



How Can L2 Lexicon Be Proceduralized While Interacting with Proceduralized L2 Grammar: A Cognitively Linguistic Model of the Declarative/Procedural Interface.

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Abstract

This article sheds light on how L2 lexicon should be considered cognitive and thus recalled for L2 grammar and how the latter embraces L2 lexicon due to its meaningfulness derived from L1. In so doing, this review article shows a possible interaction of the proceduralized knowledge of L2 grammar with the declarative knowledge of L2 lexicon from a cognitively linguistic perspective. This results in getting L2 lexicon proceduralized so as to support the weak interface position, i.e. partial conversion of declarative knowledge into proceduralized one. However, this article does not support the strong interface position, i.e. total conversion of declarative knowledge into proceduralized one as declarative language irregularities are not cognizable as declarative meaningful lexicon. Although there has been a debate whether learnt/declarative knowledge can be converted into acquired/proceduralized knowledge, cognitively linguistic consideration has been taken so far to support this transfer of knowledge. That is why; this article views how cognizable L2 vocabularies are to be recruited by L2 proceduralized grammar.

Key words: L2 proceduralized knowledge; declarative knowledge; L2 vocabulary acquisition; cognitive learning; L2 mental lexicon.

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Introduction and Background

It is still not clear whether an explicit knowledge can be transferred to an implicit knowledge although this distinction was first brought to attention about 35 years ago. Krashen (1981), who initiated this distinction, asserted that learning is totally different from acquisition and thus explicit knowledge can, by no means, change to implicit knowledge. However, later suggestions, which are referred to as the weak interface position, opposed Krashen's non-interface position. This was called so in the belief that there is a partial conversion of certain learnt knowledge into Acquired or automatic one. One form of the weak interface position was explained by Schmidt (1990) through the notion of noticing. A learner can convert knowledge through noticing and by being attentive to different linguistic features available in the input. The second form was suggested by R. Ellis (2008), who claimed that practicing declarative explicit knowledge in unplanned discourse can get them proceduralized and thus automatized. Finally, N. Ellis (2005), who claimed a different form, stated that noticing the gap between what is noticed with what is produced in L2 leads to automatizing L2 knowledge. Dekeyser (2007) challenged the weak and the non-interface position suggesting that all learnt knowledge can be converted into acquired one over practice. This view, however, constitutes the strong interface position.

There is no clear evidence if any of the positions are really processed and followed in the learner's mind. These positions were first presented by applied linguists based on the distinction between acquisition and learning, but they were not first discussed in relation to neurocognition and cognitive linguistics and this has formed a growing theoretical linguistic issue rather than a neurolinguistic or a cognitively linguistic background. Nevertheless, introducing the distinction of explicit/implicit knowledge for the entire weak interface position has brought applied linguists, educators and curricula designers' attention to and created awareness about an interesting trend, namely, whether and how explicit knowledge can be converted into implicit knowledge.

On the other hand, it is uneasy to empirically measure if learners follow one or none of the weak interface positions. Several neurocognitive researches conducted later showed no clear evidence about the possible transfer of explicit knowledge to implicit knowledge or the so-called declarative knowledge to proceduralized knowledge even if the former gets practiced enough in unplanned discourse. For example, Destrebecqz et al (2005), who carried out an empirical study, indicated that the striatum in the brain is concerned of the implicit component whereas anterior cingulate or the mesial prefrontal cortex supports the explicit component. Although it was noticed that implicit learning processing could be monitored by explicit knowledge, they could show a partial disconnection of the substrates between the conscious and subconscious learning as a learnt sequence was being exposed to the brain. Importantly, the researchers in this study concluded that "it remains unclear whether implicit and explicit learning processes recruit different brain structures or share, either in part or in totality, the same neural mechanism." (ibid: 480) Moreover, Yang and Li (2012) revealed in an empirical research that there was a partial association in the brain between the two types of the knowledge. They stated that although brain networks support implicit and explicit learning, "explicit learners engage a network that uses the insula as a key mediator whereas implicit learners evoke a direct frontal-striatal network. Individual differences in working memory also differentially impact the two types of sequence learning" (ibid: 1).

There have been several studies conducted in the field of neurocognition, neuroscience and psychology about the interaction of the proceduralized knowledge with declarative knowledge. For instance, Montare (1992) examined how 62 students were able to develop procedural learning through 'discrimination-reversal learning task'. After getting the respondents exposed to a hierarchy of 'declarative cognizance', he said: "The plausibility of this cognitive hierarchy is enhanced by observations that increasingly higher levels of declarative cognizance are associated with increasingly faster learning" (ibid: 243). Moreover, Anderson (1990) in his 'Adaptive Control of Thoughts' claims that there is a unified basic memory called the working memory through which it first retrieves factual information from the declarative memory and secondly it matches existing patterns from the production memory to get the declarative knowledge addressed with proceduralized existing patterns. This constitutes an interaction between declarative knowledge and



procedural one and gets the former proceduralized. In addition, specifying the importance of declarative knowledge, Berge and Hezewijk (1999) claimed that declarative knowledge should have been paid much more attention as it is considered an integral part of human's mind to develop cognition. They added that "declarative knowledge is considered here not as an alternative kind of knowledge, as is usually the case in theories of memory, but as part of procedural knowledge" (ibid: 606). Similarly, Giampaolo (2103) investigated cognitive strategies, if followed by the study participants, through the 'Think- Aloud Technique'. He explained that the learners could develop their cognitive strategies because they usually establish hypothetical norms of L2 and check how effective they are. He added that language mistakes of declarative information, resulted from being exposed to the language and creative reasoning, were viewed developmental and indicated a gradual progress of the students' performance. In contrast, Hong (2016) revealed different results after carrying out a study with 60 Chinese students to investigate learning effectiveness and cognition of both declarative and procedural knowledge. "The results of t-tests revealed that adding the instructor in a video lecture increased learners' cognitive load only when learning procedural knowledge" (ibid:74).

In this article, however, I am exploring, within a different cognitively linguistic model, based on evidences in neuroscience and neurocognition, how can L2 lexicon interact with L2 proceduralized grammar. That is, it will investigate what cognitive processes and how they are involved to get L2 Lexicon proceduralized towards L2 Proceduralized grammar.

However, I will use the word 'hearing' rather than "listening to" although the latter should be used to imply comprehension and understanding of what is being listened to. Nevertheless, 'hearing' is used here to imply more psycholinguistic sense as to how hearing as an innate skill relates to speaking and how it is important to recruit L2 lexicon through cognizance.

A Cognitive View of L2 Discourse

It has been a consensus that language speakers perform better in planned discourse, i.e. they can speak more accurately as they already plan what to speak and communicate particularly when their planned talk contain declarative knowledge. As such knowledge requires high concentration in the careful style, it is better to plan how to produce it accurately and correctly. In unplanned discourse, in contrast, language users communicate their declarative knowledge less accurately and fluently as they are not prepared before and do not have enough concentration in the vernacular style (R. Ellis, 2004).

According to R. Ellis (2008) in his variable competence model, an L2 user can use his interlanguage and can communicate both automatic and unanalyzed knowledge in natural discourse so as to get as much proceduralized knowledge as possible. Tarone (1983, 1985) adds that L2 user can effectively use analyzed and unanalyzed L2 knowledge as L2 speaker switches between high concentration in the careful style through which analyzed knowledge is produced and the vernacular style through which unanalyzed knowledge is produced, so effectiveness and fluency are said to happen based on two practices: speaking with focus on formal properties of declarative knowledge and/or with no focus on unanalyzed and proceduralized knowledge. However, if knowledge gets proceduralized, how are they recalled when they get to be so and to be produced more effortlessly? How does declarative knowledge get to move towards proceduralization little by little?

In many instances, immediate thoughts can be communicated regardless of whether these thoughts are of implicit or explicit nature. It could exist that some fluent non- native speakers of L2 speak chunks of ideas and thoughts continuously in unplanned discourse such as long responses given in unstructured interviews on T.V or radio and their talk is understood very well. If they have totally implicit knowledge, how have they been able to proceduralize their explicit knowledge? If they have both implicit and explicit knowledge, how could they recall declarative knowledge easily to be gathered with their implicit knowledge? Yes, it is actualization or



proceduralization of L2 declarative knowledge of secondary processes into unplanned discourse, as claimed by R. Ellis (2008). But how does this actualization happen?

Undoubtedly, thinking or cognizance is an important binocular through which a language user can immediately translate his current thoughts and what is just going on in his mind into linguistic constructions of enormous lexicon. In other words, it is a fact that when a speaker is speaking, he is necessarily communicating the thoughts going on in his mind at the time of speaking. Of course, he is not speaking something he is not thinking of though it is of a declarative knowledge.

The previous point is true in the sense that planned discourse is not effectively communicative as unplanned discourse. A speaker prepares mentally what to ask and then asks a question orally. While listening to an interlocutor's answer, the speaker starts preparing his coming utterance, so he may lose the rest of the interlocutor's answer. Thus, asking for a repair may occur then. In addition, because he is involved to keep thinking of what to say next, he loses what exact lexicon and correct grammar to produce in his turns. He does not have time to translate his immediate flowed thoughts because of the preparation he has at every turn. In unplanned discourse, effectiveness occurs as a result of exchanging momentarily growing ideas at the time of speaking through turn-taking. I started comparing my degree of fluency in English as a foreign language after preparation and with no preparation. Frankly speaking, I thought it was better to prepare and think of what to say before producing it and because I got worried of making mistakes in the planned discourse, I made mistakes indeed and stammered almost every time I spoke. When I decided later to speak as naturally as I possibly can with high self-confidence and without preparation, I discovered that I did quite fewer mistakes. How could I use correct grammar addressed by correct lexis in such discourse? Is it enough that someone is equipped with all language instruments to use it every time he wants to speak? These instruments should include accurate linguistic competence, repertoire of grammar and mental lexicon. I tested myself again to get realized that I could say correct sentences with high fluency and that was a little or much better when I got mentally prepared what to say before communicating some planned sentences in different situations, so why do I need to prepare before I speak as I am able to deliver what I want without planning? Yes, maybe I kept planning how to say already proceduralized rules but how was I successful to immediately recruit L2 declarative lexicon in unplanned discourse?

However, this does not minimize the importance of planned discourse and that such discourse constitutes a highly ordered and organized way of people's communication particularly when it is written on paper, not in speaking. So, it may not be a better way to get every idea prepared mentally because effectiveness would be lost with interlocutor. When L2 user uses his grammar derived from the interlanguage, it will be better to speak without planning even though mistakes may occur. It suffices he will be effective in his communication and some mistakes do not really hinder understanding. The question remains: how does he recall declarative knowledge easily the same way proceduralized rules are recalled? Does cognizance have to do anything with that, i.e. to relate an L2 grammatical rule with an understandable and meaning-labelled L2 lexicon?

A Cognitive Model of L2 grammar with Lexicon

Thinking of something in L2 to speak it out makes it salient how to say it. Since L2 speaker could not produce an idea different from the one he is thinking of at the moment of speaking and since it is only possible to say the utterance that has the cognized meaning that is just going on in the speaker's mind, a connection may be considered to relate recognition or cognizance with production of language. L2 speaker is not more concerned to convey meanings of words than being able to first know how to get an idea or thought understandable to interlocutor through the meanings of these words. That is, L2 speaker immediately selects an appropriate proceduralized rule of what he wants to say. Then, he cognitively relates L2 Lexicon to be filled in the slots of the rule.

L2 Words are **Recognition-based** and are attributed to each grammatical slot of language rules. They may be declarative but significantly they are highly cognizable. L2 proceduralized rule is recalled by recognition of what is going to be said and gets ready then to recruit salient lexicon. That is, because of meanings labelled to



these L2 lexicon, L2 speaker could recruit words to get organized in their specified grammatical slots. An L2 speaker could know, for instance, that a sequence of words like 'the sun rains' could not be recruited to logically fit the rule 'Subject/ verb order'. This grammatical order exists as a practiced, proceduralized rule to understand cognitively logical sequences such as "the sun shines".

Although L2 words are not practiced and situationalized enough as L1 words, they still represent meanings attributed to L1 words. L2 words are shortcuts of L1 counterparts, and meanings attributed to L1 should be the same attributed to L2 to convey what needs to be conveyed. In this respect, Williams and Cheung (2011:74) declares that

You may have only had 10 minutes of experience with the word 'écureuil' but you have had many years of experience with the word 'squirrel'. This is to say that newly learned words do not have direct connection to their meanings at all, but instead indirectly access the meaning via the L1 translation equivalent word, using the well- established connection between that word and its meaning.

That is to say, L2 memorized words labelled with meanings are cognitively associated with the rule which exists and is created to convey their meanings. They should not be thought as difficult to proceduralize as they are not as cognitive as different declarative irregularities of language as the irregular past tense. However, they need to be used through situational practices to get memorized, i.e. to label meanings to them. Then, they could be proceduralized over practice as long as they are employed through proceduralized grammar.

Several researchers have viewed a lot of lexical items as a type of declarative Knowledge and distinct from proceduralized knowledge, but they may have not considered how cognizable they are to fit proceduralized grammar. In fact, if no lexicon is recruited cognitively to grammatical rules because L2 Lexicon is purely declarative, grammatical rules should be less used and thus less deactivated. Grammatical rules could not stand proceduralized in their own without being cognitively activated and fitted through appropriate L2 Lexicon. Hedge (2000) states that acquiring broader and deeper vocabulary knowledge is crucial so as to become a fluent and proficient foreign language speaker. It could be said, in some instances, that lack of lexicon often has a more severe effect on clarity and fluency of spoken and written language than poor grammar knowledge or incorrect pronunciation.

Importantly, L2 speaker's mind respects the first condition and could not overpass it to the second unless the former condition is satisfied. The first condition: cognizing what is going to be said recalls an appropriate proceduralized L2 grammatical rule. The second condition: the existence of such a rule enables L2 speaker then to recruit cognitively appropriate L2 lexis. The L2 rule is the umbrella under which memorized lexicon is expected to be recruited easily. As L2 speaker looks to make it clear about the idea he wants to convey, he innately looks for the way how to construct it. Of course, he realizes, on the other hand, that merely getting words next to each other without having them organized within a rule may create confusion to the hearer and make his utterance not understandable. One very simple example is that he knows it is necessary to show a subject, a verb and may be an object to show the meaning of 'John called Bill'. Based on his L1, a native speaker of course realizes if he gathers certain L1 lexicon haphazardly, he may most probably come up with an incorrect utterance but gathering them through a grammatical rule certainly gets the utterance correct. In this case, recruiting declarative knowledge of L2 lexicon occurs easily and smoothly. But before knowing why it happens so, we need to consider what happens if the rule is not proceduralized or if it does not exist at all to address the intended thought in the speaker's mind.

If an L2 rule is not proceduralized as it may have not been practiced enough, the speaker is still able to recall it but the recruitment of L2 lexicon is not as smooth and flowing as the case with a proceduralized rule. This is because the speaker is involved in recalling the analyzed elements of the rule and ensuring if its order is correct. Being engaged in this kind of thinking precludes or delays the easy recruitment of L2 lexicon. That is why an L2 speaker may stammer or pause while saying L2 lexicon through an analyzed, yet unproceduralized, rule.



If a rule does not even exist in the speaker's mind, the speaker simply does not use it for the idea he wants to deliver. He may use another rule or produce a group of declarative lexicon without getting them organized through a rule in the hope that the interlocutor may understand it, or the speaker may apologize he could not express his idea. He feels it can by no means be conveyed.

If the first condition is not satisfied, the second condition is then not satisfied too. As the example given above, the speaker could not recall L2 lexicon easily if he is to think of an analyzed, unproceduralized rule. The second condition is dependent on the first one and the two conditions should occur to get a smooth and easy flow of L2 production. If the first condition does not take place, the second does not happen but if the first occurs, the second should take place simultaneously and easily provided that there is a phonologically memorized L2 lexicon that bears L1 meanings.

Why should declarative knowledge of L2 lexicon be recruited easily to proceduralized grammar? Is it a miracle or is it because of that miraculous complex organ that enables human to think of something and speak it out at the same time, predict what lexicon or even ideas to follow after listening to a single utterance, understand a pragmatic and literal meaning of a sentence concurrently, and perform an act or move while keeping talking about a single idea. Human's mind should not be brought easily to discussion as far as language comprehension and production are concerned. The facts above show how complex and powerful our minds are to perform a symphony of language comprehension and production more than merely practising a declarative knowledge to get it proceduralized. However, proceduralization through practicing a declarative knowledge, noticing a linguistic, declarative feature and comparing it with how it is produced in the output are all important processes to get as much proceduralized knowledge as possible. Without them, L2 speakers could not get fluent more and more. Nevertheless, when L2 speaker is just about to actualize a declarative knowledge or recall it through a proceduralized grammatical rule, what mental processes are involved to start recruiting it faster than before? How has it got to be proceduralized? Is it solely practicing and noticing? If so, why post lingually deaf speakers start getting unable to recall actualized or even native L1 knowledge after getting deaf? Does what is being heard have something to do with what is being spoken?

To prove the truth of the above-mentioned conditions and whether it is followed by L2 user, it is necessary to say that hearing loss leads to negative changes in cognition (Wingfield and Peelle 2012, Classon et al 2013, Lodeiro-Fernández et al 2015, Delage and Tuller 2007). As human's hearing ability decreases, language speaker loses his ability of perception and thus his cognition gets weaker. Lin et al (2013: 293), after carrying out an empirical study maintained that "hearing loss is independently associated with accelerated cognitive decline and incident cognitive impairment in community-dwelling older adults". This indicates that hearing is paramount and necessary to cognition. On the other hand, several studies found that implanting cochlea improves speech comprehension and perception, and this implies that hearing at the same time is important to cognition to improve speaking (Kirk and Brown 1985, Nicholas and Geers 2007, Blamey et al 2001). With the patients employed for the studies conducted by Kirk and Brown (1985), Nicholas and Geers (2007), and Blamey et al (2001), it is implied that when they got their hearing improved due to implanting cochlea, their cognition got better through the improving perception so as to speak better. Hearing well preserves one's cognition so as to perceive and comprehend language. As a result of understanding, L2 speaker knows what to say in response to what has been heard and comprehended. Likewise, hearing what I say should preserve my cognition and thus enable me to say coming lexicon. This is evident in what Classon et al (2013) revealed. They examined verbal retrieval in respondents of simple to high sensorineural hearing impairment with natural hearing respondents through letter fluency which is a test that requires retrieving lexicon of objects of animals or foods based on the letter which these objects begin with. Importantly, they revealed that "the participants with hearing impairment produced significantly fewer words than the normal hearing participants" (ibid: 88). Undoubtedly, cognizing something hearable and understandable while speaking, is not the same as speaking while having lexicon, which is neither hearable nor understandable. If you suppose yourself talking in very much the same way as post lingually deaf people, i.e. moving your lips in a way resembles someone saying 'I want to eat banana' (without producing any kind of sound), you will realize that you do not feel and cognize the meaning of each word said. There is no salience or prediction for the word 'banana' when you moved you



mouth with the word 'eat' and no salience for the word 'eat' when you moved your lips with 'Want to'. Note here that closing your ears while producing hearable lexicon does not express the situation of post-lingually deaf people as lexicon is still hearable and thus cognizable. Post-lingually deaf people hear nothing while they are talking. In fact, hearing yourself makes it salient what to say next. This is evident in what Waldstein (1990) found in his empirical study. After studying certain features of consonants, vowels and suprasegmental features in language production of completely post-lingual deaf individuals, he concluded that "post-lingual deafness affects the production of all classes of speech sounds suggesting that auditory feedback is implicated in regulating the phonetic precision of consonants, vowels and suprasegmentals over the long term" (ibid:2099). Post-lingually deaf people are still able to speak as they already acquired language, but their language production is not understandable and effective as when they were acoustically intact. If their hearing is not related to their speaking and cognition, why could not they preserve the same fluency after they got deaf? That is why; Lane and Webster (1991:859), in their empirical study of post-lingually deaf individuals compared with hearing-control subjects, concluded that

Post-lingually deafened adults reading the Rainbow Passage differed from hearing-control subjects in producing greater pitch variability and mean pitch on stressed and unstressed vowels, greater fluctuations in pitch within sentences, less correlation of intrinsic pitch with vowel height and slower temporal parameters. When reading the Phonetic Inventory Sentences, they revealed less differentiation of place of articulation in fricative and plosive consonants.

On the contrary, if a post-lingually deaf individual's own talk is really cognized to recruit coming salient lexicon, why does his speaking deteriorate when he speaks? Recognition is alert while hearing your talk or someone's talk. As it is so, it knows what meaningful lexicon comes next. In other words, the necessity of conveying an intended meaning through a grammatical rule cognitively activates the need for word(s) and enables mind to recruit them. In a research conducted by Astorga (2015), he studied the case of 120 students. 60 of which were exposed to listen institutional English teaching. He ended up by arguing that "a comparative analysis of pre- and post-test rubric labels and scores indicated a close link between listening proficiency and a slight improvement in functional and interactive oral sub-skills" (ibid:35)

Another evidence for how L2 lexicon is recruited because of hearing-speaking strong association is the mechanism that both Broca and Wernick areas follow. It is known that Wernick's area exists to mainly perceive language and comprehend it while Broca's area represents a motor responsible for generating and producing language. What connects the two areas is a bundle of nerve fibers called the arcuate fasciculus. If this bundle is damaged, a disorder called conduction aphasia occurs and any individual affected of this disorder is characterized to have difficulty in finding lexicon, particularly, while producing long utterances, and as phrases increase in length. This, however, leads to stuttering. Importantly, this mechanism relates what is comprehended to what is going to be produced through the Arcuate Fasciculus and when this connector is affected, an individual could not find salient lexicon as he stumbles or experiences "(i) poor repetition associated with abundant phonological (literal) paraphasias, impairments in naming (from literal paraphasic contamination to total inability to produce the appropriate word); (ii) reading disturbances (comprehension is much better than reading aloud); (iii) writing disturbances (from mild spelling difficulties to profound agraphia)" (Bernal and Ardila, 2009,p:2309). Worded differently, the part that connects what is cognized to what gets the conduction aphasia speaker, to produce lexicon properly, is affected. It is important to perceive what a group of sounds mean through Broca's area in order for Wernick's area to produce what should be produced. This is similar to how hearing makes it cognizable what salient lexicon is available to recruit. An utterance like 'the student passed the', if heard well makes it salient for its speaker to possibly predict 'exam'. Suppose if a post-lingually deaf speaker heard nothing when he said, 'the student passed the', 'exam' would not be salient enough like with the first intact speaker. Likewise, if the missing utterance said by a speaker and heard by an interlocutor, the interlocutor can easily predict 'exam' be said after hearing the student 'passed' but the post-lingually deaf person would not expect 'exam' at all.

Conclusion



The human's mind is not as simple as we imagine. It is highly multifunctional in that it does not only predict what to say next, but it also predicts a coming feeling, behavior, action, or move. It is innately programmed to predict forwardly, not backwardly. It predicts when to pause although a speaker may be involved in the middle of saying an utterance. It predicts when to have a high intonation at the end of an utterance although its speaker is involved to look for meaningful lexicon for questioning. It predicts what lexicon to produce while singing or producing a tune of music.

As regular grammatical rules can be proceduralized, meaningfully L2 lexicon may also be proceduralized as they are cognitively needed. However, this meaning- labelled lexicon is recruited not because they are only memorized phonologically. The fact is they are memorized so to convey what should be conveyed. We can think of and realize the occurrence of regular grammatical rules as we can recognize what words of meanings to use to organize our thoughts. It is logical then to say that the factory of cognizance makes it salient for proceduralized rules to recruit meaning- labelled L2 lexicon.

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