

A Narrative Review of Research on Cognitive Processes During the Acquisition of English as a Second Language and A Future Research Agenda

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Abstract: *The domain of Second Language Acquisition (SLA) has evolved through different schools of thought from the 1940s to the modern era. This paper focuses on the cognitive element in SLA. It begins by outlining how the cognitive turn developed in SLA. It then briefly outlines various cognitive approaches to SLA and presents a narrative review of research from the last ten years on the cognitive processes involved in acquiring English as a second language. The paper concludes with a summary and a possible future research agenda on cognitive processes in SLA.*

Keywords: cognitive processes, second language acquisition, English as a second language, acquisition of English language, language learning

INTRODUCTION

Behaviourism, a school of thought prevalent in the early twentieth century, held that behaviour can be learned through imitation. Negative and unacceptable behaviour can be altered by rewarding the elicited positive behaviour. Moreover, it viewed learning in terms of stimulus-response conditioning and habit formation. While this philosophy primarily relates to psychology, with roots in the work of Ivan Pavlov, B.F. Skinner, and J.B. Watson, it strongly influenced and shaped the teaching and learning of English as a second language at the time. Behaviourist thought manifested in the Contrastive Analysis Hypothesis (CAH), developed by Charles Fries in 1945 and further extended by Robert Lado. The hypothesis viewed language as a conditioned response and language learning as a process of habit formation. Eventually, the Audio-lingual method originated in the 1960s and 70s in America and drew on the tenets of Behaviourism and CAH. William Moulten was its proponent. The method focused on target-language teaching and learning by presenting items as dialogues, followed by repetition and drill. However, Noam Chomsky's theory of language acquisition, proposed in 1957 in response to Behaviourism, led to a philosophical shift that posited that language acquisition is not the result of mere imitation; rather, humans are born with an innate capacity to acquire it. He termed it the Language Acquisition Device (LAD), which enables them to detect the rules of language. However, the theory was primarily associated with first language learning.

OVERVIEW OF SLA'S MAJOR COGNITIVE APPROACHES

Noam Chomsky's claim provided the foundation for formulating cognitive models of Second Language Acquisition. First and foremost is Stephen Krashen's Monitor Model. It states the difference between acquisition and learning. The former is an implicit process involving communicating meaning, while the latter is an explicit process involving knowledge of the target language through the learner's conscious practice and memory. It further argues that L2 production and competence can be achieved through the acquisition system, whereas the learning system acts as a monitor before and after L2 production. Moreover, it suggests that learners acquire language structures in a certain expected order, and that this happens when learners are exposed to comprehensible target input that is slightly beyond their current level and challenges them enough to grow linguistically in the target language. (Lai and Wei, 2019; Gass, 2018). Next is Robert DeKeyser's Skill Acquisition Theory. According to the theory, a second language is learned like any other skill, involving gaining knowledge and learning the rules of the target language, followed by conscious practice and achieving fluency and spontaneity through continuous practice. Here, DeKeyser stresses meaningful practice of the target language through meaningful conversations, which leads to a stage where the L2 comes to the learner without conscious effort. (DeKeyser, 2007; DeKeyser and Suzuki, 2025). Next is the Interaction Hypothesis, proposed by Michael Long. It suggests that interaction with a native speaker through conversation is essential for SLA, and during this conversation the learner receives comprehensible input through interactional modifications while negotiating meaning. During such interaction, the learner also receives feedback while producing output. This calls the learner's attention to target language features. (Long, 1981, 1983 and 1996). Next is the Noticing Hypothesis, proposed by Richard Schmidt. It claims that second language learning happens when a learner consciously notices features of target-language input, which Richards termed intake. (Schmidt, 1990).

Next is Bialystok's Analysis-Control model of SLA. The model proposes two cognitive mechanisms involved in SLA and L2 use: analysis of knowledge and control of processing, which jointly lead to L2 proficiency. The former involves structuring and rearranging loosely organised mental representations of language into explicit, formal linguistic structures. In contrast, the latter involves attending to relevant linguistic forms and selecting, retrieving, and using them in real situations. (Bialystok, 1994). Next is Manfred Pienemann's Processability Theory, which suggests that L2 acquisition happens in a series of developmental stages, and each stage is a prerequisite for the next. Moreover, at each stage, learners can produce and comprehend only those target language forms that their current language processor can handle. (Pienemann, 1998). Next is the emergentist approach to SLA, whose core idea is that language is neither an inherent property nor learned through rules. Rather, it develops as complex patterns through social communication, where perception, thinking, and physical actions interact with each other. (Ellis, 1998). The last is the working memory model proposed by Alan Baddeley and colleagues, which belongs mainly to psychology but offers insights into the process of SLA. Of the four working memory components they proposed, the phonological loop supports language learning by storing new sounds (Baddeley et al., 1998), while the central executive monitors grammar and plans speech (Hitch et al., 2025).

MAJOR COGNITIVE PROCESSES RESPONSIBLE FOR L2 LEARNING – LITERATURE REVIEW

The above provides a brief overview of major theoretical foundations that examine the process of SLA through a cognitive lens. This section will shed light on the cognitive processes involved in SLA and the studies conducted on them.

ATTENTION

Attention is one of the major cognitive processes involved during SLA. Earlier studies explored how task complexity, input conditions, textual enhancement, and instructional conditions influence attention, attentional processing, and their effects on L2 acquisition. Results showed that performing simple task characterised by content support, facilitated attention of the learners to the linguistic encoding by reducing processing burden (Revesz et.al., 2017). Attentional processing of target L2 grammatical feature among learners increased when their attention was directed to it and when they received explicit metalinguistic explanation which led to increased grammatical knowledge of L2 among learners (Indrarathne and Kormos, 2017). Textual enhancement of target grammatical structure through writing it in bold only directed learners' attention to it and resulted in enhancing receptive knowledge of it; however, it did not lead to significant L2 development (Lee and Revesz, 2018), and learners' attention decreased in the explicit instructional condition over time (Indrarathne et.al., 2018). Researchers have studied the role and influence of attention, attentional control, and attentional manipulation in second-language English acquisition. It was found that visual attention positively affected recall of target language feature presented in form of audiovisual input (Puimege et.al, 2021), internal attentional manipulations bettered learning of lexis among learners but didn't work better in comparison to external attentional manipulations in each case (Liu et.al., 2021), attentional control directly affected L2 listening comprehension among learners (Wallace, 2022), high attention to target language's grammatical feature did not increase L2 learning through syntactic priming among speaker groups (Coumel et.al, 2023). Attention control played a substantial role in learners' ability to remember L2 pseudo-nouns and their real words, whether recalling or recognising them (Jung et al., 2025). Recent research on the influence of perceptual salience on attention and attentional processing found that perceptually salient target grammatical features attracted greater learners' attention than less salient features; however, this did not increase awareness and intake (Cipitria et al., 2026).

NOTICING

Another cognitive process related to SLA is noticing, which has gained the attention of many researchers in the field. They studied the influence of Form Focused Instruction (FFI), suprasegmental-based instruction, multi-modal tasks, metacognitive instruction and automated written corrective feedback (AWCF) on learners' noticing and SLA. It was found that FFI increased learners' noticing of L2 grammatical features and subsequently led to their processing and acquisition (Cintron-Valentin and Ellis, 2016), suprasegmental instruction resulted in learners to notice L2 word stress and cross-linguistic differences in intonation patterns of their L1 and L2 leading to their phonological development (Saito and Saito, 2017), computer based multi-modal composing activities assisted learners in discovering L2 rhetorical and linguistic features (Dzekoe, 2017), metacognitive instruction on corrective feedback helped learners to increase their awareness of its benefits in language development particularly grammatical knowledge thus increased its noticeability at learners' end (Sato and Loewen, 2018) and AWCF provided to learners related to their L2 errors promoted noticing among them which

led them to engage in self-directed learning which in turn improved their writing accuracy (Barrot, 2023). The role and impact of noticing upon SLA has also been studied. It was found that noticing L2 linguistic features both grammatical and non-grammatical in corrective feedback, enhanced learners' immediate and long-term accuracy of those features in written texts (Bonilla Lopez et.al, 2018), learners, when directed to notice their L2 conversations to identify their grammatical, phonological and lexico-semantic errors, rather than having instruction on EFL conversation, they showed fewer such errors in post-test speaking task (Navinidia et.al., 2019) and implicit learning of L2 formulaic language occurred among learners through noticing the content rather than form (Szcześniak et.al., 2026).

WORKING MEMORY PROCESSING CAPACITY

Another important cognitive process in SLA is working memory and its processing capacity. Early research examined the role and influence of specific types of working memory on L2 performance, as well as individual differences in working memory capacity and function in SLA. Results showed that Executive Working Memory (EWM) had a strong correlation with a few lexical, syntactic and stylistic L2 features among learners during their L2 speech performance (Wen, 2016); working memory did not have any significant relation with complex task performance measures (Cho, 2018); learners with higher working memory capacity wrote more complex and fluent essays; however, they ended up making more mistakes (Zabihi, 2018). Storage capacity and attention-regulation functions of working memory helped learners understand the L2 grammatical feature in all input conditions; however, they did not help much during production of the target L2 feature (Indrarathne and Kormos, 2018). Researchers have also investigated the relationship between different types of working memory and L2 learning conditions. Results showed that L2 learners with strong complex working memory benefited most from metalinguistic explanations and direct corrective feedback with revision.

In contrast, learners with strong phonological short-term memory benefited less from direct corrective feedback with revision (Li and Roshan, 2019). The interaction between individual differences in working memory and background knowledge has also been studied, and it was found that L2 readers having higher working memory capacity showed better reading comprehension when provided with background knowledge, as they used it for their benefit in comparison to L2 readers having lower working memory (Shin et.al., 2019). Researchers also studied the relationship between working memory and L2 comprehension. Results showed that learners with high working memory showed higher comprehension in multimedia learning (Gass et al., 2019). The relationship between working memory and instruction types has been investigated, and it was found that learners' working memory capacity directly impacted their L2 vocabulary acquisition during form-focused instruction rather than meaning-focused instruction (Ruiz et al., 2021). The effect of the interaction between working memory, task complexity, and language proficiency on L2 speech performance was also studied, showing that working memory and language proficiency affected learners' lexical complexity and fluency differently depending on task complexity (Awwad and Tavakoli, 2022). The role of working memory in the proceduralization of L2 syntax under different practice conditions has also been studied, and results showed that interleaved practice helped regardless of learners' working memory capacity; however, in the blocked practice condition, learners with higher working memory capacity benefited more (Suzuki et al., 2022). The interplay among working memory, semantic encoding, L2 reading ability and learners' proficiency level has also been investigated. It was found that among beginners, better working memory was associated with faster semantic encoding speed and better reading comprehension; however, this was not the case among intermediate- and advanced-proficiency

learners (Mahshanian et al., 2025). The effect of interaction among working memory, corrective feedback timing and task complexity on the development of L2 has also been studied, and it was found that in the case of a complex task, working memory capacity of the learners determined the extent to which they benefit from the immediate corrective feedback (Rassaei, 2026).

DECLARATIVE MEMORY AND PROCEDURAL MEMORY

Other cognitive processes related to L2 acquisition are declarative memory and procedural memory. Researchers have studied how declarative and procedural memory interact with training paradigm design and how this affects L2 grammar learning. It was found that under passive, exposure-based training, declarative memory was used to acquire complex grammar rules, while procedural memory was used to acquire simple grammar rules. Similar results were obtained for both the feedback and no-feedback conditions (Antoniou et al., 2016). Researchers have also studied the role of declarative memory in L2 acquisition. It was found that during focused practice, declarative memory was active in the initial phase and played a role even when automatic processing failed (Cornillie et al., 2017). During simultaneous acquisition of grammar and vocabulary by the learners, their declarative memory capacity contributed to grammar learning rather than vocabulary learning (Ruiz et al., 2018) and better declarative memory resulted in better accuracy during L2 comprehension practice and procedural memory assisted in achieving automatization over a period of time, but only among learners having higher declarative memory (Pili-Moss et al., 2020). The interaction between declarative memory and L2 learning conditions has also been studied, and results showed that declarative memory related to L2 vocabulary learning regardless of instructional condition (Ruiz et al., 2021). The interplay between declarative memory, procedural memory, varied linguistic structures and types of corrective feedback was also investigated. It was found that learners with stronger declarative memory learned irregular past tense better when provided with recasts, while learners with stronger procedural memory learned regular past tense better when they focused on thinking and analysing rules (Sato, 2023). The impact of declarative memory on L2 task outcomes has also been studied, and no influence of the former was found on the latter (Pili-Moss et al., 2025). The effect of immersion period on declarative memory and procedural memory and its impact on L2 spoken proficiency was investigated, and it was found that better procedural memory was strongly related to longer immersion time and better L2 speaking skill; however, declarative memory did not show a connection to immersion time and L2 proficiency (Bakkouche and Saito, 2026).

TRANSFER AND CROSS-LINGUISTIC INFLUENCE (CLI)

Another important cognitive process related to SLA is the use of L1 knowledge in L2 acquisition. This phenomenon has also been studied rigorously. It was found that learners' L1 not only influenced their acquisition order and accuracy of L2 morphemes but also affected the acquisition of those morphemes which reflected their L1 grammar rules (Murakami and Alexopoulou, 2016), learners' fluency in L1, differences in their L1-L2 and their proficiency contributed to their fluency in L2 both before and during immersion period (Huensch and Tracy-Ventura, 2017), learners' L1 word knowledge got activated and affected their understanding of L2 English sentences while performing L2 sentence completion and translation task (Kim and Gruter, 2019), identifying a certain incorrect morphological rule in L2 judgement task was more difficult for the learners than wrong syntax rule as the former did not exist in their L1 as opposed to the latter (Jensen et al., 2020), learners with different L1 influenced their L2 morphosyntactic processing, however only at neural level rather at behavioural level (Wang et al., 2022). The impact of cross-linguistic structural priming on CLI has also been studied, and it was

found that during L2 English production, learners' use of structurally similar L1 and L2 features increased, resulting in the blocking of dissimilar linguistic structures (Hopp and Jackson, 2023). Influence of learners' L1 background on their acquisition of L2 skills was also studied and it was found that the L1 of learners belonging to different L1 linguistic backgrounds significantly interfered with the acquisition of their L2 English grammar, vocabulary, syntax and phonology which were evident in errors related to verb conjugation, misalignment of sentence structure and phonetic mispronunciations (Alisoy, 2024). The effect of L1 self-efficacy on L2 reading comprehension was also investigated, and it was found that the former affected L2 reading, but indirectly (Liu et al., 2024). Researchers also studied orthographic transfer from L1 to L2, but found no evidence of orthographic skill transfer among learners (Haddad-Najjar and Abu-Rabia, 2025). Sangeetha and Sridhivya (2025) also studied the effect of translanguaging on L2 acquisition and found gains in L2 vocabulary, L2 written expression, and overall English proficiency. Alyami (2026) also studied the impact of L1 sociophonetic conditioning on L2 phonological acquisition and found that L1 social conditioning shaped the social and structural aspects of L2 phonological acquisition.

LEARNER'S STRATEGIES

Lastly, researchers have also studied L2 learners' strategies and their role and effect on L2 acquisition. Learners' use of components of self-regulated learning (SRL), namely orientation, performance and evaluation, and its relation to L2 achievement has been investigated. It was found that they used SRL at a moderate to low level. Still, it showed a substantial correlation with L2 achievement (Seker, 2016), out of nine self-regulated writing strategies related to cognitive, metacognitive, social-behavioural and motivational domains, six strategies came out as highly predictive of L2 writing proficiency (Teng and Zhang, 2016), learners' L2 listening achievement was affected differently by their self-regulated listening strategies due to high differences in their metacognitive awareness during self-regulated listening (Zeng and Goh, 2018). The study also examined the relationship between language learning strategies (LLSs), L2 skill achievement, and the use of strategies corresponding to specific L2 skills. It was found that as LLS use increased, learners' achievement in L2 listening, speaking, reading, and writing also increased. Moreover, high achievers used cognitive and compensation strategies most while acquiring listening skills; compensation and affective strategies most while acquiring speaking skills; compensation strategies most while acquiring reading skills; and memory strategies most while acquiring writing skills. Low achievers utilised social strategies the most while acquiring listening, speaking, and reading skills and affective strategies the most while acquiring writing skills (Taheri et.al, 2020). The effect of self-regulated learning strategies on L2 skills in a flipped classroom has also been investigated, and significant improvements were found in L2 speaking, reading, writing, and grammar (Ozturk and Cakiroglu, 2021). The impact of technological tools on SRLS and L2 writing performance was also studied, and it was found that both a learning management platform and an automatic writing evaluation platform supported learners' SRL, which eventually enhanced their writing performance (Han et al., 2021). The effect of strategy-based intervention on learners' target SRL writing strategy use and writing performance was also explored, and a significant and sustained effect of the former was found on the latter (Shen and Bai, 2024). The interplay between Socioeconomic Status (SES), self-regulated Learning Strategies (SRLS) and components of writing proficiency, namely complexity, accuracy and fluency, was studied where SES and SRLS found to be significantly related with writing accuracy and complexity only. Moreover, high SES strengthened the relationship between SRLS and complexity and accuracy compared with middle and low SES (Dong, 2024). The effect of Large Language Models (LLMs) on learners' self-regulated learning (SRL)

strategies, L2 performance and motivation for writing has also been explored, and it was found that learners exposed to LLM-integrated instruction showed improvements in their L2 writing performance, use of SRL strategies, and writing motivation (Liu et.al., 2026). Researchers have also studied the effect of self-regulated, strategy-based speaking instruction on L2 speaking and strategy use, finding significant improvements in L2 speaking performance and more deliberate, frequent strategy use (Wang and Sun, 2026). The impact of AI-generated feedback on Self-Regulated Learning (SRL) strategies was also investigated, and learners showed greater gains in metacognitive and meta-affective self-regulation strategies (Mahmoudi-Dehaki and Esfahani, 2026).

CONCLUSION AND FUTURE RESEARCH AGENDA

To conclude, the review highlights attention and noticing, different memory systems (working, declarative, and procedural memory), cross-linguistic transfer and influence, and learners' strategies as major cognitive processes involved in L2 acquisition. Moreover, it became apparent that factors such as task complexity, input and instructional conditions, individual differences, learning conditions, immersion period, cross-linguistic priming, and strategy training play a crucial role in the success/failure of acquiring English as a second language when these factors interact with the highlighted cognitive processes.

Indeed, the presented research contributes immensely to the scope of SLA research. However, these studies are not free from limitations. First, research in Indian ESL classrooms is scarce, as participants in the reviewed studies came from Western, East Asian, and Southeast Asian countries. Second, these studies underrepresent insights from multilingual contexts, which weakens the generalisability of the reviewed research.

These limitations also point to directions for future research and call on researchers to address these gaps. Another agenda for future SLA research could be to explore the interaction between literature-based pedagogy and L2 learners' cognitive processes, and their effects on each other and on the process of L2 English acquisition.

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