Sustaining growth needs contextual supports: The mindset × ecological-system approach to motivation

Nigel Mantou Lou ✉
University of Victoria, Canada
https://orcid.org/0000-0003-1363-833X
nigellou@uvic.ca

Abstract

The belief that abilities can be cultivated, commonly referred to as a growth mindset, plays an important role in learners' motivation and persistence in their educational journey, including learning a new language. Recent research suggests that having a growth mindset alone is insufficient for educational success. Rather, the "seed" of growth mindsets flourishes best when the "soil" of the environment offers students abundant opportunities to apply and implement their growth mindsets in their learning process (i.e., the mindset × context theory). However, discussions about this contextual impact, particularly within the broader sociocultural environment (akin to "climate" in the seed-and-soil metaphor) are limited in mindset research. Therefore, this article introduces the mindset × ecological-system framework by synthesizing emerging research from psychology, education, and applied linguistics, aiming to provide a more comprehensive understanding of how social and cultural factors impact the psychological dynamics of mindsets. This framework illustrates how embedded socioecological systems, ranging from interpersonal to cultural contexts, influence the psychological processes through which mindsets shape learning and resilience. This ecological system framework of mindset serves as a guide for future research to examine how to sustain learners' growth in diverse sociocultural and achievement settings.

Keywords: mindset; belief; motivation; engagement; socioecological system

1. Introduction

Research on the growth mindset, or the belief that one's ability can be developed through effort and good strategies, has gained significant attention in understanding motivation and behaviors in the fields of education, psychology, and applied linguistics. According to mindset theory (Dweck & Leggett, 1988), learners with a growth mindset are more likely to focus on the learning process, embrace challenges, and invest more effort than those who adhere to a fixed mindset (i.e., the belief that ability is innate and unchangeable; Dweck & Yeager, 2019). Extensive research conducted across educational domains, including language learning, has shown the importance of growth mindsets in learners' effort and persistence in their learning journey (Burnette et al., 2023; Dweck & Yeager, 2019; Leis et al., 2025; Lou et al., 2017). In this paper, I will describe these findings, highlighting the psychological mechanisms of mindsets in shaping learning behaviors and learning outcomes, while also examining their dynamic reciprocal relationships (see Figure 1 – dark arrows).
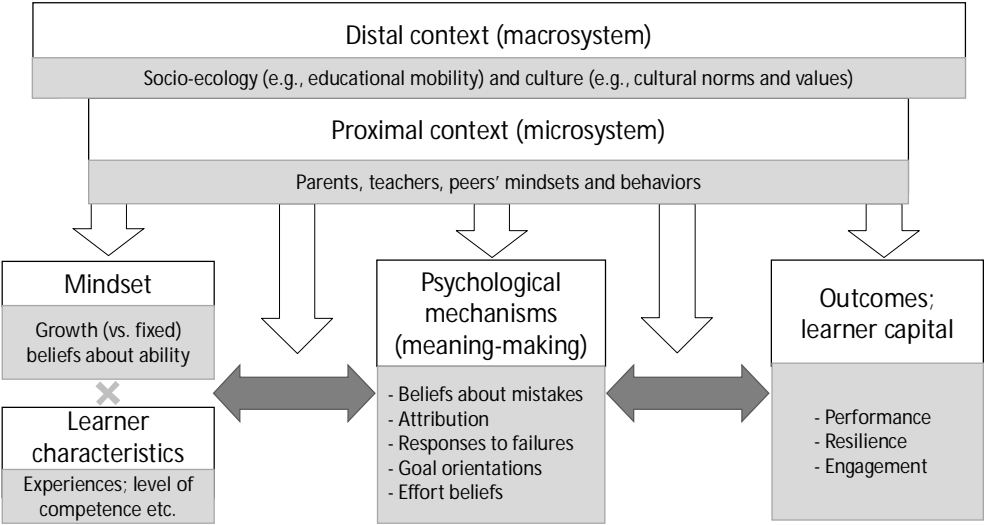

Figure 1 The mindset × ecological-system framework (the dark arrows illustrate the dynamic meaning-making system of mindset, which describes the psychological processes through which mindsets and learner characteristics are linked to learning outcomes; the white arrows depict the influence of proximal and distal contexts on the meaning-making system; this framework draws inspiration from Bronfenbrenner [1977], Noels et al., [2019], Rattan & Ozgumus [2019], and Yeager & Dweck [2020])

Despite its promising findings, the concept of mindset has faced criticism for yielding inconsistent effects on learning outcomes (Macnamara & Burgoyne, 2023). Additionally, an oversimplified understanding of mindsets and their impact on learning could lead to a "false growth mindset" (a shallow belief in the potential for change while failing short in following that belief in corresponding meaning-making and behaviors) and blame toward learners for purportedly holding a fixed mindset (Barger et al., 2022; Dweck, 2015). To address these concerns, recent research has built on the individual-level analysis and explored the heterogeneity effects (e.g., when and where mindsets work best). For instance, studies have found that growth mindsets are more effective in contexts where learners who strive for improvement are provided with opportunities to do so (Yeager & Dweck, 2020). In other words, just like a seed (growth mindset) requires fertile soil (learning environment) to grow, the effectiveness of growth mindsets depends on the supportive nature of the learning environment (Walton & Yeager, 2020). In this paper, I will highlight this research on how learners' characteristics and the proximal contexts (e.g., teachers and parents) moderate the processes of mindsets in learning (see Figure 1 – solid white arrows).

The research on mindsets and their contextual moderation, although gaining increasing recognition, has been lacking in clarity regarding the complexity of contexts and their impact on psychological processes. I argue that in order to effectively address the concern about heterogeneity within the mindset theory, it is important to integrate the ecological perspective (Bronfenbrenner, 1977). This is important because not only do proximal, classroom contexts matter, but distal, socioecological and cultural factors can also systemically explain the processes of learning and development (Bronfenbrenner, 1977). After all, the soil represents only one level of the ecosystem; broader climatic factors (e.g., sun, air, and rain) also influence the soil and the growth of a seed into a plant. However, this perspective has been largely overlooked in the mindset theory, limiting the understanding of when and where mindsets are more effective within the framework of Western cultural models. Emerging research is beginning to shed light on this aspect, indicating that the predictive power of mindsets in psychological and learning outcomes varies across different cultures (Bernardo et al., 2021; Jia et al., 2021; King, 2022; Lee et al., 2019; Lou & Li, 2023b; Sun et al., 2021). These studies suggest that cultural beliefs play an important role in the psychological processes related to mindsets.

Synthesizing this recent progress in mindset research, I present the mindset × ecological-system framework. This framework, compared to previous mindset models, delivers a more holistic perspective on how ecological contexts, ranging from interpersonal to cultural systems, interact with the dynamic process of mindsets and learning. Drawing upon this framework, I will discuss research in language education, identify existing gaps, and propose potential avenues for future research. This contextual

framework of mindsets could deepen our understanding of how mindsets interact dynamically with socioecological surroundings, offering valuable insights for contextualizing growth to foster language learners' positive experiences.

2. The psychological processes of mindsets

Mindset, a fundamental belief that drives the meaning-making system in learning (Dweck & Yeager, 2019; Rattan & Ozgumus, 2019), encompasses various psychological processes – beliefs about mistakes, attribution, responding tendency to failures, goal orientation, and effort beliefs (see Table 1 for definitions). Adapting this meaning-making framework, researchers in the second language acquisition (SLA) field have also discussed these mechanisms outlined in Figure 1.

Table 1 Language mindset meaning system (adapted from Lou & Noels, 2019)

	Fixed mindset	Growth mindset
Beliefs about mistake	Debilitating: Mistakes and failures hinder learning and impair performance. One should avoid them to achieve better learning and performance outcomes.	Enhancing: Mistakes and failures offer valuable opportunities to identify areas for improvement and to enhance learning. One should leverage these experiences to grow and develop.
Attribution:	Uncontrollable: Attribute successes to personal talent and attribute failures to a lack of innate ability.	Controllable: Attribute success to hard work and view challenges or mistakes as results of insufficient effort and motivation.
Responses to failures	Self-defensive (helpless-oriented): Responses with fear of challenges, fear of judgment or rejection, and anxiety about using the target language. Avoid similar situations.	Self-improvement (mastery-oriented): Embrace challenges as opportunities for growth. Seek out effective learning strategies and constructive feedback to continually improve and navigate through setbacks.
Goal orientations	Performance goals: Strive to excel others and affirm one's abilities or avoid appearing incompetent.	Mastery goals: Strive to enhance competence and refine skills; prioritize the learning journey.
Effort beliefs	Negative belief: Effort expended indicates a deficiency in natural talent; exerting effort cannot make up for a lack of innate talent.	Positive belief: Effort is crucial for improvement and serves as a pathway to proficiency.

While recognizing that most learners probably possess varying degrees of both fixed and growth beliefs (Lou et al., 2022), here I categorize them into two categories to illustrate the relative differences between these beliefs. Generally, a growth (vs. fixed) mindset guides positive meaning-making, such as placing greater importance on one's efforts and setting mastery goals (e.g., focusing on improvement; Mercer & Ryan, 2010). Learners with growth mindsets also tend to view mistakes and setbacks as opportunities for growth and are more persistent when facing setbacks (Blackwell et al., 2007; Zarrinabadi, Lou, et al., 2022). In contrast, a fixed mindset leads

students to pay attention to demonstrating performance itself and to view mistakes as signs of incompetence. As learners with fixed (vs. growth) mindsets attribute failure to causes perceived as unchangeable and uncontrollable, they are less likely to learn from feedback and more likely to feel frustrated and anxious (Cutumisu & Lou, 2020; Dweck & Yeager, 2019). In summary, mindsets are tied to social-cognitive factors, as well as emotional and behavioral tendencies that predict language learners' engagement, resilience, perseverance, and performance (see Lou & Zarrinabadi, 2022, for a review).

Mindset and its meaning-making processes are well conceptualized as a dynamic system situated within learners' experiences (de Ruiter & Thomaes, 2023). Learners navigate various domains or learning contexts with different mindsets (Cutumisu & Lou, 2023; Leith et al., 2014). For instance, learners might transition towards a growth mindset when other people guide them to attribute setbacks to strategies or redirect their goals towards the learning process (Kim, 2023; Leith et al., 2014). That is, changing the way learners make meaning could change their mindsets. Moreover, their learning outcomes also influence the way they make meaning of their learning (e.g., attribution of the outcomes; Zhang et al., 2021). Accordingly, this process model depicts mindsets, meaning-making, and learning as reciprocal, such that mindset beliefs and related action tendencies reinforce each other over time (de Ruiter & Thomaes, 2023). This perspective in which mindset works as a system was also depicted in SLA research, showing that growth mindsets best predict outcomes when they are paired with related meaning-making factors (Lou et al., 2022).

The meaning-making process model addresses the psychological mechanisms through which learners' mindsets influence motivation to grow. However, it is important to address the contextual factors as well as failing to do so may lead to inaccurate or overgeneralized conclusions. For example, recent research indicates that some learners have a growth mindset but may not necessarily associate it with positive meaning-making (e.g., they may not value the importance of effort; Barger et al., 2022). This phenomenon is known as a "false" growth mindset (Dweck, 2015). While adopting the belief in growth marks the initial step, learners also need opportunities to internalize these beliefs through experiences within their social environment and enact changes over time (de Ruiter & Thomaes, 2023). Therefore, overlooking how contexts interact with mindsets could obscure how mindsets truly operate. If learners encounter social experiences that contradict their meaning-making system of a growth mindset, they may not be able to make changes in their outcomes or sustain their growth beliefs.

3. The mindset × ecological-system framework

The person × situation approach has a long history in social psychology for understanding the dynamic interaction between personal characteristics and the

situation people are in (Lewin, 1942). For instance, different learners may respond differently to the same situation, while the same learner may exhibit varying behaviors in different contexts (Elahi Shirvan et al., 2021; Kim, 2023). However, the current literature on mindsets primarily focuses on the proximal environment (e.g., teachers and peers), while often neglecting the distal, cultural context. To bridge this gap, I introduce the mindset × ecological-system framework by integrating the person × situation approach and ecological framework into the process model of mindsets. This integrated framework acknowledges the significance of affordances within and the complexity of the ecological environment and highlights how the psychological process of mindset is intertwined with different levels of complex ecological systems.

The ecological approach of psychology recognizes that learners' motivated behaviors manifest or are suppressed as they adapt to the affordances of their environment (Berry, 2023; Gibson, 2014). Recent research on mindset has advanced the understanding of psychological affordances. Hecht et al. (2023) argued that learners who adopt growth mindsets also need to have the opportunities to put their beliefs into practice in order to realize the benefits of growth. In other words, growth mindsets yield the greatest benefits when the ecological environment allows learners to *apply* their growth mindsets in their learning. The affordance theory in language education highlights that language learning does not simply depend on the learner or the classroom environment (Kordt, 2018). Instead, developing proficiency in a new language is a complex, often lifelong endeavor that takes place both in the classroom and through real-world experiences (Richards, 2015). Therefore, it is important to recognize that the affordances and hindrances for growth reside not only within the classroom but also in the larger society.

Previous research into mindsets often focuses on the proximal context and neglects the influence of the sociocultural environment. Therefore, I aim to introduce this framework (see Figure 1) to broaden the mindset research by integrating the Ecological-System approach, which suggests that various systems within the ecological environment contribute to the dynamic nature of learners' motivation (Bronfenbrenner, 1977; Skinner et al., 2022; see Elahi Shirvan et al., 2021, for a discussion on language mindset). However, for the sake of interpretability, this paper will focus on the heuristic of the proximal context (microsystem) and distal context (macrosystem; cf. King, 2022; Noels et al., 2019).

3.1. Learner characteristics and outcomes

Research has clearly demonstrated that mindsets and mindset interventions yield heterogeneous effects on diverse learners (see meta-analysis: Burnette et

al., 2023). For example, mindset interventions are especially beneficial for learners who are more "at risk," including underrepresented students (e.g., first-generation students, minorities), new learners, students undergoing academic transitions, students with low socioeconomic backgrounds, and other disadvantaged students within the educational system (Burnette et al., 2023; Yeager et al., 2019). This argument that growth mindsets are most beneficial for these learners stems from the inception of mindset theory, which originated from insights into learned helplessness (see Dweck & Yeager, 2019). Learned helplessness occurs when learners attribute their setbacks to a lack of ability and feel that they cannot change the situation (Dweck, 1975). Disadvantaged students are more likely to experience learned helplessness, which undermines subsequent engagement and achievement. Growth-mindset interventions help them reframe challenges by recognizing their potential for growth through effort and strategies.

In addition to performance development, researchers argue that developing growth mindsets is considered crucial for fostering resilience – the capacity to cope with and learn from difficulties (Yeager & Dweck, 2020; Zarrinabadi, Rezazadeh, et al., 2022). Disadvantaged learners and second language (L2) learners with lower proficiency often face more challenges, resulting in heightened negative emotional experiences, such as anxiety and frustration (Lou et al., 2025). In such circumstances, growth mindsets are particularly important for guiding these learners. They enable them to perceive the potential for change, encouraging a more positive response to challenges and alleviating their language anxiety (Lou & Noels, 2020a, 2024). Therefore, the mindset framework should encompass a broader range of growth-related outcomes, extending beyond academic achievement to encompass resilience and engagement. These outcomes represent important learner capital for thriving in the long-term learning process and the development of resilience (Noels et al., 2019). After all, learning from failures can often provide more valuable information for growth and improvement than success itself.

In summary, the mindset × ecological-system framework highlights that individual-level characteristics interact with learners' mindsets in shaping the meaning-making processes, which in turn influences growth outcomes and learner capital. In addition, it draws attention to learning outcomes beyond academic achievement, recognizing the significance of resilience in understanding learners' psychological growth.

3.2. Proximal contexts

The mindset × context theory, proposed by Dweck and Yeager (2019), explains that learners' mindset alone is insufficient to bring about sustainable changes if the learning environment does not provide the necessary support and reinforcement

for learners to utilize growth mindsets in their learning. The proximal and relational environment can directly influence the psychological processes and the impacts of growth mindsets. The proximal context encompasses school and family resources and social interactions with teachers, peers, and family members (Skinner et al., 2022). In other words, the norms, practices, resources, and social relations within the school and family can shape the development and manifestation of growth mindsets in learners (King & Trinidad, 2021; Yeager et al., 2019). As depicted in Figure 1, in addition to directly impacting the meaning-making system, proximal context also serves as a moderator, influencing the relationship between mindset and meaning-making, and possibly the relationship between meaning-making and outcomes.

In the school context, a learning environment that supports learners' growth directly offers students the opportunity to develop and apply their growth mindsets. In contrast, when the learning environment overly emphasizes competition or, worse, lacks resources and safety, it can discourage learners from adopting or applying their growth mindsets. A school culture that values growth and care can support learners' development of growth mindsets. For instance, exposure to bulletin boards promoting growth mindsets or encountering growth-mindset messages embedded in the curriculum may boost students' confidence and positive attitudes toward learning (Daniels et al., 2022; Kroeper et al., 2022). When teachers emphasize learners' potential, offer chances to rectify mistakes, assist them in setting learning goals, and value the learning process, learners perceive this as a classroom culture that promotes growth (Kroeper et al., 2022; Yu et al., 2022).

Not only do the teachers' mindsets and behaviors influence learners' motivation, but so do peers and family members (Lou et al., 2024; Muenks et al., 2021). Within the family context, research indicates that parents and siblings can shape learners' motivation, engagement, and help-seeking behaviors (Lin & Muenks, 2025). In addition, peer interactions can significantly influence the development of one's mindset. Peers who offer positive feedback and model growth-mindset behaviors can promote a more positive mindset in their peers (Haimovitz & Dweck, 2017; King, 2020). It is important to note that the microsystem operates interactively and has dynamic effects on learners (Skinner et al., 2022). Thus, mindsets and the meaning-making processes are argued to be contagious, wherein people influence each other's mindsets (Burkley et al., 2017; King, 2020).

An autonomy-supportive environment is also identified as a factor that can promote growth mindsets (Yu et al., 2022; Zarrinabadi et al., 2021). In an autonomy-supportive environment, teachers acknowledge students' needs and emotions, providing them with meaningful choices and rationales that align with learners' values, goals, and/or interests (Noels et al., 2019; Ryan & Deci, 2020). In such an environment, learners are more inclined to believe that they can overcome challenges and, thus, reinforce their growth mindsets and act out growth-mindset

behaviors (e.g., seek feedback). Moreover, an environment perceived to be growth-oriented can elicit learners' trust, engagement, and a sense of belonging (Canning et al., 2020; Muenks et al., 2021). Thus, a "growth-supportive" environment may also reflect the *relationship quality* within the interpersonal system.

How do the proximal contexts influence mindset and meaning-making? Close others (e.g., teachers, parents, and peers) often *directly* communicate their beliefs and meaning-making (e.g., how they attribute success and failure) to learners, influencing learners' mindsets and meaning-making (Haimovitz & Dweck, 2017). For example, when teachers and parents attribute failures to talent or overpraise learners for their talent (vs. effort) upon success, this reinforces learners' fixed mindsets and discourages them from embracing challenging tasks (Mueller & Dweck, 1998). Learners also *readily* perceive others' views through feedback and actions (Lou & Noels, 2020b; Muenks et al., 2021). For instance, when students encounter challenges or make mistakes, teachers and peers with a growth mindset convey growth messages and provide constructive feedback (Kroeper et al., 2022; Lou & Noels, 2020c). This support from teachers and peers can foster a belief in the potential for growth. Conversely, in surroundings that encourage fixed mindsets, learners may find growth-oriented meaning-making inapplicable or unsupportive. For instance, teachers holding fixed mindsets may convey the idea that not everyone possesses inherent talent (Kroeper et al., 2022), shaping the mindset norm in the learning environment. The mindset norm in turn influences learners' meaning-making (Yu et al., 2022).

Second, when the learning environment provides resources and promotes a growth-mindset norm, it helps learners *sustain* meaning-making related to growth mindsets. Students embracing growth mindsets are more likely to engage in "positive" meaning-making when the learning environment encourages the expression of their beliefs. Conversely, when teachers and parents encourage a competitive learning environment and discourage making mistakes, even if learners endorse growth-mindset messages, they might struggle to find positive meaning in their learning experiences (Kroeper et al., 2022). In addition, the context serves as a moderating agent that influences the relationship between meaning-making and learning outcomes (Benita et al., 2014). Even if learners value feedback and embrace mastery goals (indicative of positive meaning-making), they may shy away from seeking or learning from feedback in performance-oriented, error-shaming environments (Hecht et al., 2022). Therefore, in these environments, learners' growth beliefs and motivation may yield little payoff.

3.3. Distal contexts

The broader cultural environment can shape learners' mindsets regarding their abilities and potential, as well as the mindsets of their teachers and family members.

The macrosystem can influence the psychological processes of mindsets in two ways – it directly affects the process of mindset-related meaning-making and indirectly through its impact on the microsystem. To return to the metaphor of the ecosystem, the broader cultural environment corresponds to the "climate," which could directly influence the growth of a "seed," but also indirectly influence the process through the impact on the "soil" (i.e., the immediate environment). In a broader sense, distal contexts encompass the socioecological and sociocultural systems (King, 2020; Noels et al., 2019).

The socioecological factors include the social processes related to geographic, political, and economic conditions, which shape human psychological processes and behaviors (Oishi & Graham, 2010). For instance, in certain regions, historical and economic factors may result in unequal access to educational resources. In such societies, even if disadvantaged students hold a growth mindset, they may be less inclined to act on or apply their growth mindset to their learning (Jia et al., 2021). In societies where opportunities are more scarce or unequal, learners with growth mindsets may encounter additional obstacles in fully enacting their beliefs (Lou & Li, 2023b). Consequently, the significance of growth mindsets and motivation for students' learning and resilience is diminished (Jia et al., 2021).

Sociocultural factors pertain to the shared cultural values and norms among people who have a common history or reside in close geographic locations (Markus & Kitayama, 2003). For example, some cultures may emphasize hard work as essential for success, while others may emphasize inherent talent (Heine et al., 2001; Lou & Li, 2023b). People may not be fully aware of the influence of cultural contexts on them. Nevertheless, these shared cultural beliefs can shape teachers' and parents' expectations and socializations with learners (Yamamoto & Holloway, 2010), impacting the development and expression of growth mindsets in learners (Bernardo et al., 2021; Lou & Li, 2023b; Sun et al., 2021). Cross-cultural research has indicated that students within cultural environments that uphold a more fixed-oriented system are less inclined to express their growth beliefs in learning (Lou & Li, 2023b). In such contexts, mindsets may hold little relevance for learners' academic performance. These findings, together, underscore the impact of the sociocultural environment in shaping the meaning-making processes.

4. Addressing criticisms of growth mindsets

Critics have argued that research on mindsets has had limited influence on learning outcomes (Macnamara & Burgoyne, 2023). However, it is important to recognize that having a growth mindset extends beyond achieving higher grades. Instead, it involves striving to improve within one's unique circumstances. The mindset ×

ecological-system framework emphasizes that mindsets can impact various aspects of learning, particularly individuals' behavioral and emotional responses to challenges and new experiences. Meaningful learning and progression require persistence and resilience. Placing excessive emphasis on academic performance as the sole outcome could undermine the understanding of mindset in learning. Therefore, research should examine the underlying psychological mechanisms of mindsets across a broad range of outcomes.

Failing to acknowledge that mindsets interact with other individual and contextual factors may lead to the false assumption that mindset alone determines learning. The expression and effects of growth mindsets depend on learners' characteristics and the contextual affordances within their environment. Mindset interventions appear to be more beneficial for low-achieving students than for those who already developed strong competencies (Yeager et al., 2019; Yeager & Dweck, 2020). However, for these interventions to have a long-term impact, students also need access to resources to sustain their growth. According to affordance theory, students with plentiful resources (e.g., from high socio-economic status families) are more likely to experience significant academic benefits from having a growth mindset (King & Trinidad, 2021). Therefore, it is essential to consider both individual differences and affordances when evaluating the impact of mindset interventions. For disadvantaged students, addressing resource-related issues is as important as implementing motivational interventions.

The mindset × ecological-system framework provides a complementary perspective on the current mindset literature, emphasizing the significance of addressing systemic factors alongside individual dynamics. Researchers should not overlook structural issues simply because it is possible to alter individuals' mindsets. When considering the role of mindset or implementing growth-mindset interventions in learning, it is also important to examine factors or make adjustments within the school system (e.g., reducing the excessive focus on competition and performance outcomes). Beyond the immediate context, considering learners' cultural backgrounds in mindset interventions (e.g., adapting messages to align with learners' cultural values) can foster more effective and sustainable outcomes (Brady et al., 2017). To better understand the role of a growth mindset and support students' growth in an ever-evolving environment, it is crucial to consider the diverse socioecological systems in which learning happens.

5. Implications and future directions for research in language education

The mindset × ecological-system framework offers insights for both research and practice in cultivating adaptive motivation and resilience among language learners.

This framework underscores the importance of taking into account various individual and sociocultural factors that shape learners' experiences. However, there is still a relatively limited understanding regarding the impact of individual characteristics and contextual factors on the meaning-making system of mindset in the context of language learning. This current conceptual work has sparked the development of new hypotheses and methodologies, offering promising avenues for advancing the field.

5.1. Testing the role of diverse learner characteristics

The mindset × ecological-system framework emphasizes the importance of incorporating more comprehensive growth outcomes. In the field of SLA, research has demonstrated the association between growth mindsets and a wide range of outcomes. These include engagement (Lou et al., 2022; Sadoughi et al., 2023), self-regulation (Bai & Wang, 2023; Eren & Rakıcıoğlu-Söylemez, 2023), goal orientations (Yao & Zhu, 2022), emotional responses (Lou & Noels, 2017; Yao et al., 2021), feedback-seeking behaviors (Papi et al., 2019), perseverance and resilience (Jiang, Yue, et al., 2024; Zarrinabadi, Rezazadeh, et al., 2022), and achievement outcomes (Fathi et al., 2024; Jiang, Tian, et al., 2024; Khajavy et al., 2021; Khajavy et al., 2022; Lee et al., 2023; Lou et al., 2022). Extensive research in L2 education has explored the interconnections between mindset and the meaning-making system as well as their associations with learning outcomes outlined in Figure 1 (see Elahi Shirvan et al., 2024; Lou & Noels, 2019).

However, the role of mindset in language learning varies depending on learners' characteristics. Previous studies have suggested that language mindsets are more effective among learners with little experience or lower proficiency in the target language (Lou & Noels, 2020a, 2020b). Moreover, lab experiments have shown that eliciting growth-mindset messages can reduce language anxiety among students, especially those with lower proficiency levels (Lou & Noels, 2020a). While previous research in the contexts of English as a second or foreign language has provided support for the meaning-making system, there is a lack of research attention on learners studying languages other than English (see Lou & Zarrinabadi, 2022). Additionally, limited work in SLA has investigated whether the effects of mindsets vary with age or educational level. Most of the existing research focuses on university-level or middle-school students, with little attention given to younger children or older adult learners. When examining the role of mindset in different language groups, researchers may consider the unique barriers learners may face (e.g., age-related stereotype threat, accent-related stigma) within their context.

5.2. Testing the role of proximal contexts

Simply having growth mindsets is not enough to support the growth of language learners; deliberate contextual scaffolding is also required to facilitate their progress. Research in SLA has shown that teachers' and peers' mindsets influence how they communicate with language learners (Lou & Noels, 2023). Those with a fixed mindset perceive language learners (e.g., recent immigrants) to have limited potential, which subsequently affects their willingness to provide support (Lou & Noels, 2019, 2020a). Language learners within those contexts may receive fixed-mindset-prompted feedback (e.g., consoling them for a lack of talent when they fail and praising them for their talent when they succeed). As a result, they may become more anxious in communication (Zarrinabadi et al., 2023). These findings highlight the significance of language teachers and their mindsets in shaping how they interact with learners. Therefore, integrating mindset discussions into pre-service teacher training may be beneficial. Researchers can also collaborate with teachers to incorporate mindset concepts into the learning environment (Porter et al., 2022).

While growing evidence has demonstrated the connection between teachers' practices and language learners' mindsets, we still have little understanding of how other learning experiences within direct contexts (e.g., assessment, peer feedback) impact the meaning-making process. Preliminary findings indicate that positive learning experiences can enhance the association between growth mindsets and engagement (Sadoughi et al., 2023). Furthermore, students with growth mindsets who work together as pairs demonstrate greater problem-solving performance and resilience compared to pairs comprising students with fixed and growth mindsets (Sato, 2022). This suggests that learners who hold a growth mindset may develop more effectively in a supportive environment (Hejazi et al., 2023). Therefore, future research in SLA could further explore strategies involving concrete practices and actions to foster a nurturing environment that sustains growth mindsets (Kroeper et al., 2022; Yu et al., 2022).

The process of language acquisition requires affordances not only inside but also outside the classroom (Firat et al., 2022; Richards, 2015). Notably, the perceptions of family members' mindsets were found to predict learners' motivation, behavior, and affect in math (Lin & Muenks, 2025). Learners who believe their siblings and parents have growth mindsets tend to exhibit more positive attitudes and behaviors toward learning (Lin & Muenks, 2025). In language acquisition, family relationships also play an important role in language motivation, particularly within heritage language contexts. However, there remains a gap regarding the influence of family contexts on the development of growth mindsets in language learning. Furthermore, limited research has examined the complex dynamics of the overall learning environment as a whole (Kim, 2023; Skinner et al., 2022).

For instance, how do family and school environments collectively shape the dynamics of the meaning-making process (cf. Lou et al., 2024)? What happens when parents and peers hold different beliefs? Future research should investigate the interplay of these intertwined microsystems. Qualitative methods may be particularly useful in identifying the unique contextual factors within and outside the classroom that hinder or facilitate learners' growth mindsets.

5.3. Testing the role of distal contexts

Language learning is also embedded within the macrosystem, encompassing learners' interactions with the broader sociocultural environment. Within the macrosystem, both cultural factors (e.g., individualism/collectivism, the social orientation of long-term goals, cultural beliefs about fate) and ecological factors (e.g., economics, social inequality, social mobility) could potentially shape learners' mindsets and other achievement motivations (King, 2022; Lou & Li, 2023a). Although recent research has explored social inequality and cultural norms in relation to mindsets (e.g., Bernardo et al., 2021; Jia et al., 2021; Lou & Li, 2023b), more research is needed to systematically identify other key sociocultural and ecological factors (see King, 2022 for a review of these factors) that afford or hinder the development of mindsets and moderate the impact of mindsets on outcomes.

The distal context in language motivation goes beyond sociocultural and ecological factors that impact achievement motivation and also encompasses language-specific factors (Firat et al., 2022; Noels et al., 2019). For instance, the opportunities to learn and use another language have been facilitated by globalization, technological advancements, and social media. Furthermore, cultural and language ideologies and intergroup dynamics (e.g., the vitality of the target language, multilingualism, accentism) can also impact learners' experiences and their interactions with the target language. Nevertheless, there remains limited knowledge about how these contextual factors may influence mindsets and their related meaning-making processes in language learning. To gain a deeper understanding, future research should carefully analyze the learning within the sociocultural context and explore the socialization processes involved.

Methodologically, systematic cross-cultural investigations can help us understand how different distal factors influence and moderate the role of mindsets in language learning. Furthermore, recognizing the embeddedness of the sociocultural context, research may further analyze the multilevel nature of distal and proximal environments and uncover their direct and indirect effects on the meaning-making system. Even when concentrating on one specific cultural context, researchers should embrace an emic approach and reflect on potential

contextual influences and constraints that may impact the applicability of their findings (Simons et al., 2017).

5.4. Mindset interventions in language education

A growth-mindset intervention is a promising psychoeducational intervention that has demonstrated positive effects on language learners' social and emotional well-being (Lou & Noels, 2019, 2024). However, it is crucial to note that a one-time intervention might only temporarily change students' beliefs and meaning-making processes (Hecht et al., 2023). For lasting effects, it is important to assist learners in *applying* these positive changes in their everyday lives. The mindset × ecological-system offers three important directions for future research in mindset interventions.

One important direction in language mindset intervention is to integrate the systemic and dynamic perspective. As such, learners could learn not only about the malleability of intellectual capacity but also about other components within the meaning-making system (e.g., lessons to interpret challenges positively; Hecht et al., 2023; Yeager, Bryan, et al., 2022). This integration aims to provide affordances for learners to make meaning-making tenable and actionable in possible everyday life situations. When facing actual setbacks, they would know *how to* use their growth mindsets to interpret the situation. Furthermore, because previous mindset interventions in SLA have primarily relied on cross-sectional laboratory experiments, there is a need for longitudinal studies to understand the dynamics and trajectories of mindset interventions on long-term outcomes.

In the field of SLA, there is still much progress to be made in understanding contextual moderation and the ecological validity of mindset interventions. The focus on contexts as a moderating agent of mindset is guided by a key advancement in psychological interventions that emphasize the importance of heterogeneity effects (Hecht et al., 2022). This development underscores the need for researchers to acknowledge that heterogeneity in interventions is natural, such that psychological effects may not manifest uniformly across people and contexts. Furthermore, systematic investigations of the boundaries of intervention (when and where it works) could help inform the development of theories and applications (Bryan et al., 2021). Therefore, understanding the specific contexts in which language learners are situated is crucial for better supporting their growth. For instance, large-scale studies have found that mindset interventions for students were effective only when peer norms also supported growth (Yeager et al., 2019) and when teachers also held growth mindsets (Yeager, Carrol, et al., 2022). Additionally, researchers have suggested various methods to explore the causal role of contextual variability in psychological interventions (Hecht

et al., 2022). For example, researchers may identify ecologically valid scenarios in language learning and simulate different contexts for learners (e.g., teachers providing different types of feedback) to study contextual influences. Furthermore, even for larger sociocultural contexts (e.g., educational mobility), researchers may experimentally manipulate subjective construals (e.g., learners' perceptions of mobility) to examine potential causal moderating effects on relevant psychological and behavioral outcomes (Jia et al., 2021).

Once relevant contextual factors are identified, researchers could further extend mindset interventions to also target changing the learning environment. A brief growth mindset intervention alone, such as simple growth messages in the lab, may not lead to lasting changes or resolve issues of disengagement if learners return to an unsupportive learning environment. To help the intervention achieve a lasting effect and meaningful changes, the affordance perspective suggests that the environment should provide learners with opportunities to put their growth beliefs into practice (Walton & Yeager, 2020). This may involve interventions at the context level, where the school and teachers work to change the norms surrounding mindsets in learners' immediate environments. By directing more attention to changing the "mindset norm," this perspective can inform larger-scale interventions and guide the development of effective educational strategies.

6. Conclusions

Language learners' growth mindsets can shape their adaptive meaning-making and promote language development. However, mindsets and their psychological processes are not static and unidimensional, and their effects can vary across diverse learners and contexts (de Ruiter & Thomaes, 2023). Moreover, a growth mindset is not just an individual belief about one's own ability; it is also a fundamental cultural belief that permeates the environment (Murphy, 2024). To expand on this discussion, this article introduces the mindset × ecological-system framework, which provides clarity on how individual factors and complex ecological systems shape the psychological dynamics of mindsets. Moving forward, it is important to investigate key individual and contextual factors, ranging from proximal and distal contexts, that contribute to fostering a growth mindset and a growth-mindset culture. In light of this special issue on learning beliefs (Oga-Baldwin & Fryer, this issue), I argue that while learners' beliefs in growth are important, their growth also depends on having an environment that supports them in actualizing those beliefs. This framework offers a theoretical foundation for future research on fostering growth mindsets and growth cultures that drive meaningful changes for diverse learners.

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