

Review paper

## Review of Noticing Hypothesis from Two Cognitive and Ecological Perspectives

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### Citation

Ahadi, S. (2023). Review of noticing hypothesis from two cognitive and ecological perspectives. *Journal of new advances in English Language Teaching and Applied Linguistics*, 5(1), 1207-1218.

 10.22034/jeltal.2023.5.1.10

### Received

2022-12-28

### Revised

2023-02-20

### Accepted

2023-03-27

### Keywords:

cognitive,  
ecological,  
noticing hypothesis

### Abstract

The significance of cognitive processes in language learning, such as the mental processes learners bring to task learning, has been accepted by psycholinguistics and linguistics (Zhang, 2012). The presence of conscious and unconscious processes is of the essence in cognitive psychology. More specifically, whether learning takes place consciously or unconsciously is an important discussion for second language researchers. On the one hand, scholars such as Schmidt (1990) acknowledged that attention to input is a conscious process and is a necessary process to convert input to intake. Another cogent argument he put forward was that no matter whether a learner attends deliberately to a linguistic form in the input or it is noticed unintentionally, once it is noticed, it becomes intake. On the other hand, Krashen's (1982)- Input Hypothesis- explicitly rejected a role for consciousness language acquisition and believed that acquisition occurs once learners have access to an optimal amount of appropriate input, which in turn leads acquisition to happening naturally. Having said that the existence of unconscious learning cannot be denied completely, conscious learning is assumed to have an important role in L2 learning. In this paper, we will elaborate noticing hypothesis from both cognitive and ecological perspectives.

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### Introduction

In recent years, second language (L2) researchers have examined the role of noticing in language environment. In this regard, the impact of noticing on L2 learning has been studied from different perspectives. Schmidt's (1990) noticing hypothesis originated from his experiences of learning L2 Portuguese in Brazil. He kept a diary to establish which features in

the input he had consciously attended to. He pointed out that, following instruction, his awareness of a form coincided with his ability to hear it in the input. Although the form was available in the input prior to this, he was now conscious of hearing it and was able to produce it for the first time. Schmidt stressed the role of conscious learning, suggesting that input was only able to be processed by the learner once it was noticed. Input could not lead to intake and subsequent integration in interlanguage production unless it was first noticed.

For Schmidt (1990), there is no acquisition without noticing. On this basis, Bielak and Pawlak (2013) argued that consciousness-raising tasks could accelerate the move toward noticing during the learning process. In fact, Schmidt's hypothesis (1990, 2001, 2010) explains why language learning requires attention. That is because attention is "the necessary and sufficient condition for long-term storage to occur" (Schmidt, 2001, p.16). In other words, the acquisition process of a learner could begin when the learner is aware of the linguistic features of the input.

Krashen (1981) distinguishes between learning and acquisition. Acquisition is a subconscious process of language development similar to how children acquire their L1, while learning is conscious knowledge of grammar rules. Krashen believes there is no overlap between these two processes and that acquisition occurs when learners are exposed to comprehensible input. Formal instruction is unnecessary for acquisition, but empirical research shows that instruction in conscious rule learning can aid in the attainment of successful communicative competence in a second language (Doughty, 1991; & Long, 1983,1988).

The assumptions about noticing need to be studied in different contexts. Despite the theoretical and practical propositions by experts on the investigation of Schmidt's noticing hypothesis in the cognitive perspective to second language acquisition, a great debate still exists regarding the effectiveness of noticing in ecological perspective to second language acquisition. Therefore, the present study aims to take a critical look at noticing hypothesis from these two perspectives on language learning.

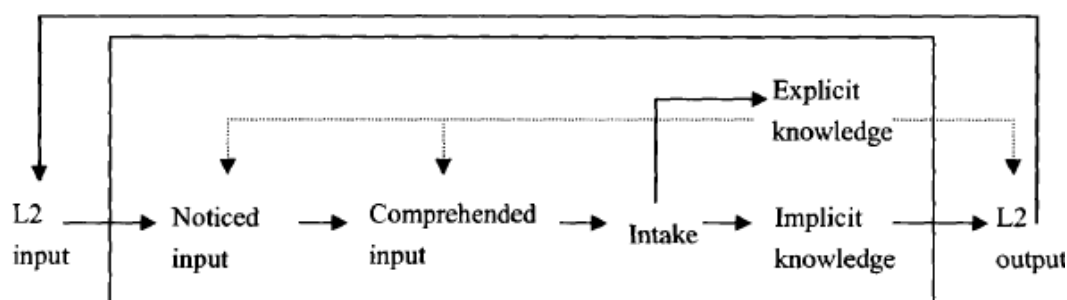
### **Noticing from Cognitive Perspective to Second Language Acquisition**

The term noticing has been defined by many scholars. For Schmidt (1990, 2001), noticing is necessary for learning and is a process of attending consciously to linguistic features in the input. As Schmidt (1990) held, awareness has different levels as noticing and understanding. In fact, noticing by which "stimuli are subjectively experienced" and is defined as "availability for verbal report" (Schmidt, 1990, p. 132), requires focal attention and is a lower level of awareness. While understanding, which represents "analyze, compare, reflect, comprehend" (Schmidt, 1990, p. 132), is a higher level of awareness. Schmidt's noticing hypothesis has two versions; strong and weak version. In its strong version, no linguistic features would be mentally represented unless the L2 learner noticed it. That is why for processing the newly learned language data, intake is considered the representation of a stimulus in long-term memory (Schmidt, 2001). However, the weak version claims noticing is conducive to learning (Schmidt, 2010).

Contrary to Schmidt, Tomlin and Villa (1994) identified noticing as a component of attention and clarified the term “attention” by detailing three distinct components: alertness, orientation, and detection. They describe alertness as the individual’s “general readiness to deal with incoming stimuli or data” (p. 190). They further defined orientation as directing attentional resources which may facilitate or inhibit detection. The last mechanism according to Tomlin and Villa is detection which refers to the cognitive registration of input, which may or may not be conscious. Detection is selective and makes input available for further cognitive processing (Tomlin & Villa, 1994). They proposed that “awareness plays a potential role for detection, helping set up the circumstances for detection but it does not directly lead to detection itself” (Tomlin & Villa, 1994, p.14). They proposed that attention can occur without awareness; however, awareness requires attention.

For Robinson (1995) noticing is what detected by L2 learners and then activated as a result of the allocation of attentional resources. That is to say, noticing means “detection plus rehearsal in short-term memory” (p. 296). In this sense, detection is a necessary step for noticing linguistic features which are processed with awareness. Furthermore, the concept of rehearsal implies that L2 learners need to make a conscious effort to memorize the new linguistic features when they notice them, like repeating a phrase or sentence, or reading the text a few times.

Ellis (1999) provides a model of cognitive process in second language acquisition where the role of noticing was given great importance. This model tries to investigate the cognitive progress in which the input occurs. Based on this model, noticing plays a vital role. Noticed input is the input in which learners absorb language features into their short-term memories while comparing them to features produced as output. If learners do notice and comprehend the input, intake either explicit knowledge or implicit, the output will be created in which the absorbed intake forms part of the learner's interlanguage system and changes only occur when language features become part of long-term memory.



**Figure 1.**

The Role of Noticing from Cognitive Perspective (Adapted from Ellis 1999: 349)

A considerable amount of research focused on factors that affect learners’ noticing of L2 (Bygate, 2001; Hawkes, 2012; Qi & Lapkin, 2001; Shabani et al., 2018). As Schmidt (1990)

stated, several factors can affect what language learners take notice of in the input they receive. These factors include expectations, frequency, perceptual salience, skill level, and task demands. Expectations play a crucial role in determining what is considered noticeable and perceptible, which activates psychological pathways. The more frequently a language feature appears in the input, the more likely it is to be noticed and incorporated into the interlanguage system. Input that is more prominent and noticeable is also more likely to be learned. The skill level and the ability to process information automatically can also influence what learners take notice of. Finally, task demands or instructional tasks can guide learners to notice particular elements of the input, which is important because what is learned is often determined by what is noticed. According to Ellis (2008), factors such as prior knowledge, past experience, task demand, individual differences in working memory, first language, and L2 are among the factors that possibly influence noticing.

The importance of noticing hypothesis as a tool in L2 output has been investigated by several researchers. Among the extensive body of research in this field, Mennim (2007) investigated the effects of noticing on the oral output of Japanese English language learners. Classroom activities were used to promote the students' conscious attention to form. The students were given tasks that helped them notice L2 forms and their oral output was recorded and analyzed to check for improvements in the use of the forms. The author concluded that noticing had positive effects on the students' language accuracy and helped them correct their errors.

Investigating the effect of task repetition and reactive focus on form on the oral output of intermediate Iranian EFL students, Baleghizadeh and Derakhshesh (2012) carried out an activity consisting of presenting lectures and recording voices based on which the teacher helped students with correction and asked them to prepare for the second lecture. The researchers analyzed qualitatively the students' lectures and detected mistakes. These mistakes, which can be categorized as verbs, direct translation, noun modifiers and prepositions, and others, are part of lectures in which students presented in two lectures, and asked them to revise their output which helped them notice L2 forms. Overall, the researchers reported that noticing had positive effects on students' oral performance and helped them correct their errors.

In another study, Mirzaei et al., (2012) investigated the students' L2 learning employing correct English intonation patterns. The participants were low-intermediate and upper-intermediate and were randomly assigned into two groups, experimental and control groups. In the practice sessions, the experimental group received noticing-enhancing instruction, repeated activation of intonation patterns, metalinguistic explanations, picture descriptions, and interactive role-playing. The data for the study were collected with pre-tests and post-tests. Also, the recordings from the experimental group were transcribed and analyzed. The quantitative analysis of the test results showed that the experimental group outperformed in the post-test, meaning that noticing had a positive effect on EFL students' intonation patterns.

In a recent paper by Jafarpour et al. (2017), the effect of oral pushed output on the learning and retention of English perfect tenses was studied. The experimental group and control group of the study were taught English perfect tenses explicitly. The students in the former group were asked to record their oral performance on picture description and translation tasks and used the instructed language form, while those in the latter group answered some multiple-choice questions. The comparison of results showed a significant difference between the group's performance and the facilitative effect of oral pushed output on the learning and retention of English perfect tenses.

Despite the fact that the significant role of noticing has been under investigation by cognitive scholars in second language acquisition, Van Lier (1996) has examined noticing from an ecological perspective.

### **Noticing from Ecological Perspective to Second Language Acquisition**

Ecology refers to the totality of relationships of an organism to all other organisms with which it comes into contact; the management of the environment or specific ecosystems. Ecological linguistics is a study of language as relationships of thought, action, and power, rather than as objects, words, sentences, and rules. It also relates verbal utterances to other aspects of meaning-making, such as gestures, drawings, or artifacts (Khatib, et al. 2010). An ecological perspective is not a new research method or a particular theory or model of teaching, research, or learning. Instead, it's a worldview that has an impact on how we conduct our lives, how we relate to others and the environment, and how we think about teaching and learning. According to the ecological perspective on second language acquisition, learning a language is viewed as a relationship between individuals and their environment (Van Lier, 2004). The concept of affordance, which refers to the opportunities presented by the environment for language learning, is of great importance. The concept of affordance in language learning views language from a relational perspective, rather than a material one. Language learning is not simply a process of representing linguistic objects in the brain based on input received but rather involves what is available to the learner to do something with, based on their capacity and in tune with their environment. Gibson (1979) argued that affordances emerge from the interaction between the learner and the environment, and are not properties of either. Van Lier (2004, p.91) defined affordance as what is available for a person to do something with and emphasized that it is a potential action that emerges during interaction with the physical and social world. Maftoon and Shakouri (2012) suggested that the quality and quantity of input learners receive is a key factor in implicit learning.

Van Lier (1996) argued that language acquisition requires active engagement in meaningful activities, rather than simply receiving input. Noticing is crucial for learners to pick up useful language information. Van Lier (2004) argues that simply noticing a form is not enough to understand it. In fact, language engagement, i.e. engaging in activities, is necessary for L2 learning. That is to say, language competencies emerge from meaningful verbal and nonverbal interactions.

From an ecological perspective, based on Van Lier (2000), language learning is not a gradual and linear process, but rather an emergent one, as learners are surrounded by opportunities to pick up the input they need for their activities. The theory emphasizes the interrelated concepts of affordance, perception, and action. Learners perceive what the environment offers them, interpret what they receive, and finally act upon their interpretations. Van Lier (2004) asserted that perception and action in a semiotic context are central to learning. He added that in a context where learners are surrounded by various affordances to perform tasks, there is no need to teach language explicitly.

According to Van Lier (2000), the ecological perspective to second language acquisition emphasizes activities and interaction as crucial factors in language learning. Kramsch (2002) also noted that the relationship between language users and the environment is influential in the ecological perspective to second language acquisition. In a study, Wen et al. (2010) conducted research on Japanese students learning English and found that those in an ecological environment had better performance than others. From the analysis, they concluded that the cognitive perspective to language acquisition relies on memorization and mechanical learning. Lightbown and Spada (2013) stated that meaningful activities promote the expression of thoughts and opinions, and lead to mutual understanding while accomplishing tasks. Additionally, Fahim and Sabah (2012) found that role-play activities with affordances help students learn vocabulary.

To conclude, the environment and the interactive conversation make learners aware of their needs and perceptions. In fact, from an ecological perspective to second language acquisition, the target language environment provides the context for learners to acquire the L2.

### **The Noticing Hypothesis and Pedagogical Implementations**

The Noticing Hypothesis has influenced language teaching and resulted in various pedagogical methods. Schmidt (1993, 2001) distinguishes between perceived information (input) and noticed information (intake). He also differentiates noticing from metalinguistic awareness, which involves forming abstract language rules. To enhance the noticed input in short-term memory and facilitate its internalization in long-term memory, different methods, such as consciousness-raising tasks, enhanced input, enriched input, and negative/ positive evidence, to improve the learning process have been proposed (Bielak & Pawlak, 2013; Gass et al., 2013).

During task implementation, various types of feedback are provided to continue noticing (Gass and Selinker, 2008). When learners fail to notice and use certain target language features due to their inadequate perceptual salience in the linguistic form, the quality of language input must be improved. Input enhancement is one way to improve language input. It is achieved through two types of input: visual input which includes using a range of techniques for textual manipulation such as highlighting specific linguistic features by underlining, using boldface, or italics and oral input that is using oral repetition, intonation, stress, and pitch (Farley 2005; Winke 2013). Take Doughty's (1991) study on highlighting specific linguistic features as a



tool in promoting noticing as an example, based on which the relative clauses in the texts were highlighted. The researcher found out that learners who enjoyed materials with highlighted texts performed better on comprehension tests and their knowledge of relative clauses compared to another group who received no highlighting. In the same line, Sharwood Smith (1993) investigated the effect of noticing through input enhancement conditions. That is, exposing to these materials, learners have noticed the target points. Drawing upon Sharwood Smith's (1993) notion of input enhancement, Journdenias et al., (1995) attempted to assess to what extent learners have noticed highlighted input by examining retrospective think-aloud. A list of Spanish verb forms was given to students. A group of students who received input enhancement made more references to Spanish verb forms during a production task think-aloud compared to those who did not receive it. In a study, Swain and Lapking (1998) carried out a jigsaw activity consisting of sets of pictures based on which the students wrote stories working in pairs. The researchers analyzed the students' dialogues and detected language-related episodes (LREs) and concluded that noticing in oral discourse by observing learners' conversational adjustments can have a positive impact on noticing during task completion.

In conjunction with boosting noticing corrective feedback has been received wide currency among researchers. Defined as any indication to the learners that their use of the target language is incorrect Lightbown and Spada (2013), corrective feedback has been studied and reviewed in L2 research and supports its beneficial effects for L2 acquisition has been reported. For example, Long (1996) defined corrective feedback as the interaction between the sender and receiver which is prompted by the selective attention and productive manner of the receiver activated by input. Different types of corrective feedback such as implicit feedback or recast, explicit feedback; metalinguistic feedback; clarification request; elicitation; and repetition can be employed (Ellis et al., 2006; Mackey, 2006). Implicit feedback is given to learners without any overt indicator that an error has been committed (Loewen, 2009); it is provided in the form of recasts, that is correcting a learner's incorrect utterance without interrupting the flow of communication and it involves restating or rephrasing the utterance to convey the correct form implicitly (Lightbown & Spada, 1990). Another way of providing correction is through explicit feedback in which the teacher points out to the correct form explicitly (Ortega, 2009). Metalinguistic feedback also involves pointing out the correct form through comments, information, or questions relevant to the learner's utterance (Lyster & Ranta, 1997). Another type of corrective feedback is a clarification request made by the teacher or interlocutor when learners are requested to correct their mistakes, thereby becoming aware of their ill-formed sentences (Gas & Selinker, 2008). In some cases, the teacher might ask some questions to draw students' attention to errors and elicit the correct form; this process is known as elicitation (Lyster & Ranta, 1997). Repetition is also used as feedback to enhance noticing. Teachers repeat the incorrect utterance using appropriate intonation to capture students' attention (Gass & Selinker 2008). It is believed that in doing so learners will notice errors and correct them.

According to Mackey (2006) the implementation of consciousness-raising tasks, which explores language acquisition and the workings of the human mind in learning, enhances learners' ability to consciously perceive input and convert it into knowledge. The focus is on

drawing learners' attention to linguistic features through consciousness-raising and hypothesis formulation rather than explicit input, allowing for reflection and eventual goals instead of immediate mastery (Ellis, 1993).

Boosting noticing in language learning is attempted via positive/negative evidence. Positive evidence is based on actual language forms, while negative evidence deals with the incorrectness of a form. In both cases, the aim is to draw learners' attention to language form (Gass & Selinker, 2008). Learners can develop hypotheses by observing input in positive or negative form. Syntactic processing and hypothesis testing result from input and output processing. After receiving input, the processing stage involves transforming the information into output through focused practice. Learner output is used to improve input through feedback, and successful instruction creates opportunities for output processing (Skehan, 1998).

Learners can develop noticing skills through self-generated or self-confronted tasks that require planning, monitoring, and self-assessment. This approach exposes learners to traces and impressions of their activities. According to Ellis (2003), self-confrontation involves using learners' own output as input, thereby increasing their awareness and self-assessment of performance. Stimulated recall prompts learners to remember their mental processes during activities (Egi 2010). Stimulated recall is a method for exploring the target language learning process through introspection. Learners report their thinking about a task or activity after some interval. In some situations, learners can repeat the task for better performance.

### **Criticisms of the Noticing Hypothesis**

Schmidt's noticing hypothesis has gained popularity among researchers in second language acquisition. However, this hypothesis has faced some criticisms. Firstly, Tomlin and Villa (1994) argued that the process of acquiring language involves both conscious and unconscious learning, which can lead to arguments about the role of noticing. While consciousness is necessary for learners to gain new knowledge, measuring its level can be difficult, and verbal data may not always be reliable. Secondly, noticed knowledge requires further processing for comprehensible output if noticing is the first step of processing the knowledge. However, by emphasizing the importance of attention for all learning, attention, and awareness may facilitate some kinds of learning but not others (Gass, 1997). Lastly, Robinson (1995) commented that Schmidt's hypothesis lacked a clear explanation for the necessary role of noticing in converting input into the intake. Thus, Robinson researched the relationship between attention and memory to complete the hypothesis. It has been claimed that noticing is a complex process for learners to internalize knowledge and produce output. Teachers may face challenges in providing noticing opportunities and evaluating learners' success. Testing the effectiveness of noticing in L2 processing is challenging for research.

### **Conclusion**

Despite these criticisms, noticing is considered a crucial stage in successful second language acquisition and learning. Schmidt emphasized the importance of attention in learning, stating that "people learn about the things they attend to and do not learn much from the things they



do not attend” (Schmidt, 2001, as cited in Ellis, 2015). Ellis added that without noticing, there is no learning (Ellis, 1995, p.89). Noticing also helps connect input and output, as well as implicit and explicit learning. This study reviewed and discussed empirical studies conducted in the field of noticing hypothesis. It concludes that noticing can be studied from both cognitive and ecological perspectives, and improved through explicit or implicit approaches and interventions in both input and output processing. Noticing certain forms in the input can lead to the emergence of those forms in the output through interventions in teaching and learning processes, which determines the growth of language knowledge in L2 settings. Additionally, this circulation may lead to the establishment of new research studies with novel ideas on the effects of noticing.

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