Revisiting the 5- to 7-Year Shift: The Age of Metacognitive Control?

Garvin Brod

Leibniz-Institut für Wissensmedien

Leibniz Institute for Research and Information in Education

Katherine McAuliffe

Boston College

Tomer Ullman

Harvard University

Author Note

Correspondence concerning this article should be addressed to Garvin Brod, Leibniz-Institut für Wissensmedien, Schleichstr. 6, 72076 Tübingen, Germany. Email: g.brod@iwm-tuebingen.de

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Abstract

The term *5- to 7-year shift* refers to the marked changes in behavior observed as children transition from preschool age to school age. In their seminal book, Sameroff and Haith (1996) synthesized developmental science's understanding of the causes and consequences of this shift. Has this understanding evolved in the last 30 years? In this article, we examine recent lines of research that provide new insights on the substantial developmental changes occurring between ages 5 and 7, including the emerging benefits of active learning, the onset of counterfactual reasoning, and growing sensitivity to social norms. While the role of environmental factors remains debated, recent evidence highlights metacognitive control as a central driver of the 5- to 7-year shift. During this period, children can increasingly translate the outcomes of their monitoring processes into action, enabling more flexible, goal-directed regulation of learning and social behavior.

Keywords: cognitive development, kindergarten, early elementary, schooling

Across cultures and historical eras, the years from five to seven mark a turning point in children's lives**.**[AU: Can this be rephrased so it is in the active voice? Who has recognized this? Or could it be rephrased as “children undergo …”?]. In a study that examined ethnographies from 50 communities worldwide, researchers identified a consistent shift in expectations across this interval: Children were granted greater household responsibility and, crucially for education, were regarded as teachable (Rogoff et al., 1975). To this day, in many societies, ages 6 or 7 mark the onset of formal instruction, reflecting a shared intuition that at this age, children become capable of learning in fundamentally new ways.

The term *5- to 7-year shift* was introduced by Sheldon White (1965), but it was Jean Piaget who placed this period at the center of cognitive developmental theory. Piaget (1950) described these years as marking the transition from pre-operational to concrete-operational thinking, during which children moved from reliance on surface features toward more principled causal reasoning, from focusing on single dimensions to coordinating multiple perspectives, and from an egocentric viewpoint to recognizing that others hold different beliefs. Piaget argued that this progression was not simply the result of learning but of underlying biological maturation. In his view, children younger than 5 operated with a qualitatively different logic than those age 7 and older.

In 1996, a landmark volume entitled *The Five to Seven Year Shift: The Age of Reason and Responsibility* (Sameroff & Haith, 1996) charted the research landscape that followed Piaget’s foundational work. It documented how neo-Piagetian approaches revealed developmental change to be far more domain-specific and sensitive to task demands than Piaget proposed (see Brainerd, 1978), and how fine-grained methods showed that competencies Piaget believed to emerge around age 6 or 7—such as number understanding or causal inference—could be detected in much younger children under the right conditions (see Baillargeon, 1994). Environmental and sociocultural accounts further challenged the focus on individual maturational processes, arguing that transitions in roles, demands, and responsibilities—often connected with the start of formal schooling—played a central causal role in reorganizing children's cognition, motivation, and self-concept (see Morrison et al., 1995). Thus, this volume reframed the 5- to 7-year shift not as a unitary stage transition but as a developmental reorganization emerging from the dynamic interplay of brain maturation, experiential input, and institutional demands.

It has been 30 years since publication of Sameroff and Haith's book, and about 60 years since the term 5- to 7-year shift was coined. Has our understanding of cognitive changes between the ages of 5 and 7 evolved? In this article, we highlight three areas in which researchers have identified new insights into cognitive changes between ages 5 and 7 over the last 10 years: 1) active learning, 2) counterfactual reasoning, and 3) sensitivity to social norms. Our treatment is necessarily selective; we cannot do justice in one article to the full breadth of empirical and theoretical work of the past three decades. We selected these three areas because we see in them a central thread connecting the observed changes: children's growing ability to translate the outcomes of monitoring processes into action, a capacity known as *metacognitive control*.

Active Learning

Researchers have examined how performing self-directed actions during learning shapes learning success. Some studies have focused on allowing learners to select the order and pacing of study, which usually benefits older children and adults (Katzman & Hartley, 2020; Markant et al., 2016; Sobel & Kushnir, 2006).[1] An age-comparative study with 5- to 11-

[1] For the sociodemographic characteristics of the studies reviewed herein, please see Supplemental Table 1 in online materials.

year-olds contrasted this condition with a yoked control group in which children passively observed another child's choices (Ruggeri et al., 2019). Yoked designs isolate the effects of self-directed activity because they ensure that both groups encounter the same information for the same amount of time. The benefits of choosing how to study emerged around ages 6 to 7 and increased sharply through age 9.

Researchers observed a similar developmental pattern when 5- to 9-year-olds made inconsequential choices about where images appeared on the screen, with 5- to 6-year-olds benefitting only marginally. In contrast, in a study in which 4- to 7-year-olds could chose an ending for a cartoon clip or see a pre-chosen ending, researchers did not find a reliable benefit for long-term memory (Tani et al., 2025). However, bccause the sample was relatively small, the study did not examine age-related differences, leaving unanswered the question of whether 6- or 7-year-olds showed an emerging benefit. Together, these studies indicate that the benefits of active control are not present early in childhood but emerge gradually over the first decade of life, with a particularly dynamic transition around ages 5 to 7.

Other research has investigated the effects of actively predicting outcomes before seeing the correct answer, a strategy that reliably enhances learning in older children and adults (Brod, 2021; Theobald & Brod, 2021). In one study with 4- to 7-year-olds, only children 5 and older benefited from predicting associated words before receiving feedback; younger children often recalled their (incorrect) predictions instead of the correct answers. A similar developmental trajectory appeared in research on learning from conflicting feedback. In a study of 5- to 9-year-olds, children predicted which of two objects would displace more water before observing the actual outcome (Holstein et al., 2025). Many children erroneously believed that an object's weight played a role in water displacement, leading to incorrect predictions. Children's ability to monitor and resolve conflicts between their prediction and the feedback emerged at about ages 6 to 7 and improved thereafter. Around these ages, children's pupils began to dilate more following incorrect predictions than following correct predictions, indicating successful conflict monitoring. Better conflict monitoring, in turn, predicted a greater likelihood of subsequentely revising an incorrect belief. Taken together, these findings suggest that actively generating predictions—especially when those predictions are likely to be wrong—begins to effectively promote learning around age 6.

In summary, recent research on active learning indicates that self-performed actions begin to reliably enhance learning relative to observed actions between 5 and 7 years. The advantage of self-performed over observed actions likely depends on metacognitive abilities—specifically, the capacity to monitor how new information relates to prior knowledge and adjust one's thinking and actions accordingly (i.e., metacognitive control). Young children typically struggle with this task. Converging evidence from research on metacognition suggests that children do not reliably slow their responses in the context of conflict until about ages 6 or 7 (Davidson et al., 2006; Roebers, 2022). Thus, it is tempting to speculate that the emerging benefits of self-directed activity around this age reflect a broader developmental surge in metacognitive capacities.

Counterfactual Reasoning

What if Sameroff and Haith (1996)'s book had never been written? This is a counterfactual question because it asks us to imagine the consequences of things known to be contrary to the real world. While people may disagree about the specifics of counterfactuals, they are rather consistent about the kinds of changes they make when considering alternatives to reality and the ways in which they make these changes (Byrne, 2007; Roese, 1997; Roese & Olson, 2014). Counterfactuals are closely tied to causal judgment and the understanding of how the world could have been different matters for how people understand the world as it actually is (Gerstenberg, 2024; Goddu & Gopnik, 2024; Roese, 1997). Counterfactuals help people understand how to apportion credit and blame (see, e.g., Gerstenberg, 2024; Payir & Guttentag, 2019). Given their importance for learning, reasoning, attribution, and action, it may be surprising to realize how late many aspects of counterfactuals seem to develop.

In the years since Sameroff and Haith's publication (1996), much developmental work has examined when and in what way children begin to reason counterfactually. Roughly speaking, early results pointed to early competence, with claims of children as young as 2 years reasoning counterfactually (Harris et al., 1996). Later work suggested that these results were false alarms (Beck & Guthrie, 2011), and pushed the full understanding of counterfactuals more toward age 12 (Rafetseder et al., 2013). Since then, the pendulum has swung back, with recent work placing the emerging of counterfactual reasoning closer to 5 to 7 years (see, e.g., Kominsky et al., 2021; McCormack et al., 2018; Nyhout & Ganea, 2019), though no clear consensus exists about the exact trajectory. A better understanding of the developmental trajectory of counterfactual reasoning is intimately linked to understanding why this reasoning emerges when it does. The different findings with regard to age may have to do with different methods of assessement, what is meant by counterfactuals, and the ability to solve the same task in different ways, only some of which rely on counterfactual reasoning (Kominsky et al., 2021; Rafetseder et al., 2013).

Generally, counterfactual reasoning requires children to hold a model of the actual world W, and then intervene on variables within that model V, simulate the consequences of that change on downstream or upstream variables to create a similar-but-changed copy of the world C, while keeping W around. Such basic operations are necessary but not sufficient for answering counterfactual questions in an adultlike way. The basic operations may be in place before age 5 (Kominsky et al., 2021), but children may either use alternative strategies to answer questions or intervene on variables different from adults, or they may change them in ways that are not like adults. In addition, while the basic machinery for counterfactual reasoning may be in place earlier than age 5, successfully holding in mind both real and changed worlds may rely on advanced working memory and metacognitive skills.

Working memory and metacognitive limitations may tie counterfactuals together with other phenomena that are otherwise not obviously related, including emerging understanding of puns and loopholes. By loopholes, we mean the circumvention of rules, commands, requests, or restrictions through the ambivalence of language (Bridgers, Qian et al., 2025). Consider, for example, a child who is told that it is “time to get in the bath,” who then gets in the tub with their clothes on, and does not turn on the faucet. Recent developmental work shows that around 4 to 6 years, children begin to appreciate, predict, and generate loopholes (Bridgers, Parece et al., 2025). Computational work that predicts loophole behavior requires holding two worlds in mind: the actual intended goal and the technically possible, unintended meaning. Similarly, linguistic puns require holding in mind two possible meanings (Kao et al., 2016). In this way, disparate phenomena may be tied together through metacognition and working memory. We note that this emerging understanding of loopholes and the is past the age when children typically pass canonical false-belief tasks, start to lie, or reason about hypotheticals, all of which could be said to require holding in mind a not-real option (Beck et al. 2006; Lee, 2013; Wellman et al., 2001). However, such cases seem to require holding in mind fewer options in that the real world is either not explicitly contrasted, or it is evident as a background condition. For example, the hypothetical question, “What if I pushed the toy car off the table?” could be seen as requiring holding in mind the truth that the car is not in fact being pushed off the table right now (otherwise the person with this thought would be hallucinating). But the counterfactual question, “What if the toy car had not been pushed off the table?” requires holding in mind that the toy car was pushed off the table, the thought of what would had happened if it had been pushed off, and the fact that none of this is currently taking place.

In summary, recent research on children's understanding of possible and counterfactual worlds has been the subject of sustained debate. The debate is far from over, with different findings placing the emerging understanding of counterfactuals earlier or later than the 5- to 7-year range, though recent work places it within that period (Kominsky et al., 2021). This developmental change likely reflects an interplay between maturing cognitive architectures that support counterfactual reasoning, more general cognitive resources that enable counterfactual operations, and increasingly adultlike interventions in how variables within a world model are selected and manipulated.

Sensitivity to Social Norms

One of the many challenges children must tackle as they begin to navigate the world is that things *ought* to be done a certain way at certain times and places. The rules that govern the actions of the adults in their lives—the social norms—are often unspoken and causally opaque. Nowhere is this more clear than in the domain of the norms governing social behaviors like fairness, trust, honesty, and conflict management. Early in their development, children must not only learn how to perform these social behaviors—behaviors that often involve resolving a conflict between the temptation to be selfish and the choice to do what is best for others—but they must do so in accordance with local customs. Over the last two decades, researchers have made tremendous progress in understanding when and how children begin to conform to social norms, and the developmental period around 5 to 7 years appears to involve prounounced changes.

One key finding from developmental work on social norms, particularly those that govern the distribution of resources, is that children understand social norms before they conform with them (Blake et al., 2014). In the United States, children as young as 4 report that resources ought to be divided equally, but it is not until age 8 that their actual decisions about resource division reflect this understanding (Smith et al., 2013). In cross-cultural work, this general pattern—a gradual closing of the gap between norms and behavior with age—is widespread, although particular trajectories vary across studies (Amir et al., 2026; House et al., 2013, 2020).

What processes account for children's increasing norm conformity with age? At a descriptive level, researchers have identified at least three forces: 1) direct prompts from models, 2) descriptive norms, and 3) third-party norm enforcement. Studies of children from Western, educated, industrialized, rich, and democratic (WEIRD countries points to around 5 to 7 years as a critical window during which these forces exert their influence on children's social decision making.

First, direct prompts from models about the appropriate action can encourage children to conform to norms (House & Tomasello, 2018; McAuliffe et al., 2017; Ruggeri et al., 2018). German children increased their compliance with adult-prompted sharing norms between ages 6 and 11, with clear conformity emerging around age 7 (House & Tomasello, 2018). Other work on the influence of models points to 5 to 7 as an important transition period in children's compliance with norms. In one study, children's sharing was sensitive to both selfish and generous norm prompts and sensitivity varied with age (McAuliffe et al., 2017). Specifically, while younger children were especially influenced by selfish prompts and older children by generous prompts, 6- to 7-year-olds appeared to be in a transition period, and their sharing was spurred by both selfish and generous prompts. In more recent work, simply reminding children to make fair decisions had a pronounced influence on younger children, with this prompt effective in pushing the age of emergence of costly fairness (i.e., rejecting a resource distribution in which the decision-maker has more than a peer from around 7 to 5 years (González et al, 2025).

Second, descriptive norms—information about what is common—also influence children's norm sensitivity. In a study that used a novel norm paradigm to show that children tend to disapprove of those who go against the grain, 4- to 6-year olds were likely to negatively evaluate nonconformity, and this tendency decreased with age into adulthood (Roberts et al., 2017). More recent work suggests that by age 6, children update their own normative beliefs based on what is common (Deutchman et al., 2026).

Finally, a third line of work that has identified 5 to 7 years as a key period for sensitivity to norms is research on children's third-party enforcement. In one study, although younger children began to protest and tattle when norms were violated, not until around 6 years (at least in the United States) did children reliably intervene against a range of norm violations, including theft, property destruction, and fairness (Marshall & McAuliffe, 2022; Marshall et al., 2025).

In summary, empirical work on children's norm compliance has highlighted several forces that shape children's decision making. This work points to the period between 5 to 7 years as one of especially proncounced changes. But researchers have not provided a mechanistic account of what underlies developmental shifts in norm compliance.

Metacognition may be the reason for an underlying maturational change that could have ripple effects on children's norm cognition. The evidence we have reviewed suggests that around age 6, children begin to adapt their behavior and intervene with peers in response to norm violations, which likely depends on metacognitive control abilities. Although the field lacks direct empirical evidence for this link in children, studies with adults point to its feasibility. Adults who scored higher on a measure of metacognition learned foreign social norms from feedback more quickly than did adults who scored lower (Morris et al., 2019). Researchers should probe this link in children. Metacognition itself varies across cultures (Ordin et al., 2024), consistent with the idea of a dynamic interplay between cultural learning and metacognition (Heyes et al., 2020), a dynamic that could apply to learning social norms.

Synthesis: Metacognitive Control and the 5- to 7-Year Shift

We highlighted three areas in which recent research has yielded new insights into shifts between ages 5 and 7 years. Could the developmental changes observed across active learning, counterfactual reasoning, and sensitivity to social norms be driven by a common underlying mechanism? As illustrated in Figure 1, we propose that a central thread connecting these shifts is children's growing ability to translate the outcomes of monitoring processes into action, by adjusting learning strategies, exploiting loopholes, or enforcing norms. This capacity has been described as metacognitive control (Nelson & Narens, 1990).

[Figure 1 about here]

Across all three areas, evidence suggests that even 5-year-olds have substantial monitoring capacities. They can detect discrepancies between expected and observed outcomes, recognize ambiguity or alternative interpretations, and notice violations of social norms. However, in each area, younger children appear to struggle with reliably using the results of such monitoring processes to regulate their behavior. Thus, the developmental shift observed between ages 5 and 7 seems to reflect not the emergence of monitoring per se, but an increasing ability to use monitoring outcomes in the service of flexible, goal-directed action—that is, metacognitive control.

The distinction between monitoring and control can be seen in a study in which U.S. and Swiss 5- to 7-year-olds learned about the meanings of Japanese characters (Destan et al., 2014). For each character, children were asked to judge how likely they were to remember it later (judgments of learning) and were tested on their memory later. By age 5, children's judgments of how likely they were to remember a character was fairly in line with objective difficulty. However, only 6- and 7-year-olds used these judgments to regulate their behavior by allocating less study time to easier items and more to difficult ones. Once again, the critical developmental change between ages 5 and 7 is not in the ability to monitor, but in the ability to use monitoring outcomes to guide action.

Contextual and Individual Factors

Before concluding that metacognitive control constitutes a source of the 5- to 7-year shift, we should consider a longstanding limitation of this research, which Sameroff and Haith (1996) emphasized. Much of the evidence we have reviewed is from WEIRD societies. Where data from other cultural contexts are available, they suggest differences in developmental trajectories (e.g., House et al., 2020; McAuliffe et al., 2025). Although these findings stem primarily from research on social norms, they indicate that cultural factors may shape both the timing and the expression of the so-called 5- to 7-year shift.

Studies have also chronicled substantial variability in age trajectories in WEIRD societies. In one, while the first indications of metacognitive control emerged at age 6 (Destan et al., 2014), in other studies, they have shown up as early as age 4 (e.g., Hembacher & Ghetti, 2014) or as late as age 9 (e.g., Lockl & Schneider, 2004; for a recent review on age-related differences in cognitive offloading as a form of monitoring-based control, see Armitage & Gilbert, 2025). This variability suggests that task context matters considerably, and is a reminder that age is at best a rough proxy for developmental status. Furthermore, converging evidence has demonstrated effects of school entry on executive function capacities and their neural underpinnings (e.g., Brod et al., 2017; Davidson et al., 2023). Since metacognitive control depends on executive functions (Roebers, 2017) and can be trained in middle childhood

(Eberhart et al., 2025), education may play a causal role in enabling children to translate monitoring into action, and the onset of this training may codetermine when metacognitive control emerges.

Conclusion

Recent research underscores that children's thinking and behavior change profoundly between ages 5 and 7. We argue that these changes are best understood through the lens of metacognitive control, which captures the emerging coordination of existing cognitive capacities into flexible, goal-directed regulation of learning and social behavior. Identifying the biological and cultural conditions under which this coordination arises is a promising agenda for the next 30 years of research on the 5- to 7-year shift.

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Author Contributions

Garvin Brod (conceptualization [equal], writing—original draft [lead], writing—review and editing [equal]), Katherine McAuliffe (conceptualization [equal], writing—original draft [supporting], writing—review and editing [equal]), Tomer Ullman (conceptualization [equal], writing—original draft [supporting], writing—review and editing [equal])