TEACHING METHODS AND THEIR CONCEPTUALISATION FROM A COGNITIVE PERSPECTIVE OF KNOWLEDGE ACQUISITION

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ABSTRACT

The concept of method has been substantially conditioned by the sources and principles on which the different methods have emerged throughout history. Accordingly, methods have been characterised by the virtues and deficiencies of such sources and principles. Due to easily understandable reasons, methods have not hitherto had access to the essential cognitive component in learning: the biological support on which it depends, that is to say, the brain, its structure, its functioning, and both the neurolinguistic and psycholinguistic elements and processes which trigger learning. It is argued that these factors should not only be studied and considered, but that they should be urgently integrated into the construct of method and its practical implications.

key words: Language teaching method, cognitive processes, psycholinguistics, neurolinguistics, declarative knowledge, procedural knowledge, repetitive practice.

RESUMEN

El concepto de método ha estado condicionado sustancialmente por las fuentes y recursos sobre los cuales se han basado los métodos concretos que han ido surgiendo a lo largo de la historia. En tal sentido, los métodos se han caracterizado por los aspectos positivos y negativos, virtudes y carencias propias de dichas fuentes o recursos. Por razones fácilmente comprensibles, los métodos no han tenido acceso hasta ahora a un componente cognitivo esencial en el aprendizaje: el soporte biológico del cual depende, es decir, el cerebro, su estructura, su funcionamiento, los elementos y procesos neurolingüísticos y psicolingüísticos que en él propician el aprendizaje. En este artículo argüimos que dicho componente cognitivo no sólo debe ser estudiado y tenido en cuenta, sino que debe incorporarse con urgencia al constructo metodológico y a las implicaciones prácticas que este conlleva.

PALABRAS CLAVE: método para la enseñanza de lenguas, procesos cognitivos, psicolingüística, neurolingüística, conocimiento declarativo, conocimiento procedimental, prácticas repetitivas.

I. INTRODUCTION

Language teaching methods have usually arisen within the school setting, which is a normal fact taking into account that this is the usual context where teaching has been (and still is) developed. The methods emerged in the school tradition have always been strongly conditioned by the prevalent linguistic theories at the time, both in their conception and in their nourishing sources.

In spite of this, it should be recognised that the study of other factors, together with those linguistically-rooted, has enriched teaching theory and practice. These are pedagogical factors, experience (as based on perceived and therefore "experienced" facts), or certain psychological factors of a behavioural nature, such as the case of the Audiolingual Method, which constitutes a clear example of the transference of the results from empirical studies on animal learning into human learning.

To a greater or lesser degree, all the preceding factors have undoubtedly constituted the underpinnings in the construct of method. Indeed, none of these disciplines should be excluded. Nevertheless, psycholinguistic and neurolinguistic parameters have hardly been considered in the theoretical and practical foundations of any method. What we precisely argue in this article is that the absence of psycholinguistics and neurolinguistics in the configuration and discussions of language teaching methods is critically flawed.

II. A PSYCHOLINGUISTIC
AND NEUROLINGUISTIC PERSPECTIVE

As Doughty recently states, "Whereas pedagogically oriented discussions of issues abound [...] psycholinguistically motivated rationales for pedagogical recommendations are still rare" (206). The same can be stated regarding neurolinguistic factors: applied linguistics in general and foreign language teaching in particular have not taken into account neurological fundamentals. We believe that if language learning is a type of knowledge, knowing the psycholinguistic and neurolinguistic mechanisms and processes that occur in our mind when learning will be a useful basis, not only to teach foreign languages more effectively, but to conceptualise a method of action as well.

II.1. The Neurological Network, the Physical Support of Knowledge

Since the 19th century, when Broca discovered the dependency relationship between the ability to talk and the part of the brain known as "Broca's area," cerebral research has made great advances (Harris). Such advancement has been fostered by new technologies and the increment in the number of researchers in this area.

It seems to be beyond any doubt that the centre of our cognitive system is rooted in our brain, which is composed of more than one thousand million neu-

rons, each of which has more than one hundred connections. This results in a potentially astronomical number of possible combinations of such connections.

We also know how neurons communicate between each other: by means of neurotransmitters. All these are activated through electrical impulses of a variable intensity originated by chemical elements produced in the cell body of each neuron. The neural network is a highly specialized organ responsible for administering all the human functions and activities (a kind of "central computer" on which all the information converges, is then organised and issues suitable commands to be executed by the corresponding part of our body). Besides, certain brain areas are specialised in functions (such as that in charge of language ability, for instance).

II.2. DECLARATIVE AND PROCEDURAL KNOWLEDGE

The distinction between these two types of knowledge is largely accepted by the scientific community. Also, the neural structure and functioning seem to provide physical support for this distinction (Ullman, "Contributions"). Declarative knowledge (henceforth *DEC*) refers to "the what," that is, facts and events (Squire; Roediger et al.). It is the type of knowledge that mostly distinguishes human beings from the rest of animals, since it allows us to reflect and make statements or value judgements. In reality, *DEC* can be transferred to our working memory once or many times, which implies that it is explicit, reflective and fully conscious knowledge. It could be stated that *DEC* is the closest type of knowledge advocated by rationalism, given that it involves a high level of the deductive component.

In linguistic terms, *DEC* is the explicit knowledge that we have about language and its functioning. Therefore, it refers to the whole of grammar, i.e. the knowledge of the underlying structural system which allows us to produce, process and send messages to our listener, or to receive them from our speaker so as to process and decode them to facilitate their understanding. An example of *DEC* applied to foreign language learning is the knowledge of the rule that adjectives in English do not agree either in gender or number with the noun they modify or qualify, as in 'young boys' (and not *'youngs boys', for example, which is a common initial mistake for Spaniards).

As opposed to declarative knowledge, there exists another type of knowledge: procedural knowledge (*PRO*). This is "automatised" knowledge, which does not require explicit and conscious reflection on the processes and sequences of actions implied. If *DEC* refers to "the what," *PRO* corresponds to "the how." *PRO* makes it possible for us to learn to walk by walking, because we are already born with the necessary elements to walk. These are autonomously activated without the intervention of explicit reflection. As to language as a skill, human beings learn by means of our innate potentiality to construct the communicative instrument that has been already acquired by our fellow men, with whom we interact. In many aspects, the skill of language communication resembles other skills, such as walking, driving a car, making certain movements to reach an object, etc. *PRO* allows us

to produce readily available forms. Returning to our previous linguistic example, procedural knowledge would imply the automatic and error-free production of adjectives which do not agree in gender or number with the nouns they modify or qualify.

According to neurology and neurolinguistic specialists (see for example Ullman, "Contributions") our brain has two differentiated systems -even if not completely independent- for *DEC* and *PRO*. These two types of knowledge differ in the manner in which they are acquired and stored:

a) *DEC* is not encapsulated. *PRO* is fully encapsulated, i.e., it is not readily available to our memory or mind -or not available at all- and consequently it is not usually consciously analysed or processed.
b) *DEC* is relatively slow in processing due to the conscious attention implied while transmitting it to working memory. On the contrary, *PRO* is quick in performance; it may be transferred to working memory, but it frequently remains in the implicit, not conscious memory system.
c) *DEC* is usually rapid to acquire. The acquisition of *PRO*, however, is gradual and slow; it requires multiple or constant repetition of presentations, stimuli or responses. This involves an essential connection with the way that data are transferred from working memory to long-term memory and are thus finally consolidated. In turn, this holds a very important pedagogical implication, as shall be seen in subsection II.5.

Both *DEC* and *PRO* are important for overall language mastery, in the sense that linguistic knowledge consists of both types of knowledge, each of which has a different role. The learner needs a solid declarative base to which to refer to regarding activities that require a conscious, elaborate and not immediate delivery of production, such as certain writing tasks; on the other hand, the learner needs to have readily available forms so that their attention can be liberated from short-term memory and thus be applied to higher-level skills instead of the manipulation of forms (Bialystock; Johnson, "Teaching," *Language*). As a result, communication will not be slow but sufficiently agile. Despite this, as Johnson ("Teaching," *Language*) also cautions, learning should not depend on *PRO* alone, since the direct automatisation of forms without a previous declarative base could risk fossilisation of the wrong forms.

Nevertheless, although neither *DEC* nor *PRO* should be absent in the learning process, it should not be forgotten that the finality in language learning is the automatisation of what has been learnt. This means that the ultimate objective is the attainment of *PRO*.

II.3. Sequence of *DEC* and *PRO* in Knowledge Acquisition

A key question in skill learning and thus in language learning is how to reach full proceduralisation, i.e. automatisation. As explained above, taking into

account that both *DEC* and *PRO* are necessary for complete and balanced language mastery, the two following premises can be stated: (i) the presence of *DEC* or the recourse to this type of knowledge is a necessary condition for the achievement of *PRO* (according to Anderson 1982), and (ii) in any event, *DEC* contributes to the attainment of *PRO* insofar as conscious and reflective knowledge opens the way to the initial practice required for the beginning of proceduralisation, which will add to the automatisation of the different linguistic skills more effectively. This facilitative role of *DEC* for the attainment of *PRO* is closely linked to the crucial issue discussed in this section: what is the optimal sequence of *DEC* and *PRO* for knowledge acquisition?

Following Anderson's "Adaptive Control Theory" model of skill learning or ACT[1] (Anderson, "Acquisition," *Cognitive*; Criado; Criado and Sánchez) highlight that the learning of *DEC* and *PRO* is usually subject to an order or sequence, which is *DEC">PRO*. Anderson's model (1982, 2005) claims two principles in knowledge acquisition: (i) *DEC* precedes *PRO*; (ii) complete knowledge is attained when full proceduralisation of knowledge is reached. The first principle results in the sequence *DEC">PRO*. The second principle advocates a necessary 'transfer' from *DEC* to *PRO* so as to achieve efficiency in skill use. Empirical evidence as to the pattern *DEC">PRO* can be found in the following studies (DeKeyser, "Skill" 101; Logan, "Toward," "Shapes," "An Instance"; Anderson et al.).

Evidently, the consideration of *DEC">PRO* as the single *sequence* of mastery for skills in general and for L1 and L2 in particular emerges as too rigid. In relation to L1, *DEC* does not seem to exist in newborn babies in an explicit manner, which implies that *PRO* is their only available resource for survival—accordingly, basic skills such as eating and the like are completely proceduralised already, whilst other types of less essential skills (such as language) are gradually acquired in a later stage. Regarding L2, *DEC">PRO* applies to adult learning in formal contexts; immigrants who do not attend formal instruction are a prototypical example of only-*PRO*-acquirers (with the resulting risk of fossilisation as indicated in subsection II.2).

II.4. KNOWLEDGE ACQUISITION AND TYPES OF MEMORY

There exists a great plethora of recent studies on neurolinguistics (Ullman, "Contributions"; Ahlsen) which support the dependency between diverse language uses or specific components of language and certain neural disorders, such as aphasia, agrammatism, etc. Undeniably, one of the most important aspects involved is memory.

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[1] The latest version of this model is ACT-R (R for "rational") and is largely close to the previous one.

We will only make reference to two types of store which most directly have an effect on the mechanisms of retention and learning subject to be used in language teaching -and thus to be integrated in a determined method: short-term memory and long-term memory.

Atkinson and Shiffrin postulated the theory of short-term memory which has gained more acceptance and which has been more influential in cognitive psychology. The fundamental characteristic of this type of memory is its limited capacity to store data. We are not capable of retaining (sometimes not even of perceiving) all the details in a scene that appears before our eyes. Neither are we capable of retaining or detecting all the linguistic elements in a written paragraph, or even less in a page o a chapter, or a whole oral conversation maintained during several minutes. Typically, we only retain those elements to which our attention is drawn with more emphasis, or those elements on which we focus our own attention. The remaining data are lost, that is, they disappear from the neural network through which they are accessible to our knowledge system. According to Atkinson and Shiffrin (Anderson, *Cognitive* 176), the model of retention to which data presented to us seems to adjust corresponds to Figure 1:

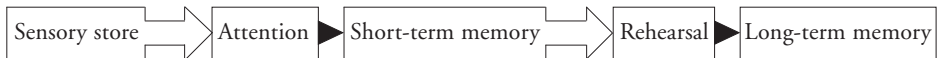| Sensory store | Attention | Short-term memory | Rehearsal | Long-term memory |

Figure 1.

From a biological perspective, the selective filter of short-term memory is extremely useful despite its limitations: it allows us to disregard much of the data accessible to us, which would overcharge our memory in great excess without involving any benefit given the total or nearly total lack of relevance of such data. On the other hand, the storing of all the data perceived by our senses would lead to such an accumulation that their processing and manipulation would become impossible to handle. Accordingly, the suitable complement of short-term memory is long-term memory; in other words, a type of memory capable of retaining only relevant, useful or necessary data -which are those needed for survival- during long periods of time.

II.5. MEMORIZATION AND REPETITIVE PRACTICE

From a methodological point of view, it is especially interesting to highlight the mechanisms which allow the data selected in short-term memory to be consolidated in long-term memory. This type of memory is vital for the acquisition of language skills, since it is the basis of proceduralisation of knowledge -the ultimate objective of linguistic learning. Rundus and Anderson (*Cognitive* 241ff) showed one of the most relevant facts regarding the two types of memory in his experiments: repetition or repetitive practice is essential so that information in short-

term memory is transferred to long-term memory and is thus consolidated there. Accordingly, the more data are repeated, the more possibilities they will become consolidated. This also reveals the function of short-term memory: it is like an intermediate stage towards long-term memory. In other words, the factor of time is crucial in memorization: the longer data stay in short-term memory, the more possibilities for these data to access long-term memory.

Craik and Lockhart concluded that repetition is not so efficient from the perspective of the number of times with which it is performed but from the viewpoint of the intensity and attention paid during the repetitive process. This means that sheer repetition alone is not enough (it might even be irrelevant); but if repetition is accompanied by the attention of the person who repeats, there will be more possibilities of the information being stored. Owing to this, some authors favour the term "working memory" instead of short-term memory. In any event, the value of practice, both to retain data in working memory and in long-term memory, seems to be indisputable. As an example, Pirolli and Anderson (Anderson, *Cognitive* 188) have empirically shown that practice increases the capacity to retrieve data up to 50%.

III. TRADITION AND COGNITIVE FACTORS IN LANGUAGE TEACHING METHODS

During the last five hundred years, which is a well-documented period of time in relation to foreign language teaching, methods have had an unquestionable prominence in language classes (Kelly; Sánchez, *Historia*, *Los métodos*; Richards and Rodgers; Howatt). Due to their own nature, methods constitute a very important aid for teachers and students, since they offer an integrated, coherent and ordered guide or method of action. We should remember that every method poses advantages and disadvantages, that is to say, they are subject to unavoidable limitations. The disadvantages of a certain method augment if its definition or configuration does not correctly integrate all the necessary elements that should be present. By *method* (from the Greek "*meta-hodos*": follow a way or route), we understand both the "the systematic and ordered way of doing something" and "the ensemble of techniques or activities that define such a way of acting" (Sánchez, "Metodología" 666). [My own translation from the Spanish original]. The emphasis lies on the procedural or formal aspects of action. But this perspective oversimplifies what is really involved in a method. Mackey stresses this fact when he affirms that methods "limit themselves to a single aspect of a complex subject, inferring that that aspect alone is all that matters" (156).

From the perspective of the reasons and motivations that underlie a method and the sources which nourish its principles, it must be stated that if such reasons and motivations are slanted or incomplete, the resulting methodological construct would also be slanted and incomplete. As stated above, the absence of psycholinguistic and neurolinguistic factors in the configuration of methods constitutes an undesirable omission. In what follows we will analyse how the cognitive principles and

processes previously described in section II have either been included or omitted in major foreign language teaching methods.

III.1. THE GRAMMAR-TRANSLATION METHOD

The method that has taken deepest roots in the traditional school system since the latter was worldwide established is the so-called "traditional method," or more rightly named as Grammar-Translation Method. This method relies on a linguistic theory which basically considers language as an ensemble of rules which leads to the generation of sentences from an undetermined number of words. Consequently, in the first place, students have to learn the rules and they secondly apply them to the lexicon in order to create sentences by means of direct and inverse translation practice (mainly in the written modality).

In more current terms, the Grammar-Translation Method prioritises the learning of *DEC*, that is, explicit, conscious and accessible-to-reflection knowledge about the language. Only after understanding what has to be learnt, the student will proceed to the proceduralisation stage or the consolidation of learning through practice. The latter is mainly focused on rule memorization rather than on the proceduralisation of the communicative use of language. It is taken for granted that the person who understands a rule will then be able to build the useful sentences for communicative interaction. Thus the first stage or the understanding of the object of learning is emphasised most, given that *DEC* is the ultimate objective and *PRO* is only used to reinforce *DEC*.

III.2. THE DIRECT METHOD

Contrary to the type of practice involved in the Grammar-Translation Method, another method arose at the end of the 19th century, the Direct Method, which advocates *oral practice*. This is radically different from the principles of the Grammar-Translation Method. The Direct Method is tightly linked to natural learning, and is founded on the pedagogy that derives from the observation of the environment without major theoretical implications. However, it clearly assumes -even if not explicitly- that linguistic knowledge is acquired by way of practice (*PRO*) and rejects the reflection upon language (*DEC*), which is branded as harmful for learning. The Direct Method is centred on proceduralisation through language use in situational contexts which entail a certain level of relevant communication. In other words, the emphasis is not placed on forms isolated from the context in which they are used.

III.3. THE AUDIOLINGUAL METHOD

In one of his most important works, Lado offers a clear description of the "new" methodological approach that was to become firmly established during the

1960s: the Audiolingual Method. The most outstanding feature of this new method is that it is supposedly based on "scientific criteria." The importance of this starting point needs to be highlighted. The methods applied until the end of the 20th century were supported by speculations and assumptions as well as principles which are totally different from those which govern experimental sciences. Hence the change of perspective was considered "revolutionary."

The scientific criteria on which this new method rests come from experimental psychology, specifically from Skinner's application to linguistic learning from his research on animal learning (more precisely, the experiments performed on laboratory rats. The approach is not incorrect. Indeed, the mechanism of repetition as a basis for learning is not only corroborated by current studies, but it is also confirmed as the basic mechanism for the proceduralisation of knowledge in our brain, as was explained in subsection II.5.

A careful analysis of the Audiolingual Method reveals that the problems that tend to be attributed to this method do not lie in repetitive practice or *drills* as a learning strategy so much. The crucial issue is that such repetitive practice or drills are not contextualised and are finally—and almost exclusively—focused on forms and structures, thus ignoring content or meaning. The result is that practice becomes mechanical and thus critically deviates from what is language: an instrument of communication where both form and meaning are inseparable so as to attain the communicative objectives inherent to language use. The following drill reveals a non-contextualized exchange which is consequently hardly significant for real communicative purposes:

Book. The book in on the table.
Sparrow. The sparrow is on the roof.
Elephant. The elephant is on the lorry.
Girl. The girl is on the chair, etc.

Given that the semantic distance among the four utterances above is remarkably striking, the lack of contextualisation of each one of them -both in isolation and in relation with the remaining sentences- is clearly noticeable. If we compare this type of practice or drill with the habitual practice in the Grammar-Translation Method, the similarities are also evident. If the objective in the Audiolingual Method was the structure, in the Grammar-Translation Method it was the underlying rule. In both cases the meaning is subordinated to the form, which is prioritised. Observe this example from the Grammar-Translation Method:

Has this good girl my good mother's ring? She has not your mother's ring, she has her brother's. Have you my cap or my neighbour's? I have neither yours nor your neighbour's, I have my father's, etc.

(Brown, John G. *Gramática española-inglesa: sistema teórico-práctico. Por un nuevo método Modificación del Doctor Ollendorff*. Madrid. Librería de San Martín, 1858. Lesson VII).

The meaning reflected by the words is irrelevant from the point of view of the communication established, which is contextually null and void. It has to be borne in mind that the type of practice involved in each case above perfectly accounts for the objectives in each respective method: for the Grammar-Translation Method, being able to perform direct and inverse translation; for the Audiolingual Method, being able to communicate at an oral level by means of vocabulary and patterns representative of real life communication (Sánchez, *Los métodos*). In this sense, there is an excellent correspondence between ends and means.

III.4. THE COMMUNICATIVE METHOD

It could be argued that this lack of context or 'communicative' nature so typical from the Grammar-Translation and the Audiolingual methods is what the Communicative Method, originated during the 1970s, tries to cater for. With its many variants and nuances, it stresses, at least from the perspective of the theory which inspired it, the functionality of language: language is used as an instrument of communication (Halliday; Van Ek; Canale and Swain; Littlewood; Savignon; Sánchez, *La enseñanza*). Therefore, message is given priority over the forms through which it is conveyed. Truly, the Communicative Method has been qualified by many of its followers, and the importance of focus on form in language has also been claimed in certain variants of the Communicative Method such as the Task-Based Language Teaching Approach (Long and Robinson; Skehan, *Cognitive*, "Task-based"). In spite of this, the emphasis on content predominates and there are many cases in which forms are explicitly neglected.

The sources and principles which underpin the Communicative Method are essentially linguistic, although it should be acknowledged that the language approach is more complete and realistic than in previous methods. Other elements are appreciated, such as pedagogical and psychological factors, together with the intense debate and fruitful research on second language acquisition. This debate and the ensuing studies have been crucial to opening the way to two essential disciplines in the configuration of the new methodological paradigm advocated in this work: psycholinguistics and neurolinguistics.

The principles on which the Communicative Method relies have given rise to practice activities with certain specific characteristics which are also related to the departing theoretical tenets of this method. The emphasis on the content transmitted by means of linguistic forms is one of the most noteworthy characteristics of such practice. Accordingly, the message should be comprehensible; also, open-ended activities with almost no precise objectives are favoured on the grounds that the sheer linguistic use will lead towards the consolidation of language in communicative use (even if what is intended to be consolidated is not well defined). In summary, open-ended or free activities prevail over controlled exercises. Grammar activities are not totally excluded, but they are either cautioned against or they are neglected at the cost of tasks which are only guided by the targeted communicative objectives ("being able to write a holiday report," for example).

As can be seen, then, the Communicative Method is not basically free from the conceptual limitations which have characterised the preceding methodological formulations. From a cognitive perspective, this means that *DEC* is also neglected in the Communicative Method in favour of *PRO*, which results from practice as understood in a global sense and somewhat undefined ("language practice as communication").

In the activities, meaning is transmitted by a few structural patterns, in such a way that a certain balance is achieved in the importance granted to both form and meaning, as can be seen in this model:

> Talk about the picture. Examples:
> *There's some water in the big field.*
> *There are some pigs in the small field.*
> *There are some sheep on the mountain.*

> (Swan, Michael and Catherine Walter. *Cambridge English 1: Student's Book*. Cambridge: Cambridge UP, 1984. Unit 7C).

> There also abound more open-ended activities, such as the following one:
> Write three things that you were going to do and three things you were supposed to do in the last four weeks. Think about why you didn't do these things.
> *Visit my aunt*

> (Redston, Chris and Gillie Cunningham. *Face 2 Face Intermediate*: *Student's Book*. Cambridge: Cambridge UP, 2006. Unit 10A).

III.5. FINAL REMARKS

It is necessary to acknowledge the close link between the theories and the foundations from which each method departs, the resulting methodological formulation and the suitable matching between the objectives and the strategies and activities implemented to attain such goals. Despite this, the change to a new method, a frequent practice throughout history, has not allowed us to eliminate certain advantages and problems almost inherent to the method in question; what is more, changes show that the preceding methods were not as efficient as expected. The related explanation of these two points can be perfectly framed within a cognitive perspective as has been done in the whole of section III: the theoretical principles of methods do not comply with the prevalent *DEC*">*PRO* cognitive sequence of second language learning by adults. This is revealed by the large stress on *DEC* in the Grammar-Translation Method, the emphasis on *PRO* and the strong rejection to *DEC* in the Direct and Audiolingual Methods; or the bias towards *PRO* in the Communicative Method (particularly in the Task-Based Language Teaching Approach, or in Process-based Approaches). Besides, practice should avoid mechanical repetition without any form-meaning connections because the absence of such a link may hinder proceduralisation (DeKeyser, "Beyond").

IV. CONCLUSION: NEW PSYCHOLINGUISTIC AND NEUROLINGUISTIC PRINCIPLES FOR THE DEFINITION OF A LANGUAGE TEACHING METHOD

From the previously outlined studies on psycholinguistics and neurolinguistics, there emerge several insights which fully influence the configuration of a method for language teaching in order to avoid the deficiencies described in the major language teaching methods above. The most significant insights can be summarised in the following points:

1. Two different types of knowledge are to be differentiated: *DEC*, as related to linguistic reflection—how the system works—and *PRO*, which refers to consolidated, i.e. utterly proceduralised and automatised linguistic knowledge. It should be remarked that both types of knowledge are relevant for language learning insofar as *DEC* leads to *PRO*, which is the decisive objective for linguistic proficiency, and as *DEC* usually precedes *PRO* and conditions the acquisition of the latter (following Anderson, "Acquisition," *Cognitive*).

2. Both *DEC* and *PRO* are two complementary types of knowledge or subject to be complementary. There is no reason why we should do without one or another in learning.

3. The key element in the process of knowledge acquisition is data retention or memorisation. This is a necessary condition in the acquisition and mastery of any type of knowledge, including language. For this purpose, our brain utilises a strategy which has always been present in the history of education, although with varying degrees of success: repetitive practice. The neural activity which leads to data retention is consolidated through the same repetitive processes, which has been sufficiently endorsed by experimental research.

4. The data to which we have access are stored in long-term memory. Short-term memory or working memory is a prior stage to more lasting consolidation. Together with repetitive practice, another factor has an effect on the transfer of data to long term memory: the intensity of practice and the attention paid to selected information. This means that not all repetitive practice is valid despite being very frequent. Repetitive practice without attention can be inefficient, whilst less-durable repetitive practice may be effective as long as it is performed with the appropriate conditions of attention and intensity. Hence the conclusion that the nature of practice is crucial and influences its efficiency.

5. The nature of practice in foreign language teaching can be viewed under two different angles, in relation to a) how linguistic practice should be and b) the type of attention applicable to practice with linguistic elements. Regarding a), it must be remembered that language use needs to be communicative, that is, both form and meaning ought to be contemplated. As to b), the

attention and intensity of practice can be developed via the resort to reflection on language. This reflection should be limited to the specific linguistic points involved in each practice activity. Both the practice activity itself and the pertinent linguistic reflection must be suitably balanced in such a way that repetition is primed and reflection is adjusted to the very essential needs in each activity; accordingly, repetition will be finally effective.

Therefore, a realistic methodological formulation faithful to the human learning systems cannot and should not ignore psycholinguistic and neurolinguistic perspectives. Without any doubt, the incipient studies and research on these two fields will refine the methodological contributions in the near future, but the already available results point towards the consideration of a more realistic description of the elements to be taken into account when fixing and defining a methodological option.

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