Personal Agency and Cognitive Complexity: An Interdisciplinary Analysis of Dot, Linear, and Network Thinking

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Abstract

Personal agency – an individual's capacity to intentionally influence their own functioning and life circumstances – has been theorized to shape how people engage with complex problems. This paper examines the relationship between personal agency and the development of cognitive thinking models characterized as "dot" thinking (isolated points of thought), "linear" thinking (sequential, cause-effect thought chains), and "network" thinking (integrative, systems-oriented thought). Adopting an interdisciplinary approach that draws on psychology, education, organizational development, and coaching literature, we synthesize theoretical and empirical insights. We review key constructs of personal agency (self-efficacy, locus of control, and motivational orientations) and discuss validated measures such as self-efficacy scales and locus of control inventories. Existing empirical research on adult learners and professionals is examined to identify strategies that have been used to cultivate personal agency – from mastery experiences and autonomy-supportive learning environments to coaching interventions. We then analyze how personal agency factors (e.g. strong self-efficacy beliefs or an internal locus of control) correlate with greater cognitive complexity and facilitate transitions from dot thinking to linear and network thinking. The discussion highlights that individuals with higher personal agency are more likely to engage in flexible, complex thought patterns, whereas low agency can constrain thinking to simplistic or rigid patterns. The paper concludes with implications for adult education and professional development, suggesting that fostering personal agency is integral to developing the cognitive complexity required in today's complex problem-solving contexts. All claims are grounded in existing theory and empirical studies, and no new intervention methods are proposed.

Introduction

In an era of accelerating complexity, the capacity of individuals to navigate problems through sophisticated thinking patterns has become increasingly important. A key determinant of such capacity may lie in personal agency – the sense of control over one's actions and outcomes. Personal agency is broadly defined as the capacity to originate and direct actions for given purposes, implying an intentionality and belief in one's effectiveness in influencing events . Albert Bandura (1986) famously argued that individuals are not merely reactive organisms shaped by environmental forces, but self-organizing and self-reflective agents of their own development . Beliefs about one's capabilities – termed self-efficacy – form the core of this personal agency, functioning as "key elements in the exercise of control and personal agency" . In parallel, developmental and educational theorists have noted that as people mature, they strive for greater agency, moving "from dependence toward self-direction" and seeing themselves as proactive initiators of change rather than passive reactors . This interdisciplinary understanding of agency sets the stage for exploring how it might influence cognitive development.

Equally important to this inquiry is the nature of cognitive models that individuals employ when thinking and problem-solving. For the purposes of this analysis, we focus on three metaphorical modes of thinking: dot thinking, linear thinking, and network thinking. These terms describe increasing levels of cognitive complexity in how people organize thoughts. Dot thinking refers to a basic mode where thoughts or pieces of information are treated as isolated points, without extensive connection to others – akin to atomistic or point-wise thinking . Linear thinking is a step beyond, where one connects discrete points into a sequential chain – a thought process that follows a clear, one-dimensional progression from cause to effect or from premise to conclusion . Finally, network thinking (sometimes termed systems thinking or complex thinking) involves richly interconnected thought patterns, wherein multiple factors, feedback loops, and relationships are considered simultaneously in a web-like structure . These modes can be seen as progressively more complex ways of structuring cognition, moving from simple and independent units of thought to integrated and dynamic networks of ideas . Prior work suggests that developing the ability to engage in network or systems thinking is crucial for addressing complex, real-world problems that defy simple linear solutions .

This paper aims to analyze how personal agency relates to the development of these cognitive thinking patterns. Do individuals with a stronger sense of agency more readily progress from dot thinking to linear and network thinking? Conversely, might a lack of agency – as seen in external locus of control or low self-efficacy – inhibit cognitive complexity, keeping one's thinking confined to simpler patterns? We address these questions through a theoretical and analytical synthesis of literature across psychology, education, organizational development, and coaching. The inquiry is grounded in empirical findings: we examine studies on how agency is measured (e.g. through self-efficacy scales, locus of control inventories) and on interventions that successfully enhance personal agency in adults (such as educational strategies and coaching frameworks). We then critically explore how these agency factors may influence cognitive complexity and the transition between thinking modes.

By drawing connections between personal agency and cognitive complexity, the paper contributes a cross-disciplinary perspective with practical implications. Understanding this relationship can inform the design of adult learning and professional development programs – for instance, highlighting that empowering learners or employees (thus increasing personal agency) may enable them to adopt more complex, networked approaches to problem-solving. The analysis proceeds with a review of key concepts and measures of personal agency, followed by an overview of the cognitive models of dot, linear, and network thinking. We then synthesize research on cultivating agency in adult learners and professionals, and discuss the influence of agency on cognitive transitions. The methodology of this paper is a literature-based theoretical analysis, and as requested, we focus on evaluation of existing knowledge rather than proposing new empirical studies or tools.

Literature Review

Personal Agency: Definition and Measurement

Defining Personal Agency: In psychological terms, personal agency refers to the individual's capacity to initiate and control actions toward desired goals. It encompasses a sense of autonomy and efficacy – the feeling that one is an actor in shaping one's life rather than a pawn of external forces . Bandura's social cognitive theory situates personal agency at the core of human behavior, asserting that "among the mechanisms of human agency, none is more focal or pervading than the belief of personal efficacy" . In other words, the belief in one's capability to produce desired effects by one's actions is the foundation of agency. Personal agency involves several interrelated components identified in the literature: self-efficacy beliefs, locus of control, goal-setting capacity, and internal standards and values that guide one's actions . Together, these factors determine how much a person feels in control of their outcomes and how proactively they engage with challenges.

Self-Efficacy: Self-efficacy – a concept developed by Bandura – refers to one's belief in one's ability to organize and execute courses of action required to manage prospective situations . It is domain-specific (one might have high academic self-efficacy but low social self-efficacy, for example) yet also contributes to a general sense of competence. Bandura (1997) posited that self-efficacy beliefs affect almost every aspect of human endeavor: how people think, feel, motivate themselves, and behave . People with high self-efficacy choose more challenging tasks, exert more effort, and persist longer in the face of difficulties, reflecting a robust personal agency. By contrast, those with low self-efficacy may doubt their capacity and thus shy away from complex

tasks or give up quickly, exemplifying diminished agency. Self-efficacy is typically measured by validated scales tailored to contexts (e.g., academic self-efficacy scales, social self-efficacy scales). A widely used instrument is the General Self-Efficacy Scale (GSES) developed by Schwarzer and Jerusalem (1995), which assesses a broad sense of personal competence to deal with novel or difficult situations. The GSES has been tested across cultures and found to have high reliability and construct validity . Such measurement tools provide empirical insight; for instance, scores on self-efficacy scales often correlate with outcomes like better stress coping, higher work satisfaction, and lower depression , underscoring that perceived agency has real behavioral and affective consequences.

Locus of Control: Another core aspect of agency is locus of control, a construct introduced by Julian Rotter (1966). Locus of control refers to an individual's generalized belief about the control of events in their life – whether outcomes are contingent on one's own behavior or on external forces such as luck, fate, or powerful others . An internal locus of control indicates the person attributes outcomes to their own actions and choices, whereas an external locus of control indicates belief that outside forces largely determine what happens . Those with a strong internal locus typically have a higher sense of personal agency; they see themselves as "masters of their fate" to a greater extent. Rotter's Internal-External Locus of Control Scale, a 29-item forced-choice questionnaire, is the classic measure and has been extensively validated in diverse samples . Research has linked an internal locus of control to numerous positive effects, such as better academic achievement, superior job performance, and even health outcomes, while a predominantly external locus has been associated with learned helplessness and depression (in extreme forms) . Notably, locus of control is not entirely fixed; longitudinal evidence shows it can shift with life experiences. For instance, a longitudinal study by Wu, Griffin, and Parker (2015) demonstrated that increasing job autonomy and skill use in one's work led to a significant increase in internal locus of control over a four-year period . In that study, employees who were given more decision-making latitude and opportunities to apply their skills developed a stronger belief that they control their work outcomes, compared to those in less empowering conditions . Such findings highlight that environments nurturing agency can reinforce an internal control orientation, which in turn feeds back into greater personal agency.

Motivational Orientation: A third facet related to personal agency is one's motivational orientation or profile. Motivation theories distinguish between autonomous, intrinsically motivated behavior and controlled, extrinsically motivated behavior (Deci & Ryan, 2000). Individuals who are intrinsically motivated – driven by interest, enjoyment, or personal value in tasks – exhibit a form of agency wherein they willingly engage and persist, essentially self-regulating their behavior. In contrast, extrinsically motivated individuals who act due to external pressures or rewards may feel less personal ownership of their actions. Self-Determination Theory (SDT) formalizes this idea, proposing that a sense of autonomy (acting volitionally and in accordance with one's true interests) is one of three basic psychological needs that foster optimal motivation and well-being . Tools for "motivational profiling" include questionnaires that assess intrinsic vs. extrinsic motivation (e.g., the Work Preference Inventory for adults, or

the Academic Motivation Scale for learners) and inventories for related constructs like need for achievement, need for power, and fear of failure (which can drive or hinder agency). While motivation is a broad field, it intersects with agency: for example, goal orientation measures (distinguishing learning vs. performance goals) have been tied to agency. People with a mastery or learning orientation – focusing on developing competence – tend to attribute outcomes to effort and strategy (internal, controllable factors) and thus sustain a higher sense of agency in learning tasks . In contrast, those driven solely by performance outcomes or external validation may feel less inherent agency and more contingent self-worth. Attributional style is another related concept: individuals who habitually attribute successes to their own efforts and failures to controllable factors are likely to maintain stronger agency, compared to those with an external or stable-negative attribution style (e.g., "I failed because I'm just not good at this") who risk learned helplessness.

In sum, personal agency is a multi-dimensional construct anchored by self-efficacy beliefs and locus of control, and supported by motivational factors that together determine how empowered an individual feels. A variety of validated instruments – self-efficacy scales, locus of control scales, and motivation/goal orientation inventories – allow researchers to quantify these aspects. Empirical studies consistently show that higher personal agency (high self-efficacy, internal locus, autonomous motivation) correlates with proactive behaviors, resilience, and effective learning . These findings will inform our later analysis of how agency relates to cognitive complexity, as it stands to reason that those who feel capable and in control may be more willing and able to engage with complex, non-linear thinking challenges.

Cognitive Models: Dot, Linear, and Network Thinking

Human thinking can be organized and described in various ways. The metaphors of dot, linear, and network thinking provide a useful conceptual scaffold to discuss levels of cognitive complexity in thought patterns. These terms are not rigid scientific classifications, but they encapsulate patterns observed in problem-solving and reasoning, and have been used in organizational and educational contexts to encourage broader thinking skills . We outline each model below and connect them to established concepts of cognitive complexity.

Dot Thinking (Atomistic Thought): Dot thinking refers to a mode of thought where ideas or pieces of information are treated as isolated, discrete points. In dot thinking, one tends to focus on single facts, events, or tasks independently, without necessarily seeing a connection between them. It is analogous to viewing each issue in a vacuum or as a standalone "dot." This pattern is the simplest and most rudimentary: as one commentary put it, "the point or dot model of the isolated thought" is the smallest unit in the "classification of thinking patterns" moving from

small/simple to large/complex . Dot thinking can be useful for tasks that require intense focus on one element at a time or when learning foundational facts. However, it has clear limitations for complex problem-solving, which often requires integrating multiple elements. If a person's thinking remains at the dot level, they may struggle to see causation, context, or the "big picture." In educational terms, this might be likened to a novice who memorizes unrelated facts but has not yet grasped how they fit into a broader framework. Some cognitive and learning theories describe a similar idea: for instance, the early stages of expertise development involve accumulating "chunks" of knowledge (which could be seen as dots) before understanding the relationships among them. Dot thinking might also be observed in individuals who compartmentalize thoughts or fail to transfer learning from one situation to another, due to seeing each situation as unique and unrelated.

Linear Thinking (Sequential Thought): Linear thinking is a step up in complexity – it connects the dots. In linear thinking, one arranges thoughts in a logical sequence or chain of cause and effect. This mode is characterized by step-by-step reasoning: A leads to B leads to C. It is analytical in a sequential way, often simplifying a process to a series of stages or a flowchart-like progression . Linear thinking is common and often effective for problems that have a clear procedure or linear causality. For example, algorithmic tasks or procedural learning (like following a recipe or solving a math equation by formula) employ linear cognition. A description of linear thinking from an organizational perspective is "first think this, then that; first this happens, then that happens," linking a series of points with connectors, usually in a straight line . This conveys a single-track progression toward a well-defined outcome. Linear models include not only straight lines but also cycles or loops that assume repeated linear sequences (e.g., a Plan-Do-Check-Act cycle is essentially a linear sequence in repeated rotations) . The linear approach aligns with classical logical thinking and many traditional teaching methods that present information in an orderly progression. It reduces complexity by focusing on one pathway. However, linear thinking can become a limitation when faced with complex or wicked problems that do not follow a single chain of causality. Over-reliance on linear models may lead to addressing symptoms rather than underlying causes, as noted by management theorists: linear thinking "focuses on addressing 'symptoms' instead of looking for what is causing the symptoms" in a system . In sum, linear thinking adds some complexity (relations between dots) but often assumes a stable, straightforward relationship among components, and may break down in dynamic, multifaceted situations.

Network Thinking (Systems or Complex Thought): Network thinking represents a high level of cognitive complexity, wherein thoughts are organized in a web or network of interrelated ideas. Instead of a single sequence, network thinking acknowledges multiple connections, interactions, and feedback loops among elements . This mode parallels what is widely known as systems thinking in disciplines like organizational development, biology, and engineering. It requires holding a holistic view – seeing the whole system and the parts simultaneously – and understanding that changing one element can have rippling effects across the network. A network thinker might consider how A influences B, but also how A and B together influence C,

and how C might loop back to affect A, and so on. This nonlinearity is crucial in domains such as ecology, project management, or organizational strategy, where many variables interact. As one source puts it, today we understand that organizations (and many phenomena) "are made up of networks, and they exist within other networks, and all of these networks are made up of multiple interconnections that increase their complexity" . In a network, causality is often circular or bidirectional rather than uni-directional. Key concepts in network/systems thinking include feedback loops (reinforcing or balancing loops that can amplify or regulate changes) and mental models (deeply held beliefs or assumptions that influence how we interpret the system) . For instance, in a team project, a network-thinking leader would recognize that team morale, communication patterns, resource allocation, and external stakeholder inputs all feed into each other in complex ways – requiring a management approach beyond a simple checklist. The cognitive demand of network thinking is high: it involves what psychologists call cognitive complexity, the ability to differentiate among multiple elements and integrate them into a coherent understanding. People vary in their dispositional cognitive complexity, but it can be developed through experience and deliberate practice (e.g., cross-disciplinary learning, problem-based learning). Notably, network thinking does not imply chaos; it often entails finding patterns and organizing principles at a higher level of abstraction. Concepts like mind maps or concept maps are visual tools that externalize network thinking by showing nodes and links among ideas. Recent approaches to knowledge management and learning (for example, connectivist learning theories or networked note-taking systems) explicitly promote networked ways of linking information, as opposed to linear note-taking, to mirror how complex knowledge is structured . In summary, network thinking reflects an advanced form of cognition wherein an individual perceives and works with a constellation of interdependent factors. It is well suited to complex problem-solving but can be overwhelming without the cognitive and emotional capacities to manage uncertainty and connectivity.

Progression and Relationships: These three modes – dot, linear, network – can be seen as a progression in one's cognitive development or approach to a task . Simple problems or early learning stages might only require dot collection (facts, isolated skills). As understanding grows, a person naturally begins to connect dots into linear sequences (rules, procedures, narratives). With even deeper expertise or broader perspective, those linear chains themselves interconnect into a networked framework of knowledge. This progression echoes several theories in cognitive and adult development. For instance, Perry's (1970) model of intellectual development in college students goes from dualistic thinking (somewhat analogous to isolated right/wrong dots) to relativistic thinking (understanding multiple perspectives in a connected web). Similarly, Kegan's constructive-developmental theory of adult development suggests that individuals move from simpler, dependent orientations of meaning-making to more complex, interdependent ones where they can hold multiple systems in mind . Only a minority reach the highest "inter-institutional" or network-like stage of being able to integrate many systems of thinking. Cognitive complexity as a trait has been measured by tests of integrative complexity (e.g., examining the structure of one's reasoning in essays or interviews). Research has found that certain experiences and individual differences lead to greater cognitive complexity. For example, exposure to diverse cultures or disciplines tends to increase the number of constructs and perspectives an individual can integrate, fostering networked thinking, whereas very narrow or

controlled experiences might leave one with a linear or even dot perspective on unfamiliar challenges . There is also evidence that internal locus of control is associated with cognitive complexity. A study hypothesized (and found support) that persons with an internal locus of control would show greater cognitive complexity than those with an external locus – presumably because those with internal locus engage more deeply and self-directly with tasks, leading them to perceive more nuances and interrelations, whereas external locus individuals might take things at face value or rely on given structures.

It is important to note that dot, linear, and network thinking are context-dependent modes rather than permanent labels for individuals. A highly capable, "network-oriented" thinker might still approach a very novel problem in a simplistic (dot) way initially until they gather information. The skill – and perhaps the mark of cognitive maturity – is in being able to flexibly shift between these modes as appropriate . Indeed, effective problem-solvers often zoom in (to individual elements) and zoom out (to see systemic patterns) iteratively. Educators and coaches often encourage learners and clients to expand their repertoire beyond a single default mode. For instance, someone stuck in linear thinking might be prompted to brainstorm more holistically (network mode), whereas someone overwhelmed by complexity might benefit from breaking the issue into components (dot mode) as a starting point.

Having outlined these cognitive models, we next explore how personal agency might influence an individual's capacity or tendency to engage in linear and networked thinking, and how one might foster agency to support cognitive growth. First, we review research on strategies that have been used to cultivate personal agency in adult learners and professionals – as these environmental and behavioral supports form the basis for any subsequent development in thinking patterns.

Cultivating Personal Agency in Adults: Empirical Strategies and Frameworks

Because personal agency is crucial for adaptive functioning, researchers and practitioners have developed various strategies to strengthen it in adults – whether in educational settings, workplace training, or coaching relationships. These strategies typically aim to increase individuals' self-efficacy, internalize their locus of control, and promote autonomous motivation. Below, we evaluate some key frameworks and empirically supported approaches from the literature in psychology, adult education, organizational development, and coaching.

Mastery Experiences and Incremental Challenges: Bandura's theory identifies mastery experience – succeeding at challenging tasks through effort – as the most powerful source of self-efficacy . Following this, an evidence-based strategy is to provide adults with achievable challenges and progressive goal-setting opportunities that allow them to experience success as a result of their own actions. Educational programs often incorporate incremental goal-setting: learners are encouraged to set a series of small, attainable goals and celebrate each achievement, thereby reinforcing their sense of efficacy. For example, an adult literacy course might have students set a goal to read a short article, then a chapter, then an entire book, acknowledging progress at each step. These "small wins" accumulate into a stronger overall belief in capability . Training programs for developing agency explicitly design curricula such that participants perform tasks of increasing difficulty, each within reach but requiring effort. As an empirical illustration, one study in a workplace context found that employees given slight stretching goals (moderately challenging targets) and then recognized for achieving them showed significant improvements in self-efficacy over time, compared to those with either no goals or extremely high goals that they often failed (which can damage self-efficacy if not attained) . The principle is consistent: success attributed to one's own effort provides "concrete evidence of one's agency" and builds an internal expectation that "I can do this if I try" . This method has been effectively used in domains ranging from health behavior change (e.g., gradual increases in exercise routines) to academic skill development and is a staple of cognitive-behavioral coaching interventions as well.

Autonomy-Supportive Environments: The social environment plays a crucial role in either supporting or undermining personal agency. Empirical research in organizational psychology has shown that increasing individuals' autonomy – the latitude to make decisions and control their work – can strengthen internal locus of control and proactive behaviors . In a longitudinal field study mentioned earlier, granting employees more decision-making power and opportunities to utilize their skills led to a measurable shift toward a more internal locus of control over several years . In educational settings, the parallel is creating a learner-centered environment. Adult education theorists (e.g., Knowles's andragogy) have long emphasized that adults want to be treated as self-directed, capable of steering their own learning . Practical implementations include involving learners in setting learning objectives, giving choices in assignments or methods, and fostering a classroom climate of respect for learners' experiences. When adults are invited to make meaningful choices in their learning process, they begin to "see themselves as proactive, initiating individuals…rather than as reactive individuals, buffeted by uncontrollable forces" (Brookfield, 1986, as cited in Imel, 1988) . Empirical support for this comes from program evaluations in adult literacy and continuing education: programs that increased student involvement in decision-making saw participants develop greater ownership of their learning and a corresponding rise in persistence and initiative . One report from a literacy program noted that by the end of the term, the class "functioned as much more of a democracy," with learners suggesting adaptations to activities and voicing preferences – behaviors indicative of enhanced agency . Similarly, in organizations, empowering leadership styles (where leaders delegate authority, share information, and encourage autonomous decision-making) have been associated with employees' increased self-efficacy and proactive problem-solving. The takeaway is that agency can be cultivated by gradually expanding an individual's scope of autonomy,

accompanied by support and safety nets so that the new responsibilities are not overwhelming. This aligns with Deci and Ryan's concept that autonomy satisfaction enhances intrinsic motivation and engagement, reinforcing the person's internal drive and sense of agency.

Cognitive Framing and Attribution Training: How individuals interpret events significantly impacts their sense of agency. Thus, interventions often target cognitive reframing – teaching individuals to frame outcomes in terms of personal influence rather than fixed ability or external chance. One approach is attributional retraining, where people (especially learners facing failure) are guided to attribute setbacks to changeable factors like effort or strategy use, rather than lack of talent or bad luck. Studies in academic contexts have shown that a brief training encouraging students to view intelligence as improvable (a "growth mindset") and to see mistakes as opportunities to learn can increase their academic locus of control and persistence . In coaching, clients are often asked reflective questions that highlight their role in past successes ("How did you make that positive outcome happen?") to reinforce an internal attribution. Likewise, discussing past failures might involve identifying controllable factors ("What could you do differently next time?") instead of seeing it as inherently uncontrollable. Over time, this kind of cognitive reframing can shift a person's default explanatory style to a more agentic one. A related strategy is cultivating a future orientation with concrete planning: for example, having individuals visualize a desired future and map out steps they can take to get there. This exercise, common in solution-focused coaching and motivational interviewing, often boosts clients' sense that their actions directly affect their progress, a key element of agency.

Strengths-Based and Empowerment-Oriented Frameworks: Contemporary coaching and counseling approaches frequently emphasize strengths and values to build personal agency. The idea is to start from an individual's existing capabilities and successes, thereby fostering a sense of competence and control. One prominent example in the rehabilitation and counseling field is the Good Lives Model (GLM) for offender rehabilitation, which is a strengths-based framework. Rather than focusing only on risk factors or deficits, GLM works with individuals to identify their goals and personal values (the "good lives" they seek) and emphasizes building the competencies (skills, education, prosocial activities) to achieve those goals. This approach inherently treats the individual as an active agent in their rehabilitation. Preliminary studies of strengths-based programs like GLM in forensic settings report improved motivation and engagement among participants, as well as anecdotal increases in their sense of ownership over their progress . In education, a strengths-based approach might involve allowing adult students to integrate their personal interests into projects, thereby giving them a sense of agency in what they learn and how they demonstrate learning. Empowerment-oriented teaching also includes collaborative learning and problem-based learning, where learners tackle real-world problems in teams – a process that requires them to exercise choice, initiative, and responsibility. Empirical research in adult education and community programs supports that such involvement leads to gains in self-efficacy and agency. For instance, one community education program reported that learners who initially were hesitant later started "voicing their preferences, making independent choices, and assertively solving problems in their lives" after being engaged in a curriculum that

placed them in active decision-making roles . Another study in healthcare education found that patient-education programs using an empowerment model (like the 5A self-management model: Assess, Advise, Agree, Assist, Arrange) led to patients feeling more control and confidence in managing their health . These examples across domains illustrate the general principle: agency flourishes when the individual is treated as a capable, autonomous partner, not a passive recipient. By aligning learning or development activities with the person's own goals and providing a supportive structure for them to take action, we see measurable improvements in agency-related outcomes (e.g., stronger internal locus, higher self-efficacy, greater initiative).

Coaching and Mentoring for Agency: The field of coaching (including life coaching, executive coaching, and academic coaching) explicitly focuses on empowering individuals to reach their goals. Coaching often acts as a catalyst for personal agency by providing a safe yet challenging space for individuals to set self-concordant goals, reflect on their experiences, and commit to action steps. Empirical evidence has begun to document coaching's effects on agency factors. For example, a study on executive coaching found significant improvements in coachees' self-efficacy beliefs following a coaching program . As their confidence in handling work challenges grew, these managers also took on more complex tasks and set higher personal goals . In educational contexts, a concept known as "agentic engagement" has been discussed, where students are coached to actively contribute to the learning process (asking questions, suggesting ideas) and in turn build their ownership of learning. Mentorship programs similarly can strengthen agency: a mentor provides encouragement, feedback, and a role model of agentic behavior. Through vicarious experience (seeing someone similar succeed) and verbal persuasion ("you can do this"), mentors bolster a mentee's self-efficacy . Moreover, by holding mentees accountable for setting and achieving goals, mentors nudge them to practice agentic behaviors. A concrete example comes from youth development programs where at-risk adolescents with mentors showed increased internal locus of control and hope (a construct involving agency thinking) compared to those without mentors, as the mentoring relationship helped reframe their life narrative from one of helplessness to one of possibility and self-determination.

Psychological Support and Safety: While challenging experiences build agency, individuals also need support to avoid discouragement. Thus, a complementary strategy is to create a psychologically safe environment where adults can attempt new behaviors with minimal fear of harsh judgment or failure. This encourages experimentation and risk-taking, which are essential for someone to exercise agency. In practical terms, instructors or coaches might normalize failures as learning opportunities and emphasize effort and growth. Group support can also play a role: peer discussions and collaborative projects can show individuals that their actions and voices matter to others, reinforcing a sense of impact. Studies of adult learning communities find that when learners feel respected and heard by peers, they become more assertive in expressing needs and pursuing goals . This is partly because the social validation of one's agency ("my input influenced the group's outcome") strengthens internal beliefs of effectiveness.

Across these strategies, it is evident that cultivating personal agency is an active, experiential process. One cannot simply lecture someone into feeling more agentic; rather, one must design conditions under which the person experiences their own agency. Over time, these repeated experiences recalibrate the person's self-beliefs (self-efficacy, control, motivation). We have seen that such interventions are documented in multiple fields – from education (andragogy, self-directed learning models) to organizational development (employee empowerment, participative management) to coaching (goal-focused, solution-oriented techniques). Having established how agency can be supported, we now turn to the critical analysis of how personal agency might influence cognitive complexity – in particular, the capacity to move from dot or linear thinking toward more networked, complex thinking.

Methodology

This study employs a theoretical analysis based on integrative literature review. We synthesized findings from peer-reviewed research articles, theoretical frameworks, and evaluations in the domains of psychology, education, organizational development, and coaching to build an interdisciplinary perspective. Key databases and sources were consulted to gather empirical studies on personal agency and on cognitive complexity (including thinking patterns and adult development). We prioritized literature that was grounded in empirical research (e.g. validated scales, longitudinal studies, intervention studies) to ensure the analysis remains evidence-based. By comparing insights across disciplines, the analysis identifies common themes and constructs. Given the theoretical nature of our inquiry, no new empirical data were collected; instead, we critically examined existing research and theories. The methodology aligns with an integrative review approach, aiming to draw connections between concepts (personal agency and cognitive models of thinking) that have not been extensively linked in prior research. In reviewing the literature, attention was given to established measures (for personal agency) and widely accepted definitions (for dot/linear/network thinking as described in organizational and cognitive literature). The discussion that follows emerges from this comprehensive synthesis. All sources used are cited in APA style within the text, and the reference list was compiled to provide full bibliographic details. This method allows us to develop a coherent narrative and theoretical model about the relationship between agency and cognitive complexity without introducing speculative propositions beyond what the current knowledge base can support.

Discussion

The relationship between personal agency and cognitive complexity appears to be a mutually reinforcing one. Our review suggests that individuals with higher personal agency – those who

trust in their own efficacy and feel in control of outcomes – are more likely to engage in and sustain complex, networked thinking. Conversely, those with diminished agency often gravitate toward simpler, more concrete thinking modes (dot or linear thinking), potentially as a coping mechanism within perceived constraints. We discuss several key linkages and implications below.

Agency as a Foundation for Exploring Complexity: Personal agency provides the confidence and motivation needed to tackle complex problems. High-agency individuals believe that their actions can make a difference, which is a prerequisite mindset for venturing into the ambiguous territory of network thinking. Tackling a multifaceted issue (network mode) inherently carries risk – there are many variables and no guarantee of success. Someone with strong self-efficacy is more likely to say "I can figure this out" and begin mapping a complex problem, whereas someone with low self-efficacy might feel overwhelmed and avoid the complexity altogether, reverting to either doing nothing or addressing only one small piece (dot thinking). Empirical evidence supports this: for instance, studies show that self-efficacy positively correlates with persistence and effective problem-solving in complex tasks . One study found that students with higher self-efficacy demonstrated better "problem-solving tendencies and engagement" on complex problems than those with lower self-efficacy . The likely mechanism is that self-efficacy reduces the fear of failure and increases resilience, allowing individuals to maintain cognitive effort even when a problem does not yield an immediate linear solution. Additionally, an internal locus of control means a person attributes outcomes to their own strategies; such a person, when faced with a complex system, is more inclined to experiment with different approaches (since they believe their input matters) rather than assume nothing can be done. In contrast, an external locus of control might induce paralysis or a narrow focus on blame, neither of which is conducive to network thinking. Indeed, as noted earlier, a hypothesis confirmed by research is that individuals with an internal locus show greater cognitive complexity in their thinking than those with an external locus . They perceive more nuances and dimensions in a situation, likely because they are actively scanning for aspects they can influence, whereas external locus individuals may simplistically perceive themselves at the mercy of a few external factors.

Cognitive Flexibility and Adaptive Thinking: Personal agency also contributes to cognitive flexibility – the ability to shift perspectives or thinking strategies. A sense of agency fosters a mindset that one can approach problems in multiple ways (since one is not wed to a single script handed down by others). This flexibility is crucial for moving between linear and networked thinking. For example, a project manager with high agency might plan a project linearly (timeline with milestones) and remain alert to emergent complexities, ready to adjust the plan and consider systemic impacts (network thinking) if the situation changes. That readiness to adapt comes from confidence in one's capacity to handle change. On the other hand, a low-agency manager might rigidly stick to a linear plan even as complications arise, perhaps because they do not feel capable of dealing with the uncertainty of a more complex re-assessment. In psychology, this could be related to the concept of learned helplessness: when people feel they

have no control, they tend to stop trying alternative strategies and their thinking can become rigid and simplistic (a sort of cognitive tunnel vision). Learned helplessness has been shown to impair problem-solving; animals and people who have been conditioned to believe nothing they do matters often fail to find solutions even when they exist, essentially failing to see connections that would lead to a solution. In a classroom context, a student who repeatedly experiences failure might resort to memorizing isolated facts (dot thinking) or following rote procedures without understanding (linear, but unreflective), because they don't trust themselves to genuinely engage with the material in a deeper way. Interventions that break the cycle of learned helplessness – by giving the student a success experience and a sense of control – often result in the student attempting more holistic learning strategies thereafter (like trying to integrate concepts, i.e., network thinking). This aligns with the finding that enhancing students' agency (through building self-efficacy and autonomy) can lead to more cognitive engagement and strategy use , which are essential for complex thinking.

Influence of Agency on Transitions Between Thinking Modes: The transitions from dot to linear to network thinking can be seen as cognitive developmental steps, and personal agency may act as both a catalyst and a lubricant in this developmental process. For instance, consider an adult learner in a professional development course on systems thinking. If that learner has high agency, they are more likely to actively grapple with the new concept, ask questions, draw parallels to their own work (thus connecting dots into a network). They might say, "Let me apply this systems mapping to a problem I face; I believe I can improve the situation by understanding it better." In doing so, they transition from a perhaps previously linear approach to a more networked one. Meanwhile, a learner with low agency might think, "This is too complex, I'll just stick to what the instructor says or to my usual way," thereby avoiding the transition. Empowerment-based interventions have been observed to coincide with cognitive growth. In adult literacy programs, as learners gained agency (voicing opinions, making choices in class), instructors reported those learners also started tackling more complex tasks and making connections between class content and real life . This anecdotal evidence suggests that once individuals feel ownership of their learning, they engage in higher-order thinking like analysis and synthesis (which correspond to connecting ideas, i.e., network thinking). From a theoretical standpoint, this makes sense: higher-order thinking often requires initiative and confidence to go beyond what is given. Agency provides that initiative and confidence.

On the other side of the relationship, developing cognitive complexity can also reinforce personal agency. As one's thinking becomes more networked, one might better appreciate how their actions can have far-reaching effects (thus actually increasing one's sense of impact). Leaders trained in systems thinking, for example, often report feeling more empowered to lead change, because they can see leverage points in the system where interventions might work, rather than feeling that problems are the result of uncontrollable forces . In contrast, a linear-thinking leader might feel stuck ("if A doesn't cause B, I don't know what to do"), whereas a network thinker identifies multiple pathways to influence an outcome. Therefore, cognitive complexity and agency can form a positive feedback loop: agency enables complex thinking,

which in turn can strengthen the belief in one's ability to understand and influence complex systems, further enhancing agency.

Interdisciplinary Perspective – Education, Organizational Development, Coaching: Each field we examined provides supporting evidence for the agency–cognitive complexity link:

- In education, particularly adult education, fostering agency (through self-directed learning and empowerment in the classroom) has been associated with deeper learning approaches. Adult learning theories explicitly state that as learners gain agency, they transition from surface learning (often associated with memorizing discrete facts) to deep learning strategies (integrating concepts, applying knowledge) – essentially moving toward networked cognition . Educators note that true critical thinking and problem-solving ("rigor") emerges when students have a sense of ownership of their learning .
- In organizational development, many modern leadership models argue that leaders must be both empowered and empowering to handle a VUCA (volatile, uncertain, complex, ambiguous) environment. Empowered leaders (internal locus, high self-efficacy) are more likely to break out of siloed, linear management approaches and adopt systemic perspectives . There is also research on organizational learning showing that psychologically empowered employees contribute more to organizational innovation and adaptability because they proactively share knowledge and connect ideas (behaviors emblematic of network thinking in a social context). An interesting angle is that organizations themselves can be seen as needing "agency" to learn, via distributed leadership and a culture that encourages individuals at all levels to think systemically and initiate improvements. Thus, personal agency at the individual level can scale up to collective agency (e.g., a team's belief in its efficacy, known as collective efficacy) which is critical for complex organizational problem-solving .
- In coaching and personal development, a common goal is to help clients reframe limiting beliefs (like "I can't change this situation") into agentic ones ("What can I do to change this?"). As clients adopt an agentic mindset, they often experience a cognitive shift, seeing new connections and options where they previously saw obstacles. Coaches often use tools like mind maps or systems diagrams with clients, which literally encourage network thinking about a personal or professional challenge. For example, an executive coachee working on improving work-life balance might map out all factors affecting their time use (work demands, delegation possibilities, personal habits, support systems) – an exercise in network thinking – and in doing so realize there are leverage points they can act on (personal agency). The coaching literature reports enhanced self-efficacy and goal attainment in clients, which ties back to them perceiving more control and more complexity (nuance) in their situations .

Caveats and Critical View: While a positive relationship between agency and complex thinking is generally supported, it is important to acknowledge that the interplay is complex and not unidirectional. High personal agency does not automatically mean an individual will employ

network thinking effectively; knowledge and cognitive skill are also required. For instance, a very confident person (high self-efficacy) might believe they can solve a complex problem but still approach it naively (perhaps overestimating their understanding – the Dunning-Kruger effect could be invoked here). In such cases, they may simplify a complex issue into a linear one incorrectly, because they feel effective but lack the cognitive framework to handle complexity. This suggests that agency must be coupled with education and reflection to yield genuine cognitive sophistication. Conversely, it's possible for someone to be a brilliant systems thinker yet have low personal agency in certain contexts. They might intellectually see all the moving parts of a system but feel powerless to change it (perhaps due to external constraints or low confidence). This could lead to analysis paralysis – seeing complexity but not acting on it. Therefore, an optimal development approach is to nurture both agency and cognitive skills in tandem, ensuring that increased perception of complexity comes with the empowerment to address it.

Moreover, cultural and contextual factors influence this relationship. Some cultures emphasize interdependence and external control more, which could affect both locus of control orientations and preferences for linear vs holistic thinking. For example, East Asian cultures influenced by Confucian thought historically value holistic, contextual thinking (which is akin to network thinking), yet individuals might report a stronger sense of fate or external influence (lower personal agency in the Western individualistic sense). However, one might argue that collective agency (belief in one's group or in prescribed methods) could substitute to some extent, enabling complex thought through trust in collective processes rather than personal control. These nuances are beyond our scope but worth noting: the ideal of a fully autonomous agent tackling complexity may be a particularly Western individualistic framing.

Implications: Recognizing that personal agency and cognitive complexity reinforce each other has practical implications. In adult education and professional training, integrated programs that simultaneously empower individuals and teach complex thinking techniques could be most effective. For example, a leadership development workshop might couple exercises in self-efficacy building (like reflecting on past successes, setting a challenging project goal) with training in systems thinking tools. The agency component ensures participants feel capable of using the new tools, and the thinking tools ensure that participants channel their enhanced agency into effective analysis rather than simplistic solutions. In coaching, practitioners should be mindful that boosting a client's agency (e.g., through encouraging language and success experiences) might naturally expand the client's thinking horizons, and vice versa, introducing the client to a broader perspective can increase their sense of agency about the issue. Thus, a coach might intentionally toggle between focusing on the person (their confidence, choices) and the problem system (its facets and connections) during sessions.

Finally, policy-makers and organization leaders should consider that efforts to improve “critical thinking” or “innovation” in a workforce will likely fall flat if employees are not concurrently empowered. An organization that says it wants network/system thinkers but maintains tight control and low autonomy for staff sends mixed messages. The staff, lacking agency, will stick to narrow, linear approaches even if they conceptually know about systems thinking. Therefore, creating a culture of empowerment is a prerequisite for unleashing higher-level cognitive work. This aligns with observations that many major business failures have occurred under leaders who were isolated and relied on linear models ; in contrast, successful adaptation often involves distributed agency and collective sensemaking (networked cognition across the organization).

Conclusion

This interdisciplinary analysis elucidated the interplay between personal agency and cognitive models of thinking – dot, linear, and networked – in the context of adult learning and professional practice. Grounded in psychological theories of self-efficacy and control, we identified personal agency as a critical enabler for engaging with cognitive complexity. Individuals who perceive themselves as capable agents (high self-efficacy, internal locus of control, intrinsic motivation) are better equipped to progress from handling isolated facts (dot thinking), to applying sequential logic (linear thinking), and ultimately to synthesizing interconnected information (network thinking). Empirical studies across domains support this progression: when adults are empowered through mastery experiences, autonomy support, and reflective coaching, they not only gain a stronger sense of agency but also demonstrate more complex, proactive thinking patterns in addressing challenges . Conversely, lacking a sense of agency can trap individuals in low-complexity thought – either focusing on one element at a time or rigidly adhering to linear routines – due to fear of failure or habituated dependence on external guidance.

We also highlighted that the influence is bidirectional and context-dependent. Enhancing personal agency and cognitive complexity should be pursued together. Educational and organizational interventions that integrate empowerment (building agency) with training in systems thinking or problem-solving have shown promising results in producing self-directed, innovative learners and workers. The literature offers concrete strategies: goal-setting for quick wins, participatory learning design, attribution retraining, strengths-based coaching, and creating psychologically safe environments for experimentation. These strategies, backed by theoretical rationale and empirical evidence, provide a toolkit for practitioners aiming to cultivate agency and cognitive growth in adults.

Critically, our analysis avoided proposing new frameworks, instead evaluating existing ones. This revealed that while much is known about fostering agency and about teaching complex thinking, rarely are they discussed in tandem. Our interdisciplinary approach suggests that bridging this gap could amplify the effectiveness of both: an agentic mindset empowers complex thinking, and success in complex thinking further reinforces the agentic mindset. Future research could explore this synergy explicitly – for example, experimental studies to see if interventions that target both personal agency and systems thinking yield superior outcomes (such as better decision-making or innovation) compared to interventions targeting either alone. Additionally, nuanced research could examine potential pitfalls, such as overconfidence without sufficient cognitive skill, or cognitive overwhelm despite high motivation, to delineate boundary conditions of our conclusions.

In conclusion, personal agency and cognitive complexity should be seen as parallel targets in adult development. The increasingly networked nature of knowledge and work in the 21st century demands individuals who not only have the technical skills to understand complexity but also the personal agency to act on that understanding. By empowering individuals as active agents and equipping them with the cognitive tools for dot, linear, and network thinking, educators and leaders can facilitate the growth of capable professionals and learners who thrive amid complexity rather than be defeated by it. The synthesis presented in this paper reinforces a simple yet profound insight: people think in more complex ways when they believe they have the power to effect change, and empowering people is therefore a catalyst for unlocking higher-order thinking in our organizations and communities.

References

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37(2), 122–147.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Prentice-Hall.

Bandura, A. (1997). Self-efficacy: The exercise of control. W.H. Freeman.

Brookfield, S. (1986). Understanding and facilitating adult learning. Jossey-Bass.

Imel, S. (1988). Adult learning in groups. ERIC Digest (No. 79) .

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 80(1), 1–28.

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), Measures in health psychology: A user's portfolio. NFER-Nelson.

Wu, C.-H., Griffin, M. A., & Parker, S. K. (2015). Developing agency through good work: Longitudinal effects of job autonomy and skill utilization on locus of control. Journal of Vocational Behavior, 89, 102–111 .