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The Co-construction of Counterfactual Worlds in Parent–Child Reminiscing

Angela Nyhout[1], Emily Veall[2], and Patricia A. Ganea[2]
[1] School of Psychology, Keynes College, University of Kent
[2] Department of Applied Psychology and Human Development, University of Toronto

Counterfactual thinking plays a central role in human judgment and decision making. Most of what we know about its development comes from studies where children are prompted to reason counterfactually. In which everyday contexts do children first hear and produce counterfactuals? In this study, we explored parent–child reminiscing as a promising context. We propose that children's early counterfactual thinking might be scaffolded by caregivers via a co-construction process, whereby one dyad member offers an antecedent (e.g., "If we'd remembered an umbrella") and the other offers a consequent (e.g., "we wouldn't be wet."). Sixty-two parent–child dyads (children aged 3–6 years) discussed positive and negative shared past events and were later prompted to discuss "what could have happened differently." We analyzed conversations for the dynamics of co-constructed counterfactuals and the forms any counterfactuals took, including their structure (additive or subtractive), direction (upward or downward), and controllability (controllable or uncontrollable). While spontaneous counterfactuals arose infrequently, all dyads produced counterfactuals when prompted. Parents frequently introduced counterfactual frames that children could build on, leading to co-construction. Counterfactuals were slightly more common following negative or unexpected events compared with positive and routine ones. Both parents and children predominantly focused on controllable aspects of events, suggesting a shared recognition of which counterfactuals are most useful for behavior change. Our results highlight the role of parent–child conversations in supporting the development of counterfactual reasoning and suggest potential pathways for fostering this skill in early childhood.

Public Significance Statement
This study highlighted how conversations with parents support young children's ability to think about "what could have happened" in the past—a skill called counterfactual thinking that plays an important role in learning and decision making. By understanding how parents support early counterfactual thinking, we can identify ways to foster problem solving and learning in young children.

Keywords: counterfactual thinking, parent–child conversations, reminiscing, co-construction, cognitive development

Episodic counterfactual thinking is the ability to reason about possible alternatives to past events. In adulthood, this tendency is deployed spontaneously and frequently. The counterfactual possibilities we imagine can shape our predictions, plans, and behavior. Counterfactuals often engender feelings of relief or regret about the past, and these emotions can help us to set intentions (Smallman & McCulloch, 2012) and make more optimal decisions in the future (Epstude & Roese, 2008). Counterfactuals are also known to play a role in causal (McCloy & Byrne, 2002) and moral judgments (Byrne, 2016).

Given the integral role of counterfactual thinking in everyday judgments and decision making, it is important to uncover when and how children begin reasoning about counterfactual possibilities. Counterfactual thinking is a complex cognitive process, requiring us to retrieve a representation of a past event, stipulate a change, and reason through the implications of those changes (Nyhout & Ganea, 2019a). The reasoner must hold in mind both a representation of what *actually* happened and what *could have* happened had a different set of circumstances transpired. Because of this complexity and the significant demands counterfactual thinking places on executive

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Angela Nyhout https://orcid.org/0000-0003-3852-9527
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Correspondence concerning this article should be addressed to Angela Nyhout, School of Psychology, Keynes College, University of Kent, Canterbury, Kent CT2 7NP, United Kingdom. Email: a.nyhout@kent.ac.uk

resources, some researchers have argued that it may not be within the capabilities of young children and may only emerge in middle to late childhood (Rafetseder et al., 2013)—somewhat later than other abilities to entertain hypothetical possibilities, including pretend play (Harris, 2000; Mitchell & Riggs, 2014; Nyhout & Ganea, 2019a) and future thinking (Beck et al., 2006).

With this complexity in mind, the present study explored whether and how children's early instances of counterfactual thinking are scaffolded by caregivers during conversations about past events. Specifically, we examined whether parents scaffold the cognitive process of thinking counterfactually with their children and also whether they signal to their children when and which types of counterfactuals might be useful. Moreover, in contrast to the dearth of research on children's early engagement in spontaneous counterfactual thinking, we know relatively more about their spontaneous and semispontaneous engagement in other types of hypothetical thinking. For instance, sometime during their 3rd year of life, children typically begin reasoning about and discussing hypotheticals in the form of pretend play (Harris et al., 1993) and to mark uncertainty about outcomes (O'Neill & Atance, 2000). Between the ages of 3 and 5, children's ability to consider and discuss the future improves steadily (Atance, 2015; Nyhout & Mahy, 2023).

Most past studies have prompted children's counterfactual thinking by asking them counterfactual conditional questions based on short narrative vignettes or videos. Typically, children are presented with causal events that result in an outcome (e.g., a floor getting dirty because of muddy shoes) and are then asked how things would have been different had the causal event(s) not occurred (e.g., "If the girl had taken her shoes off, would the floor be dirty?"). These studies generally find that counterfactual thinking shows protracted development between ages 4 and 8 years and that children's ability to answer counterfactual questions depends greatly on task complexity (Beck & Riggs, 2014), including the number and nature of causal relations they are asked to reason about (Nyhout & Ganea, 2021). This past work, focused on when children develop the *competency* to think counterfactually, does not tell us whether and when children encounter and engage in counterfactual thinking in everyday contexts nor the contents of the counterfactuals they entertain.

Limited evidence exists on children's spontaneous counterfactual thinking, with only one study to our knowledge directly analyzing this in childhood. Guajardo et al. (2016) presented 8- to 11-year-olds with short vignettes that varied in their outcome valence (negative or positive outcomes) and expectancy (expected vs. unexpected outcomes). Outcome valence was varied according to whether a character succeeded at some task (e.g., winning/losing a spelling bee) and expectancy was varied based on whether the character was the best or worst in their cohort at the activity. Children were asked to retell the story and then to reflect on the character's actions. Only 5% of children generated counterfactuals during retelling, while 42% mentioned a counterfactual when asked to reflect on the character's actions. In a subsequent study in which stories were made more engaging and relevant, 64% of children generated counterfactuals spontaneously, rising to 98% when explicitly asked what the character could have done differently. Children generated more counterfactuals in response to negative compared with positive events, but outcome expectancy did not appear to have a clear influence on the generations of counterfactuals. This study suggested that 8- to 11-year-olds engage in spontaneous counterfactual thinking when the content is interesting and relevant to them. In this case, the target content was about fictional characters. We may expect children to engage in counterfactual thinking earlier and more often in response to events they have participated in.

A corpus study of 2- through 5-year-old children's naturalistic production found that counterfactuals (which the researchers termed "past hypotheticals") appeared later and with less frequency than future hypotheticals in production, though both past and future hypotheticals appeared in the corpus before children's fourth birthdays (Kuczaj & Daly, 1979; Study 1). While this study captured instances of counterfactual thinking in naturalistic contexts, there are a few caveats. First, the researchers applied a strict criterion, requiring children to use the correct grammatical form to refer to past hypotheticals. In other studies, preschoolers have referred to counterfactuals (following prompts) without using the correct grammatical form (e.g., Nyhout & Ganea, 2020; Slobin, 1966). Second, the study was based on a limited sample, with some of the conclusions drawn from longitudinal data with only one child. Moreover, the contexts in which conversations were recorded (e.g., play) may not be especially fertile ground for eliciting past counterfactuals.

We know from previous studies with adults that certain contexts are especially likely to elicit counterfactual thinking. Adults' counterfactual thinking is triggered in response to negative, unexpected, and "near miss" scenarios over positive, neutral, and predictable ones (Byrne, 2016; Sanna & Turley, 1996)—we are more likely to engage in thoughts of "what if?" when we arrive at the airport late for our flight than when we arrive on time. According to the functional theory of counterfactual thinking, counterfactuals serve a preparatory function, allowing us to learn from past events and act more optimally in the future (Epstude & Roese, 2008). On the functional theory, Roese and Epstude (2017) outlined three ways in which counterfactual form varies: structure, direction, and focus. *Structure* can be additive, where the counterfactual includes additional actions or elements that did not occur in reality, or subtractive, where actions or elements are subtracted from reality to generate the counterfactual. Additive counterfactuals are considered advantageous because they "specify novel, creative solutions to build upon the status quo" (Roese & Epstude, 2017, p. 11). *Direction* refers to whether the counterfactual is better or worse than reality—evaluative classifications that are commonly referred to as upward and downward counterfactuals. Like additive counterfactuals, the functional theory predicts that upward counterfactuals will be more advantageous than downward counterfactuals because they identify improvements on the status quo and therefore may lead to more optimized performance in the future. Finally, *focus* refers to whether the counterfactual is about the self or another individual or entity. Generally, because counterfactuals are argued to help individuals modify their own behavior, those about the self should be more advantageous than those about others. Consistent with these predictions, adults generate more upward than downward (Markman et al., 1993), additive than subtractive (Callander et al., 2007), and self-focused than other-focused counterfactuals (McCrea, 2007). Moreover, extensive evidence indicates that adults are more likely to focus on *controllable* as opposed to uncontrollable aspects of a situation when thinking counterfactually (Girotto et al., 1991; Mandel & Lehman, 1996; Markman et al., 1993). Identifying and considering changes to features of a situation that one could have reasonably influenced (e.g., bringing an umbrella) is likely more useful than identifying features outside one's control (e.g., the weather).

Despite these insights from experimental studies, we know relatively little about how counterfactual thinking is embedded in social and communicative contexts. Most research on counterfactual thinking has relied on controlled tasks or hypothetical scenarios, leaving open questions about how counterfactuals are used in everyday discussions.

To understand the role of counterfactuals in children's lives, it is essential to seek to identify spontaneous instances. The present study looked to parent–child conversations about the past as a potential context for the early emergence of spontaneous counterfactual thinking. We did this for two reasons. First, given the complexity of counterfactuals and their utility in shaping human judgments and behavior, at least in adulthood, caregivers might play an important role in scaffolding children's early counterfactual thinking. We predicted that children's early use of counterfactual thinking may be scaffolded by parents through a *co-construction* process, where one conversation partner offers a counterfactual antecedent (e.g., "What would have happened if you had been more careful?") and the other offers a consequent (e.g., "I wouldn't have hurt myself."). In line with this prediction, preschoolers in Kuczaj and Daly's (1979) study were more likely to reference hypothetical possibilities when they were initiated by an adult compared with self-initiated. We adopt the concept of co-construction from Jacoby and Ochs (1995) who emphasize the ubiquity of collaborative, joint, or co-constructive interactions between children and caregivers in producing and understanding language, and building social and cultural identities.

Second, given that counterfactual thoughts arise most often when adults reflect on their past actions and decisions, conversations about the shared *past*—especially negative and surprising events—may elicit counterfactual possibilities. Such conversations with caregivers could not only support children with the cognitive demands of thinking counterfactually but could also guide them to recognize which counterfactuals are useful for making judgments and decisions.

Extensive research has focused on parent–child reminiscing, finding that conversations about the shared past support children's development in a vast array of areas—particularly when parents use an elaborative style that is detailed, emotional, and collaborative (Salmon & Reese, 2016)—including autobiographical memory (Fivush & Nelson, 2006), narrative language skills (Haden et al., 1997; Rowe, 2012), sense of self (Fivush et al., 2003), mentalizing (Taumoepeau & Reese, 2013), and socioemotional skills (Lagattuta & Wellman, 2002). A parallel line of research has also investigated parent–child conversations about the future (Hudson, 2006) and these conversations have been shown to improve children's prospection abilities (Chernyak et al., 2017; Leech et al., 2019). Previous research has not, to our knowledge, focused on whether and when parent–child reminiscing conversations depart from what happened to *what could have happened*.

To investigate this possibility, we took a novel approach that combined methods from naturalistic (Kuczaj & Daly, 1979) and experimental (Canfield & Ganea, 2014) parent–child conversation studies, and experimental studies examining adults' counterfactual thinking (see Roese & Epstude, 2017) to develop our procedure and coding scheme. We instructed parent–child dyads to discuss events that they had both experienced. Each dyad was asked to discuss one negative and one positive event. We analyzed conversations for alternatives to past events that could be articulated either as past-focused (i.e., counterfactual: "I should have been more careful") or future-focused possibilities ("Next time, I'll be more careful"). Through this study, we addressed two major questions. First, do parents scaffold the complex cognitive process of thinking counterfactually by *co-constructing* possibilities with children? We focus on an age group during which counterfactual thinking is an emerging ability (3–6 years) with the prediction that parents will scaffold children's counterfactual reasoning via a co-construction process in which the parent introduces a hypothetical frame that the child can enter.

Second, do parents signal to children when and which counterfactuals are useful for adaptive decision making and behavior change? We asked whether counterfactuals and future hypotheticals arise spontaneously during parent–child reminiscing, and if so, in which conversational contexts they arise (e.g., negative vs. positive events). Negative events typically trigger more counterfactual thoughts than positive ones, as we seek to identify how similar events could be avoided in the future (Epstude & Roese, 2008). We therefore expected dyads to generate more counterfactual alternatives in response to negative over positive events, in line with findings with adults (Sanna & Turley, 1996) and children (German, 1999). Given that the precise contents of the counterfactual generated matters for how we adapt our behavior in the future (Roese & Epstude, 2017; Smallman, 2013), we also examined the *form* of the possibilities generated by dyads, looking at structure (additive or subtractive), direction (upward or downward), and controllability (controllable or uncontrollable). We predicted that parents might signal to children which counterfactuals are more advantageous by generating more additive, upward, and controllable counterfactuals.

Method

Participants

The sample included 62 children between the ages of 3.10 and 5.92 ($M = 4.70$, $SD = 0.81$; 36 females) and their parents (94% mothers). A post hoc sensitivity analysis ($\alpha = .05$, 80% power) revealed that a sample of 62 dyads is adequate to detect a minimum effect size of $f^2 = 0.13$—a small to medium effect size according to Cohen (1992). Participants were primarily recruited from the Greater Toronto Area in Ontario, Canada and tested over video conferencing software (Zoom). As the study was conducted in English, children were required to have exposure to English at least 50% of the time, as indicated by parents prior to testing. Five children were additionally tested and excluded from this sample due to limited English proficiency ($n = 1$) and failure to engage in conversation ($n = 4$). Just over half (55%) of parents provided demographics information, identifying their child's ethnicity as White (47%), mixed ethnicity (35%), Chinese (18%), and Latin American (3%). The majority of parents reported having obtained a bachelor's degree or higher (90%). The study was not preregistered. Our target sample size was 60 dyads. Given the within-subjects design and the intensive nature of transcribing and coding parent–child conversations, we determined this sample size to be sufficient to detect meaningful patterns. Additionally, the challenges posed by the COVID-19 pandemic, such as conducting sessions online, informed our decision to select a manageable and realistic sample size.

Design and Procedure

This study was approved by the research ethics board at the University of Toronto. Parent–child dyads were tested over a single

session, which took place on a private video call with an experimenter due to the COVID-19 pandemic. The experimenter was present on-screen when providing instruction, and further guided participants through the study with PowerPoint slides containing written prompts and visual cues. The first portion of the study, the *spontaneous phase*, was intended to assess when and how counterfactuals may surface spontaneously during parent–child reminiscing. This phase involved a naturalistic parent–child conversation, where dyads were asked to reminisce on both a *positive* and a *negative* shared experience.

Parents were asked to first select an event to reminisce on with their child prior to initiating conversation. We counterbalanced whether dyads were first invited to choose and discuss the positive or negative event. Dyads were shown a slide outlining five event topics to choose from based on each set *valence* (*positive* or *negative*). The event topics included sample categories of events that children would typically experience and parents may be present for (e.g., positive: a time when the child "tried something new" or negative: "broke a rule"). Topics were broad categories of events intended to help parents select events from their experience that would meet our categorization of valence. Topics were also coded for the predictability of the implied event's outcome (*expected* or *unexpected*), as described in the next section, though participants were not explicitly instructed to select expected versus unexpected events. Instead, coding for *expectancy* happened post hoc. The experimenter instructed parents to select an event that was distinct rather than routine and asked the child to confirm that they had some memory of it.

Once the topic was established, the experimenter indicated that they would not be participating in the conversation, but instead would be turning off their camera and attending to other work to maintain the naturalistic quality of the exchange. Finally, dyads were advised to discuss the past event over approximately 5 min (though a time limit was not imposed) and address the experimenter once the conversation concluded. When the dyad indicated they had finished a conversation, the experimenter turned on their camera and invited parents and children to select and reminisce on the second event, using the same instructions as the first.

The second and final portion of the study was the *prompted phase*. This phase involved explicitly prompting dyads to consider alternatives to the events they had reminisced on. The experimenter asked dyads to consider "what could have happened differently?" and the following prompt was displayed on a slide shown to participants: "Please discuss how these events might have turned out ***differently***." Dyads were verbally instructed to discuss possibilities for both events in the order in which they were originally discussed. We included this conversational prompt to examine how parent–child dyads express counterfactuals (i.e., their contents and the possible dynamics of co-construction), regardless of whether these were spontaneously generated. We included the prompted phase because results from pilot testing ($n = 8$), carried out in person prior to the COVID-19 pandemic, suggested that spontaneous counterfactuals arose relatively infrequently. Again, in this phase, the experimenter indicated they would not be present for the conversation and that it should take approximately 5 min.

Coding

The entirety of dyads' conversations, including both the spontaneous and prompted phases, was transcribed using the CHAT transcription and coding format (MacWhinney, 2000). Transcription was semiautomated by Otter AI software and then checked for accuracy and converted to CHAT format by two research assistants. All transcripts were then reviewed for accuracy and adherence to the CHAT system by the second author.

One individual coded all transcripts, while a second individual coded 50% of the files to ensure reliability. Transcripts were first scanned line-by-line for instances of hypotheticals. We took a broad range of linguistic constructions to be hypotheticals, which we conceptualized based on context as any hypothetical variation on an established event (Slobin, 1966). Hypotheticals could include if + past tense (e.g., "If Grandma came over, we would have cake"), past subjunctive (e.g., "If Grandma had come over, we would have had cake"), wish constructions (e.g., "I wish Grandma came over so we could have cake"), and uses of "maybe" and modal verbs to refer to future possibilities (e.g., "Maybe Grandma will come over so we can have cake"; O'Neill & Atance, 2000). Instances in which the parent repeated the prompt verbatim were not considered valid counterfactuals. Utterances were the unit of analysis such that a counterfactual world discussed over the course of multiple utterances or conversational turns could be counted as multiple instances of counterfactuals. Successive utterances that did not offer anything new and only reframed a previous premise were not counted as instances of counterfactuals. Generally, this meant that each antecedent was counted once and each consequent was counted once, as a single antecedent could be met with multiple consequents and vice versa. If a previous hypothetical statement was restated with an added novel element or if the antecedent was rephrased in a manner that may allow for a novel interpretation, this would be counted as a distinct utterance (e.g., "what if it was very cold!" vs. "if it was snowing and cold outside!").

If a discrepancy in coding was identified, coders came to a consensus on how to categorize the utterance by discussion. Statements were identified and coded, according to (a) *spontaneity* (determined by where it appeared in the two study phases: spontaneous or prompted), (b) *temporal direction* (past counterfactual or future hypothetical), (c) the parent–child *dynamics* in constructing or co-constructing counterfactuals, (d) *contexts* (positive/negative), and (e) *form* were also addressed by the coding scheme. These categories are described in more detail below and outlined in Table 1. Examples from transcripts are presented in Table 2. Note that for categories (c)–(e), we focused on counterfactuals only.

First, we coded *spontaneity* according to the test phase that the utterance occurred in—*spontaneous* or *prompted*—to determine the prevalence of spontaneous counterfactual thinking during conversations.

Second, we coded *temporal direction* according to whether a hypothetical referred to a past counterfactual or future hypothetical variation on an established event, determined using both the surrounding conversational context and the linguistic construction used.

Third, we coded the contribution of the parent and child to counterfactuals. Counterfactuals comprise an antecedent (e.g., "If you brought an umbrella") and a consequent (e.g., "you wouldn't be wet"), but the order in which antecedent and consequent occur can vary. As such, we coded whether each counterfactual or partial counterfactual was an *initiation* or *completion* by the parent or child to capture their role in creating each counterfactual. The conversation partner who initiates a counterfactual does so by presenting a new hypothetical frame in the form of an antecedent (e.g., "What would have happened if you'd brought an umbrella?") or consequent (e.g., "How could you have stayed dry?") that the other

Table 1
Coding of Counterfactual Utterances Generated in Parent–Child Reminiscing

Spontaneous: *Counterfactual generated during parent–child reminiscing*	Prompted: *Counterfactual generated in response to "What could have happened differently?"*
Dynamics of construction: *The conversation partners' role in contributing to a counterfactual*	
Initiation: *Parent* or *Child* provides an original antecedent/consequent	
Completion (self): *Parent* or *Child* provides a corresponding antecedent/consequent to a previously stated initiation	
Completions were captured in analyses as:	
Co-construction: *Parent* or *Child* provides a corresponding antecedent/consequent to other partner's initiation	
Full counterfactual: *The same partner* provides both the antecedent and consequent.	
Contexts: *The type of event a counterfactual is based on*	
Positive/negative: Valence of the event	
Expected/unexpected: Reasonable predictability of the event's outcome	
Form: *The specific features of a counterfactual*	
Structure (additive/subtractive): Contains novel elements or removes elements present in the real event	
Direction (upward/downward): Offers a better or worse alternative to reality	
Controllability (controllable/uncontrollable): Refers to a feature of a situation that is within versus not within an agent's control	

conversation partner can add on. For the purpose of analyses, counterfactuals where one partner initiated and the other completed were coded as *co-constructions*. Those where the same partner offered both the initiation and the completion were coded as *full counterfactuals*.

Next, we coded the *context* in which counterfactual utterances occurred based on the type of event that invoked the counterfactual, denoted by its valence (*positive* or *negative*) and the expectancy of its associated outcome (*expected* or *unexpected*).

Finally, we coded the *form* of counterfactuals, with categories drawn from existing literature on adults' generation of counterfactual possibilities. On the functional theory of counterfactual thinking, certain forms are deemed to have greater functional value (Epstude & Roese, 2008; Roese & Epstude, 2017). The three types of form include *structure*: whether the counterfactual differs from the real event by adding (*additive*) or subtracting actions and elements (*subtractive*); *direction*: whether the counterfactual proposes a better (*upward*) or worse alternative to reality (*downward*), and *focus*: whether the counterfactual refers to the *self* or an *other*. However, because we were coding interactions between dyads—compared with past studies of adults' counterfactual thinking that mostly focused on single participants considering their own actions—we deemed focus to be a less relevant category. Instead, we coded for *controllability*: whether counterfactuals refer to features of a situation that were within the child's or parent's control, compared with uncontrollable features (Mandel & Lehman, 1996; see also Nyhout & Ganea, 2020, for results with children). We therefore captured structure (*additive* or *subtractive*), direction (*upward* or *downward*), and controllability (*controllable* or *uncontrollable* features).

Coding reliability was very good. There was a 92.4% overlap between the coders in utterances that were identified as hypotheticals. Of those utterances identified as hypotheticals, there was 91.3% agreement in how the utterances should be categorized according to the coding scheme. Any disagreements were resolved by discussion between the coders.

Transparency and Openness

This article details how we determined our sample size, data exclusions, experimental manipulations, and all measures used in the study. Anonymized transcripts, coded data, and study materials are available on the OSF project page (https://osf.io/6h89e/?view_only=3c218e6b6ad34545888276dd81b262f6; Nyhout et al., 2025). Data were analyzed using R, Version 4.0.3 (R Core Team, 2020), and the following R packages: ggplot2 (Version 3.3.3; Wickham, 2016) for data visualization, MASS (Version 7.3-53; Venables & Ripley, 2002) for negative binomial regression analysis, and pwr package (Champely, 2020) for the post hoc sensitivity analysis. The study design and analysis were not preregistered.

Results

In the following subsections, we first report descriptives where relevant before reporting the results of analyses. In preliminary analyses, we did not find gender differences in the production of target utterances, $p > .612$, and therefore do not include gender in our models. Consistent with most past studies of parent–child conversations, parents produced more utterances ($M = 135.74$, $SD = 48.62$) than children ($M = 75.10$, $SD = 34.33$) across the course of the conversations, $t(61) = 14.41$, $p < .001$, 95% CI [52.23, 69.06].

Spontaneity: Do Counterfactuals and Future Hypotheticals Arise Spontaneously During Parent–Child Reminiscing?

Spontaneous counterfactuals arose infrequently (Figure 1), with only six of the 62 dyads mentioning a counterfactual in the spontaneous phase. Spontaneous future hypotheticals were relatively more frequent, with 22 dyads mentioning at least one. In the *prompted* phase, this pattern was reversed, with counterfactuals appearing more frequently than future hypotheticals. All dyads produced at least one counterfactual, while 17 produced one or more future hypothetical. Given that dyads were prompted to discuss "what could have happened differently," the increased incidence of counterfactuals relative to future hypotheticals is expected.

Because the data were overdispersed, overall utterance $M = 0.99$, variance = 3.88, estimated overdispersion parameter (θ) = 2.389, indicating moderate overdispersion in the data, we used a negative binomial regression using the glm.nb function from the MASS

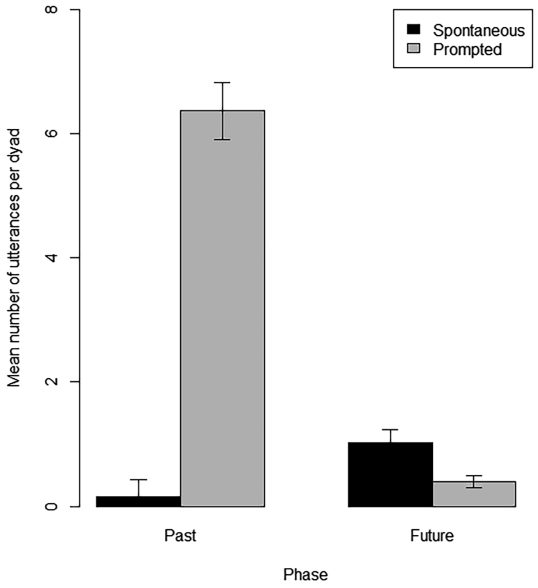
Table 2
Examples of Counterfactuals Generated in Parent–Child Reminiscing

Context: Type of event the counterfactual is based on	Form: Features of the counterfactual	Examples of coded counterfactual	Dynamics of construction: Contributions to the counterfactual
Positive and unexpected—tooth fairy brought presents	Upward additive	PAR: So the tooth fairy came at night while you were sleeping to bring you some presents, right?	*Parent initiates discussion on past event*
		CHI: It could be different if I saw!	Initiation
		PAR: So what would have happened if you would have seen the tooth fairy?	*Parent reframes child's premise*
		PAR: How would that have been different?	
		CHI: I would have been happy?	Completion (self) *Full counterfactual
		PAR: Would you have talked to her?	Completion (self) *Full counterfactual
		CHI: I would say "hi."	Completion (self) *Full counterfactual
		PAR: Yeah?	*Parent prompts child to build on counterfactual premise*
		PAR: What else?	
		CHI: I would ask if she could come say hi to you	Completion (self) *Full counterfactual
		PAR: You would have woken me up to meet the tooth fairy?	Completion (other) *Co-construction
		CHI: Yeah	*Agreement*
		PAR: That would have been okay	*Evaluative statement, confirming initial premise*
Negative and unexpected—car accident	Upward additive	PAR: What about the car accident?	*Parent initiates discussion on past event*
		PAR: Can you think of some other ways that that could have gone differently?	*and restates counterfactual prompt given by experimenter*
		CHI: Yeah	*Agreement*
		CHI: The man could have looked to the left again.	Initiation
		PAR: Yeah, so that that [the car accident] never happened?	Completion (other) *Co-construction
		CHI: Yeah.	*Agreement*
		PAR: I like that you thought of a good thing that might have happened in the car accident instead of it going worse.	*Evaluative statement, supporting child's contribution and restating counterfactual*
Negative and unexpected—fell and hit tooth on table	Downward additive	CHI: It was better if I knocked out my tooth!	*Evaluative statement on past event*
		CHI: Because if I fell down on the floor and broke my head…	Initiation
		CHI: Then I would not remember anything.	Completion (self) *Full counterfactual
		PAR: You could get a concussion or something	Completion (other) *Co-construction
		CHI: Yeah!	*Agreement*
		CHI: So [the] tooth thing was way better than having that	*Confirming evaluative statement on past event*
Positive and expected—planned fishing trip	Upward additive	PAR: What about the river?	*Parent initiates discussion on past event*
		PAR: What could have happened differently?	*and restates counterfactual prompt from experimenter*
		PAR: How about catching a big fish like a trout or a salmon?	Initiation
		PAR: And what if we did?	*Agreement and evaluative statement*
		PAR: Would not that be awesome?	
		PAR: Will you bring it home or will you leave it in the water again once you see it	*Future-oriented, prompting child to build on premise*
		CHI: I want to bring it home	Completion (other) *Co-construction
Negative and expected—planned allergy testing	Downward subtractive	PAR: But if you … we did not get the allergy test.	Initiation
		PAR: If you did not go through that, we would not know what you were allergic to.	Completion (self) *Full counterfactual

Note. Texts in italics include descriptions of the conversational elements that did not contribute to the quantitative coding. PAR = parent; CHI = child.

Figure 1

Mean Number of Past (Counterfactual) and Future Hypothetical Utterances Produced by Dyads During the Spontaneous and Prompted Study Phases



Note. Error bars represent standard error of the mean.

package (Venables & Ripley, 2002), which is appropriate for modeling overdispersed count data. The outcome variable was number of utterances and the predictor variables were child's exact age (mean centered), speaker (parent or child), utterance type (past or future hypothetical), and phase (spontaneous or prompted). The overall model fit was good, with a substantial reduction in deviance (null deviance = 947.34, residual deviance = 403.46), McFadden pseudo $R^2 = 0.34$, indicating the model explained a meaningful portion of variance in the utterance count. Speaker was a significant predictor of utterance count, with parents more likely to produce target utterances overall than children ($\beta = 1.06$, $SE = 0.16$, $z = 6.44$, $p < .001$). There was a significant effect of utterance type, such that future hypothetical utterances were significantly less frequent than past ones ($\beta = -2.56$, $SE = 0.39$, $z = -6.54$, $p < .001$). There was also a significant effect of Phase, such that spontaneous utterances were significantly less frequent than prompted ones ($\beta = -3.93$, $SE = 0.73$, $z = -5.42$, $p < .001$). Finally, there was a significant Type × Phase interaction: Future utterances were more likely than past ones during the spontaneous phase, whereas past utterances occurred more frequently in the prompted phase ($\beta = 5.20$, $SE = 0.84$, $z = 6.19$, $p < .001$). When controlling for total utterances produced by each speaker in a dyad, partner no longer emerged as a significant predictor ($p = .628$). Where relevant in subsequent analyses, we present results by proportion to control for speakers' overall talkativeness. Regression coefficients are presented in the Appendix.

Dynamics of Construction: Who Initiated and Completed Counterfactuals?

Because spontaneous utterances were infrequent, we focus analyses in this section on counterfactual utterances in the *Prompted* phase. To examine the co-construction dynamics, we ran a series of generalized linear models with Poisson distribution using the glm function in R to accommodate the outcome variable of utterance count. Descriptive statistics can be found in Table 3.

First, across dyads, we found a significantly higher occurrence of co-constructed compared with individually constructed counterfactuals ($\beta = -0.54$, $SE = 0.10$, $z = -5.18$, $p < .0001$). With increasing child age, the number of counterfactuals increased ($\beta = 0.19$, $SE = 0.079$, $z = 2.49$, $p = .0127$) though this did not differ across construction type (co- or individually constructed), $p = .790$.

We ran a series of analyses with partner (child or parent) and child's mean-centered age as predictor variables with the following outcome variables: (a) number of *initiations* (these could be antecedent *or* consequent), (b) number of *completions* (antecedent *or* consequent) of the other conversation partner's counterfactual, and (c) number of *full counterfactuals* (antecedent + consequent) produced by each partner.

For the number of *initiations*, only partner was a significant predictor ($\beta = 1.06$, $SE = 0.11$, $z = 9.32$, $p < .001$) such that parents initiated more counterfactuals than children. Child's age ($p = .083$) and the partner by age interaction were not significant ($p = .139$). When considered as a proportion of total utterances by each speaker, partner was no longer a significant predictor ($p = .620$).

For the number of *completions*, the model showed a significant main effect of age, such that more counterfactuals were completed with increasing child age ($\beta = 0.22$, $SE = 0.09$, $z = 2.52$, $p = .012$). There was also a significant main effect of partner, with children completing more of their partners' initiations than parents ($\beta = -1.83$, $SE = 0.18$, $z = -9.99$, $p < .001$). However, the partner × age interaction was not significant ($p = .564$). Note that not every counterfactual initiation was met with a completion, and these results reflect only completed responses. When considered as a proportion of total utterances by each speaker, partner ($p = .221$), and age ($p = .823$) were no longer significant predictors.

For the number of *full counterfactuals*, partner was a significant predictor, such that parents offered more full counterfactuals than children ($\beta = 1.05$, $SE = 0.20$, $z = 5.29$, $p < .001$). Age was also a significant predictor, such that more complete counterfactuals were produced with increasing child age (estimate = 0.61, $SE = 0.21$, $z = 2.91$, $p = .003$). This was moderated by a significant partner by age interaction (estimate = −0.52, $SE = 0.24$, $z = -2.14$, $p = .032$). With increasing age, children were more likely to offer a complete counterfactual on their own ($p = .005$), whereas child's age did not significantly predict the number of complete counterfactuals offered by parents ($p = .441$). Again, when considered as a proportion of total utterances by each speaker, partner ($p = .7401$), and age ($p = .662$) were no longer significant predictors.

Table 3

Mean Number of Counterfactuals (SD) That Were Individually- and Co-constructed by Partner and Dyad

Dynamic	Parent	Child	Dyad
Individual			
Full counterfactual	1.73 (1.86)	0.68 (1.21)	2.40 (2.17)
Co-construction			4.11 (2.70)
Initiations	4.85 (2.62)	1.69 (2.15)	
Completions	0.56 (1.21)	3.54 (2.45)	

Consistent with our predictions, parents appeared to scaffold children's counterfactual thinking by offering a counterfactual frame (antecedent or consequent) that children could then build on.

Context: Which Types of Events Encourage Discussion of Counterfactuals?

Each dyad discussed one positive and one negative event. Because counterfactual utterances were rare during the spontaneous phase (n = 2 for children, n = 8 for parents), we focus this section on utterances in the prompted phase. During this phase, children produced a total of 53 counterfactual utterances for positive events (M = 0.43, SD = 1.15) and 50 for negative events (M = 0.40, SD = 0.99). Parents produced a total of 162 counterfactuals for positive events (M = 1.31, SD = 1.79) and 130 for negative events (M = 1.05, SD = 1.54).

We used a negative binomial regression model with child's age, speaker (parent or child), and valence (positive or negative) predicting the number of counterfactual utterances produced. None of the individual variables emerged as a significant predictor of counterfactual utterances. Thus, we did not find evidence that the production of counterfactuals varied by event valence (negative or positive), in contrast to findings with adults indicating the occurrence of such differences (Byrne, 2016; Sanna & Turley, 1996). The lack of difference between conversational contexts could be due to the fact that they were prompted—though one may have still expected *more* counterfactuals to be generated in response to some event types than others. Full regression results are presented in the Appendix.

During coding, we also categorized events as expected or unexpected, although we did not explicitly prompt parents to discuss events of either type. Whereas positive events were fairly evenly split between expected (55%, n = 34) and unexpected (45%, n = 28), the majority of negative events were categorized as *unexpected* (89%, n = 55). Because of the naturally occurring and unequal distribution of expected and unexpected events, we present descriptive statistics only for these data. Thirty of the 34 dyads who discussed a positive-expected event generated at least one counterfactual possibility, for a total of 101 counterfactuals across all dyads (M = 1.63, SD = 2.17). Twenty-five of the 28 dyads who discussed a positive-unexpected event discussed one or more counterfactual, totaling 119 counterfactuals (M = 1.92, SD = 2.88). All seven dyads who discussed a negative-expected event generated at least one counterfactual (total = 20, M = 0.32, SD = 1.06). Negative-unexpected events appeared to provide the greatest stimulus for counterfactuals: 52 of the 55 dyads discussed at least one counterfactual (total = 165, M = 2.66, SD = 2.44).

Form: What Types of Counterfactuals Do Parents and Children Consider?

We present results from separate negative binomial regression analyses for each of the form categories with speaker (child or parent) and child's age as predictors. Descriptive statistics are presented in Table 4.

Structure

Children generated additive counterfactuals more than 80% of the time, whereas parents generated a more even proportion of additive and subtractive counterfactuals (58% vs. 42%, respectively). In a regression looking at the number of counterfactuals that added compared with subtracted features from a situation, none of the predictors emerged as significant, ps > .091.

Table 4
Descriptive Statistics Examining the Contents of Dyads' Counterfactuals, Including the Number of Counterfactuals That Arose Across the Sample, Proportion (per Conversation Partner), and Mean Number per Participant

	Child			Parent		
Category	n	%	M (SD)	n	%	M (SD)
Structure						
Additive	85	83	1.37 (1.72)	169	58	2.73 (2.17)
Subtractive	18	17	0.29 (1.05)	123	42	1.98 (1.66)
Direction						
Upward	49	48	0.79 (1.09)	125	43	2.02 (1.36)
Downward	54	52	0.87 (1.57)	167	57	2.69 (2.29)
Controllability						
Controllable	84	82	1.35 (1.82)	239	82	3.85 (2.73)
Uncontrollable	19	18	0.31 (0.92)	53	18	0.85 (1.52)

Direction

Children and parents considered both upward and downward counterfactual possibilities in relatively equal proportions (Table 3). None of the predictors emerged as significant for the regression examining the number of upward and downward counterfactuals dyads generated, ps > .097.

Controllability

More than three quarters of the counterfactuals generated by both children and parents identified controllable compared with uncontrollable features of situations (Table 3). We compared the number of controllable versus uncontrollable features identified in counterfactuals and found that dyads produced significantly more counterfactuals that identified controllable compared with uncontrollable features of a situation (estimate = −5.49, SE = 2.15, z = −2.55, p = .011). Neither speaker nor child's age were significant predictors, nor were their interaction terms (ps > .157).

Discussion

We examined whether and when counterfactual possibilities arise in the context of parent–child conversations about shared past events. Specifically, we asked whether (a) parents scaffold the complex cognitive process of thinking counterfactually with their young children and (b) whether they signal to their children when and which counterfactuals might be useful. Parents and their 3- to 6-year-olds discussed both negative and positive past events they had experienced together. During this age range, children's counterfactual reasoning abilities undergo major developments (Beck & Riggs, 2014; Beck et al., 2006; Harris et al., 1996; Nyhout & Ganea, 2019a; Rafetseder et al., 2010). Importantly, the production of counterfactuals in our study often occurred as part of a *co-construction* process whereby one member of the dyad—most often the parent—introduced a counterfactual frame which the other conversation partner built on. We

therefore found evidence in support of our first prediction that parents would scaffold children's counterfactual thinking through a co-construction process, particularly in the prompted phase.

Given extensive findings with adults that counterfactuals appear to serve a preparatory function, helping us to learn from past events and adapt our behavior in the future (Roese & Epstude, 2017), we further expected dyads to discuss more counterfactuals about negative compared with positive events, and to produce more additive, upward, and controllable counterfactuals (compared with subtractive, downward, and uncontrollable ones). However, spontaneous counterfactual and future hypothetical possibilities arose infrequently. When prompted by an experimenter to consider how past events could have happened differently, different contexts (positive vs. negative, expected vs. unexpected events) stimulated a fairly even number of counterfactual possibilities, although there was some indication that negative-unexpected events (e.g., accidents) stimulated more discussions of counterfactuals than positive and expected events. Dyads produced more counterfactuals that changed controllable, compared with uncontrollable features of events. In the following paragraphs, we consider the major findings of the present study in light of what we know about counterfactual thinking in both development and adulthood.

In this study, we asked whether interactions with caregivers, and specifically interactions involving conversations about the shared past, may provide scaffolding for children's expression of counterfactual thinking in conversations. We found partial support for this prediction. When prompted to discuss how past events could have been different, parents provided scaffolding by introducing a counterfactual antecedent or consequent that children could then build on. Co-constructed counterfactuals significantly outnumbered individually constructed ones. Moreover, with increasing age, children in our sample constructed more full counterfactuals on their own, as well as completed more of their parents' initiations.

Interestingly, parents' counterfactual initiations did not appear to be significantly influenced by the child's age. This finding suggests that parents might implicitly recognize the complexity of counterfactuals and maintain a consistent role in initiating and co-constructing counterfactuals, even as children's own contributions increase with age. At least in the prompted phase, parents supported children's counterfactual reasoning in the full age range studied. It is an open question whether children's responses observed in the co-constructed conversations—especially among the youngest children in our sample—reflect genuine counterfactual reasoning or a more general understanding of causal relationships (Rafetseder & Perner, 2010). We can be more certain that children were engaging in genuine counterfactual reasoning in the cases where they initiated counterfactual questions or premises during conversations ($M = 1.69$ initiations per child).

Although children first show the ability to reason based on counterfactual premises around the age of 4 (Harris et al., 1996; Nyhout & Ganea, 2019b, 2020), their success at counterfactual reasoning—typically indexed as their ability to answer counterfactual questions with a logically correct response—depends greatly on the complexity of the causal models they are asked to reason about (Nyhout & Ganea, 2019a), including the number and nature of causal relations (e.g., Nyhout & Ganea, 2021; Nyhout et al., 2023). Some researchers have highlighted that children may "mimic" counterfactual reasoning in scenarios involving single causes, answering counterfactual questions based on their general causal knowledge—for instance, inferring that a character would not be wet if it had not rained, because they know that a lack of rain is usually associated with being dry (Rafetseder & Perner, 2010). The extent to which children's participation in conversation about counterfactuals reflects causal or counterfactual thinking is an important direction for future study.

Children's ability to express counterfactual thoughts in conversation may also be influenced by linguistic factors. Recent findings from an elicited production task of hypothetical language (Grigoroglou & Ganea, in press) show that beginning at age 3, children can use a variety of linguistic forms to express hypothetical thought and by age 6, they produce conditional sentences "if-then" constructions at similar rates as adults. Nevertheless, the use of linguistically complex constructions, such as if-clauses, is more predominant in low-hypotheticality scenarios (e.g., indicative conditionals, "If grandma comes over, we eat cake") than in high-hypotheticality scenarios (e.g., counterfactual conditionals, "If grandma had come over, we would have eaten cake"; Grigoroglou & Ganea, in press). These findings complement our own, showing that even though children are able to reason counterfactually earlier in development (e.g., Nyhout & Ganea, 2019b), their ability to express counterfactuals in conversation is still under development at age 6.

The co-construction process observed in parent–child conversations could serve to reduce the complexity of counterfactual reasoning for children, with parents simplifying or breaking down causal and counterfactual inferences into more manageable chunks. Interestingly, the co-construction process we observed in naturalistic conversations mirrors the structure of many counterfactual reasoning tasks used in experimental settings, where children are presented with a counterfactual premise (e.g., "What if the girl had taken off her shoes?") that they must then complete. In this study, parents naturally initiated the counterfactual premise, much like experimenters do in structured tasks. This finding underscores the ecological validity of counterfactual tasks used in experimental settings.

With increasing age, children showed an increasing tendency to offer full counterfactuals without the support of parents. This finding provides the first evidence to our knowledge that children can express full counterfactual thoughts (i.e., antecedent + consequent) that have not been initiated by an adult experimenter or parents. In future work, we intend to look more widely at the contexts that may encourage children to express counterfactual ideas spontaneously.

Counterfactuals in our study arose primarily when dyads were prompted to discuss them. Spontaneous counterfactuals and future hypotheticals were infrequent during discussions about the shared past, which may be due to the retrospective nature of the conversations. Parents might be more likely to use counterfactuals for corrective purposes in the immediate aftermath of an event (e.g., "You wouldn't have fallen off your bike if you had been looking where you were going") rather than during later reminiscing, when their focus may be on supporting memory for the event, rather than alternative possibilities. If so, we may find more instances of counterfactuals if we are able to capture conversations immediately after a mistake or accident occurs.

Beyond the role of conversational timing, other types of interactions might promote the development of children's spontaneous counterfactual thinking. Given the overlap between causal, counterfactual, and scientific reasoning (Nyhout & Ganea, 2021), conversations that encourage children to consider rich causal explanations or hypotheses could provide cognitive and linguistic scaffolding that facilitates counterfactual reasoning. Variations in

parents' conversational scaffolding style are also known to influence children's autobiographical memory and perspective-taking (Fivush & Nelson, 2006; Haden et al., 1997; Salmon & Reese, 2016; Taumoepeau & Reese, 2013). In a similar vein, children whose parents engage them in more elaborative and decontextualized forms of conversations may also have more opportunities to consider counterfactual possibilities.

While exposure to different types of conversations may provide a foundation for counterfactual thought, the likelihood of counterfactuals arising appears to be influenced by the nature of the event under discussion. Although dyads were not explicitly instructed to discuss expected versus unexpected events, we found preliminary evidence that negative-unexpected events triggered more counterfactuals than other types of events, consistent with past work with adults (Byrne, 2016; Sanna & Turley, 1996). In our main analysis, comparing negative and positive events, however, dyads in our sample discussed a relatively equal number of counterfactuals across both negative and positive events. The lack of difference across events could have been due to participants being prompted to consider alternative possibilities in both cases. However, some past studies with adults have found differences across contexts in the occurrence of counterfactual thoughts, even when participants are explicitly prompted to think of them (e.g., "As commonly happens in such situations, Mr. Jones often thought, 'If only?', How do you think Mr. Jones continued this thought?"; Kahneman & Tversky, 1982; Mandel & Lehman, 1996). Due to the relatively low number of spontaneous counterfactuals, and because all dyads produced counterfactuals when prompted, we may find more differences across contexts if, consistent with the above suggestion, we are able to capture conversations in the immediate aftermath of events. For instance, parents and children may discuss counterfactual alternatives more in response to unexpected negative events (e.g., the child breaking an object) compared with unexpected positive events (e.g., the child winning a raffle prize at school).

In looking at the *form* of the counterfactuals generated, we found preliminary evidence that parents help children to identify which types of counterfactuals are useful for adaptive behavior change. Both parents and children showed an overwhelming tendency to discuss *controllable* compared with uncontrollable counterfactuals. In learning from past events, it is likely more adaptive to identify changes to features of a situation that were within one's control (e.g., the speed at which one was driving) compared with uncontrollable features (e.g., the weather conditions). In past research, children have shown an early and increasing tendency to identify controllable features of a situation in their counterfactuals between the ages of 3.5 and 8 years (Nyhout & Ganea, 2020). Thus, it appears that parents signal to children during conversations that controllable counterfactuals are useful ones to consider, and children readily build on these alternatives to controllable events. Future work may also look at whether parents and children spontaneously mutate other features of situations that previous work suggests are a focus of adult counterfactual thinking, including deviations from moral and statistical norms and more temporally recent events in a sequence (Byrne, 2016).

In contrast to our predictions, parents were relatively equally likely to add and subtract features of events in their counterfactuals and to consider both better and worse variations on reality. In past research, adults have generated more additive than subtractive counterfactuals and more upward than downward counterfactuals, with additive and upward counterfactuals providing more useful templates for future behavior (Roese & Epstude, 2017). Similar patterns might have emerged in the present study had parents generated more spontaneous counterfactuals. Interestingly, children in the present study were much more likely to generate additive than subtractive counterfactuals (83% vs. 17%, respectively), but this pattern was attenuated among parents (58% vs. 42%). Children may therefore already be starting to recognize which counterfactuals are more adaptive.

Together, the current results suggest that parents scaffold children's early counterfactual thinking in conversations by co-constructing counterfactuals. Whether and when counterfactuals emerge more spontaneously in parent–child conversations remains an open question. As we have suggested, parents may issue counterfactuals when discussing events with children more immediately after they have happened. Future work should seek to widen to scope of parent–child interactions examined. For instance, do parents discuss counterfactual possibilities with children when reading books or watching films in which characters have caused accidents or engaged in transgressions to enable their children to learn lessons from them?

In addition to widening the range of parent–child interactions, future work should also seek to widen the generalizability of the current work. Our study was limited by the fact that most of the parents who took part were female and dyads were mostly from middle-socioeconomic backgrounds. Although we did not find gender differences in our sample, past work has identified differences in mothers' and fathers' interaction styles with their young children. For instance, fathers tend to pose more *wh*-questions to their children (Leech et al., 2013; Rowe et al., 2004; Tomasello et al., 1990). Counterfactual questions typically take a *wh*-form (i.e., "What would have happened if?") and therefore one might expect to find more instances of counterfactuals in fathers' compared with mothers' speech given a larger sample.

As extensive past work has demonstrated, parent–child conversations are fruitful ground for fostering children's cognitive and linguistic abilities, including children's autobiographical memory (Fivush & Nelson, 2006), narrative language skills (Haden et al., 1997; Rowe, 2012), sense of self (Fivush et al., 2003), mentalizing (Taumoepeau & Reese, 2013), and socioemotional skills (Lagattuta & Wellman, 2002). The current work extends this focus to provide a picture of how parents scaffold children's early counterfactual reasoning abilities. Parents introduced counterfactual premises that their children could then build on, significantly lessening the cognitive demands associated with entertaining and reasoning from false premises. Given the utility of counterfactual thinking across a broad range of tasks—including causal inference, adaptive behavior change, and scientific reasoning—it should be of interest to identify how caregivers can be encouraged to foster children's developing counterfactual thinking abilities.

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(*Appendix follows*)

Appendix

Supplementary Statistics

Table A1

Regression Coefficients From the Negative Binomial Regression Model With Age, Partner, Temporal Direction, and Phase as Predictors With Utterance Frequency as the Outcome Variable

Coefficient	Estimate	*SE*	*z*	*p*
(Intercept)	0.49	0.13	3.80	<.001
Age_c	0.22	0.16	1.38	.1688
PartnerParent	1.05	0.16	6.44	<.001
TypeFuture	−2.56	0.39	−6.54	<.001
PhaseSpontaneous	−3.92	0.72	−5.42	<.001
Age:PartnerParent	−0.22	0.20	−1.08	.2802
Age:TypeFuture	−0.46	0.48	−0.96	.3349
PartnerParent:TypeFuture	−0.33	0.48	−0.68	.4941
Age:PhaseSpontaneous	−0.13	0.90	−0.14	.8886
PartnerParent:PhaseSpontaneous	0.33	0.82	0.40	.6914
TypeFuture:PhaseSpontaneous	5.20	0.84	6.19	<.001
Age:PartnerParent:TypeFuture	0.07	0.59	0.12	.9012
Age:PartnerParent:PhaseSpontaneous	0.27	1.02	0.27	.7889
Age:TypeFuture:PhaseSpontaneous	0.28	1.04	0.27	.7896
PartnerParent:TypeFuture:PhaseSpontaneous	−0.83	0.98	−0.85	.3967
Age:PartnerParent:TypeFuture: PhaseSpontaneous	0.06	1.21	0.05	.9625

Table A2

Regression Coefficients From the Negative Binomial Regression Model With Age, Partner, and Valence (Context) as Predictors

Coefficient	Estimate	*SE*	*z*	*p*
(Intercept)	−0.41	0.93	−0.44	.6596
Age	0.04	0.19	0.21	.8312
PartnerParent	1.91	1.13	1.69	.0915
ValencePositive	−1.59	1.35	1.18	.2397
Age:PartnerParent	−0.20	0.24	−0.86	.3885
Age:ValencePositive	0.34	0.28	1.23	.2193
PartnerParent:ValencePositive	0.42	1.62	0.26	.7954
Age:PartnerParent:ValencePositive	−0.04	0.33	−0.13	.8945

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