Cognitive Factors in Language Learning

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Abstract
This article attempts to unveil the status of 'consciousness', attention and noticing in cognitive psychology and language learning. It sheds light on their definition, scope and implementation in the language classroom, and shows that an effective way to teach the language is not through the use of traditional methods where metalanguage and practice play the main part but instead through developing learners' cognitive capacities.

ملخص
يسعى هذا المقال إلى الكشف عن الدور الذي تقوم به العوامل المعرفية كالوعي والانتباه والملاحظة في علم النفس المعرفي وتعليمية اللغات، فهو يسلّط الضوء على تعريفها وضبط مجالها وكيفية استعمالها في أقسام اللغة، كما يبيّن أن الطريقة الناجعة لتعليم اللغات لا يتم عبر استعمال المناهج التقليدية حيث تكثر الشروح والتمارين بل عبر تطوير المهارات المعرفية لدى المتعلمين

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Introduction

Since the 1990s, more interest has been put on the learning processes used in acquiring second or foreign languages. Cognitive factors such as consciousness, attention and noticing have been dealt with in Cognitive Psychology and Second Language Acquisition. In what follows, we will discover the role played by these factors in learning the intricacies of language.

Consciousness

'Consciousness' is a form of inward knowledge and awareness of one's surroundings felt by the senses or the mental faculties. However, in recent Cognitive Neuroscience, 'consciousness' has been ascribed different functions and anatomical locations in the brain and hence assigned different definitions.

Consciousness as a Psycholinguistic Construct

Consciousness has been investigated from the psycholinguistic, individual or intrapersonal perspective; that is, as a mental faculty that human beings are endowed with in their brains. This ability should be energetically propelled to acquire the linguistic aspects of the target language.

Schmidt (1990) makes the strong claim that language awareness and conscious processing of the linguistic input are a necessary condition for L2 development to proceed. He shows that 'consciousness' has been used ambiguously in scientific literature and that three senses ought to be distinguished.

In the first place, there is consciousness as 'awareness' which consists, in its turn, of three degrees or levels: (a) *perception* which "implies mental organization and the ability to create internal representations of external events…. Perceptions are not necessarily conscious, and subliminal perception … is possible" (*ibid*. 132), (b) *noticing* which is the "availability for verbal report…[but] the lack of a verbal report cannot be taken as evidence of failure to notice" (*ibid*.) as someone may experience or notice something without being able to describe it. Schmidt also defined *Noticing* as "the basic sense in which we commonly say that we are aware of something, but does not exhaust the possibilities" (*ibid*.). Other terms equivalent to Schmidt's noticing such as 'focal awareness', 'episodic awareness' and 'aperceived input' have also been used, and (c) '*understanding*' which covers the mental activities which attempt to comprehend the objects of consciousness, and involves conscious analysis and comparison with what has been noticed on other occasions (*ibid*.). In the second place, there is consciousness as 'intention' which refers to the intentional, deliberate, volitional effort (*ibid*. 133). Yet, Schmidt admits that not all intentions are conscious as people may become aware of things that they do not have any intention to notice at all. Thirdly, there is consciousness as 'knowledge'. Here, Schmidt sees that there are two common distinctions between knowledge types: (a) implicit versus explicit knowledge in which the explicit/implicit contrast represents a continuum, but there is no consensus amongst researchers on a clear-cut line between them, (b) declarative versus procedural knowledge; that is, 'knowledge of facts' versus 'knowledge how'. Some researchers claim that procedural knowledge needs awareness and stems from declarative knowledge, other researchers do not share this idea; still some others maintain that the two types are quite independent and think that "declarative knowledge develops along a continuum from unanalysed to analysed, whereas procedural knowledge varies along a continuum from controlled to automatic" (*ibid*. 134). In the main, what Schmidt wants to demonstrate is that the role of subliminal learning has been too much exaggerated and that consciousness at the level of 'noticing' the form of the input is necessary and sufficient to subsequent L2 learning and that consciousness at the level of understanding is quite facilitative of later learning to occur.

Schmidt (1993: 217) posits that "target language forms will not be acquired unless they are noticed, and one important way that instruction works is by increasing the salience of targeted forms in input so that they are more likely to be noticed by learners." The necessity of noticing and

attention to form has also been advanced by Schmidt and Frota (1986; in Ellis 1994: 361) who maintain that for noticed input to become intake, learners need to compare what they notice in the input with their current iterlanguage output, and they refer to this conscious process as 'noticing the gap'.

Theories of Consciousness

SLA researchers (Schmidt, 1990) have been concerned with cognitive theories of consciousness believing that classroom language learning is quite akin to any other type of learning. Theories of consciousness are based on the assumption that human beings are limited capacity processors of information and that language learning is a complex skill like playing chess or riding a bicycle which involves a set of information-processing techniques to overcome limitations in mental capacity. These theories attempt to highlight how the information processing system works and how input is converted into intake through noticing.

Consciousness in information processing theories and in global workspace theory is reviewed here. Schmidt (1990: 135) explains the notion of consciousness as a limited capacity memory system by drawing a composite picture from a number of information processing theories which define input processing in terms of a set of different storage structures. The multistore models of memory consist of three components: (1) "sensory registers" or "a bank of buffer stores" that receive information through unconscious processes, (2) a short-term store, and (3) a long-term store. The short-term-store is said to be equivalent to consciousness and necessary for permanent storage. Yet, information stored in short-term memory will be lost if it is not encoded in long term memory. This confirms the claim that storage without consciousness is not possible al all (Schmidt, *ibid*., 135-36).

Harley (1994) agrees with Schmidt (1990, 1993) that consciousness is not one unique issue but rather a multifaceted concept which needs to be disentangled in order to comprehend how language learning takes place. Along line with this argument, Van Lier (1996: 70-71) notes that "consciousness, in its multiple roles and guises, enters into language learning in a myriad of different ways at numerous points in the learning process. Anyone who says that all or most language learning occurs unconsciously must therefore have a very special definition of consciousness in mind, one which does not reflect the richness of the different senses described by Schmidt."

Similarly, Carr and Curran (1994) state that although 'consciousness' and 'attention' are often treated as synonyms in a sense that if one is conscious of something, one is attending to it and vice versa, there is considerable evidence in recent cognitive literature for dissociating the two concepts. What they mean is that learning may need some focused attention, but may not entail awareness of what is being learned while paying attention. Learners who demonstrate certain structural patterns in their interlanguage may not be aware of the presence of such patterns, nor are they able to reconstruct their various constituents when asked to do so. In addition, Carr and Curran intend to draw a distinction between two

cognitive notions: 'focal attention' and 'conscious-awareness'. The former represents the whole coarse-grained attentional system, and the latter represents both consciousness and awareness in other theorists' terminology.

The debate between researchers on the role of conscious and unconscious language learning is still prevalent in cognitive and SLA research. Some theorists maintain that consciousness is very crucial for language learning and language use to proceed, especially among adult learners (Schmidt, 1990, 1993). Others maintain that consciousness or form-focused instruction in language learning does not lead to acquisition, but rather represents a real obstruction for language learning and language use (Krashen, 1987). After reviewing a number of controversies in psychology and SLA literature, McLaughlin (1990) argues that the terms 'conscious' and 'unconscious' "have acquired too much surplus meaning and should be abandoned in favor of clearly defined empirical concepts" (*ibid*. 617).

Bialystok (1982) speaks of a theoretical interface model in which formal explicit instruction, which is somewhat similar to grammar consciousness-raising, is said to play a crucial role in learning a second language. She uses the term 'explicit knowledge' to refer to a conscious analytic awareness of the target language and 'implicit knowledge' to denote an intuitive feeling for what is grammatically correct and acceptable. Unlike Krashen (1981), Bialystok (1982) claims that there is a continuum between these two types of knowledge. Likewise, Sharwood Smith (1981) challenges the simplistic treatment of consciousness-raising in which a rigid dichotomy between conscious and unconscious learning is established and the inherent acquisitional processes are compared with the conscious metalinguistic learning of grammatical rules and declensions. He concludes that "While the empirical evidence for the impermeability and primacy of the acquisition device in the second language learner is hotly contested, there is every reason to accept the older, intuitively attractive version which says that explicit knowledge may aid acquisition via practice" (*ibid*. 167). Indeed, these terms have been attached different meanings and need to be replaced with new unambiguous and testable concepts that may help researchers to replicate all the psycholinguistic experiments.

Consciousness as a Socio-cultural Construct

Consciousness can be regarded as a property of the individual's brain or what Van Lier (1996) calls the 'intrapersonal' concept as opposed to the 'interpersonal' construct which is associated with the individual socio-cultural development as propounded by Vygotsky (1981). In this new paradigm, the interpersonal construct has a great influence on the intrapersonal construct. Vygotsky (1981 in Ellis, 2003: 177) sees that in the child's development, any function appears on two planes: first on the social plane between people as an interpsychological category, and then on the psychological plane within the child as an intrapsychological category.

Sociocultural theory considers the learning of grammar as a framework of reference where learners can spur their language development through social interaction and collaborative dialogue and problem solving (Larsen-Freeman, 2001: 38). 'Consciousness' has been defined by Vygotsky as "the objectively observable *organization* of behavior that is imposed on

humans through participation in sociocultural practices" (Vygotsky, 1981; in Van Lier, 1996: 71). In addition, Vygotsky regards consciousness as "the highest level of mental activity", and incorporates two main subcomponents: *intellect* and *affect* which are "dynamically interconnected, transforming one another constantly", and organizing all the socio-cognitive and emotional activities in the "zone of proximal development (ZPD), the innate attention-focusing preferences of the child" (*ibid.* 71-72). This conception of consciousness provides a global view of language learning where emphasis is put not only on the brain or the cognitive processes but also on the affective, social and cultural variables. It is through social interaction, pair work, or group work that learners can develop their cognitive capacities and gain linguistic proficiency.

According to Platt and Brooks (2002: 369) "Sociocultural theory rejects the Cartesian dualistic view of mind, and embraces instead a view attributed to Hegel, whose philosophy rested on notions of historical and cultural situatedness." Proponents of this theory such as Bakhtin (1981) said Platt and Brooks, believe that the external sociocultural and historical contexts including beliefs, values, traditions, practices, tools and motives of the culture shape the subsequent development of internal conditions favourable to learning (*ibid.*). The Sociocultural Approach offers a social view of learning that is broader than that of the language classroom. It focuses on a wide discoursal interaction rather than classroom interaction, and it is not concerned with the mere linguistic system and its relation with the mind. Within this context, Lantolf (1996; in Ellis, 2003: 175-76) argues "that many people find it difficult to conceive of neural computation as a theory", and offers an alternative view of learning called the 'sociocultural SLA' which sees that "higher forms of mental activity are *mediated* " and that mediation can be threefold: " (1) mediation by others in social interaction; (2) mediation by self through private speech; and (3) mediation by artefacts, for example, tasks and technology". Consciousness, then, as Van Lier (1996: 73) states is "the *organizing, controlling* and *evaluating* of experience." Indeed, without consciousness, individuals might respond to external stimuli appropriately though instinctively as "the leaf of a plant which moves in the direction of sunlight" (*ibid.*).

The Attention Hypothesis

Recent studies in cognitive literature that give due support to consciousness are those devoted to the role of attention in learning a second language. Attention is regarded as being of paramount importance for any type of learning. Allocating attention to specific features of language seems to be a sine qua non condition for learning to take place. In this context, Schmidt (1993: 209) states:

Most psychological models of memory hold that the allocation of attention is the necessary and sufficient condition for encoding a stimulus into long-term memory, and that efficient retrieval depends on both the quantity and the quality of attention at the time of encoding.

Tomlin and Villa (1994: 194) review many studies in the fields of Psychology and Neuroscience which draw theoretical and empirical distinctions among attention, awareness and consciousness and come to

conclude that "Attention is not simply a coarse-grained, limited-capacity system" as used to be considered, but consists of three discrete but interconnected networks: 'alertness', 'orientation', and 'detection'. They also make clear that attention is different from awareness in a sense that the latter requires the former, but the opposite does not hold true (*ibid.*). These three attentional networks are said to have a direct bearing on language learning. 'Alertness' is the overall readiness to deal with external stimuli. It can operate independently or readjust 'orientation. Attentional resources can be directed towards some sensory stimuli. Orienting attention increases the activation of 'detection' which involves the cognitive selection and registration of various sensory stimuli (*ibid*. 190-192).

As to how attention, consciousness, and awareness are mapped with one another. Schmidt (1993: 209) considers that attention, be it voluntary or involuntary, proves to be very crucial to learning since it controls the access to conscious experience. When learners bias their attention to a certain input, they become conscious of it; hence; every type of learning must be accompanied by awareness. Logan, *et. al.* (1996) examine the attention hypothesis and contend that attention determines not only what is learned during practice but also what is retrieved from memory in automatic performance, and hold that not everything that is stored in memory is necessarily retrieved. They adopt for their experimentation on the role of attention and automaticity a distinction advanced by Treisman (1969) between four different types of attention defined in terms of stimuli analyses: 'input selection', 'analyzer selection', 'target selection', and 'response or output selection'. These have been defined concisely as follows:

Input selection involves choosing which stimulus or set of stimuli to analyze, analyzer selection involves choosing which kind of analysis to perform on the (input) selected stimuli, target selection involves choosing a course of action depending on the result of an analysis, and output or response selection involves choosing an overt response to execute as a result of the analysis. (Treisman, 1969; in Logan *et al*. 1996: 621)

Indeed, 'attention' needs to be disentangled in order to understand the deep cognitive processes and their neuro-anatomical areas. Given the fact that the attentional capacity is of limited resource (Carr and Curran, 1994), the question that should be raised is whether the attentional limitations explain the failure of some subjects to learn the various intricate points of language provided by teachers. More specifically, are learners cognitively able to attend simultaneously to both meaning and form? Or as a solution to relieving the attentional load on FL learners, should grammatical instruction put more emphasis on one of them and then move to the other; and if so, which should be the first emphasis?

The Noticing Hypothesis

'Noticing' represents a crucial variable in language learning and notably learning grammatical forms and structures. Schmidt (1990: 129) concludes that "subliminal language learning is impossible, and that noticing is the necessary and sufficient condition for converting input to intake". Schmidt (1993: 209) also maintains that attention controls the access to conscious awareness and triggers 'noticing' which is "the necessary and sufficient

condition for the conversion of input to intake". He also concedes that "Noticing is related to rehearsal within working memory and the transfer of information to long-term memory, to intake, and to item learning" (*ibid*. 213). Schmidt also extends the 'noticing hypothesis' to the fact that what is noticed is not the input alone but all the features surrounding it; that is, if learners seek to learn pragmatics, they have to notice not only the linguistic forms but all the relevant contextual features. However, he eventually notifies that 'noticing' is a controversial issue as long as one can 'pick up' some targeted features without being consciously aware of them (*ibid*.). After all, there are some conditions which further or restrict noticing linguistic items such as the learner's previous knowledge of languages, language universals, input salience, and input frequency.

Current research in Cognitive Psychology points to the interconnectedness between consciousness, attention, intention, awareness, alertness, detection, orientation, and noticing. Neuroscience, Cognitive Psychology, and artificial intelligence are fraught of controversy, especially in what concerns the mapping between the functions of these terms and their neuroanatomical systems in the brain. Schmidt (1993: 208) comments on this issue saying that the greatest impediment to progress in comprehending the role of cognitive processes resides in the confusion and vagueness of terminology. On his part, Robinson (1995: 318) states that: "The nature of the interaction between cognitive resources during information processing and language learning is little understood." In cognitive psychology and SLA research, there is a growing support for consciousness rather than unconsciousness and for attentional rather than attentionless learning.

Eventually, it would be more convenient to approach the language learning issue from both internal and external perspectives providing equal emphasis to cognitive processes as well as environmental factors; that is, focusing on internal processes such as consciousness, awareness, and noticing as well as on external factors such as input enhancement, form-focused instruction, and the type and amount of input. It seems reasonable to argue that input alone however rich, diversified and comprehensible is not sufficient for developing L2 proficiency and fluency as it may be improved by triggering learners' cognitive processes.

The Input Enhancement Hypothesis

Sharwood Smith (1981) used the term 'consciousness-raising', but later replaced it by 'input enhancement' (1991) because, as he says, the former involves directing learners' attention to linguistic forms, but this direction could be achieved either internally by the learner or externally by the teacher. Consciousness-raising focuses on the learner internal processes that are inaccessible to simple observation, whereas input enhancement focuses more on the observable characteristics of the input and less on the learner internal processes, and involves various ways in which input is made more salient and easily noticed.According to Sharwood Smith (1993), the difference between consciousness-raising and input enhancement lies in their assumption regarding the input/intake dichotomy.

Consciousness-raising implies that the learner's mental state is altered by the input; hence, all input is intake. Input enhancement implies only that we can manipulate aspects of the input but make no further assumptions about the consequences of that input on the learner. To be absolutely clear, this is teacher-induced or externally input enhancement (*ibid.* 176).

So, it is possible to manipulate the aspects of the input in order to make it more prominent, but it is not possible to tell that the learner's consciousness has been raised. In the same way, Tomlin and Villa (1994: 199) define input enhancement in language teaching as "the bringing to awareness of critical form distinctions" which can be enhanced via "meta-descriptions of linguistic forms" and "input flooding".

There are different ways of making input more salient so as it would permeate the learner's mind. Some studies, according to Sharwood Smith (1993:177), point to the use of corrective feedback, the use of positive input enhancement by making more salient certain correct forms in the input, and the use of negative input enhancement by flagging certain forms as incorrect. Other studies make recourse to different degrees of elaboration such as 'colour coding', 'boldfacing', 'special stress', 'intonation and gesture', metalinguistic terminology, or even inducing L1 generalisations and transfer errors and using non-linguistic signals such as gasping or making a funny face when hearing an error (*ibid*.). According to Sharwood Smith (1993: 166-167), the notion of input is taken from information processing studies in SLA and comes to mean the actual language data that learners are exposed to and supposed to learn. Thus, language researchers are investigating how the information is processed by the learner's mind. Accordingly, it is necessary to know "What makes the LAD ready to receive certain input at certain times, and what makes it appear to ignore a vast mass of evidence and continue, obstinately, as it were, to operate with a system that is in contradiction with the target norms as manifest in the input?" (*ibid*. 168).

As for the role of input enhancement, White *et. al.* (1991: 417-418) think that it has a great deal of beneficial effects in guiding SLA. First, naturalistic input does not enable learners to perceive the formal aspects of language, therefore input does not become intake; however, input enhancement provides positive evidence by drawing the learner's attention to the formal aspects of language that may otherwise pass unnoticed. Second, input enhancement may also supply negative evidence by helping learners to 'unclean' incorrect forms in the target language. Third, input enhancement plays a crucial role in cases where there seems to be no positive evidence to pre-empt erroneous forms and structures as is the case with adverb placement in English which is generally free except between the verb and the object. So, incorrect generalisations could be disconfirmed on the ground of negative evidence (*ibid*.). On their part, Tomlin and Villa (*op. cit*. 186) list a series of instructional procedures used to enhance input including "the explicit discussion of linguistic form, metalinguistic description, negative evidence through overt error correction, and input flooding, in which the learner is exposed to a great number of exemplars".

Implications for Foreign Language Teaching

The value of consciousness, attention and noticing in language learning has become very crucial in recent years. Learner-centred orientation renders due emphasis to learning processes and strategies; that is, to a learner who relies on his own intellectual capacities and who bases his learning on analytic cognitive modes. Prompted by the notion of grammar consciousness as a pedagogical tool for language learning, Ellis (1990) presents a model of formal instruction which allows learners to develop their grammatical awareness and to build explicit representations of the grammatical system. When learners become consciously aware of a particular form or structure through conscious processing, they will carry on noticing it in subsequent communicative input. He hypothesises that "explicit knowledge functions as a facilitator of implicit knowledge by making the learner conscious of linguistic features in the input which otherwise might be ignored. Explicit knowledge helps the learner to *notice* marked forms" (*ibid*. 196). Ellis (1993) argues that a structural syllabus cannot easily develop an implicit knowledge in L2 learners because of the 'learnability problem'; that is, learners are not developmentally ready for learning some grammatical entities. So, he advances that explicit knowledge through grammar instruction consists of 'intake facilitation' allowing learners to pay attention to the formal features in the input and to notice the gap between these features and those used in their own output. It must be recalled here that 'explicit knowledge' for Ellis is merely a conscious representation and not an 'articulated knowledge; that is to say, learners may know some grammatical rules, but may not be able to put this knowledge into practice (Ellis, 1993: 93). As far as the issues of 'consciousness' and 'noticing' are concerned, Ellis (1994: 361) emphasizes that "Noticing is of considerable theoretical importance because it accounts for which features in the input are attended to and so become *intake* (information stored in temporary memory which may or may not be subsequently accommodated in the interlanguage system)".

Consciousness is deemed necessary for promoting noticing. Fotos (1993: 386-387) suggests that the role of formal instruction should consist of raising learners' consciousness of some language forms and getting them notice these forms in subsequent meaning-focused input. She also argues that noticing is an essential trigger for language processing and that language learners usually follow four general processing steps: (1) noticing, (2) comparing interlanguage and input, (3) constructing hypotheses about input and interlanguage, and (4) testing hypotheses related to the new input and output.

Eventually, consciousness, attention, noticing and input enhancement can yield beneficial effects on language learners. Although many language professionals insist on 'teaching language' without recourse to 'explicit knowledge' because of the influence of the Natural Approach and Communicative Language Teaching, and although some researchers such as Krashen (1987) think that these cognitive concepts have inhibiting effects, there is strong evidence in recent literature that they would suit at least the cognitive styles of some learners because language learning is, in

essence, learning the way in which language functions in order to convey meanings.

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