.37]).

Effect of age The effect of age on children's responses varied depending on the question type. For "fault", the effect of age was positive (estimate: 0.758, CrI [0.621, 0.910]), indicating that as children become older they become increasingly likely to select the distal cause. We also found that the effect of age for "caused" was positive (estimate: 0.405,

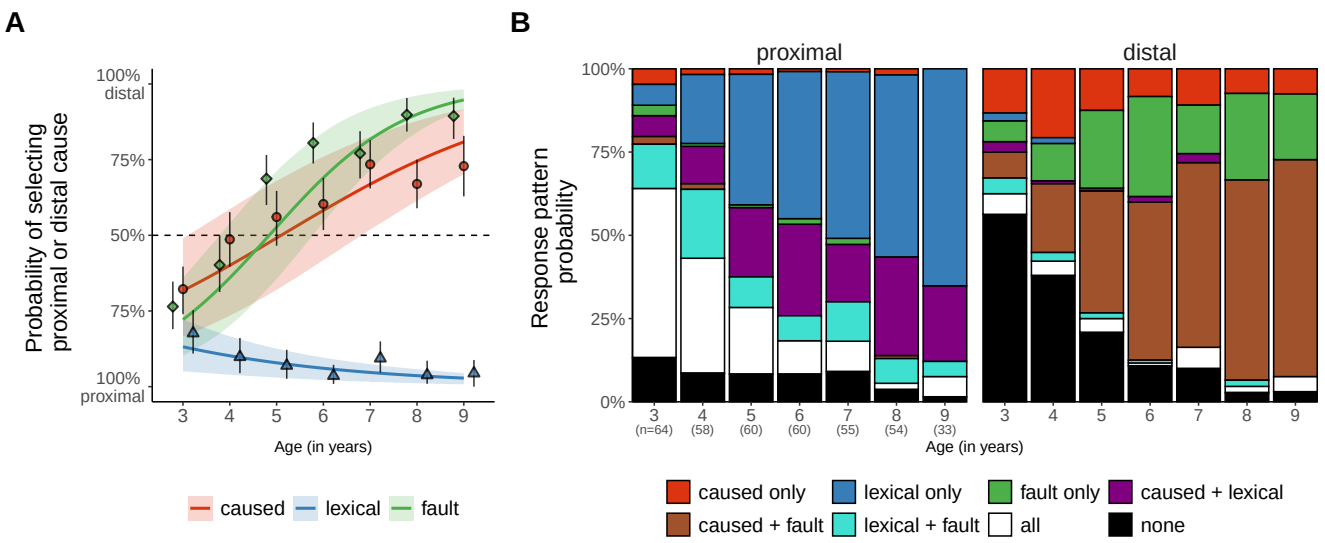

Figure 3: **Experiment 2 results**. **A** Probability of selecting the distal or proximal cause for causal chains involving disconnections when asked questions about causation that used either "caused" or a lexical causative, like "break", and when asked a question about moral responsibility using "fault". Large points show the percentage with which each age group selected either referent. Error bars show 95% bootstrapped confidence intervals. Regression lines show the fits of Bayesian logistic mixed effects models with 80% credible intervals. These estimates exclude "neither" responses. **B** Individual response patterns for proximal and distal cause selections for each age group. See Figure 2b caption for details.

CrI [0.284, 0.525]). In contrast, for lexical causatives, the effect of age was negative (estimate: −0.307, CrI [−0.485, −0.119]), indicating that as children become older they become less likely to select a distal cause. Interestingly, the age effect for "fault" was stronger than for "caused" (difference: 0.353, CrI [0.210, 0.504]).

Individual participant response patterns Figure 3b shows the individual participant response patterns. The overall pattern was very similar to that in Experiment 1. Again, most participants selected the proximal cause only for the lexical causative, and the distal cause for both "caused" and "fault". Some participants selected the proximal cause for both "caused" and "lexical", and some participants selected the distal cause only for "fault". Three-year-olds, again, tended to choose the proximal cause for all three causal expressions.

Discussion

When considering causal chains involving disconnection, such as Suzy letting go of Andy's safety rope, Andy slipping while he is wall climbing, falling into a fan, and the fan breaking, 3-year-old children think that the proximal cause, Andy, "caused" the fan to break, "broke" it, and that it is his "fault" that it broke. By around 5 or 6, children distinguish these different causes and accordingly make different judgments of who is at "fault": Suzy—the distal cause—"caused" the fan to break, it's her "fault" that it broke, but Andy "broke" it. Interestingly, once children begin to distinguish these kinds of causes, their understanding that it is the distal cause who is at fault develops faster than their understanding that the distal cause is the one who "caused" the outcome.

General Discussion

While it is widely agreed that responsibility requires causation, there are different kinds of causes. As children begin distinguishing these, how does this affect their understanding of moral responsibility?

Across two experiments, we found that when children begin to distinguish causes, they also begin to make different judgments about moral responsibility. We found in Experiment 1 that when Andy hits Suzy with his bike, she falls into a fence and it breaks, 3-year-old children thought "caused", "break" and "fault" referred to the proximal cause (e.g., Suzy). Around 4, children thought that these verbs to referred to different causes: Andy, the distal cause, "caused" the fence to break, it's his "fault" that it broke, but Suzy, the proximal cause, "broke" it. In Experiment 2, we found that when Suzy let go of Andy's safety rope, he slips while wall climbing, falls into a fan and the fan breaks, 3-year-olds took "caused", "break" and "fault" to refer to the proximal cause, Andy. Around 5 or 6, children understood these verbs to refer to different causes. Suzy, the distal cause, "caused" the fan to break, it's her "fault" that it broke, but Andy, the proximal cause, "broke" it.

Our findings build on Piaget's (1932) outcome-to-intention shift, suggesting an additional, perhaps more fundamental, shift that involves distinguishing types of causes. While most research evaluating the outcome-to-intention shift focuses on

situations where there is a single causal candidate that directly produced an outcome, causes need not always directly produce their effects. Some causes indirectly produce them, as distal causes in chains do, and others don't produce effects at all: disconnecting causes involve absences and thus don't produce outcomes. For instance, though releasing a rope might cause Andy to fall, there is nothing that releasing the rope transfers (Aronson, 1971). When children are not yet distinguishing between kinds of causes, they treat the direct cause as the one who is at fault, even if it was a mere accident that it produced the effect. For example, when Suzy gets hit by Andy, falls into the fence, and it breaks, she doesn't intend to break the fence. It is only by accident that she ended up breaking it. In many ways, this is similar to the standard finding that children determine responsibility by only focusing on the outcome. But we add that it isn't just that they focus on the outcome: they also focus on what directly produced the outcome. When there are two causal candidates available to select as the one who is at "fault", young children focus on who directly produced the outcome. When they begin distinguishing causes, they now no longer say that the person who directly produced the outcome is at fault. The indirect cause, whether through connection or disconnection, is at fault. That is, moreover, the person who "caused" the outcome to occur. Once children develop a more expansive conception of causation, and use different causal verbs to refer to them, they also shift in their judgments of fault.

The shift in children's causal judgments also depends on whether the distal cause involves a connection or disconnection. Distal causes that are connected to their effects are distinguished from proximal causes earlier than distal causes involving disconnection: those that bring about their effects through an absence. Thus, in addition to finding that distinguishing types of causes matters for fault, our findings also reveal that some causes are more challenging for children. Though it is more difficult to understand "caused" to refer to disconnecting causes, when children begin referring to disconnecting causes as what "caused" the outcome to occur, they are more inclined to think that those causes are also at "fault".

The use of different causal verbs to distinguish types of causes involves the development of both semantic and pragmatic understanding (see Beller & Gerstenberg, 2025). Children need to understand that lexical causatives like "break" refer only to direct, productive causes. And they need to understand that "caused" has a broader meaning. While children may initially view lexical causatives and "caused" as only referring to direct causes, once they begin distinguishing direct causes from distal causes—and have available a meaning for "caused" such that it can refer to these—they can then contrast kinds of causes in their use of different causal verbs. But doing so also requires pragmatic understanding: since "caused" can, for instance, refer to proximal and distal causes in a chain, when children are asked "Who caused the fence to break?", they need to recognize that the speaker likely intends to refer to the distal cause. Had the speaker wanted to refer to the proximal cause, they could have used the lexical causative instead. As these aspects of semantic and pragmatic understanding in the use of causal verbs unfolds over development, children also develop an understanding of "fault".

We observed a gradual separation in "caused" and "fault" over development. One way to understand this is that they have different semantic content. Part of what makes "caused" challenging is that it is true of proximal and distal causes in chains. This may be less the case for "fault" in our situations: Whereas it isn't literally false to say that, Suzy, the proximal cause, "caused" the fence to break, it does seem false to say that it is her "fault". Children come to understand that. What underlies this?

One simple idea is that when children consider chains, "fault" applies only to who initiated the chain (see German & Nichols, 2003; Gerstenberg & Lagnado, 2012; Henne et al., 2021; Hilton et al., 2010; McClure et al., 2007; Parker et al., 2020; Samland, Josephs, Waldmann, & Rakoczy, 2016; Spellman, 1997). But this could be underpinned by something deeper, including that there are different counterfactuals that need to be accessed when deciding fault compared to causation. Deciding fault is perhaps based, at least in part, on evaluating social counterfactuals, including those about chosen actions, whereas determining what causes what just deals with a description of the physical process, and perhaps relevant counterfactuals about that process (Gerstenberg, 2024; Lagnado & Gerstenberg, 2017; Wu & Gerstenberg, 2024). For instance, children might refer to the distal cause as what "caused" the fence to break because they realize that the fence wouldn't have broken without the occurrence of this event. They might, at the same time, recognize that the distal cause acted negligently (see also Lagnado & Channon, 2008; Nobes et al., 2017; Sarin & Cushman, 2024), think that it was at least reasonably foreseeable that a negative outcome would occur, and understand that had the agent made different choices, the outcome wouldn't have occurred.

Conclusion

We examined how children's developing ability to distinguish different causes relates to their understanding of moral responsibility. Before distinguishing types of causes, children largely treat direct productive causes as what causes outcomes to occur. These are also designated as being at "fault". But once they distinguish causes, they can now recognize that indirect causes and even disconnecting causes that involve absences can cause outcomes and be at fault. The ability to distinguish kinds of causes is related to a shift in children's understanding of moral responsibility. Given that responsibility requires causation—a fact that even young children recognize—this shift in different causal judgments to different moral judgments may be a deeper, more fundamental shift than an outcome-to-intention shift in moral judgment.

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