Metacognition as a domain of skill

Brendan Conway-Smith (brendan.conwaysmith@carleton.ca)
Department of Cognitive Science, Carleton University
Ottawa, ON K1S5B6 Canada

Abstract

While metacognition is recognized as an improvable skill, its classification as a distinct skill domain remains underdeveloped. This paper advances the characterization of metacognitive skill as a domain of expertise by drawing on established research from motor and cognitive skill domains. It is argued that metacognitive skill shares fundamental principles with other skill domains, including goal-directed action, hierarchical organization, and the interaction between declarative and procedural knowledge. By examining these principles, this paper seeks to establish a comprehensive framework for metacognitive skill development, with implications for research and applications in education, therapy, and beyond.

Keywords: metacognition; metacognitive skill; skill; learning

Introduction

Interest in metacognition has grown alongside the emergence of information-processing models of human cognition. Metacognition or "thinking about thinking," (Flavell, 1979) has emerged as a prominent area of research in cognitive science within fields such as psychology, education, and AI. While metacognition has shown to be an improvable skill, its characterization as a domain of skill remains underdeveloped. To help articulate metacognition as a distinct domain of expertise, this paper situates metacognitive skill alongside traditional domains of motor skill and cognitive skill, specifying its unique properties, gradability, and hierarchical structure. Drawing on frameworks that identify the shared characteristics of skill domains (Shepherd, 2021), and dual-system theories of metacognition (Thompson, Evans & Frankish, 2009), I argue that metacognitive skill shares core principles with other skill domains while pursuing distinct meta-level goals such as attentional control and emotional regulation.

Through a synthesis of theoretical and empirical work, I outline the knowledge structures and control mechanisms that give rise to metacognitive skill, mapping its development from deliberate instruction-following to automatic, proceduralized responses. The discussion clarifies and refines our understanding of metacognition domains, their ideals of success, and the interplay between deliberate control and automaticity. By articulating the foundational characteristics of metacognitive skill, this paper aims to advance both theoretical frameworks and practical applications for metacognitive skill across diverse contexts.

Theoretical frameworks are vital to scientific progress as they unify empirical findings, guide research, and establish conceptual foundations (Kuhn, 1962). Ideally, a theoretical framework for metacognitive skill would integrate research, distinguish it from general cognition, inform applications, and clarify how improvements in monitoring and control occur. *First*, this paper outlines key characteristics shared by skill domains, including goal hierarchies, control, and action restrictions. *Second,* metacognitive skill is positioned within this framework, demonstrating its alignment with existing models while highlighting its unique properties. *Third,* the gradability of metacognitive skill is examined across success rates, goal breadth, and adaptability.

While research affirms metacognition's role in enhancing cognitive performance, a key question remains: what characteristics define metacognition as a distinct domain of skill? This paper aims to address this question, contributing to Schraw's (2000) call for a "unified theory of metacognition."

Characteristics of skill domains

In this section, I outline the fundamental attributes that define skill domains across diverse fields. Whether in driving, chess, or attentional control, skill domains share core components, including specialized knowledge, hierarchical goal structures, and constraints on both action-types and applicable circumstances. Identifying these shared characteristics provides a conceptual framework for positioning metacognition within the broader landscape of skill, allowing for a precise articulation of its distinct actions, contexts, and objectives.

This discussion is drawn in large part from the research of Joshua Shepherd (2021) and his work on action domains, which begins by emphasizing control as a fundamental component of any skill. In this view, one cannot exercise a skill S without possessing control over behaviors involved in exercising S. Researchers widely agree that skilled action requires agents to possess high levels of control over their activity within a domain, often requiring years of practice (Mylopoulos & Pacherie, 2021).

Habit vs. skill

While both habit and skill arise from repetition and practice, they differ in flexibility, attentional engagement, and control. Douskos (2019) distinguishes skill by its adaptability, whereas habit is largely automatic and context-dependent. A habitual driver may fail to notice a road closure, while a skilled driver quickly adapts to find a new route. Bermúdez (2017) highlights that skill involves intentional control, maintaining conscious goals and attentional modulation. Gross (2013) synthesizes these views, defining habits as rigid and automatic, while skills balance automaticity with conscious regulation, allowing for precision and flexibility.

Ideals, goals and actions

Shepherd characterizes control as the agent's ability to flexibly and consistently align their behavior with a planned course of action, which is measured by an ideal of success. He emphasizes that an ideal of success serves as a fundamental constituent of any action domain, as it qualifies actions based on their outcomes. Control, in this sense, depends on various causal factors that enable the agent to reliably execute actions in accordance with their ideal of success and their plan to achieve it. Some action domains have only one ideal of success, while others consist of more than one ideal. For instance, the overarching ideal or goal in chess is to checkmate one's opponent, while gymnastics involves a combination of ideals such as form, gracefulness, and complexity of routine.

Goals often require subgoals to achieve, and entail a hierarchical goal structure where goals and tasks are organized according to their conduciveness to the ideal of success. For instance, in basketball, the goal of scoring the most points requires subgoals, such as shooting accurately and defending against opponents' attempt to score. These in turn are supported by further subgoals such as ball handling and footwork. Subgoals can be ordered according to their importance or centrality to higher goals, that is, according to their conduciveness to success. While some subgoals are critical to success, others are peripheral and their contributions to overall success in a domain are minor. Specific goals and subgoals within a domain require particular action-types for their achievement. The appropriate actions and behaviors possess causal properties that consistently lead to the attainment of goals.

Expertise typically involves agents being skilled at more than one specific action and instead require proficiency in a cluster of action-types. These clusters tend to support each other both heterarchically and hierarchically. Skills that are clustered heterarchical occur simultaneously or laterally, for instance a tennis player's forehand serve is improved when combined with a particular body position. Clustered action-types may also be organized hierarchically, or linearly, such as a basketball player's skillful dribbling toward the basket supporting an eventual layup. In the case of cognitive skills such as math, basic addition and division are required to solve more complex equations. The goal and task structures of motor and cognitive domains of skill depend on their conduciveness to their respective ideals of success or overarching goal. Certain action-types, like aiming, are shared across multiple domains, such as archery and football, demonstrating a partial fluidity between domains.

Restrictions define and regulate skill development. Action-type restrictions limit permissible behaviors within a domain, as seen in sports rules (e.g., soccer players cannot use hands) or professional guidelines (e.g., medical procedures must follow ethical protocols). Circumstance-type restrictions constrain where and when skills can be applied, such as playing field dimensions in sports or syntax rules in programming. This provides insight into how control enables an agent to consistently and flexibly align their actions with a goal-oriented plan, including metacognitive control.

Knowledge

Skilled actions and clusters of action-types are shaped by domain-specific and task-specific knowledge. Experts possess robust internal models of their domain, which are crucial for controlling complex actions. Christensen et al. (2016) refer to these as "causal control models." While not always necessary, domain-specific knowledge enhances planning and execution. For example, chess experts rely on knowledge of goals and action-types, such as piece movements and strategic deployment (de Groot, 1978).

Internal models represent causal relationships within a domain, allowing agents to predict outcomes and select appropriate actions. A driver, for instance, relies on an internal model of surrounding vehicles, adjusting behavior based on the environment and their own characteristics, such as speed, size, and maneuverability. These models support the selection of success-conducive plans — mental representations outlining sequences of actions directed toward a goal. For instance, fire-building techniques range in effectiveness, and one's expertise involves refining the most efficient approach.

The literature on skill often distinguishes between two primary forms of expert knowledge — declarative and procedural (Fitts, 1964; Dreyfus & Dreyfus, 1985; Stanley & Williamson, 2001). *Declarative knowledge* is formatted propositionally, and encompasses facts, rules, and explicit strategies relevant to a domain. For instance, chess players must understand the appropriate rules about moves, and building a fire requires knowledge of the step-by-step procedures. This form of explicit knowledge enables an individual to articulate conditions for success and the strategies needed to achieve goals, but does not necessarily extend to action execution.

Procedural knowledge, by contrast, is implicit and often non-verbal, relating to the specific process of executing tasks within a domain. It encompasses motor and procedural representations that direct and control actions that reliably result in goal attainment. For example, a tennis player may use declarative knowledge to learn proper serving techniques, while procedural knowledge enables the player to physically execute the serve with timing and precision. Procedural knowledge develops through practice, becoming increasingly automatic, thereby enabling a more fluid, efficient performance.

Proceduralization

Modern theories often build upon dual-process approaches to skill acquisition, which is often described as a transition from deliberate cognitive control to more automatic execution through proceduralization (Fitts & Posner, 1967; Anderson, 1982). In dual-system theories, this process is described as the migration of cognitive operations from System-2, which is effortful and relies on declarative knowledge, to automatic, procedurally driven System-1 processes (Kahneman & Frederick, 2004). Proceduralization underlies this transformation, playing a key role in the refinement of both motor skills and cognitive skills (Ford, Hodges & Williams, 2005; Anderson, 1982; Tenison & Anderson, 2016).

At the core of proceduralization is the shift from declarative to procedural knowledge. Early in learning, individuals rely heavily on declarative, explicitly accessible facts and rules to consciously guide performance. Through repeated practice, this slow and effortful retrieval process is progressively replaced by procedural knowledge, which enables faster and more efficient task execution with minimal cognitive effort (Fitts & Posner, 1967; Dreyfus & Dreyfus, 1986; Kim & Ritter, 2015). This transition enhances fluency and adaptability, allowing skilled individuals to operate effectively in dynamic and unpredictable contexts.

However, expertise does not equate to the complete elimination of cognitive control. Instead, cognitive resources are reallocated to higher-order processes such as error detection, strategy refinement, and goal adjustment, while routine elements of performance become automatic (Fridland, 2019).

While some domains require the proceduralization of a narrow range of specialized skills (e.g., a baseball pitcher refining throwing mechanics), others require the integration of a broader set of skills (e.g., a trial lawyer combining reasoning, persuasion, and speaking). In both cases, skill is gradable, varying in proficiency, success rate, task range, and adaptability. To possess partial skills means that an agent excels in certain dimensions while being less developed in others, which highlights another important aspect of skill within a domain — its gradability.

Gradability of skill

That skill is gradable entails that an agent can possess varying levels of proficiency within a domain. Shepherd (2021) propose three principal dimensions along which a skill may vary: the success-rate at achieving goals (height), the range of goals achieved (breadth), and performance across diverse circumstances (depth).

The dimension of *height* refers to the agent's actual success-rate at goals central to a domain. A higher success-rate in achieving these goals typically reflects greater skill. When success at different action-types is uneven, priority is often given to actions that contribute more to overall success, or to central goals within the domain.

The dimension of *breadth* considers the agent's success-rate across the various goals within a domain. An agent is considered more skilled if they can maintain higher success across a larger range of action-types or sub-skills, with greater emphasis placed on more central goals in complex domains.

The dimension of *depth* evaluates the range of circumstances under which an agent can maintain good performance. This entails the flexibility of skill, differentiated from the brittleness of habit, where the control of action can adapt to novel situations reliably, such as golfers adapting to changing wind conditions and terrain. The more varied the situations in which an agent can demonstrate strong height and breadth, the greater their skill.

These three dimensions interact and contribute to a more nuanced understanding of skill, with the ideal being high performance across all dimensions. This lends insight into how control enables an agent to flexibly and consistently align their actions with a goal-oriented plan, including metacognitive control.

Metacognition

First introduced by Flavell (1976) in his research on metamemory, metacognition was defined as "one's knowledge concerning one's own cognitive processes" (p. 232). Since then, the term has expanded to involve a wider array of processes, and can be broadly construed as both the monitoring and control of cognitive operations (Nelson and Narens, 1994; Shea et al., 2014; Wells, 2019). *Metacognitive monitoring* refers to the capacity to perceive and identify cognitive states such as feelings and thoughts for the purposes of regulating those states or directing behavior. *Metacognitive control* refers to the active regulation of cognitive states or processes toward the attainment of meta-level goals.

Theoretical frameworks such as Nelson and Narens's (1990) model differentiates between the meta-level, which monitors and controls cognitive processes, and the object-level, where these processes occur**.** The interaction between these levels allows for reciprocal adjustments, enabling individuals to monitor their own cognitive and control them, such as attentional and emotional control.

Metacognitive skill

Metacognitive skill refers to the degree to which one is able to monitor and control their own cognitive processes (Van der Stel & Veenman, 2010). Metacognitive skills represent higher-order cognitive abilities that govern the monitoring and regulation of one's thoughts, emotions, and other mental processes. Empirical research strongly suggests that metacognitive ability can be improved through practice and training (Baird et al., 2014). For example, educational interventions enhance problem-solving, academic performance, and self-regulation (Kramarski & Mevarech, 2003; Zimmerman & Schunk, 2011). Attentional processes can also be improved through the repeated practice of attention-based tasks (Posner et al., 2015; Anderson, 2016). Metacognitive training, including mindfulness techniques, plays a key role in Cognitive Behavior Therapy (CBT; Dobson, 2013) and Metacognitive Therapy (MCT; Normann & Morina, 2018), both of which help individuals regulate maladaptive thoughts and emotions (Wells, 2019).

Metacognition as a domain

This section connects the previously discussed domain-general characteristics of skill to the specific properties of metacognitive skill, highlighting its unique goals, knowledge, and action-types. While the literature encompasses a broad range of metacognitive skills, including metamemory, metaperception, and metareasoning, this discussion focuses on paradigmatic cases of metacognitive skill in attentional control, emotional regulation, and meta-learning.

Metacognitive ideals, goals and actions

Expert metacognitive control requires the ability to flexibly and reliably align mental actions with a plan, evaluated against an ideal of success. This ideal represents an overarching standard for an optimal outcome in a specific metacognitive subdomain (e.g., an ideal attentional or emotional state).

Within the literature on attentional skill training, various ideals of success are studied, ranging from attaining a maximally stable narrow focus to an inclusive open-monitoring approach (Favre-Bulle et al., 2024; Eberth et al., 2019). In this context, metacognitive control involves continuously monitoring and adjusting mental actions to align with overarching goals and their corresponding subgoals. Some ideals of success allow for a plurality of goals, while others may encompass only a single goal. For example, achieving a stable narrow focus may involve training attention on a selection of sensory modalities, such as sight, sound, or the breath. Typically, metacognitive goals that best support the overarching ideal of success are prioritized.

The attainment of metacognitive goals is supported by subgoals and their corresponding action types. In developing stable narrow focus, subgoals may include ignoring irrelevant stimuli and preventing mind-wandering. These subgoals can be trained independently, with action-types applied both hierarchically (e.g., clearing the mind before focusing) and heterarchically (e.g., simultaneously focusing and resisting mind-wandering).

Emotional regulation similarly involves controlling mental actions to align with ideals, such as achieving a state entirely free from anxiety (Gross, 2014; Eberth et al., 2019). Various approaches can be used to achieve these ideals, including cognitive reappraisal and mindfulness techniques (Dobson, 2013; Wells, 2019). For instance, in managing anxiety, subgoals may include identifying emotional triggers and reducing reactivity to them. These subgoals can be trained independently through additional subgoals and action types, some of which may transfer from other metacognitive domains like attentional training.

From this, it follows that metacognitive skills in attentional control and emotional regulation encompass a diverse range of goals, subgoals, and mental action types. As with motor and cognitive skills, metacognitive skill relies on factors that enable an agent to reliably control mental actions in alignment with plans, goals, and an ideal of success. Repeated practice of these mental actions enables an agent to achieve their metacognitive goals more consistently, effectively, and flexibly.

Dual-process metacognition

Researchers have found it useful to adopt a dual-process approach to metacognition, distinguishing between two levels with distinct functional roles and types of representations. (e.g., Koriat, 2000; Arango-Muñez, 2011; Proust, 2013). According to dual-process theories of metacognition, "System-1" or "Type-1" metacognitive control predominantly operates through implicit, non-conceptual processes. This level involves operations that are more automatic and less consciously accessible, as well as "metacognitive feelings" that guide mental actions through intuitive signals like fluency. System-1 metacognitive control is largely characterized by the unconscious automaticity of habits, which, while useful in certain contexts, lacks the flexibility and adaptability essential for advanced metacognitive expertise.

The second level, "System-2" or "Type 2" metacognitive control is driven by explicit metarepresentations — propositional concepts referring to cognitive states or processes — allowing for more deliberate and flexible cognitive regulation. Conceptually driven metacognitive control is more amenable to deliberate cultivation, as in cases of therapeutic strategies and learning techniques that rely on metacognitive instructions. This tractability is the rationale for focusing on System-2 processes within our characterization of metacognitive skill.

While System-1 and System-2 metacognitive controls are often discussed as separate processes, research suggests that high-level metacognitive skill emerges from their dynamic interplay, a concept revisited later in the discussion on metacognitive skill development.

Metacognitive knowledge

Skilled metacognitive control largely depends on domain-specific metacognitive knowledge — metarepresentations — a propositional form of declarative knowledge that refers to cognitive or metacognitive properties (Shea et al., 2014; Proust, 2019). Metarepresentations facilitate the construction of internal models that encode specific properties, processes, and causal relationships within metacognitive domains. These models map out sequences of mental actions that reliably achieve goals, guiding both the selection and execution of appropriate strategies. For instance, the development of attentional control relies on an internal causal model that represents the target of focus, the relevant mental actions needed to sustain attention, and potential obstacles such as mind-wandering (Jahn et al., 2023). By leveraging this model, individuals can dynamically adjust their strategies in response to cognitive challenges, enhancing their ability to maintain focus. Metacognitive causal control models are essential for metacognitive skill, as they allow agents to predict and select the appropriate mental actions to achieve metacognitive goals.

Metacognitive knowledge is distinct from metacognitive skill, as it does not automatically lead to the deployment of metacognitive processes (Veenman & Elshout, 1999). The execution of metacognitive instructions is performed by way of procedural knowledge. Veenman et al. (2006) suggest that metacognitive skills can be understood as domains of procedural knowledge. For example, declarative metaknowledge can represent the broad instructions for an attentional training technique. Metacognitive procedural knowledge enables the fluent, automatic execution of these strategies through practice (Anderson, 2016).

Metarepresentations in the form of instructions guide System-2 processes, enabling flexible regulation of attention, emotion, memory, and learning (Jahn et al., 2023; Richards & Gross, 2000; Schraw & Moshman, 1995; McCormick, 2003). In contrast, System-1 processes are primarily implicit and stimulus-driven, lacking the flexibility of System-2. For example, when attention becomes habitually directed toward entertainment or phone scrolling, it tends to reflect limited attentional control, as it remain confined to those specific contexts (Choi et al., 2021). System-2 processes, shaped by metarepresentations, offer greater adaptability to novel situations. For instance, deliberate practice of attentional techniques improves the ability to allocate attention effectively across diverse contexts (Jahn et al., 2023).

Metacognitive internal models help individuals predict and adapt to cognitive challenges, such as attention lapses or emotional reactions, allowing for preemptive adjustments. Just as an experienced driver predicts and reacts to road conditions, skilled metacognitive agents refine their responses to environmental distractions, and variations in cognitive and emotional states.

Some metacognitive skills, such as maintaining focus or monitoring comprehension, transfer across domains, while others are tailored to specific contexts. For instance, attentional strategies used in deep reading may differ from those required for rapid decision-making in sports (Posner, Rothbart & Tang, 2015).

Stages of metacognitive skill learning

Research indicates that metacognitive skill development follows established models of skill acquisition, progressing from deliberate, effortful control to automatic, fluent performance. This section examines how metacognitive skill develops through proceduralization (Conway-Smith, West & Mylopoulos, 2023), highlighting the knowledge components that support this progression.

Building on foundational skill acquisition theories in motor and cognitive skill (Fitts, 1964; Anderson, 1982), metacognitive skill begins in the declarative phase, where individuals rely on explicit, consciously applied strategies to regulate cognitive processes. At this stage, metacognitive actions require substantial working memory resources, as learners must deliberately recall and implement strategies for monitoring attention, evaluating comprehension, or managing emotions. For instance, a novice attempting to sustain focus during reading may repeatedly remind themselves to check for mind-wandering, relying on self-instruction and external cues to maintain attentional control.

As practice continues, the intermediate phase marks the gradual proceduralization of metacognitive strategies. Metacognitive instructions, once consciously retrieved, becomes increasingly refined and integrated into procedural memory. This transition is characterized by a shift from rigid, step-by-step application of strategies to a more fluid, adaptable approach. For example, an individual practicing cognitive reappraisal to regulate emotions may initially follow a structured sequence of steps but, over time, learn to assess and adjust emotional responses intuitively.

In the autonomous phase, metacognitive processes become highly automatic, requiring minimal conscious oversight. At this level, procedural knowledge enables rapid and efficient execution of metacognitive strategies in response to environmental or cognitive cues. For instance, an experienced meditator may effortlessly refocus attention on their breath when distractions arise, without consciously recalling specific instructions. Similarly, a skilled learner may unconsciously detect comprehension difficulties and adjust their reading approach without explicit reflection.

While proceduralization reduces cognitive effort and enhances efficiency, expert metacognitive control does not equate to the complete elimination of conscious oversight. Instead, deliberate control remains available for higher-order regulation, such as detecting anomalies, refining strategies, or adapting to novel challenges. For example, while an expert may seamlessly regulate attention under routine conditions, they may engage explicit monitoring processes when encountering unexpected cognitive demands, such as heightened stress or unfamiliar problem-solving tasks (Zimmerman & Schunk, 2011). This capacity for adaptive regulation highlights the interplay between automaticity and flexible control that characterizes expert metacognitive skill.

Through repeated application and refinement, metacognitive skill follows a structured trajectory: from declarative, effortful control to procedural, fluid execution, balancing automatic processes with strategic oversight. Repeated practice embeds metacognitive strategies into procedural memory, enabling efficient and flexible responses across diverse circumstances.

Partial skills

In some metacognitive domains, agents may require only partial skills to succeed, while others necessitate a broader range of metacognitive strategies. For example, achieving single-pointed focus may only demand resistance to mind-wandering, while maintaining broader attentional goals — like open monitoring, or impermanence perception — requires a suite of skills, including metacognitive sensitivity, adaptability, and the ability to shift focus flexibly. To possess partial metacognitive skills means excelling in certain subdomains while being less developed in others, underscoring the gradability of metacognitive expertise.

Gradability

Metacognitive skills are gradable, meaning that monitoring and control processes can vary in proficiency. Here, the gradability of attentional control is examined across three key dimensions: success rate (height), breadth of achievable goals, and adaptability across circumstances (depth).

Height in the context of metacognitive skill refers to an individual's success rate in achieving meta-level goals. Higher proficiency in sustaining attention, for example, indicates greater skill. Priority is generally given to actions that most effectively contribute to central goals. In attentional training, narrow focus takes precedence over peripheral subgoals like clearing the mind, whereas in emotional regulation, sustained attention may serve as a secondary goal, supporting broader objectives such as perceiving the impermanence of emotions.

Breadth captures an agent's success across various meta-level goals and subgoals. Greater attentional skill is expressed as proficiency across multiple attentional action-types, such as resisting intrusive thoughts and maintaining open monitoring. Similarly, emotional regulation skills that enhance impermanence perception rely on a broad set of attentional capacities, including focused attention, open awareness, and non-reactive observation.

Depth reflects the ability to maintain metacognitive control across diverse and dynamic circumstances. It measures how well an agent adapts their mental actions to novel challenges. For example, an individual with deep attentional skill can sustain focus across different cognitive tasks, environments, and emotional states.

The skill development of a novice in emotional regulation training illustrates this framework. Initially, they exhibit limited height (low success rate), narrow breadth (few skills), and shallow depth (limited adaptability to complex emotional states). Novices often begin by applying domain-specific metacognitive plans, typically introduced by an instructor or another form of structured guidance. Through repeated practice, they gradually develop greater breadth, height, and depth of skill. Another example involves attention training, where a novice may struggle to maintain focus for extended periods and frequently become distracted. Their initial goal attainments, such as brief moments of maintained attention, are evaluated against an ideal of success, which serves as a benchmark for progress, assessing both the quality and duration of attentional stability.

Restrictions

Restrictions on metacognitive action-types and the contexts in which they are applied influence both the development and practical use of metacognitive skills.

Action-type restrictions. Metacognitive skill is inherently constrained by the types of mental actions an agent can perform. These boundaries define what is possible within metacognitive domains and guide skill refinement. For instance, equanimity, a key component of emotional regulation, requires focusing on the impermanence of physical sensations rather than visual or auditory stimuli (Wongpakaran et al., 2021). In this case, the target of focus is critical to achieving desired metacognitive outcomes.

Certain restrictions also differentiate legitimate metacognitive actions from external enhancements. For example, while caffeine may improve attention, it does not constitute a metacognitive action. Similarly, metacognitive control excludes pharmacological interventions, as they bypass skill development rather than engaging deliberate, self-directed cognitive processes.

Circumstance-type restrictions. The effectiveness of metacognitive training is also shaped by environmental and situational constraints. Novices require controlled, low-distraction settings — dim lighting, silence, or the absence of emotionally charged stimuli — to develop attentional focus and emotional regulation. In contrast, experts can sustain metacognitive control in more dynamic and unpredictable environments, demonstrating greater adaptability and depth of expertise. These restrictions evolve alongside skill development. A novice meditator may struggle to maintain focus in a noisy environment, while an expert can sustain equanimity even amidst chaos, such as during emotionally charged interactions or high-stakes situations. This underscores the importance of tailoring metacognitive training to match an individual's level of expertise.

Conclusion

This paper establishes metacognition as a distinct skill domain that shares core principles with motor and cognitive skills. By examining goal-directed action, hierarchical structure, gradability, and the interplay between declarative and procedural knowledge, we gain a clearer understanding of its characteristics. Recognizing these features can help inform training strategies in therapy, education, and beyond. Framing metacognition as a skill domain bridges theoretical and applied perspectives, offering insights into self-regulation, learning, and attentional and emotional control. Future research should explore how metacognitive expertise transfers across different tasks and domains and how it can be refined through training to enhance adaptability in real-world contexts.

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