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A close look at l2 learning: from individual differences to multiple intelligences and brain based studies

Tesis para optar al grado de Licenciado en Lingüística con Mención en Lengua y Literatura Inglesas

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INTRODUCTION

Since the second half of the twentieth century a significant paradigm shift has taken place in second language education, namely, the shift from positivism to post-positivism, and from behaviourism to cognitivism.

In science, in general, when a paradigm shift, like this one occurs, we look at things from a different perspective since we focus on different aspects of the phenomena in our lives. In the case of language pedagogy, specifically, we found a move away from the tenets of behaviourist psychology and structural linguistics towards a cognitive, and later, towards a sociocognitive psychology. We also witness a more contextualised meaning-based view of language.

This fact is reflected in such different methods as Audiolingualism, whose goal was to attain mastery of linguistic competence by means of oral drill practice; and later in approaches such as the Natural Approach which aimed to achieve the ability to use the language in the right context or situation, i.e. linguistic competence.

Key components of this shift have meant:

- Focusing greater attention on the role of learners rather than on the external stimuli learners are receiving from their environment. Thus, the centre of attention shifted from the teacher to the student. This shift is generally known as a move from *teacher-centred instruction* to *learner-centred education.*
- Respecting diversity among learners and viewing their differences not as impediments to learning, but as resources to be recognised, catered to and appreciated. This shift is known as the study of *individual differences*.
- Focusing on the internal processes of the classroom rather than solely valuing the views of those who come from outside to study classrooms. This shift led us to such innovations as qualitative research, which values the subjective and affective factors of the participants and the uniqueness of each classroom situation.

- Along with this emphasis on context, came the idea of connecting the school with the world beyond as a means of promoting holistic learning.
- Helping the students understand the purpose of learning and develop their own purposes.
- A whole-to-part orientation instead of a part-to-whole approach. This involves such approaches as beginning with meaningful whole texts and then helping students understand the various features that enable texts to function.
- An emphasis on the importance of meaning rather than sentence drills and other forms of rote memorisation.
- A view of learning as a lifelong process rather than something activated to prepare for an exam.

The paradigm shift in the teaching and learning of an L2 outlined above has led to many changes in the way second language teaching is conducted and conceived. We have developed some of the different proposals that have emerged within this new paradigm for the writing of this thesis.

Chapter 1 presents a synthesis of Bloom's taxonomy of the educational system's goals, with a strong emphasis on the concept of affective domain and its theoretical potentialities for second language education.

Chapter 2 offers a general view of the difference between language-centred instruction and learner-centred education, as well as learning instruction matching.

Chapter 3 addresses the subject of individual differences in language learning and quotes two examples of methods considering these differences.

Chapter 4 examines the relationship between brain, language and learning, focusing on how the brain works to carry out different linguistic tasks. It gives an insight into how neuroscientific research proves as a reliable source from which educational proposals may improve.

Chapter 5 deals with the concept of intelligence, the theory of Multiple Intelligences and the positive educational implications that this theory has had and may have in the field of education in general and in second language learning in particular. This chapter depicts how the fields of psychology and neuroscience have been useful for the development of some theories, specifically, the way in which the theory of Multiple Intelligences de-emphasises the rigid measurement of intelligence through the IQ towards a more holistic understanding of the individual's different intelligent behaviours.

Chapter 6 relates specific cases of successful L2 learners including the theoretical aspects that have been discussed in this thesis.

We expect our work to provide a wider picture of the changes that the learning and teaching of a second or foreign language are experiencing today.

OBJECTIVES

The main objective of this thesis is to revise the general process of L2 learning and some theories that have attempted to characterise it in the past fifty years.

The specific objectives are:

- To examine the learners' individual differences as factors involved in the L2 learning process.
- To analyse the Theory of General Intelligence in contrast to the Theory of Multiple Intelligences and how the latter contributes to consider students as holistic learners.
- To revise the state of the art of brain studies as a neuroscientific basis for learning in general and the learning of an L2 specifically.
- To relate specific cases of successful L2 learners with the theoretical aspects discussed in this thesis.

I Chapter One

1. AFFECTIVE DOMAIN

1.1. Background

In 1948 during the American Psychological Association Convention, a group of college examiners integrated by David Krathwohl, Benjamin Bloom and Bertram Masia, established a classification system as a theoretical framework of educational goals for the evaluation of student performance. They considered identifying it as a taxonomy which would provide a useful structure for categorising levels of abstraction of questions that commonly occur in educational settings. They considered that teachers characteristically ask questions within particular levels, and if those levels could determine the levels of questions that would appear on the exams, students will be able to study using appropriate strategies.

That meeting became the first of a series of informal annual meetings of these college examiners; being the publishing of the 'Taxonomy of Educational Objectives' the first product of these meetings.

According to Bloom et al. (1956) their educational taxonomy was intended to provide for classification of the goals of the educational system. It was expected to be of general help to all teachers, administrators, professional specialists and research workers who deal with curricular and evaluation problems. It was especially intended to help them discuss these problems with greater precision. For instance, some teachers believe that the first thing their students should do is understand; others desire their students to internalise knowledge; while others want their students to grasp the core or essence, or comprehend. But do they all mean the same thing? What does a student who really understands do which he does not do when he does not understand? It was believed that teachers should be able to define this issue, since it would facilitate the exchange of information about their curricular developments as well as their evaluation devices.

Moreover, we think the taxonomy could be a source of constructive help in relation to the problems of learning a second language given that the cognitive, the affective and the psychomotor domains are considered to be of equal importance.

1.2. The Taxonomy of Educational Objectives

We are interested in analysing this important document in our study since B.S. Bloom et al. were, to a certain extent, pioneers in the study of how students learn.

1.2.1. Cognitive domain

It includes those educational goals or objectives which deal with "the recall or recognition of knowledge and the development of intellectual abilities and skills" (Bloom, 1956).

Bloom et al. (1964) divided this domain into six major hierarchically arranged levels as follows:

-*Knowledge*: Most learners and their teachers similarly consider the acquisition of knowledge or information to be the primary, if not the sole objective of any program of education. If a student is able to recall or recognise some idea or phenomenon encountered in learning, he or she satisfies the requirements of the first level of this domain. "Although information or knowledge is recognised as an important outcome of education, very few teachers would be satisfied to regard this as the primary or the sole outcome of instruction. What is needed is some evidence that the students can do something with their knowledge, that is, that they can apply the information to new situations and problems" (ibid.). The student is able to: enumerate, define, describe, identify, label, list, match, name, outline, recall, recite, recollect, relate, reproduce, select, state.

-*Comprehension* is the ability to grasp meaning of material. This skill may be shown by translating material from one form to another (words or numbers), by interpreting material (explaining or summarising). The student is able to: change, construct, convert, decode, defend, define, describe, distinguish, discriminate, estimate, explain, extend, generalise, give example, illustrate, infer, paraphrase, predict, restate, rewrite, solve, summarise.

-*Application* is the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. The individual can: apply, change, compute, demonstrate, develop, discover, dramatise, employ, illustrate, interpret, manipulate, modify, operate, organise, predict, prepare, produce, relate, solve, transfer, and use.

-*Analysis* is the ability to break down material into its component parts so that its organisational structure may be understood. This skill may include the identification of the parts, analysis of the relationship between parts, and recognition of the organisational principles involved. Thus the learner is able to: analyse, breakdown, classify, compare, contrast, determine, deduce, diagram, differentiate, distinguish, identify, illustrate, infer, outline, point out, relate, select, separate, and subdivide.

-*Synthesis* is the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). The students are able to: categorise, combine, compile, compose, conceive, construct, create, design, devise, establish, explain, formulate, generate, invent, make manage, modify, organise, originate, plan, propose, rearrange, reconstruct, relate, reorganise, revise, rewrite, set up, summarise, tell, and write.

-*Evaluation* is the higher component of the Taxonomy to judge the value of material (statement, novel, poem, research report) for a given purpose. And allows the learner to: appraise, ascertain, choose, compare, conclude, contrast, criticise, decide, defend, describe, discriminate, explain, interpret, justify, relate, resolve, summarise, support, validate, and write (a review).

1.2.2. Affective domain

It is important for our study since it includes objectives which describe “changes in interest, attitudes, and values, and the development of appreciations and adequate adjustment” (ibid.), which are essential aspects in learning a foreign language.

The classification of objectives in the affective domain was definitely more challenging. First, they were not stated as precisely as were those of the cognitive domain and, in fact, educators were not as clear as to the learning experiences appropriate to these objectives. "The evidence suggests that affective behaviours develop when appropriate learning experiences are provided for students much the same as cognitive ones develop from appropriate learning experiences" (ibid.). The research team did assume that the affective domain should be structured hierarchically as is the cognitive domain. The challenge was to locate the continuum of behaviours. The taxonomy begins at the level at which the learner is merely aware of or able to perceive a phenomenon.

-*Receiving* is the willingness to receive or to attend to particular phenomena or stimuli (classroom activities, textbook, assignment, etc.). Receiving has been divided into three subcategories: awareness, willingness to receive, and controlled or selected attention. From the teaching standpoint, receiving is concerned with getting, holding, and directing the student's attention. The student can: acknowledge, ask, attend, be aware, choose, describe, follow, give, hold, identify, listen, locate, name, receive, reply, select, show alertness, tolerate, use, view, and watch.

-*Responding* refers to active participation on the part of the student. The student is sufficiently motivated not to just be willing to attend, but is actively attending, he has become sufficiently involved in or committed to a subject, activity, so as to seek it out and gain satisfaction from working with it or engaging in it. Thus he will: agree (to), answer, ask, assist, communicate, comply, consent, conform, contribute, cooperate, discuss, follow-up, greet, help, indicate, inquire, label, obey, participate, pursue, question, react, read, reply, report, request, respond, seek, select, visit, volunteer, and write.

-*Valuing.* When the student sees worth or value in the subject, activity, assignment, etc. He is motivated, not by the desire to comply or obey, but by the individual's commitment to the learning situation. The learner is able to: accept, adopt, approve, complete, choose, commit, describe, desire, differentiate, display, endorse, exhibit, explain, express, form, initiate, invite, join, justify, prefer, propose, read, report, sanction, select, share, study, and work.

-*Organisation* means bringing together a complex set of values, resolving conflicts between them, and beginning to build an internally consistent value system. The individual sees how the value relates to those already held or to new ones that are coming to be held. The integration of values is less than harmonious; it is a kind of dynamic equilibrium that is dependent upon salient events at a specific point in time. The student can: adapt, adhere, alter, arrange, categorise, classify, combine, compare, complete, defend, explain, establish, formulate, generalise, group, identify, integrate, modify, order, organise, prepare, rank, rate, relate, synthesise, and systemise.

-*Characterisation by a Value or Value Complex*: the internalisation of values has a place in the individual's value hierarchy. The values have controlled one's behaviour for a sufficiently long period of time to have developed a characteristic "life style" which is pervasive, consistent, and predictable. The individual can: act, advocate, behave, characterise, conform, continue, defend, devote, disclose, discriminate, display, encourage, endure, exemplify, function, incorporate, influence, justify, listen, maintain, modify, pattern, practice, preserve, perform, question, revise, retain, support, uphold, use.

1.2.3. Psychomotor Domain

It is also crucial in the learning of a foreign language since it includes objectives which emphasise some muscular or motor skill, and it pertains to "the manipulative or motor-skill area" (ibid.), some acts which require a neuromuscular co-ordination. The group found few of these objectives in the literature, for example, that they were most frequently related to handwriting and speech and to physical, trade and technical courses. The psychomotor domain, which is important in our study, is also organised hierarchically as follows:

-*Imitation* occurs in the early stages of learning and it is a complex skill, overtly, after the individual has indicated a readiness to take a particular type of action. Imitation includes repeating an act that has been demonstrated or explained, and it includes trial and error until an appropriate response is achieved. Students demonstrate competence when they: begin, assemble, attempt, carry out, copy, calibrate, construct, dissect, duplicate, follow, mimic, move, practice, proceed, repeat, reproduce, respond, organise, sketch, start, try, and volunteer.

-*Manipulation* is the true stage when an individual continues to practice a particular skill or sequence. The response is more complex than at the previous level, but the learner still is not "sure of him/herself". However he is able to: acquire, assemble, complete, conduct, do, execute, improve, maintain, make, manipulate, operate, pace, perform, produce, progress, and use.

-*Precision* is when skill has been attained. Proficiency is indicated by a quick, smooth, accurate performance, requiring a minimum of energy. The overt response is complex and performed without hesitation. The student is able to: achieve, accomplish, advance, automatize, exceed, excel, master, reach, refine, succeed, surpass, and transcend.

-*Articulation* involves an even higher level of precision. The skills are so well developed that the individual can modify movement patterns to fit special requirements or to meet a problem situation. Thus he can: adapt, alter, change, excel, rearrange, reorganise, revise, surpass, and transcend.

-*Naturalisation* includes an automatic response. The individual begins to experiment, creating new motor acts or ways of manipulating materials out of understandings, abilities, and skills developed. One acts "without thinking". Naturalisation Verbs include: arrange, combine, compose, construct, create, design, refine, originate, and transcend.

II Chapter Two

2. LEARNER-CENTRED INSTRUCTION

Second Language Acquisition (SLA), as a sub-discipline of applied linguistics, is still a very young field of study. While it may not be possible to identify its precise starting point, many researchers would agree that the late sixties marked the beginning of an intense period of empirical and theoretical interest in how second languages are acquired. Much of this research has been directed at understanding and contributing to more effective instructed language learning, and the effects of instruction on learning. Much of the theorising about L2 instruction has been specifically undertaken with language pedagogy in mind. For example, Krashen's Monitor Model (Krashen, 1981), Long's Interaction Hypothesis (Long, 1996), and especially the theory of instructed language learning (Ellis, 1994) all address the role of instruction in L2 acquisition.

In particular, there is no agreement as to whether instruction should be based on a traditional focus-on-forms approach, involving the systematic teaching of grammatical features in accordance with a structural syllabus, or on another focus-on-form approach which involves attention to linguistic features in the context of communicative activities derived from a task-based syllabus or some kind of combination of the two. Nor is there agreement about the efficacy of teaching explicit knowledge or about what type of corrective feedback to provide or even when explicit grammar teaching should start. These controversies reflect both the complexity of the object of enquiry (instructed language learning) and also the fact that SLA is still in its infancy.

2.1. Formal Instruction

Some previous investigations concerning the effects of formal instruction have referred to the term as ‘grammatical teaching’. This occurs in classrooms when teachers try to help learning by raising the learners’ consciousness about the target language rules. Formal instruction can be deductive (the learners are told the rules) or inductive (learners develop a knowledge of the rules through carrying out language tasks).

Findings from various sources show that instruction has little influence over the order of acquisition (Ellis 1989, Ellis 1990: 166, Ellis 1994: 631, Felix & Hahn 1985); or as Felix said: “The possibility of manipulating and controlling the students' behaviour in the classroom is in fact quite limited” (1985: 109).

Differing from Krashen, Ellis states that there are investigations that indicate that the acquisition of grammatical morphemes is not acquired in the same order as they were taught (1990: 139). Therefore, they question formal instruction especially when researchers such as Lightbown (1985) claim that instruction may appear to be effective initially but with time the effects disappear.

Many researchers have argued that students, particularly adults definitely benefit from formal instruction, even if the grammatical structures are presented in an order different from the ‘natural order’ (Bailey, Madden & Krashen 1974: 243, de Villiers 1974), or that instruction somehow is significant for the learner so that when he is ready to assimilate new material, acquisition becomes easier (Ellis 1990: 169). But definitely others have even stated that formal instruction is a more efficient way of acquiring a second language than natural exposure (Krashen et al. 1978: 260). We now know that the process is different for each individual, as it is exemplified in the next chapters.

2.2. Language-centred Instruction

Traditionally, language instruction has been directed at developing rule-based competence (i.e. knowledge of specific grammatical rules) through the systematic teaching of pre-selected structures - what Long (1991) has referred to as a focus-on-form approach.

Ellis et al. (2001) reported that extensive instruction occurred relatively frequently in communicative adult ESL lessons through attention to form, either pre-emptive (i.e. teacher or student-initiated) or reactive (i.e. corrective feedback). Loewen (2002) showed that learners who experienced such momentary form-focused episodes demonstrated subsequent learning of the forms addressed in both immediate and delayed tests. However, it is not possible to attend to those structures that learners do not attempt to use (i.e. extensive instruction cannot deal with avoidance). Also, of course, it does not provide the practice

that some structures may require before they can be fully acquired. Although it has been argued, instruction needs to be conceived of in terms of both approaches.

‘Implicit knowledge’ is procedural, it is held unconsciously, and can only be verbalised if it is made explicit. It is accessed rapidly and easily and thus it is available for use in rapid and fluent communication (see Chapter 4).

In the view of most researchers, ‘competence’ in an L2 is primarily a matter of implicit knowledge. Explicit knowledge “is the declarative and often anomalous knowledge of the phonological, lexical, grammatical, pragmatic and socio-critical features of an L2 together with the metalanguage for labelling this knowledge” (Ellis, 2004) (see Chapter 4).

Ellis makes a distinction between ‘explicit knowledge’ as metalingual explanation and as analysed knowledge. The former entails a conscious awareness of how a structural feature works while the latter consists of knowledge of grammatical metalanguage and the ability to understand explanations of rules.

Early research into naturalistic L2 acquisition showed that learners follow a “natural” order in the sequence of acquisition. Actually, they master different grammatical structures in a relatively fixed and universal order and they pass through a sequence of stages of acquisition on route to mastering each grammatical structure. This led researchers like Corder (1967) to suggest that learners had their own 'built-in syllabus' for learning grammar as implicit knowledge, same as Chomsky’s LAD. Krashen (1981) famously argued that grammar instruction played no role in the development of implicit knowledge (what he called 'acquisition'), a view based on the conviction that learners (including classroom learners) would automatically proceed along their built-in syllabus as long as they had access to comprehensible input and were sufficiently motivated. Grammar instruction could contribute to learning only as explicit knowledge.

According to Ellis, language instruction is a concept from the 60’s. In our study, we consider ‘instruction’ only as the transmission of knowledge that the teacher provides to the student, who is only a recipient.

2.3. Learner-Centred Approaches

Over the last twenty years, there has been a shift towards the idea of student independence when they learn English, and substantial research has been done on 'learner-centred' approaches to teaching. According to David Nunan, “Learner-centredness is more of an attitude that an approach” (cited in Ellis 1994). He also states that learner-centredness is not necessarily synonymous with independence even though in most situations it is.

In learner-centredness, the focus is on both students and instructor, and instruction itself focuses on the learner and the learning process. The teacher creates a learning environment that resembles as much as possible the one in which students learned their first language. Students participate in the learning process by establishing learning goals, developing and choosing learning strategies, and evaluating their own progress. In the classroom, students attend to models provided by the teacher (input) and then build on those models as they use language themselves (output). Classroom activities incorporate real-world situations. Students work in pairs, in groups, or alone depending on the purpose of the activity. Besides, they talk without constant teacher monitoring, while the teacher provides feedback or correction when questions arise.

Learner-centred teaching encourages students to take responsibility for their own language skill development and helps them gain confidence in their ability to learn and use the language. Teachers support students by devoting some class time to non-traditional activities, including teaching learners how to use learning strategies, how to use available tools and resources, and how to reflect on their own learning, explained under the concept of metacognition in following chapters.

Instruction may not affect the spontaneous performance of the L2 learner but it may positively affect certain planned L2 production i.e. writing, when focused on form, learners are able to benefit from "knowledge acquired through formal instruction" (Ellis 1986: 224).

Another benefit of instruction is that it can prevent fossilisation (e.g. Long, 1985: 87) and the use of pidgin-like constructions which are ungrammatical but often never rectified by the uninstructed learner since they can communicate in spite of that.

There are various theories about why instruction is beneficial to acquisition. One possibility is offered as a simple consciousness raising activity, or that it works indirectly with delayed results (Ellis 1990: 169-70).

The final thing to be said about the effectiveness of instruction is that in some studies, benefits have been recorded: “It should also be noted that, even though no difference was found between the orders of instructed and naturalistic learners in most of the studies, there was evidence in some others that specific morphemes were performed more accurately as a result of instruction” (Ellis 1994: 631).

To achieve maximum results, language syllabuses are generally organised in order to offer a correlation between natural learning order and teaching order, since what works best is some combination of the two (Ellis 1986: 216).

Bailey, Madden and Krashen (1974: 243) and de Villiers (1974) note that adults, in particular, will benefit considerably from a course which follows a ‘natural syllabus’.

Brindley (1991 cited in Ellis 1994: 632) maintains that question formation is considerably aided by a carefully designed course of instruction, one which matched the students' own natural development.

Ellis (1994: 632) argues that, for example, in the acquisition of German word order rules, instruction which follows the natural progression is essential, as it is presented later in Derek’s case (see Chapter 6). So, if the data can be relied on and the current level of the student ascertained, instruction designed to his needs should ensure maximum benefit.

2.3.1. Learning Instruction Matching

Looking for the most efficient type of instruction the researchers recognised that the process of a second language acquisition presents some structural properties that universally exist in language learners. According to Nicholas (1985 cited in Ellis 1994: 646) “There is no unique best path to ultimate communicative competence. Rather, learners will differ in the kind of instruction that they respond best”. As a result of this, it is possible that optimal type of instruction will be that which matches the individual learner’s preferred approach to learning.

It is probably beyond the abilities of most teachers to design lessons involving the kind of matching instruction employed in Wesche's (1981) study, which used language aptitude tests to identify different learning styles and then sought to match the kind of instruction provided to the learners' preferred approach to learning. However, teachers can cater to variation in the nature of their students' aptitude by adopting a flexible teaching approach involving a variety of learning activities. They can also make use of simple learner-training materials (e.g. Ellis and Sinclair, 1989) designed to make students more aware of their own approaches to learning and to develop awareness of alternative approaches. Good language learner studies (Joan Rubin, 1975 and Alice Omaggio, 1988) suggest that successful language learning requires a flexible approach to learning. Thus, increasing the range of learning strategies at learners' disposal is one way in which teachers can help them to learn. Similar alternatives are presented with the theory of Multiple Intelligences in Chapter 5.

III Chapter Three

3. FACTORS INVOLVED IN LEARNER-CENTRED INSTRUCTION

The present chapter reviews individual differences as factors involved in second or foreign language learning. It also intends to give a brief exposition of these differences, by enclosing a general classification, and the corresponding explanation of their role in the learning process.

The study of individual differences (ID's) is definitively relevant in L2 learning, especially in the area of learner-centred education. The findings that we may encounter in this area of research provide significant insights that are useful not also for language teachers or applied linguists, but also for learners, since they help us understand why learners vary in how quickly they learn and why most learners fail to achieve native-speaker competence.

Four basic questions that arise from ID's studies are as follows:

- In what ways do language learners differ?
- What effects do these differences have on learning outcomes?
- How do learner differences affect the process of L2 acquisition?
- How do individual learner factors interact with instruction in determining learning outcomes?

This chapter attempts to answer these questions in general.

Various researchers have classified individual differences. Table 1 (see Appendix for Chapter 3), for example, lists the main variables mentioned in three surveys. It demonstrates the importance attached to individual differences, and also the different ways to classify them.

The constructs in Table 1 (presented in Appendix for Chapter 3) are often vague and overlap in indeterminate ways which makes it difficult to synthesise the results of different studies, and even more difficult to arrive at a coherent overall picture.

Another problem, related to that of classifying learner variables, is the choice of terms for labelling each factor. Often there is no clear distinction drawn in the use of the terms.

Despite these problems, the study of ID's has attracted a lot of attention in second language acquisition research and has made considerable advances.

Due to the problems that have been recently mentioned above, no attempt will be made in the following pages to examine all the dimensions listed in Table 1. Rather, the chapter will attempt to define a number of central constructs by outlining a framework for examining ID's (Ellis, 1994).

3.1. Individual Learner Differences

3.1.1. Learner's beliefs about language learning

Language learners, especially adults, bring a variety of beliefs to the classroom, which we could call "mini theories" of L2 learning. There has been relatively little research into the nature of them and even less about how learner's beliefs affect language learning.

Wenden (1986, 87) grouped them into three general categories:

1. Use of the language: It includes beliefs relating to the importance of learning in a natural way, like practicing, trying to think in the L2 and living and studying in an environment where the L2 is spoken.

2. Learning about the language: Here, the emphasis is on learning grammar and vocabulary, enrolling in a language class, receiving feedback on errors, and being mentally active.

3. Importance of personal factors: It includes beliefs about the feelings that facilitate or inhibit learning, self-concept, and aptitude for learning.

Horwitz (1987) used a questionnaire to elicit the beliefs of thirty two intermediate level students of different ethnic backgrounds who were studying at an intensive university English program in the USA. Some of the pre-conceptions that the subjects had about language learning included restricted views about the nature of language learning, i.e. believing for instance that the best way to learn English is to spend most of their time memorising vocabulary and grammar rules, or to know more about the culture; the idea that people are born with a special aptitude for learning a FL; or the belief that some languages are more difficult than others.

3.1.2. Learner's Affective States

While students' beliefs about language learning tend to be stable, their affective states are quite the opposite. Learners, especially students in a classroom situation, react in different ways to the same situations. Apparently, they need to feel secure and free of stress in order to take a learning task properly.

Though learners' affective states are so individualistic and changeable in nature, they have gained importance in second language teaching. Several hypothesis have been made about their enormous influence on students' ability to concentrate on learning, and therefore, on the acquisition of a second language.

One component of learners' affective states is anxiety.

3.1.2.1. Anxiety

Anxiety can be defined as a diffused uncomfortable feeling of nervousness or worry about something caused by a certain threat to a value that the individual believes to be important.

According to Skehan (1989) there are two types of anxiety:

1. 'Trait anxiety' is characteristic of the learner's particular personality which affects all domains, and therefore will be present in all situations.

2. 'State anxiety' is the apprehension that is experienced at a particular moment in response to a particular situation.

3. The latter is our main concern, as it is the one that is normally present in the classroom.

A piece of research carried out by Horwitz and Young (1991 cited in Ellis 2003: 480) indicates that students generally experience what is referred to as 'language anxiety', a situation-specific anxiety linked to attempts to learn a second language and communicate in it.

Another study made by Bailey (1983 cited in Ellis 2003: 480) found that learners were likely to feel anxious when they compared themselves to other classmates and perceived less proficient in the language. On the contrary, their anxiety decreased when they found themselves more capable than their peers. She also mentions other possible sources of anxiety, such as tests, the relation a student has with the teacher, and when the student compares himself to his own personal standards or goals.

Nevertheless, there is evidence of cases in which anxiety influences the learner in a positive way. This is what is called 'facilitating anxiety' (as opposed to 'debilitating anxiety'). For example, Kleinmann (1978 cited in Ellis 2003: 481) investigated anxiety in Spanish- and Arabic-speaking learners of English. It was reported that they were less likely to avoid complex grammatical structures and that nervousness while using English helped them do better.

Mixed results, such as the ones mentioned above, could be due to the fact that the relationship between anxiety and performance is not simply a linear one, since many of the studies have been made under the assumption that learners with low anxiety will learn better (Scovel, 1978; cited in Skehan 1989: 115).

McIntyre and R. Gardner (1991, cited in Ellis 2003: 483) proposed a widely-accepted model (Table 2, see Appendix for Chapter 3) that accounts for the role of anxiety in language learning. In this model, anxiety is not regarded as a necessary condition of successful L2 learning, but rather as one of the factors that contributes with varying degrees in different learners. They state that the relationship between anxiety and learning is regulated by the learner's stage of development and by situation-specific learning

experiences. As Skehan (1989) recognises, the model shows that anxiety can be the cause as well as the result of it.

For instance, a student in a post-beginner stage will develop situation anxiety if his classmates have made fun of him in another opportunity, discouraging him to continue participating in class.

Based on these studies, we can say that there does seem to be a relationship between anxiety and learning, but it is a rather arguable one as most studies show different results. Moreover, additional variables such as age, aptitude, and others, may all affect this relationship.

Therefore, additional designs and studies are needed in order to separate the different effects of these potentially important variables.

3.1.3. Age

There is a widely-held lay belief that younger L2 learners generally do better than older learners. This is supported by the *Critical Period Hypothesis*, according to which there is a fixed span of years (the first ten years) during which language learning can take place naturally and effortlessly, and after which it is not possible to be completely successful. This is controversial, however. The controversy centres on both whether there are significant differences in L2 learning according to age, and also on the theoretical explanations for those differences which researchers claim to have found.

The age issue remains an important one for theory building in second language acquisition research, for educational policy making and for language pedagogy. It is also helpful to distinguish the effects of age according to learning contexts such as in naturalistic and instructed situations.

There is a large amount of research that has addressed the age issue. Not surprisingly, commentators have arrived at distinct conclusions, but despite this, some common ground is emerging:

1) Adult learners have an initial advantage where rate of learning is concerned, particularly in grammar. However, eventually they will be overtaken by child learners, who receive enough exposure to the L2. Obviously, this is less likely to happen within instructional contexts than in naturalistic settings, because the critical amount of exposure is usually not available in the former.

2) Only child learners are capable of acquiring a native accent in informal learning contexts. Land (1990) puts the critical age at 6 years, but Scovel (1981) argues that there is no evidence to support this, and argues for a pre-puberty start. On the other hand, Singleton (1989) points out that children will also acquire native-like accent if they receive massive exposure. However, some children who receive such exposure still do not achieve a native-like accent, possibly because they strive to maintain active use of their L1. Adult learners may be able to acquire a native accent with the assistance of phonetic instruction, but further research is needed to substantiate this claim.

3) Children may be more likely to acquire native grammatical competence. The critical period for grammar may be later than for pronunciation (around 15 years). Some adult learners, however, may succeed in acquiring native levels of grammatical accuracy in speech and writing and even full linguistic competence.

4) Irrespective of whether native-speaker proficiency is achieved, children are more likely to reach higher levels of attainment in both pronunciation and grammar than adults. A conclusion that might be drawn from all this is that the process of acquiring a L2 grammar is not substantially affected by age, but that of acquiring pronunciation may be.

These general conclusions provide substantial support for the existence of at least a sensitive period for the acquisition of L2. The distinction between a ‘critical’ and a ‘sensitive’ period rests on whether completely successful acquisition is deemed to be only possible within a given span of a learner's life, or whether acquisition is just easier within this period. The conclusions also led to the possibility that there may be multiple critical/sensitive periods for different aspects of language.

One of the major points of controversy is whether the differences between child and adult learners are to be explained as primarily the result of environmental factors or of changes in the mental and neurological mechanisms responsible for language learning.

An obvious possible reason could be the fact that adults experience more negotiation of meaning and therefore better input. Another obvious possibility is that adolescents and adults possess more fully developed cognitive skills, which enable them to apply themselves conscientiously to the task of learning an L2. This is likely to give them an initial advantage over children, but may not be sufficient to grammatical high levels of L2 proficiency. Most likely, the rate advantage enjoyed by adults is the result of a combination of factors.

3.1.4. Language Aptitude

The concept of language aptitude is often seen as a monolithic construct. However, in educational terms it is more fruitful to consider its multicomponent basis, since this provides a framework for the study of learner strengths and weaknesses. Such view of aptitude was proposed by Carroll in 1965, a conception that was derived from The Modern Languages Aptitude Test, also known as MLAT (Carroll and Sapon 1959, 1960) which has proven to be the most effective way of finding out about language aptitude. The MLAT measured some abilities like:

- The ability to mimic sounds and stretches of sounds (length and accuracy)
- Oral production speech style
- Rote-memory factor and fluency factor
- Phonetic discrimination
- Work sample tests of language learning
- Phonemic accuracy under conditions of distraction
- Ability to imitate foreign accents
- Foreign language orthography's flexibility
- Ability to develop meanings inductively

These aspects of aptitude were later on summarised into four main components:

1) *Phonemic Coding Ability*: It is the ability to make a link between sound and symbol (sound symbol association ability) and the capacity to discriminate and code foreign sounds in such a way that they could be recalled later. Merely associating sound and symbol is not enough; more important are the ability to impose some sort of analysis on the familiar foreign sounds and also the ability to transform the sound into a form much easier to storage. Carroll speculated that what is involved in this ability is mainly the capacity to spell and handle phonetic-orthographic material.

2) *Grammatical Sensitivity*: The ability to recognise the grammatical functions that words fulfil in sentences. There is little evidence that grammatical sensitivity is an artefact of the way languages are taught.

3) *Inductive Language Learning Ability*: It is the ability to examine language material and from this to notice and identify patterns of correspondence and relationships involving either meaning or syntactic form, i.e., the ability to infer general aspects of the language from limited particular evidence. Although this ability is close to that of grammatical sensitivity, inductive language learning ability is more connected with reasoning and extrapolating.

4) *Memory and Learning*: According to Carroll (1981), the memory used for learning languages is mainly associative, since it involves the bonding or "stamping in" of connections between native language and target language words. He also claims that people vary in the efficiency with which they make such bonds and therefore in speed of vocabulary growth, and consequently in foreign language achievement.

Later on, Skehan (1989) claimed that taken these components into consideration it is possible to deduce the logically possible learners. Table 3 (see Appendix for Chapter 3) shows eight different learner types. Here, both the constructs of inductive language learning ability and grammatical sensitivity have been collapsed into one factor, that of language analytic sensitivity.

3.1.4.1. Language aptitude: a relevant factor in L2 learning?

The general claim that language aptitude is a relevant factor in second or foreign language learning entails other assumptions concerning the role of aptitude in the learning process.

Aptitude is separate from achievement

Carroll (1981) argues that they are conceptually different and also that they can be distinguished empirically by demonstrating that there is no relationship between measures of aptitude and of proficiency at the beginning of a language program, but that there is a relationship at the end of the program.

Aptitude must be shown to be separate from motivation

Pimsleur (1966) treats motivation as an integral part of aptitude. Carroll argues that research by Lambert and R. Gardner (1990) has consistently shown that aptitude and motivation are separate factors.

Aptitude must be seen as a stable factor, perhaps even innate

In support to this claim, Carroll refers to studies which show that learner's aptitude is difficult to alter through training.

Aptitude is to be viewed not as a prerequisite for L2 learning

All learners, irrespective of their aptitude, may achieve a reasonable level of proficiency. However, aptitude is a capacity that enhances the rate and ease of learning. Aptitude tests, therefore, are meant to provide a prediction of rate of learning.

Aptitude must be found to be distinct from general intelligence (IQ)

Research by Lambert and R. Gardner (ibid.) shows that aptitude and intelligence measurements are not related.

Aptitude research has adopted a concatenative approach, i.e. trying to find correlations between the different findings. As a result, measures of Language Aptitude are correlated with measures of language proficiency and achievement. The main aim of the research has been to establish to what extent it is possible to predict learning outcomes. A secondary aim

has been to identify which specific aspects of aptitude individual learners are strongest in, so that matching forms of instruction can be provided. A general assumption of the research is that aptitude will only have an effect on learning outcomes if the learners are sufficiently motivated to learn. (i.e. make the effort to use their intrinsic capacities).

Research into language aptitude was popular in the 1960's and 1970's. Now, with studies on brain based learning and with the help of technology we can have a different view, as we will see in Chapters 4 and 5. One reason for this is undoubtedly the strong link that existed between the models of aptitude developed during that time and the prevailing views of language (structuralist), language learning (behaviourist) and language teaching (audiolingual). As these methods or systems became obsolete, or challenged, so interest in aptitude declined.

Despite the early research had limitations, since it was restricted only to learners in formal learning contexts, it provided convincing evidence that classroom learners' language aptitude has a major effect on their L2 learning. Research makes clear that in the long run aptitude is probably the single best predictor of achievement in a second language.

3.1.5. Language Learning Styles

Language Learning Styles are usually associated with personality traits. Personality traits are the individual characteristics of a person, and the willingness to think or act in a similar way in response to different stimuli and situations.

However, Professor Joy M. Reid's definition of language learning styles is the most influential and widely accepted. Besides, her classification of styles into visual, auditory, kinaesthetic, tactile, group, and individual coincides, to a certain extent, with H. Gardner's classification of intelligences. However, Gardner, as we will see later on (see Chapter 5), disagrees with this.

According to Joy Reid (1987, cited in Peacock 2001), language learning styles are "variations among learners in using one or more senses to understand, organise, and retain experience", they are "natural, habitual, and preferred way(s) of absorbing processing, and retaining new information and skills".

The concept of 'learning style' implies individual differences, since a learning style is a "pervasive quality in the learning strategies or the learning behaviour of an individual" (ibid.). Learning styles differ from person to person and also from culture to culture since people learn how to learn through the socialisation processes that take place in families and groups of friends.

While learning strategies refer to the methods a learner employs in order to master the material, learning styles refer to "stable and pervasive characteristics of an individual, expressed through the interaction of one's behaviours and personality as one approaches a learning task" (Garger and Guild, 1984; cited in Peacock 2001).

Broadly speaking we can define learning styles as follows:

Visual Learners

This type of student learns through seeing. For them the teacher's body language and facial expressions are very useful when trying to understand the content of a given lesson. They usually sit at the front of the classroom in order to avoid visual obstructions. In the same way, they prefer to take detailed notes to better comprehend the information. They tend to think in pictures and learn best from visual displays such as diagrams, hand-outs, illustrated text books, videos, etc.

Auditory Learners

This group learns through listening. They interpret the underlying meanings of speech by listening to tone of voice, pitch, speed, etc. Therefore, they best learn through listening to verbal lectures, discussions, talking things through or listening to what others have to say about them. Reading texts aloud or using tape recorders can be excellent strategies for these learners.

Kinaesthetic Learners

This type of learner prefers active participation and experiences. They learn by doing things. Consequently, some strategies these students can use are drama, role-play, or simply moving around.

Tactile Learners

These learners prefer what is known as ‘hands-on work’. They learn by handling materials, making things with their hands or taking notes. Class projects, making collages, or artwork in general are excellent learning tools for this type of learners.

Group Learners

These learners prefer studying with others as group interaction helps them to understand the contents of the class more easily and effectively.

Individual Learners

As it can be assumed, this style is present in learners who prefer studying alone. Self-directed study or independent reading and study are more effective strategies for this type of learners.

Reid (1987, 1995), produced two major hypotheses which form the background to ideas and work in the area.

1. All students have their own learning styles and learning strengths and weaknesses.

2. A mismatch between teaching and learning styles causes learning failure, frustration, and de-motivation.

Unfortunately, mismatches frequently occur and have bad effects on the learning and attitudes of the students to the class and to the language they are learning. For example, if learners prefer individual work, but the teacher prefers group activities we would be facing a mismatch between teaching and learning styles which will make the learning process more difficult and less friendly.

If learning and teaching styles are matched, learning, behaviour, attitudes and motivation will be improved. All learners will have an equal chance in the classroom and a new gained self-awareness. Students will be likely to work harder either inside or outside their classrooms and they will take better advantage of their classes. All of these factors promote

more efficient second language acquisition, since students will trust their teachers and will have a more positive attitude to the language they are studying.

3.1.6. Motivation

Motivation is commonly defined as the drive that makes us accomplish what we want, whether that influence is a particular goal, incentive, or even our own nature. It concerns the determinants of intent, effort and tenacity, factors that push or pull us as individuals to behave in a particular manner.

The concept has been studied in depth in second language acquisition research as well as in second language teaching and learning, since the importance of motivation when learning a foreign language has been widely acknowledged.

According to Robert Gardner's socio-educational model (1985), it is useful to label motivation in terms of the learner's overall goal or orientation. 'Instrumental' motivation occurs when the learner's goal is functional, i.e. when the learner recognises the practical values and the advantages of learning the language e.g. to get a job or pass an examination. 'Integrative' motivation occurs when the learner wishes to identify with the culture of the L2 group. Much of the research conducted by R. Gardner and his co-researchers suggested that integratively motivated students are more successful language learners than those who are instrumentally motivated.

It is also helpful to define the concept in terms of the source of the incentive. The model proposed by Deci and Ryan (1985, cited in Ehrman et al. 2003: 320) distinguishes between 'intrinsic' and 'extrinsic' motivations. While the first one comes from within the individual and is related to the individual's identity and sense of well-being, extrinsic motivation comes from outside the individual when learning is done for the sake of rewards (such as grades or praise). Contrastively, for students who are intrinsically motivated, the reward is the enjoyment of the activity itself or a feeling of accomplishment in doing the task.

Hence, it is difficult to determine whether motivation is the cause or the result of success in L2 learning or both. The 'resultative hypothesis' proposed by Hermann (1980, cited in Ellis 2003: 515) claims that learners who do well are more likely to develop motivational

intensity and to be active in the classroom i.e. high level of motivation stimulates learning. Thus, perceived success in achieving L2 proficiency can help to maintain existing motivation. Conversely, a vicious circle can be created as low motivation can lead to low achievement and further lower motivation.

Motivation in L2 learning constitutes one of the most fully researched areas of individual differences, yet it has been difficult to establish methods to measure it and studies have focused mainly on the integrative and instrumental types. Furthermore, there are a number of other affective factors besides motivation which are in some way related to it, including anxiety, self-esteem and internal attitudes, and others, showing that motivation is a very complex-compound factor in learning.

3.1.7. Personality

A survey conducted by Griffiths (1991, cited in Ellis 2003: 517) of ninety-eight teachers of ESL/EFL in England, Japan and Oman, showed a mean rating of 4 (on a 5 point scale) for personality as a factor to be considered for success or failure in language learning.

However, the main problem is that there is often no theoretical basis for predicting which aspects of personality will be positively or negatively related to which aspects of L2 proficiency.

The study of personality, nonetheless, does hold a considerable promise, as it is shown in the following discussion of some studies that have examined extroversion and introversion.

3.1.7.1. Extroversion v/s Introversion

According to Eysenk (1965, cited in Skehan 1989: 100), extroversion consists of two components that go together: sociability, which is characterised by gregariousness, people-orientation, fear of isolation, etc.; and impulsivity, that is related to the need of excitement and change.

Extroverts, then, are “sociable, [they] like parties, have many friends and need excitement; they are sensation seekers and risk takers; like practical jokes and are lively and active.

Conversely, introverts are quiet, prefer reading to meeting people, have few but close friends and usually avoid excitement" (Eysenk and Chan 1982, cited in Ellis 2003: 520).

Many investigators (e.g. Naiman et.al., 1978) have suggested that extroverted students are more likely to maximise language-use opportunities and therefore, the foreign language will be best accomplished since learning a language involves the actual use of it.

Nonetheless, there are aspects of learning that go beyond learning by doing and talking to learn. In this respect, the analytic capacities supported by aptitude studies and the use of strategies e.g.: planning and monitoring, would seem to relate more easily to the introvert individual.

If this is the case, we may need to accept that both extroversion and introversion have their positive and negative features, which are likely to work in favour of or against some aspects of target-language development.

It seems that there is a value in having rather variable personality quality so that one can adapt effectively to meet different learning demands.

3.2. Language Learning Strategies

Research into language learning strategies began in the 60's, and it seems that the main concern has been related to the identification of what good language learners say they do in order to learn a second or foreign language. In some cases, they are observed during these processes. In 1966, Aaron Carton (cited in Hismanoglu 2000) published his study called 'The Method of Inference in Foreign Language Study', which was the first attempt to study learner strategies. After that, in 1971, Rubin (cited in Hismanoglu 2000) began doing research with a primary focus on the strategies of successful learners and stated that these, once identified, could be made available to help less successful learners.

3.2.1. Learning Strategies

The word 'strategy' comes from the ancient Greek term '*strategia'* that means 'the art of the war'. In non-military settings, this concept has been applied to different situations

where it has come to mean a plan, step, or conscious action towards achievement of an objective.

According to Rebecca Oxford (1990), learning strategies are "operations employed by the learner to aid the acquisition, storage, retrieval, and use of information." In fact, she defines them as "specific actions taken by learners to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations". While Richards and Platt (1992, cited in Hismanoglu 2000) define learning strategies as "intentional behaviour and thoughts used by learners during learning so as to better help them understand, learn, or remember new information", Stern (1992, cited in Hismanoglu 2000) states that, "the concept of learning strategy is dependent on the assumption that learners consciously engage in activities to achieve certain goals", consequently, "learning strategies can be considered as intentional directions and/or learning techniques."

All language learners use learning strategies either consciously or unconsciously when they process new information or perform different tasks in the language classroom. Actually, the language classroom is a problem solving environment where language learners face new input and difficult tasks given by their instructors. Thus, learners use language learning strategies to do what is required in the quickest and easiest way.

Language learning strategies help learners to participate in communication and encourage them to develop communicative competence. They encourage general self-direction for learners and are tools which are used because there is a problem to solve, a task to accomplish, an objective to meet, or a goal to attain.

3.2.1.1. Classifications of Language Learning Strategies (Rebecca Oxford, 1990)

It is important for us to highlight that language learning strategies are not restricted to cognitive functions, such as mental processing and manipulation of the new language. They also include metacognitive functions like planning, evaluating, and arranging one's own learning; as well as one's emotional, affective, and social functions. Some of the first ones – known as 'direct strategies'- involve direct learning and the use of the subject matter, in this case a new language. Other strategies such as metacognitive, affective, and social

strategies – known as ‘indirect strategies’- contribute indirectly but powerfully to learning. All of them are equally important and support each other.

It is also worth mentioning that learning strategies are easy to teach and modify. They are flexible, hence, they are not always found in predictable sequences or in precise patterns. However, they can sometimes be combined in a conventional way.

There are many factors which may affect an individual’s particular choice of strategies, such as degree of awareness, stage of learning, task requirements, teacher expectations, age, sex, nationality/ethnicity, general ‘learning style’ -which we have already analysed- personality traits, motivation level, and purpose for learning the language.

3.2.1.1.1. Direct and Indirect Strategies

Direct and indirect strategies are subdivided into three groups:

a) Direct strategies (see Figure 1, in Appendix for Chapter 3)

Direct strategies are language learning strategies that directly involve the target language. They are divided into ‘memory’, ‘cognitive’, and ‘compensation strategies’. All of these require mental processing of the language, but each group performs this processing differently and for different purposes.

Memory Strategies

Sometimes called mnemonics, help learners to store and retrieve new information. They reflect simple principles, such as arranging things in order, making associations, and reviewing. Since all of these principles involve meaning, the arrangement and associations must be personally relevant to the learner, and the material to be reviewed must have significance.

Briefly, memory strategies are subdivided into:

1. The Creation of Mental Linkages, which are subdivided into three strategies that language learners usually use: grouping, associating or elaborating, and placing new words into a context.

2. The Application of images and sounds, where the individual makes use of imagery, semantic mapping, keywords, and the representation of sounds in memory (more information about this in Chapter 4).

3. Reviewing well, which includes structured reviewing.

4. Employing action are those strategies where students make use of a physical response or sensation, and mechanical techniques.

Cognitive Strategies

The term 'cognition' refers to all the mental processes that are used to obtain knowledge or to become aware of the environment. According to Piaget (cited in Boeree 1999), cognitive development consists of a constant effort to adapt to the environment in terms of assimilation and accommodation, since cognitive structures change through these processes. 'Assimilation' involves the interpretation of events in terms of existing cognitive structure, whereas 'accommodation' refers to changing the cognitive structure to make sense of the environment.

We can infer from this that cognitive strategies are mental devices learners use to make sense of their learning. They are considered to be the most popular strategies among language learners and enable them to understand and produce new language by many different means. These strategies range from repeating to analysing expressions and then to summarising. However, their common function is the manipulation or transformation of the target language.

The use of Cognitive Strategies, briefly, is divided into:

1. Practising, which is subdivided into repeating, formally practicing with sounds and writing systems, recognising and using formulas and patterns, recombining, and practicing naturalistically.

2. Receiving and sending messages, also subdivided into getting the idea quickly, and using resources for receiving and sending messages.

3. Analysing and reasoning, where we find reasoning deductively, analysing expressions, analysing contrastively, translating, and transferring.

4. The creation of structure for input and output, which is subdivided into taking notes, summarising, and highlighting.

Compensation Strategies

These strategies enable learners to use the new language for either comprehension or production despite limitations in knowledge. They are intended to make up for an inadequate stock of grammar and, especially, of vocabulary, and to help learners to overcome knowledge gaps to continue the communication. Compensation occurs both in understanding the new language and in producing it.

R. Oxford subdivides Compensation Strategies into:

1. Guessing intelligently, where she includes the use of linguistic clues, and other clues.

2. Overcoming limitations in speaking and writing, which are subdivided into switching to the mother tongue, getting help, using mime or gesture, avoiding communication partially or totally, selecting the topic, adjusting or approximating the message, coining words, and using circumlocution or synonyms.

b) Indirect strategies (see Figure 2, in Appendix for Chapter 3)

Indirect Strategies support and manage language learning without necessarily involving the target language directly. They are divided into metacognitive, affective, and social strategies. They are useful in almost all language learning situations and are applicable to all four language skills.

Metacognitive Strategies

‘Metacognition’ refers to a higher order thinking which involves active control over the cognitive processes engaged in learning. In Flavell’s (1979) words: “Metacognition refers to one's knowledge concerning one's own cognitive processes or anything related to them”.

In other words, metacognition is related to the capacity of recognising our own processes of learning and understanding together with the ability we possess to consciously reflect and act on that knowledge of cognition to modify those processes.

Flavell distinguishes metacognitive knowledge and metacognitive experiences or regulation:

'Metacognitive knowledge' is acquired knowledge about cognitive processes; knowledge that can be used to control cognitive processes. On the other hand, 'metacognitive experiences or regulation' is the process through which we make use of metacognitive strategies or metacognitive regulation. 'Metacognitive strategies' are sequential processes that one uses to control cognitive activities, and to ensure that a cognitive goal (e.g., understanding a text) has been met. These processes help to regulate and oversee learning and consist of planning and monitoring cognitive activities, as well as checking the outcomes of those activities.

Metacognitive strategies are essential for successful language learning, and they include functions such as centring, arranging, planning, and evaluating.

R. Oxford subdivides Metacognitive Strategies into:

1. Centring your learning, where she includes strategies such as overviewing and linking with already known material, paying attention, and delaying speech production to focus on listening.

2. Arranging and planning your learning, where students are finding out about language learning, organising, setting goals and objectives, identifying the purpose of a language task, planning for a language task, and seeking practice opportunities.

3. Evaluating your learning. This last category, presumably for advanced learners, includes self-monitoring, and self-evaluating, issues that Bloom et al. had identified as crucial for learning in the mid 50's.

Affective Strategies

The affective side of the learner is probably one of the biggest influences on language learning success or failure. Negative feelings can inhibit progress, while positive emotions and attitudes can make language learning much more effective and enjoyable. Hence, they help to regulate emotions, motivations, and attitudes.

According to R. Oxford, Affective Strategies are subdivided into:

1. Lowering your anxiety, where we can find the use of progressive relaxation, deep breathing, meditation, the use of music, and the use of laughter.

2. Encouraging yourself, which includes strategies such as making positive statements, taking risks wisely, and rewarding yourself.

3. Taking your emotional temperature, the strategies probably used by highly emotional individuals, involve listening to your body, the use of a checklist, writing a language learning diary, and discussing your feelings with someone else.

Social Strategies

Language is a form of social behaviour; it is communication, and communication occurs between and among people. Learning a language involves other people, and appropriate social strategies are very important in this process. These strategies help students learn through interaction with others.

Social Strategies are subdivided by R. Oxford into:

1. Asking questions, which include questions to ask for clarification or verification, and to ask for correction.

2. Cooperating with others, is also subdivided into cooperating with peers, and cooperating with proficient users of the new language.

3. Empathising with others, is a higher strategy generally used by adult learners where we find developing cultural understanding, and becoming aware of others' thoughts and feelings.

3.3. Two Examples of Learner-Centred Teaching Methods

3.3.1. Suggestopedia

Suggestopedia is a humanistic method designed by the Bulgarian psychiatrist- educator Georgi Lozanov in 1979 and one of the first methods to consider the inner mood of learners as well as the physiological aspects involved while learning.

The term Suggestopedia comes from the Latin *suggero, suggessi, suggestum* which means "causing to come to the mind" and from *paedy, pedia* that means "child" a term also related to pedagogy and teaching (Lozanov, 1978).

It is concerned with a holistic view of the human being, that is to say, human is viewed as a complete unit, as a whole. Lozanov states that global and analytic approaches need to be taught simultaneously in order to activate both analytic and synthetic processes, imaginative thinking and logical abstraction.

'Suggestopedia' is a dynamic and innovative teaching method that redefines the speed and depth at which learning is possible, and believes that the more satisfying and enjoyable an experience is, the more thoroughly remembered it will be. It is claimed that memorisation in learning by the suggestopedic method seems to be accelerated twenty-five times over that one in traditional methods, what is called *Hypermnesia* or *Supermemory*.

Its specific set of learning recommendations derive from 'Suggestology', which Lozanov describes as "a science concerned with the systematic study of the non-rational or non-conscious influences that human beings are constantly responding to" (ibid.).

He believes that the reason why we are sometimes inefficient in learning is because we set up some psychological barriers such as fear of being unable to perform or the idea that we will fail, limitations that need to be "desuggested".

Hence, suggestion is considered the cornerstone of Suggestopedia. It begins with *de-suggestion* of ideas like "learning is hard or stressful" or that "only so much can be absorbed at a time".

Lozanov's ideal instructional environment continues to support a teacher-whole class relationship. Hence, especial decoration, furniture and arrangement of the classroom, the use of music, and the authoritative behaviour of the teacher. He does not specifically address individuals' sociological preferences for learning alone, in pairs or in small groups.

Historical Sources

Lozanov acknowledges ties in tradition to raja-yoga and Soviet psychology. From the former he has borrowed and modified techniques for altering states of consciousness and concentration, and the use of rhythmic breathing. From the latter, Lozanov has taken the notion that all students can be taught a given subject matter at the same level of skill and the importance of the learning environment.

Suggestopedia can perhaps be best understood under the range of a number of theories that describe how attentiveness is worked to optimise learning and recall.

As you can see in Figure 3 (see Appendix for Chapter 3), where the point at the far left represents studies of sleep learning, and the point at the far right represents studies on the efficiency of cramming, Lozanov believes that most learning takes place in a relaxed but focus stage. He suggests the name ‘aware–alert state’ which will lead to “superlearning”.

Georgi Lozanov perceived that traditional instruction tends to address only to the cortical structures of the left hemisphere and ignores human beings' emotionality and subconscious participation while involved in learning.

His use of Baroque music comes from psychological therapy and brain studies which stimulate the Alpha and Beta waves of the brain essentials in the liberation of incompatible ideas about the limits of human capacities. Music is used to relax, energise and bring order through pace as linguistic material is presented. Lozanov believes that this system produces a pleasurable, natural-learning process by means of classical music, art, role-playing and games.

Objectives of the method

Suggestopedia aims to deliver advanced conversational proficiency quickly. According to Lozanov, the main aim of teaching is not memorisation, but the understanding and the creation of imaginative solutions to problems. However, since students and teachers place a high value on vocabulary recall, memorisation of vocabulary pairs continues to be important in the method.

Originally designed for adults for therapeutic purposes, it has been adapted for use in business, sales, education, health, sports and performing arts for the purpose of improving personal excellence and building relationships with others.

The Syllabus

The course lasts thirty days and it is composed of ten units. Classes are held four hours a day, six days a week for groups of twelve learners, ideally socially homogeneous.

The unit study is organised around three days. The central focus of each unit is a dialogue consisting of 1,200 words approximately. Besides the students receive a vocabulary list and grammatical commentary. On the first day of work students are given a new name and personal history within the target culture. Then the material is presented. The dialogue is read three times, each one in a special way. The students first look at the new text and discuss it with the teacher. In the second reading, students relax comfortably in reclining chairs, just listening this time. The material should be presented with varying intonations. During the third reading the material is acted out in a dramatic manner over a background of Baroque music. The second and third days are spent in primary elaboration, consisting of imitation, question and answer, reading, etc. and secondary elaboration of the text, which involves encouraging students to make new combinations and productions based on the dialogues.

In the middle of the course students are asked to practice the target language in a setting where it might be used. The last day of the course is devoted to a performance in which every student participates.

There are some rules learners are expected to follow. For instance, students should not smoke or drink in class or around the school during the course. Learners must immerse

themselves in the procedures of the method. They must not try to figure out, manipulate or study the material presented, but maintain a pseudo-passive state in which the material roles over and through them. Students are expected to tolerate and in fact encourage their own "infantilisation". They have to give themselves over to the activities and techniques designed.

The teacher has also defined roles to perform. He must show absolute confidence in the method, display exemplary conduct in manners and dress, organise properly and strictly observe the initial stages of the teaching process, maintain a solemn attitude toward the session, stress global rather than analytical attitudes toward material and maintain a modest enthusiasm among other things.

The role of instructional materials is also very important. They are primarily text and tape, and indirect support materials, including classroom fixtures and music. Peripheral learning can encourage students to apply language more independently. The text book should have emotional force, literary quality and interesting characters.

The environment comprises a bright and cheery classroom, reclining chairs arranged in a circle, plus the music, all help to induce a relaxed attitude, referred to as concert pseudo-passiveness.

Theory of Learning

The learning process is based on 'desuggestion', which involves unloading the memory banks; and 'suggestion', which involves loading the memory banks with desired and facilitating memories.

There are six principal components through which desuggestion and suggestion operate and that set up access to reserves. These are described following Bancroft (1972).

First comes the principle of a*uthority*. People remember best and are most influenced by information coming from an authoritative source. Teachers are cautioned to maintain prestige -- understood as a readiness to share understandings with students (Lozanov, 1978).

Then, *infantilisation*: The teacher-student relationship should be similar to that of parent-child. “In the child’s role the learner takes part in role playing, games, songs, and gymnastic exercises that help the older student regain self-confidence, spontaneity and receptivity of the child” (Bancroff, 1972: 19, cited in Richards and Rogers, 1986).

Thirdly, ‘*Double –Planedness’*: Learning involves the unconscious as well as the conscious functions of the learner. The student learns not only from the effect of direct instruction but from the environment in which the instructions take place. The bright decoration of the classroom, the musical background, the shape of the chairs, and the personality of the teacher are considered as important as the form of the instructional material itself (Richards and Rogers, 1986). Paraconscious aspects of suggestion include teachers' voice tone, gestures, positive feedback, etc.

Finally, *Intonation, Rhythm and Concert Pseudo-Passiveness*: Variation in the tone and rhythm of presented material helps both to avoid boredom through monotony of repetition.

Theory of Language

Suggestopedia does not adopt any theory of language. Language is represented by its vocabulary and the grammar rules for organising vocabulary. Emphasis is laid on memorisation of vocabulary pairs since lexis is central and lexical translation rather than contextualisation is stressed. Home study of recordings is recommended, always including emotional content that is motivational. Dialogues are recommended to be read once before going to bed and immediately after awakening.

Research results show that through Suggestopedia there is higher achievement on average, coverage of large amounts of content, time saving and positive influence on affective variables, better attitude towards learning, higher self-concept, and improved behaviour.

Individual Differences within this model

As it was explained in the first paragraph on Suggestopedia, we chose this method as one of our examples depicting the learned-centred paradigm because of the various individual differences it takes into account. One of the main strengths that Suggestopedia has is the

fact that it considers learner's affective states. One of its main concerns refers to *state anxiety*, as the one that is normally present in the classroom. Lozanov (1978) claims that one important way to facilitate the learning process is to reduce their nervousness and anxious tension. The suggestopedic method responds to this emotional aspect through the use of relaxation exercises and the use of music which besides other functions helps students to reach the pseudo-relaxed stage. Avoiding state anxiety in the beginner state (see Table 2 in Appendix for Chapter 3), anxiety should not appear in subsequent stages. The atmosphere of happiness and quietness that Suggestopedia offers is indispensable for better learning to take place.

Regarding motivation, Lozanov (1978) believes that the more satisfying and enjoyable an experience is, the more thoroughly remembered it will be. This relates especially to the fact that *intrinsic motivation* (when students are motivated by the experience of learning) is one of the decisive factors in successful learning processes. Furthermore, positive feedback helps students regain self-esteem and confidence. Thus, suggestopedic instruction can be expected to have positive motivational effects.

Another individual difference that Suggestopedia takes into consideration is Language Aptitude. G*rammatical sensitivity* is promoted mainly through dialogues presented in the native and the target language; *inductive language learning ability* mainly through the component of double-planedness, and *memory and learning* through lists of words. The concept of 'hypermnesia', i.e. memorisation in learning by the suggestopedic method, seems to be accelerated twenty-five times over that one in traditional methods.

Lozanov believes that the reason why we are sometimes inefficient in learning is because we set up some psychological barriers such as fear of being unable to perform or the idea that we will fail, these learner's beliefs, thus, need to be "desuggested".

3.3.2. Mastery Learning

Background

When in 1963 John B. Carroll argued for the idea that student aptitudes are reflective of an individual's learning rate, he made a fundamental change in thinking about the

characteristics of instruction. In this new paradigm, Carroll suggested that instruction should focus more on the time required for different students to learn the same material. His predicament clashed with the classic model in which all students are given the same amount of time to learn, and the focus is on differences in ability. Carroll's new theory was based on the idea that all learners can have the potential to learn any instruction given, but that it would take them different amounts of time to do so.

Actually, Carroll, in his Model of School Learning (1963) identified two factors that affected the learning rate of a student: ‘perseverance of the student’, and the ‘opportunity to learn’. The first is controlled by the student, that is, how much time he will spend on learning, the latter is the time allowed to learn in the classroom, or by access to materials, or other factors.

The main ideas and proposals of this model are discussed in the following section. However, it was Benjamin Bloom (1968), who fully developed the concepts now known as Mastery Learning. In the 1960's, Bloom was involved in research on individual differences as applied to learning. Impressed with Carroll's ideas, he took them further by concluding that given sufficient time and quality of instruction, nearly all students could learn.

The theories of Mastery Learning resulted in a radical shift in responsibility for teachers; the blame for a student's failure rests within the instruction, and not on a lack of ability from the part of the student. In this type of learning environment, the challenge becomes providing enough time and employing specific instructional strategies so that all students can achieve the same level of learning.

The Model of School Learning

J. B. Carroll’s model is the basis for Mastery Learning. It stemmed from his earlier work in foreign language. Here he had found that a student's aptitude for a language predicted not only the level, but also the amount of time he required to learn to a given level, rather than viewing aptitude as indexing the level to which a student could learn.

The model basically proposes that if each student was allowed the time he needed to learn to a certain level and he spent the required learning time, then he could be expected to attain the level. This means that aptitude is defined as follows:

aptitude = time needed to learn

Conversely, if the student was not allowed enough time, then the degree to which he could be expected to learn was a function of the ratio time spent and time needed, as it is illustrated in the formula:

degree of learning = f (time actually spent / time needed)

Under typical school learning conditions, the time spent and the time needed were functions of certain characteristics of the individuals and their instructions (variables which interacted to influence school learning success). These variables are illustrated in Table 4 (see Appendix for Chapter 3).

The Variables for Mastery Learning Strategies

Benjamin Bloom (1971) specifically redefined the variables that Carroll described in his model of school learning, for Mastery Learning purposes and objectives, as follows:

Aptitude

It is defined as the amount of time required by the learner to attain mastery of a learning task. Implicit in this view is the assumption that all students can conceivable attain mastery of any learning task, given enough time. If this is correct, then learning mastery is theoretically available to all if only teachers can find methods for helping each student. Then, the central task of educational programs should be to produce positive changes in students' basic aptitudes, and help them to learn. However, the key problem for Mastery Learning strategies is to help students learn a subject to mastery whether or not changes are made in the aptitudes which are predictive of such learning.

Quality of Instruction

For Mastery Learning purposes, quality of instruction should be understood as the degree to which the presentation, explanation, and ordering of elements of the learning task approach the optimum for a given learner.

Schools have usually assumed that there should be a standard classroom situation for all students, typically consisting of group-based instruction with a ratio of one teacher to about thirty students. All teachers are expected to teach a given subject in much the same way using the same text. Consequently, in this type of instructional environments, quality of instruction is defined in terms of group results. Bloom's view is quite the opposite in this respect. He asserts that teachers may start with the very different assumption that individual students may need very different types and quality of instruction to learn the same content and instructional objectives to mastery levels. Quality of instruction then must be developed with respect to the needs and characteristics of individual learners rather than groups of learning.

Ability to understand instruction

This concept refers to the ability of the learner to understand the nature of the task he is to learn and the procedures he is to follow in its learning.

Ability to understand instruction is determined by verbal ability and reading comprehension, both related to the concept of linguistic intelligence, which is explained in the next chapter. This suggests that verbal ability determines some general capacity to learn from teachers and materials.

The greatest immediate payoff in dealing with the ability to understand instruction is likely to result from modifications in the instruction to meet individual student needs. Teachers should have a variety of resources available, among which there should be different instructional strategies and aids they could use to fit their instruction to the differing needs of all their students. Some examples of such alternatives are small-group study sessions, tutorial help, alternative textbooks, workbooks, audiovisual methods, games, and the like.

Perseverance

Perseverance can be defined as the time the learner is willing to spend in learning.

Students vary in the amount of perseverance brought to a specific learning task. Besides, students' perseverance can be enhanced by increasing the frequency of a reward and the evidence of learning success. Furthermore, in Mastery Learning there seems to be little reason to make learning so difficult that only a small proportion of students can persevere to mastery.

Opportunity to learn

A student's opportunity to learn is the time allowed to learn a specific learning task.

Assuming that aptitude determines the rate of learning, most students can achieve mastery if they are allowed and do spend the necessary amount of time on a learning task. Therefore, an effective mastery learning strategy must find ways of altering the time needed to learn as well as providing the time necessary for each student.

Figure 4 (see Appendix for Chapter 3) summarises the way in which the variables of the model interact in the process of learning a specific learning task.

Where the degree to which a student can learn is the result of the combination of these variables. It is crucial then, that Mastery Learning teachers are aware of this in order to control the learning situations according to specific objectives.

Summing up

Mastery Learning is a group-based teacher-paced instructional approach. The assumption is that given enough time and good instruction, almost all students will be able to master what they are asked to learn. Therefore, its focus is not on the content, but on the process to master it.

Normally, teachers expect about ten percent of their students to receive the highest grades and are quite prepared to fail an equal proportion of them. Thus, student's failure is frequently determined by their ranked position within the class rather than their inability to grasp the central ideas of the subject matter. The main proposal of Mastery Learning is

basically that this normal curve is not sacred. Furthermore, it assures that around ninety-five percent of the students can learn a subject. Figure 5 (see Appendix for Chapter 3) shows the distribution of school achievement in both types of instruction (according to the grading system in Chile)

Mastery Learning is ideal for sequential subjects where prior knowledge is necessary to progress like foreign language learning, but it is also adaptable to episodic subjects like history. In other words, the goal of Mastery Learning approaches is to have all students learn instructional material at roughly equivalent, high levels. It is evident that this type of learning works best with the traditional content-focused curriculum, i.e. based on well-defined learning objectives organised into smaller, sequentially organised units.

The teaching strategies capture many of the elements of successful tutoring and the independent functionality seen in successful top-ten students. In a Mastery Learning environment, the teacher directs a variety of group-based instructional techniques using co-operative learning schemes. However, some strategies require students to work independently, rather than with classmates. Typical strategies used are modelling, practice, re-teaching, and reinforcement. The instructional material may involve the usual workbooks, text-books, or lectures, but these should be supplemented individually or by small-group tutorial discussions.

Individual Differences within this model

We believe that Mastery Learning is mainly concerned with dealing with the specific problems that may arise due to learners' differences in aptitude. Its methodology and procedure are directed to this particular objective, based on the assumption that aptitude does not necessarily have a correlation with achievement, as it was stated above.

Another individual difference that is taken into account is motivation, which is related to the variable of perseverance. The curriculum is also designed to motivate learners to spend extra time on improving their performance.

Concerning individual differences, the claim seems to be that they should not play a role in student's learning. Therefore, neither teaching standards nor criteria should reflect such

differences. Furthermore, Mastery Learning supporters argue that it is possible that for many years individual differences have been used as a scapegoat for ineffective instruction (Block, 1971). Then, a fundamental task in education according to this theory is to develop strategies that, taking into account individual differences, promote rather than inhibit the fullest development of the individual.

IV Chapter Four

4. BRAIN AND LANGUAGE LEARNING

This chapter deals with the relationship between brain, language and learning. More specifically, it gives an overview on how the brain works everyday inside the body to fulfil linguistic tasks.

In spite of the fact that there is a great amount of information about these topics and the links among them, until the last decade, most of the information had come from studies of brain-injured patients who had suffered strokes due to blockage of blood flow to the brain, severe accidents, or gunshot wounds to the head during war time (Dronkers, 1999). In this research paradigm, facts are obtained by comparing the language deficits resulting from these injuries with the areas of the brain which became injured.

It is obvious then, that such investigations had to rely on autopsy data obtained long after they had been collected. Today, neuroscience research is being conducted with normal non brain-injured subjects, giving us an increasing understanding about the structure and function of the brain, as well as the brain mechanisms involved in language and learning.

4.1. Contexts of Learning

The individual brain and the individual person cannot be studied in isolation. Educators and psychologists have been trying to figure out, without much success, the way in which these areas should be connected in language teaching and learning. Nevertheless**,** neuroscience can also offer valuable insights about the way in which context affects learning and hence it must be considered in the process.

Context includes biological factors, such as drugs and sleep, where memory is consolidated, as well as social factors, like culture, and reward and punishment. In this study emotion, motivation and stress, which traditionally are not considered as a fundamental part neither of teaching nor of learning, will be taken into account.

Most teachers would agree that students participate in class and learn best when they are in a relaxed, motivated environment. The opposite is also true: fear and anxiety can inhibit learning and educational performance. Neuroscientists believe they know why (Ceri, 2004). Experts have examined the link between emotions, learning and the brain, and two specific parts of the brain were of particular interest: the Hippocampus, which among others, functions as an interface between short and long-term memory, is crucial in storing information (see Figure 1, in Appendix for Chapter 4); and the Amygdala, which is involved in assigning emotional significance to events, and is especially engaged in the management of fear (see Figure 2, in Appendix for Chapter 4). If you confront a dangerous bull, for instance, the Amygdala will take over and inhibit reasoning. In the same way, under stress, transmission of information to the neocortex either does not happen, or at least, not normally or optimally.

A different situation is presented when we deal with anxiety. (see Chapter 3).

4.2. Brain and Language

If we observe the brain, the main characteristic we externally see is the division of it in two hemispheres, for a long time considered them as separate entities (see Figure 3, in Appendix for Chapter 4).

The left hemisphere has been thought to be the analytical one, that is to say, its main function would be the recognition of the different parts that constitute a whole. On the other hand, the role of the right hemisphere has been to look for and build relationships among scattered parts, not acting lineally but in a holistic way.

In this way, it would be especially efficient in visual and spatial processes as well as in the emotional and non-verbal components of speech. Besides, it would have to do with music, gestures, recognition of colours and image formation. The ability to deal with certain kind of conceptual thought and ideas such as loyalty, beauty or love**,** is also attributed to the right hemisphere.

A usual misconception in brain science and learning was to consider a dispute between the hemispheres, “right brain versus left brain learning”. It is highly important to clarify at this

point, that the brain works as an integrated system in which one part rarely works in isolation (Paradis 2001). Actually, the two hemispheres are connected by the *corpus callosum* (see Figure 4, in Appendix for Chapter 4). Hence, recent findings in neuroscience show us a more complex, flexible an integrated view of the human nervous system. In this way, learning and behaviour are not expected to be simple processes regulated by simple cortical areas in the brain, but complex systems that are regulated by different cortical and subcortical domains that relate cognitive, affective and social factors in a dynamic and integrated way.

We are just in the beginnings of the comprehension of the relationship between human brain and human mind. That means that from now on educators and neuroscientists must work together in order to develop more comprehensive and effective theories of teaching and learning.

People learn in an integrated way where implicit, subconscious, procedural, and emotional features interact with explicit, conscious, declarative, and non-declarative features. The emotional environment of learning is, then, obviously crucial for a best students' affective achievement.

4.2.1. The Classical Model

Classic descriptions of the brain areas involved in language have largely implicated those in the left cerebral hemisphere known as Broca´s area and Wernicke´s area (Dronkers 1999). These investigations began in 1861 when Pierre Paul Broca described his examination of a chronically ill patient with unusual speech deficit. When the patient died, Broca discovered a lesion involving the posterior inferior frontal gyrus (i.e., the back part of the lowest section within the frontal lobe). Though Broca never cut the brain to examine the extent of his lesion, he suggested that this specific region was responsible for the articulation of speech.

Some years later, in 1874, the German neurologist Carl Wernicke discovered that a very different kind of language deficit, an impairment of auditory memory for words, was related to a damage in the superior temporal gyrus (i.e., the top of the temporal lobe) (see Figure 5, in Appendix for Chapter 4).

Wernicke also developed a model of language processing that was reformulated by Norman Geschwind in the 1960's, the so called *Wernicke-Geschwind Model* (see Figure 6, in Appendix for Chapter 4). According to this model, comprehension of language is dependent on Wernicke´s area, whereas Broca´s area, next to the primary motor cortex, is responsible for language production. Between both areas there is a link known as the 'arcuate fasciculus', a group of associated fibers which function is the transmission of linguistic information from Wernicke´s to Broca´s areas.

Modern techniques and technologies may gradually be changing the classic model, since the new findings are showing more and more clearly that other brain areas are also important, as well as the likelihood that language processing involves a network of brain areas that contribute in individual but interactive ways.

4.2.3. Modern Methods of Analysis

Today scientists employ *functional neuroimaging techniques*, which measure brain activity by detecting changes in blood flow in human subjects.

The main two neuroimaging techniques are PET (Positron Emission Tomography) and fMRI (Functional Magnetic Resonance Imaging). In both, PET and fMRI the volunteer lies inside the scanner and performs some cognitive or sensorimotor task while the scanner registers regional blood flow in the person's brain (Buckner and Petersen 1998, Blakemore and Firth, 2000).

Other methods operate in a different way. The EEG (Electroencephalogram) measures the electrical activity of networks or large circuits of brain cells (pyramidal cells) in the outer layers of the cortex. Activated nerve-cells of the brain generate electric signals. In the standard procedure 19 metal electrodes are glued to the scalp and thus the oscillatory activity of the cortex ("brain waves") is recorded. The frequency ranges (delta, theta, alpha, and beta) are then closely inspected one after the other. If the underlying cortical areas of two electrodes oscillate within the same frequency at a given point in time, (e.g. task: Two minutes of watching TV in English for a non native speaker of English) then these two parts of the brain are said to cooperate for performing this task (Reiterer, 2001).

The IBVA (Interactive Brainwave Visual Analyser), which was used by Brian Morrisey (1996) both in the U.S. and Chile for his brain waves suggestopedic studies, can provide data simultaneously for the four major channels or frequency ranges in addition to eye movement through the use of electrodes set in a headband over the frontal lobes of the brain (See Figure 7, in Appendix for Chapter 4).

Magnetoencephalogram and computer axial tomography (X-rays) among others are modern methods used as real windows to look into our brain for trying to find evidences that can help us understand, at least a little, this wonderful part of our being and the different applications they can have, both for teaching and learning processes.

4.3. Cerebral mechanisms and second language learning

Attention has been drawn recently to the fact that language, so defined, is only one component of verbal communication. According to various studies (e.g. Paradis, 2001), at least four components are involved in the acquisition and use of language: implicit linguistic competence, metalinguistic knowledge, pragmatics and motivation. It is known that each one of them is related to a specific neurofunctionally-modular cerebral mechanism.

It has been stated that linguistic competence is acquired *incidentally***;** that is to say, acquirers focus their attention on something other than what is being internalised. It is stored *implicitly***,** since the speaker is not conscious of the procedures activated to generate sentences. It is used *automatically*, which means it is not under conscious control. This competence, as all other implicit skills, is subserved by the procedural memory, a task specific mechanism that, in the case of language use, relies on the integrity of the cerebellum, the striatum and other basal ganglia, and on circumscribed areas of the left perysilvian cortical region (See Figure 8, in Appendix for Chapter 4).

On the other hand, metalinguistic knowledge is learned *consciously*, it is stored *explicitly*, and is used in a *controlled* manner (Paradis, 2001). Metalinguistic knowledge is subserved by another kind of memory, the declarative one, a system that relies on the integrity of the hippocampal system, the medial temporal lobes, and a large area of tertiary cortex.

As long as they are subserved by different memory systems, linguistic competence and metalinguistic knowledge are dissociated; that means that one can function while the other is impaired. The clinical study of a number of pathological conditions gives empirical support to this dissociation. In the case of aphasia, for example, there is a loss of access to implicit linguistic competence, but not to the declarative memory. As a result, some aphasic patients seem to recover their less proficient second or foreign language better than the mother tongue, a consequence that may result from the fact that second language is stored mainly, or importantly, in the declarative memory while the mother tongue relies heavily in the procedural memory. In contrast, Alzheimer patients present a condition in which the declarative memory is first affected. Here, loss of second language has been reported, as a consequence consistent with the idea that second language learning is usually learned consciously and stored explicitly, i.e. that it relies on metalinguistic knowledge and on declarative memory.

Regarding pragmatics, the third component of language acquisition and use, researchers have focused on the role that paralinguistic competence plays in the comprehension and use of intonation, gestures, and facial expressions to specify the meaning of a sentence. As it is well known by now, most of the time we mean more than we say, as in the case of implicatures, or we mean something different from what we actually say, as in metaphors and idiomatic expressions (Paradis, 2001). Paralinguistic devices are critical in such processes as inferring or deriving the intended meaning beyond the literal one, a capacity that could be considered the kernel of pragmatic competence. These devices have been reported to be vulnerable to right hemisphere damage, showing that verbal communication functions cannot be restricted to the left hemisphere. The role of the right hemisphere in pragmatics can be explained because of the necessity to rely on context (situational or textual) and general knowledge in order to derive an interpretation, functions that are known to be based mostly in the right hemisphere.

With respect to emotion, the fourth component of language acquisition and use, it also relies in a specific neurofunctionally-modular cerebral mechanism.

4.3.1. Methods of learning: some examples

Rote learning

Studies on memory have shown that both a phonological code plus rehearsal are important to memorise and store verbal information. Two neurofunctional imaging studies investigating the effect of rehearsing items to be recalled on brain activity implicate the role of the left inferior parietal cortex in storage of material, and the left inferior frontal cortex in rehearsal (Blackemore and Firth, 2000). A common suggestion is that the areas activated during maintenance of verbal material (left premotor cortex, supplementary motor cortex, left inferior frontal cortex and right cerebellum) comprise a network involved in speech production (Jodines et al., 1996; cited by Blackemore and Firth, 2000). This is consistent with the proposal that rehearsal of rote learned stimuli uses articulatory codes.

It has been revealed through brain imaging that individuals who lack this neuronal circuitry may have a difficult time learning poetry or prose by heart, however, if sufficiently motivated, they will be able to learn, perhaps by alternative routes using other types of learning.

Imitation

There is evidence that observing someone doing something activates a component of the brain's motor system without inducing an overt movement, an activity performed by the mirror cells. Thus, imitation seems to play an important role in education. However, imitating attitudes, mentalities and emotions may be more important than imitating simple movements. Unfortunately, up to this moment, only imitation of simple movements has been scanned.

Visual imagery

Visual mental imagery, involves "seeing with the mind's eyes". Thus, mental images of objects and events affect much of the same processing that occurs during the corresponding perceptual experience. Neuroimaging studies have revealed that at least two-thirds of the same brain areas are activated during visual imagery and visual perception.

In sum, in the last decades a growing body of evidence shows that verbal communication is not restricted to the classic areas of the left hemisphere, the well known Broca´s and Wernicke´s areas. Verbal communication, instead, is widely distributed and uses resources from both procedural and declarative memory, and both right and left hemispheres.

V Chapter Five

5. THE CONCEPT OF INTELLIGENCE AND THE THEORY OF MULTIPLE INTELLIGENCES (MI)

5.1. Introduction to the Study of Intelligence

Since Greek times man has been interested in the human intellect. Actually, Plato and Aristotle, among others, set the foundations for modern explorations on intelligence. However, the theories concerning its definition have developed only during the last two centuries.

Regarding its measurement, the French psychologist, Alfred Binet would publish what could be considered the precursor of most common intelligence measures: the first intelligence test for school children. This test, developed between 1905-1911, was designed to select the mentally defective and retarded children, in state schools, who were unlikely to benefit from the normal system, so that they would be provided with special education.

Working with the physician Theodore Simon, the 'Binet-Simon Scale', which comprised a variety of tasks they thought were representative of typical children's abilities at various stages in life, was created. The purpose of this scale was to compare children's mental abilities relative to those of their normal peers (Siegler, 1992).

For the practical use of determining educational placement, the score on the Binet- Simon scale, would reveal the child's mental age. With this in mind, Binet and Simon concluded, among other things, that just as children grow older, they become more mentally capable, and that while some children can perform above their chronological ages, others perform below their chronological ages. In other words, if a child was able to answer questions for all age groups up to nine years, for example, his mental age was said to be nine years irrespective of his actual chronological age (Fancher, 1985).

Binet, though, was aware of the limitations of his scale. He stressed the remarkable diversity of intelligence and the certain need to study it using qualitative as opposed to quantitative measures. Contrary to what many educators have asserted till today, the purpose of an intelligence test, for Binet, was to classify not to measure. Besides, an intelligence test could provide only a sample of all of an individual's intelligent behaviours (Siegler, 1992).

In the U.S., the mental testing movement, began when Lewis Terman published, in 1906, a revised and perfected version of the Binet-Simon scale for American populations. The new Stanford-Binet scale, would allow for the scientific diagnosis and classification of children to be placed in special classes; help the schools respond to children of superior intelligence; help determine vocational fitness; and serve as a standard for research. Hence, this new Stanford-Binet scale, was no longer used solely for providing education for all children, as was Binet's objective, but unfortunately it was transformed into a fundamental component of the American educational structure (White, 2000).

By 1916, Terman, in order to stream, adopted the suggestions of the German psychologist, William Stern, that the ratio between mental and chronological age be taken as a unitary measure of intelligence multiplied by 100. The resulting 'intelligence quotient' became known as the 'IQ', and is now known in the classic formula: IQ = Mental Age/Chronological Age X 100.

The notion that intelligence tests were accurate, scientific, and valuable tools for bringing efficiency to the schools resulted in assigning the IQ score, an almost leading position as a primary, definitive, and permanent representation of the quality of an individual's mind. Since then, and for the next several decades, intelligence testing has been deep-rooted in schools and other places as a tool for classifying people according to their IQs.

It is not surprising, then, that intelligence tests have encountered solid criticism. Some people like, the Multiple Intelligences proponent, Howard Gardner (1983), state that since the current IQ tests are not guided by plausible theories of how the brain actually operates, they do not accurately measure contemporary ideas of what intelligence really is.

Thus, it is evident that proponents of this assumption have widen the net of the concept of intelligence in terms of identifying more areas in which a student may be talented. Consequently, the Multiple Intelligences theory has a particular relevance for the identification of some minority groups who traditionally have been under-identified with more conventional approaches.

5.2 Intelligence: One versus Many

An exact definition of intelligence is still debated. There are, however, two major schools of thought on its nature and properties. Those who believe that there is one factor from which all intelligence is derived, also known as general factor 'g'; and the multiple intelligences exponents, who suggest that each person's level of intelligence, as it has been traditionally considered, is actually made up of autonomous faculties that can work individually or in conjunction with other faculties.

Regarding the first group, let us examine some general ideas and arguments concerning the concept of the general intelligence factor:

Early in the twentieth century, researchers, who had been studying the subject of intelligence, discovered that all tests of mental ability ranked individuals in about the same way. But, it was the British psychologist Charles Spearman who noticed that, although mental tests are often designed to measure specific domains of cognition, verbal fluency, memory, or mathematical skill, people who did well on one kind of test tended to do well on the others, and people who did poorly on one test generally did so in the rest of them (Gottfredson, 1998).

In order to prove that this positive correlation emerged from a common underlying factor, Spearman (1904), proposed that two factors could account for individual differences in scores in mental tests. The 'Two- Factor Theory of Intelligence', was based on the idea that the performance of any intellectual act requires some combination of 'g', or general factor, that governs performance on all cognitive tasks, and 's' or specific factors, which are specific abilities an individual mental task requires, and which vary from one test to another.

In consequence, Spearman believes that intelligence can be thought of as a factor that is common to all the activities that are usually called intelligent. Leading psychologists, such as Arthur R. Jensen, have confirmed his findings; and partly because of his research, most intelligence experts now use ‘g’ as the working definition of intelligence (Gottfredson, 1998).

Among the arguments presented to confirm the plausibility of this belief, proponents explain that the general factor gives account for most differences among individuals in performance on diverse mental tests. They claim that this is true regardless of what specific ability a test is meant to assess, of the test’s manifest content (whether words, numbers, or figures) and of the way the test is administered (in written or oral form, to an individual or to a group). Tests of specific mental abilities are said to measure those abilities, but they all reflect ‘g’ to varying degrees as well. Hence, the ‘g’ factor can be extracted from scores on any diverse set of tests (ibid.).

Concerning research on the physiology of ‘g’, studies of elementary cognitive tasks (ECTs), conducted by Jensen and others, answer for the relationship between the psychological and physiological aspects of ‘g’. These mental tasks have no intellectual content, for example, in the most basic reaction-time tests, the subject must react when a light goes on by lifting the index finger off a red button and immediately depressing a blue button. In this task, movement time seems independent of intelligence, but the decision times of higher IQ subjects are slightly faster than those of people with lower IQs, and as the tasks are made more complex, correlations between average decision times and IQ increase (ibid.).

These results further support the notion that intelligence equips individuals to deal with complexity and that its influence is greater in complex tasks than in simple ones. Moreover, the ECT-IQ correlations are comparable for all IQ levels, ages, genders and racial ethnic groups tested. Reaction times do not reflect differences in motivation or strategy. They seem to measure the speed with which the brain apprehends, integrates and evaluates information. These studies suggest that ‘g’ is a reliable and a global phenomenon at the neural level as it is at the level of the complex information processing required by IQ tests and everyday life (ibid.).

While decades of research have shown that differences in general intelligence, whether measured as IQ or ‘g’, are both genetic and environmental in origin. The same is thought to be true for all other psychological traits and attitudes, including personality, vocational interests and societal attitudes. Recent findings, however, have shown that the heritability of IQ rises with age. That is to say, the extent to which genetics accounts for differences in IQ among individuals increases as people get older leaving the effects of environment on intelligence fade rather than grow with time (Bouchard, 1994).

In opposition to the former proponents, the second major trend on the study of intelligence theory and research, is concerned with the formation of more complex multiple intelligence theories. They propound to de-emphasise the use of standardised testing to measure intelligence, to get away from the correlations among them and look, instead, at more naturalistic sources of information about how people around the world develop skills important to their way of life.

On this basis, the theory of Multiple Intelligences presents itself as a useful source from which people, working on the educational area, can take advantage of. Approaching students as capable of showing their intelligences in a wider range of ways, is one of the possibilities that enable teachers to put in practice a more learner-centred type of education.

5.3 The Theory of Multiple Intelligences (MI)

Howard Gardner, psychologist and professor of Cognition and Education, is one of the most distinguished and widely known critics of the notion that there exists but a single human intelligence (or g factor) that can be assessed by standard psychometric instruments.

“I embarked on quite a different path into the investigation of intellect. I had been conducting research with two groups: children who were talented in one or more art form and adults who had suffered from strokes that comprised specific capacities while sparing others. On the basis of such data, I arrived at a firm intuition: human beings are better thought of as possessing a number of relatively independent faculties, rather than as having a certain amount of intellectual horsepower, or IQ, that can be simply channelled in one or another direction. A better formulation for human intelligence would be *a psychobiological potential to solve problems or to fashion products that are valued in at least one cultural*

context. In my focus on fashioning products and cultural values, I departed from traditional psychometric approaches" (Gardner, 1983).

To clarify the definition of an intelligence, Gardner developed criteria that each of the candidate intelligences had to meet in order to be considered as such. These criteria were drawn from sources ranging from psychology, learners' case studies, anthropology, cultural studies, to the biological sciences and neuroscience.

I. Potential isolation by brain damage. For example, linguistic abilities can be compromised or spared by strokes.

II. The existence of prodigies, savants and other exceptional individuals. Such individuals enable the intelligence to be observed in relative isolation.

III. An identifiable core operation or set of operations. Musical intelligence, for instance, consists of a person's sensitivity to melody, harmony, rhythm, timbre and musical structure.

IV. A distinctive developmental history within an individual, along with a definable nature of expert performance. One examines the skills of, say, an expert athlete, salesperson or naturalist, as well as the steps to attaining such competence.

V. An evolutionary history and evolutionary plausibility. One can examine forms of spatial intelligence in mammals or musical intelligence in birds.

VI. Support from tests in experimental psychology. Researchers have devised tasks that specifically indicate which skills are related to one another and which are discrete.

VII. Support from psychometric findings. Batteries of tests reveal which tasks reflect the same underlying factor and which do not.

VIII. Susceptibility to encoding in a symbol system. Codes such as language, arithmetic, maps and logical expression, among others, capture important components of respective intelligences.

(Gardner, 1998)

In 1983, Gardner concluded that seven abilities met the criteria already mentioned: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal. It is worth mentioning here that most standard measures of intelligence acknowledge primarily linguistic and logical intelligences, and some, spatial intelligence. But, the other four abilities have been almost entirely ignored.

The seven intelligences were briefly characterised as follows (Gardner, 1983):

Linguistic Intelligence involves sensitivity to spoken and written languages, and the capacity to use the language to accomplish certain goals. This intelligence includes the ability to effectively use language as means to remember information, and to express oneself rhetorically or poetically. Among those that Gardner sees as having high linguistic intelligence are writers, poets, and lawyers.

Linguistic intelligence seems quite specific and localised. Some of its mechanisms are located in specific regions of the brain, as it was already explained, for example, the syntactic processes mediated by the Broca's area. Others are much more dispersed in the left hemisphere, for example, the semantic system. Still, others seem dependent upon right hemisphere structures, such as the pragmatic functions of language. As a consequence, the more complex interactions that characterise our linguistic intercourses depend upon a constant flow of information among these crucial linguistic regions.

In this respect as seen in the previous chapter, during the last decades a large amount of evidence shows that verbal communication is not restricted to the classic areas of the left hemisphere but is distributed in both right and left hemisphere. If further information is desired, the previous chapter offers a deeper account of the cerebral mechanisms that are specifically related to second language learning. As for now, we are only going to deal with the description given by H.Gardner of the seven intelligences characterised in 1983.

Musical Intelligence involves skill in the performance, composition, and appreciation of musical patterns. It comprises the capacity to recognise and compose musical pitches, tones, and rhythms.

Investigators, working with both normal and brain-damaged humans, have demonstrated that the processes and mechanisms basic to human music and language are distinctive from one another. For example, the mechanisms by which pitch is apprehended and stored are different from the mechanisms that process other sounds (e.g. the sounds of language). Moreover, there are cases in which individuals who have become aphasic have exhibited diminished musical ability without losing fundamental linguistic competences. On this basis, it is concluded that whereas linguistic abilities are lateralized, in normal right-handed individuals, almost exclusively to the left hemisphere, the majority of musical capacities, including the central capacity of sensitivity to pitch, are localised, in most normal individuals, in the right hemisphere.

Since it is crucial to know whether other abilities occur together with music, Gardner suggests that none of the claims with respect to musical breakdown has had any systematic connection with other faculties (such as linguistic or numerical processing). That is, the core operations of music do not bear intimate connections to the core operations in other areas. Then, it deserves to be considered as an autonomous intellectual area.

Logical-Mathematical Intelligence has to do with the capacity to analyse problems logically, carry out mathematical operations, and investigate issues scientifically. It entails the ability to detect patterns, reason deductively and think logically. This intelligence is most often associated with scientific and mathematical thinking.

Logical-mathematical abilities become fragile not from focal brain disease but, rather, as a result of more general deteriorating diseases, such as the dementias, where large portions of the nervous system decompose more or less rapidly. On the other hand, abilities like language and music remain relatively unaltered in these same circumstances. Moreover, electrophysiological studies have documented considerable involvement of both hemispheres during the solution of mathematical problems.

Spatial Intelligence involves the potential to recognise and use the patterns of wide space and more confined areas.

The right hemisphere of the brain, and in particular the posterior portions of this, proves to be the crucial site for spatial (and visual-spatial) processing. Despite this, deficits in spatial ability can also follow damage to the left posterior regions. But, when it comes to finding one's way around a site, to recognising objects, faces, and scenes, damage to the right posterior regions is far more likely to cause impairment than damage to other comparable regions of the brain. Alternatively, the presence of even a small lesion in the left hemisphere, in addition to right hemisphere damage, suffices to devastate an individual's spatial functioning.

Bodily-Kinesthetic Intelligence entails the potential of using one's whole body or parts of it to solve problems. It is the capacity to use mental abilities to coordinate bodily movements since mental and physical activities are closely related.

In order to reinforce the claim for a separate bodily intelligence, Gardner states that several researchers have documented that individuals who have completely lost their verbal memories, nonetheless, remain capable of learning and remembering complex motor sequences and patterns of behaviour. Certainly, there are patients whose linguistic and logical capacities have been devastated but show little or no difficulty in carrying out highly skilled motor activities.

The Personal Intelligences are divided into Interpersonal and Intrapersonal. Interpersonal Intelligence is the ability to understand the intentions, motivations, and desires of other people. It allows people to work effectively with others. Educators, salespeople, counsellors, religious and political leaders all need a well-developed Interpersonal Intelligence.

Intrapersonal Intelligence entails the capacity to access one's own feelings, fears and motivations, and to draw on them to guide behaviour. In Gardner's view it involves having an effective working model of oneself, and to be able to use such information to regulate our lives.

The frontal lobes constitute the meeting place and major integrating station for information from the two great functional realms of the brain: the posterior regions, involved in the

processing of sensory information; and the limbic systems, where individual motivational and emotional functions are sheltered, and one's internal states are generated.

At the core of personal knowledge, as represented particularly in the frontal lobes, there are two kinds of information. One is the ability to know other people, to recognise their faces, their voices, and their persons, to react appropriately to them, and to engage in activities with them. The other is our sensitivity to our own feelings, our own wants, fears, and personal histories. Each of these forms can be compromised by experimental surgery. But, the ability to link these forms of knowing to symbols, so that we can conceptualise our intuitive knowledge of our self and our more public knowledge of others, constitutes a unique human function. In this regard, the frontal lobes because of their unique role as an integrating juncture play an irreplaceable role in the forms of intelligence with which we have been concerned.

Furthermore, an eighth and ninth intelligence were added in 1995: Naturalist, which permits the recognition and categorisation of natural objects; and Existential, which captures the human proclivity to raise and ponder fundamental questions about existence, life, death, and finitude. Both of them also sufficed the criteria already mentioned (Gardner 2003).

The theory of Multiple Intelligences made two strong claims. The first one is that all humans possess all these intelligences, and the second one is that just as we all look different and have unique personalities and temperaments -a term used by early psychologists - we also have diverse profiles of intelligences. Indeed, no two individuals, not even identical twins or clones, have exactly the same combination of profiles, with the same strengths and weaknesses. Even in the case of identical genetic heritage, individuals undergo different experiences and seek to distinguish from one another (Gardner, 1983).

Answering to criticism whether MI theory is empirical or not, Gardner (1995:203) confirmed that his theory is based completely on empirical evidence, and the number of intelligences, their description, and their subcomponents are all subject to alteration in the light of new findings. For instance, studies of pathologies in which an individual loses a sense of social judgement, has provided additional evidence for the importance and

independence of interpersonal intelligence. In contrast, the finding of a possible link between musical and spatial thinking has caused doubts on the possible relations between faculties that in 1983 were thought to be independent.

Incidentally, several years after the publication of *Frames of Mind*, various misunderstandings emerged in relation to the theory and its use in educational settings. For this purpose, it is worth mentioning the following "realities" (Gardner, 1995):

Firstly, an intelligence is a new kind of construct and it should not be confused with a domain or a discipline. Gardner admits that in writing *Frames of Mind* he was not careful in distinguishing intelligences from other related concepts. For this reason, he re-defines an intelligence as *a biological and psychological potential that is capable of being realised to a greater or lesser extent as a consequence of the experiential, cultural, and motivational factors that affect a person.* In contrast, a domain is an organised set of activities within a culture, characterised by a specific symbol system and its related operations, which can be realised through the use of several intelligences. Therefore, the domain of musical performance, for example, involves bodily-kinesthetic, personal, as well as musical intelligences. In the same way, a particular intelligence like the spatial one, can be put to work in an indefinite number of domains, for example, sculpture, sailing or neuroanatomical investigations.

Secondly, an intelligence is not the same as a 'learning style', a 'cognitive style', or a 'working style'. The concept of *style*, in Gardner's words, designates a general approach that an individual can apply equally to any conceivable content. In contrast, an *intelligence* is a capacity, with its component processes, that is adapted to a specific content in the world.

Thirdly, MI is not contradictory with *g* (general intelligence), with hereditarian or environmental accounts of the nature and causes of intelligence. Instead, MI theory questions not the existence but the descriptive power of *g*. Gardner does not consider the study of *g* to be scientifically improper, and he is willing to accept the use of it for certain theoretical purposes. Rather, he is centred on those intelligences and intellectual processes that are not covered by *g.* Likewise, MI theory is neutral on the question of heritability of

specific intelligences, as there is no doubt that human abilities and human differences have a genetic base. However, Gardner rejects the 'inherited versus learned' dichotomy and instead he stresses the interaction, from the moment of conception, between genetic and environmental factors.

5.3.1 Educational Implications of MI

In reference to the connections between MI and education, Gardner (1998:21) is careful in giving any conclusive answers. On the one hand, he admits that MI theory coincides with educators' intuitions that children are smart in different ways and with the belief that more students can be reached more effectively if their favoured ways of knowing are taken into account in curriculum, instruction and assessment. But, on the other hand, Gardner concludes that the only association that exists between MI theory and education is that MI theory should be best thought of as a tool rather than as an educational goal. In other words, educators have to determine in combination with their communities the goals that they are seeking, and once these have been set, then MI theory can provide powerful support.

However, Gardner (1995:208) does refer to some positive ways in which MI can be, and has been, used in schools. He emphasises that any uniform educational approach is likely to serve only a minority of children. Therefore, the idea of applying MI on education, for example, by approaching a topic, subject matter, or discipline from a number of perspectives that prove pedagogically appropriate for the topic at hand, results in motivating more students in the process of learning, simply because children do not all learn in the same way. And since understanding can also be demonstrated in more than one way, a pluralistic approach give students the possibility to display their new understandings, as well as their difficulties, in ways that are comfortable for them and accessible to others.

Schools that use MI theory encourage learning that goes beyond traditional books, pens, and pencils. Teachers and parents who recognise their learner's/children's particular gifts and talents can provide learning activities that build on those inherent gifts. As a result of strengthening such differences, individuals are free to be intelligent in their own ways (Richards and Rodgers, 2001).

Applications of MI in language teaching have been more recent, so it is not surprising that the theory lacks some of the basic elements that might link it more directly to language education. One lack, for example, is a concrete view of how MI theory relates to any existing language and/or language learning theories, though attempts have been made to establish such links (e.g., Reid 1997; Christison 1998).

It is fair to say, then, that MI proposals look at the language of an individual, including one or more second languages, not as an "added-on" and somewhat peripheral skill but as central to the whole life of the language learner and user. In this sense, language is supposed to be integrated with music, bodily activity, interpersonal relationships, and so on. Language is not seen as limited to a 'linguistics' perspective but encompasses all aspects of communication. And, although language learning and use are obviously closely linked to what MI theory label 'Linguistic Intelligence', MI proponents believe that there are aspects of language such as rhythm, tone, volume, and pitch that are more closely linked to a theory of music than to a theory of linguistics, for example (Richards and Rodgers, 2001).

In the section Learners' Case Studies, we have included a piece of research about successful foreign language learners conducted by Earl Stevick, to demonstrate that in L2 learning there are many factors, apart from a purely linguistic aptitude, which also prove to be of importance.

Besides, there are no goals stated for MI instruction in linguistic terms. MI pedagogy, in general, tries to focus on the language class as the setting for a series of educational support systems aimed at making the language learner a better designer of his own learning experiences. Such a learner would be both better empowered and more fulfilled than a learner in traditional classrooms. Thus, a more goal-directed learner and happier person is held to be a likely candidate for being a better second language learner and user (ibid.).

On account of this, M. Christison (1996) calls for the benefits of using MI theory in the ESL/EFL classroom. Here, Christison says, teachers will be able to examine their best teaching techniques and strategies in light of human differences. First of all, as the types of learning activities teachers select are often directly related to their experiences in the real

world, teachers need to learn more about their own MI profiles and become aware of the factors that affect their teaching. It is important, then, to know how MI theory influences their own teaching as once they understand this concept, then they will be able to consciously apply the theory to their lesson planning and curriculum development. Therefore, the purpose is to connect one's life experiences to the ideas presented in MI theory so that, language teachers and students, gain profit from these approaches that will help them reflect on their own teaching and/or learning.

Besides, since teachers have a large repertoire of knowledge and methods that they draw on intuitively, MI theory provides them with a framework for organising their practice by offering a way of categorising and understanding the contents of their repertoire. It helps them extend their practice, and reflect on the development of it.

MI theory assists language teachers in at least four ways:

1. It provides teachers with theoretical support for adding variety to their teaching

2. It reminds them of the importance of teaching in a variety of ways

3. Since the appearance of MI theory, many useful ideas and techniques have been developed for teaching via MI.

4. MI theory has encouraged ministries of education and similar bodies all over the world to support and expand on what teachers have been doing for years in teaching concepts in a variety of ways.

In fact, Christison (ibid.) affirms that in MI classrooms, EFL lessons become alive, students' interest is captivated and they are, therefore, motivated to actively participate alone, in groups or as part of the entire class. Students are able to give their best, as there are activities to cater to each individual's preferred ways of learning. In other words, MI makes learning effective and fun.

The theory can also be an effective assessment tool to measure student learning.

Concern for individual differences will imply the fact that teachers must create as many learning options for students as possible. And these learning options, in turn, should incorporate various intelligences proposed in MI theory in order to provide students with guidance and with an opportunity to learn an L2 in a different way; one which will enable them achieve the learning objectives and goals through the different intelligences.

Creativity and use of one's imagination is also highly encouraged and rewarded. The learning option will also provide the opportunity to explore various ways of learning: acting/role playing, collage, mime, book report, poetry, drawing, computer stimulation, creative journal writing, musical rhythmic application, and traditional tests. In this way, students will demonstrate their learning of an L2 through a performance of understanding. In other words, the fact that students are allowed and encouraged to use their imagination and creativity enhances and adds excitement to learning, which may result in increasing motivation and better understanding of a second or foreign language.

In short, the MI classroom and its activities are intended to enable students to become more well-rounded individuals and more successful learners in general. The more awareness students have of their own intelligences and how they work, the more they will know how to use that intelligence to access the necessary information and knowledge from a lesson (Richards and Rodgers, 2001).

5.4 Brain Based Education

During the last two decades neuroscientists have been doing research that has proved to have implications for the improvement of teaching practices. In this context, Brain-based education arises as an extensive approach to teaching and learning which is clearly supported by a biologically driven framework that has helped determine how human learning actually occurs.

In the previous chapter on brain studies the relationship between brain, language, and learning has already been described. And also, how current neuroscience research is reaching an increasing understanding about the brain mechanisms involved in the processes of language and learning. All of these bring into account the fact that the individual brain and the individual person cannot be studied in isolation.

The theory actually helps explain recurring learning behaviour and it includes a broad mix of techniques which stress the connection of learning to student's personal life, emotional experiences, and unique capacities.

This view of education is shared with other learner-centred approaches, already presented in our work, such as: Mastery Learning, Suggestopedia, Learning Styles, and also, with the implications for education of MI theory.

5.4.1 How Brain-Based Education and Learner-Centred Approaches Coincide.

The research shows that the way the brain works has a significant impact on the kinds of learning activities that are most effective for learning. Some of the characteristics of the brain which Caine & Caine (1999) bring up coincide with aspects mentioned in previous chapters:

- Every brain is uniquely organised. It is a parallel processor so it can perform several activities at once
- Meaning is more important than just information and humans' search for meaning is innate.
- The search for meaning comes through patterning.
- Emotions are critical to patterning and drive our attention, meaning, and memory.

They also conclude that the brain is social. Consequently, it develops better in concert with other brains.

Some interactive teaching elements emerged from those characteristics (Caine and Caine, 1994) For instance, that teachers should create learning environments that fully immerse students in an educational experience. A principle they call *Orchestrated immersion.*

Relaxed alertness is another one. It consists of trying to eliminate fear in learners, by maintaining a highly demanding environment. Students must have a personally meaningful challenge which is going to stimulate their minds to the desired state of alertness. In the same way, as previously discussed in chapter 3, motivation, which is related to

perseverance, is improved in a challenging setting and is one of the individual differences that are taken into account both in Mastery learning and Brain-based education.

The ‘active processing of experience’ allows the learner to consolidate and internalise information by actively processing it in order to gain insight about a problem.

These authors also include ‘Twelve design principles’ for teachers to organise their lesson plans (Caine and Caine 1999), which somehow coincide with some of the aspects involved in learning that have been described in previous chapters.

Link indoor and outdoor spaces so that students can move about using their motor cortex for more brain oxygenation.

Variety of places. Many children, especially small ones, prefer the floor and under tables to work with a partner.

Change displays in the classroom to provide stimulating situations for brain development. Allow students create stage sets where they can act out scenes from their readings, demonstrate a science principle, or act out a dialogue between historical figures.

Have multiple resources available. Provide educational, physical and a variety of settings within the classroom so that learning activities can be integrated easily. Computer areas, experimental science areas, for example, should be close to one another. Multiple functions should be our goal.

The community at large as an optimal learning environment. Teachers need to find ways to fully use city and natural space as a primary learning setting.

Enrichment. The brain can grow new connections at any stage. Challenging complex experiences with appropriate feedback are best. Cognitive skills develop better with music and motor skills.

It is worth mentioning that Caine & Caine agree with H.Gardner in the sense that they are willing to modify their theories if new findings about the brain and how it is connected to

learning and memory skills are discovered. Consequently, educators should update their knowledge and techniques, and consider the student in his personal process of learning.

The teacher should act as a reflective practitioner and decision maker to appropriately apply Learning styles, Multiple intelligences, and Brain-based education. Consequently teachers must be informed about them, understand them, continue to study them, reflect upon them, and make appropriate applications for the benefit of their own students and their teaching situations (Guild, 1997).

Similarly, the student is a reflective practitioner. Students talk about their own learning and are active in the planning and assessment of the learning process. They are engaged in exploring, experimenting, creating, applying, and evaluating their ways of learning, as well as interacting actively with the content and concepts they are studying.

As a result, the whole person is educated. Teachers pay attention to the cultural, physical, social, and emotional life of the learner as well as to his or her academic life. Each one of the theories presented here promotes personalisation of education by connecting the student's total life to the learning in the classroom. Educators acknowledge developmental stages and consider them for instructional and curriculum decisions.

The curriculum, in turn, has substance, depth, and quality. Basic skills are treated seriously and are frequently learned in the context of appropriate applications. Proponents of Brain-based education, Learning styles, and Multiple intelligences convincingly demonstrate that accommodating the students' learning strengths and individual intelligences while attending to the ways the brain absorbs and processes information, results in more effective learning.

These theories also promote diversity. It is a core principle in each theory that individuals are unique and that this uniqueness has an effect on students' various ways of learning.

In short, it can be concluded that learning is a complex process and students learn in various ways. The teacher who acknowledges and actively responds to these truths will facilitate learning success for more learners. The theorists and promoters of brain-based education, learning styles, and multiple intelligences can contribute to effective applications

by pointing out the complimentary aspects of their work. The primary message should be the need for serious understanding of the learner and the learning process.

VI Chapter Six

6. CASE STUDIES

Earl Stevick in his book, *Success with Foreign Language* (1999), described and analysed the process of learning foreign languages of seven different people. They were all native speakers of English who had a specific and clear purpose for learning the second language. Some of them had previously learned a second language, therefore, they had a clear idea of the process that they had to go through and the learning strategies they had used.

For the purpose of our thesis we have chosen four subjects, who present clear differences in their learning styles. A key tenant of learner-centred education is that each learner is different and that effective teaching needs to take these differences into account. Thus, in this chapter diversity among students is not seen as an obstacle in their learning process but as an advantage. From this view, we have analysed the characters of this study, following the theories we have discussed.

6.1. The Imaginative Learner

The first case is Derek, a middle-aged executive of a company who has learned German and Russian. At the time of Stevick's research Derek was learning Finnish. The first reaction he had towards the language is confusion. He stated that Finnish is a very difficult language and that is was more difficult to understand than the other languages he had learned. He recognised that the hardest area of Finnish is its grammar; consequently he developed some very unique solutions for facilitating his own learning. This fact is what makes Stevick label Derek as an "imaginative learner".

First of all, he started solving the problem of grammar creating a system where he classified words by their inflections. Derek realised that affixes in Finnish are very important and that they can change the whole meaning of a word. His system consisted of preparing some tables, where he grouped the word in terms of inflections and, at the same time, he classified these inflections and their meanings. He stated that it is easier to memorise and to

stockpile patterns and structures than to memorise words especially out of context. This technique was very useful for Derek, since he discovered that Finish is a mathematical language with some clear structures and forms.

Continuing with his insight search for solutions to facilitate the learning, Derek created an imaginary friend that he could use when he was asked to talk in the foreign language. Thus he would always have a clear topic and a person to discuss it.

Stevick described the active mental search of this subject with the Cognitive Audiolingual Approach (CA-OB) that consists of four steps:

1) Identification of the new item

2) Reproduction of the item

3) Understanding what is the item role in the language

4) Manipulation of the item

5) Application of the item in real use

Derek once aware of his gaps in the understanding of Finnish and after developing his personal view of the language was finally able to communicate with people in the target language with fluency.

Stevick classified this case as the imaginative learner, who tries to understand the new language through his own means, not only creating patterns, but also an imaginary friend, and taking almost no attention to formal instruction.

In the description if this subject we find several characteristics applicable to the aim of our thesis and that can help exemplify what we have investigated.

When Derek created his charts or device tables, he showed he had the *visual* and the *tactile learning strategies* explained in Chapter 3. According to R. Oxford's classification of language strategies, Derek could be considered as using *memory strategies* since he arranges words in order and makes associations. He also uses *cognitive strategies* as he

manipulates the language, practices with sounds, recognises and uses formulas and patterns such as ‘starter words’. When analysing the language, he uses reasoning, and creates structures for input and output. He also employs *metacognitive strategies*, because he arranges and plans his learning. Furthermore, he uses *social strategies*, such as asking for clarification or verification, specifically regarding grammatical rules; and *affective strategies*, as he takes risks in the language.

In terms of Multiple Intelligences, all the individuals of these analyses possess the seven or nine intelligences proposed by H. Gardner. It seems that some of these cases reveal one or two outstanding intelligences, although it is to be noted that the remaining intelligences are working as well, even if this is done on scale.

Relating Derek’s case with the Theory of Multiple Intelligences, we concluded that this person is clearly related to the *mathematical intelligence* outlined in Chapter 5, due to the fact that he approaches a language in terms of recognisable patterns which, in turn, can be analysed and learned as rules. That is, he confronts the language by discerning its internal relations and underlying principles. Derek’s mathematical intelligence works in conjunction with his other intelligences. That is to say his mathematical intelligence will serve him in learning a new language but, as he will have to deal with the discrimination of phonemes, command of syntax, and acquisition of word meanings, his linguistic *intelligence* will also become relevant.

6.2. The Informal Learner

The second case in our analysis is Carla, a young American secretary who had previously lived in Brazil and Germany. She stated that she could communicate well in both Portuguese and German, although she never received formal teaching in those languages. At the time of Stevick’s research, she was taking a formal course of German.

Carla explained that the way she used to learn foreign languages was by “just throwing herself into the country”, which means not thinking about the language or its rules and structures, but learning the culture of the country by spending time with local people and participating in their activities. For Carla the classroom is a frightening place, she did not

feel as she was learning German. On the contrary, she always felt lost and scared. This fear was increased by her beliefs about the process of acquiring a foreign language.

Memorisation of rules and patterns was never accomplished in her course. Although her opinion towards her performance in the German class was not very good, her teachers agreed she could use some elements of the language that are very difficult to learn for students. However, since Carla had 'acquired' her German, those elements were natural even without the underlying knowledge. Carla did not succeed in her German course but when she had to communicate with German people she did not find any problems. Stevick classified Carla as the "informal learner", because she could manage a third foreign language with no formal instruction.

Her success according to Stevick's opinion is based in the openness and risk-taking attitude she presented when facing the new language. In her case, acquiring seems to be the medium for learning a foreign language, while formal teaching would be only an element that stopped her development. Derek, on the other hand, showed that formal instruction is what helped him in his learning and that pattern and structures are as important as fluency in the language. Finally, although Carla did not have success in learning her foreign language in formal terms of classroom instruction, she succeeded in acquiring it. This is the main topic of Stevick's research as well as ours: the medium is not important, but the achievement of the goal through the choosing of the best learning style.

Regarding learning styles, we could say that Carla has the *kinaesthetic style* as she learns by participating and experiencing real life situations.

If we had to use R. Oxford classification of learning strategies, we could say that she uses *memory strategies* since she employs physical response and sensations towards the new language. She also shows *compensation strategies* as she alters messages by saying something different that means almost the same, and by making ideas simpler; and *affective strategies* such as taking risks. However, Carla preferably uses *social strategies* by involving herself first in the culture and then in the language.

In the classification of MI Carla displays a high *interpersonal intelligence*. Here, interpersonal intelligence works as an "engine" that gives Carla the necessary motivation to see languages as a means of establishing social and affective links with others. In addition, Carla is said to have acquired the language in real-life instances of communication which can also claim for a developed linguistic intelligence; she is able to discriminate phonemes, and express herself in the new languages with no apparent difficulties. Hence, her oral communication turns out to be proficient as well. Although Carla does not stand as a successful L2 learner in terms of formal evaluations, within the MI framework she will be considered as capable as any other student since the theory accounts for diversity and tries to make teachers think of how they can approach learners considering the whole range of intelligences into account.

6.3. The intuitive Learner

The third case to be analysed is Ann, a well-educated woman who can speak several languages and who, at the time of the study, was learning Norwegian.

Her case is different from the rest of the cases of the study. Ann agreed in the importance of classroom teaching but, at the same time, she based her learning on acquiring. In her learning of Norwegian she stated that the most important area of the language is oral communication. She showed a highly-developed capacity for picking up accents, sometimes before she actually learned the foreign language. It is very easy for her reproduce sounds, mimic people's accents and fake a foreign accent.

Stevick analysed her case as the "intuitive learner" due to her natural gift for learning languages. She can reproduce new sounds and understand new vocabulary in a natural way. Ann explained that she only needs a sound and a context to realise and understand the meaning of what she has heard.

E. Stevick (1990) classified and described her learning process in accordance with John Carroll's four qualities of a good learner that were previously explained in Chapter 3. Although Carroll developed these qualities based on previous formal instruction of the new language, Ann seems to have them innately in her capacity to learn.

According to Stevick, Ann possesses a Language Acquisition Device (LAD) (Chomsky 1964), described as a mental mechanism for acquiring languages, that in her case would be more developed than in common people.

Some specialist have also developed the idea of a special element that would be in charge of the leaning of languages, but this device would operate in two different levels using two types of data: verbal and non-verbal data. The first one refers to the sounds of the language and their combinations, how they are joined in the language and their use. On the other hand, non-verbal data covers everything concerning to the language but sounds (Stevick 1990). However, the studies in neuroscience presented in Chapter 4 contradict this idea.

Ann went further in her description of her capacity for learning languages as she declared that she could communicate with animals copying their sounds and understanding what those sounds mean. If that was the case, we could say that she has a gift for communication in general, more than a gift for languages.

Stevick referred to Chomsky's universal grammar as an engine present in all humans which dictates the way language works, and which therefore states a universal similarity between human languages. Thus, we all have the capacity and the gift for communication which is not related to any language in particular, but only to a characteristic we all share.

Although there is no proof of her actually learning and being fluent in any foreign language, Stevick included her among the cases of successful learners based on her statement that in fact she can communicate and understand well in the languages she knows.

Regarding learning styles we can say that Ann is an *auditory learner* since she learns through sounds without paying much attention to the written word. In addition, she seems to have the ability to reproduce sounds more or less accurately.

If we describe Ann under Rebecca Oxford's learning strategies we could say that she uses *memory strategies* such as the representation of sounds in her mind. She also uses *compensation strategies* as she makes use of guessing in her acquisition of languages and she is always looking for linguistic clues to understand what natives say. She also uses

cognitive strategies when she practices with sounds by repeating words aloud. Finally, her *affective strategies* consist of taking risks; and her *social* ones, of asking native speakers of the target language for corrections.

In terms of the types of intelligences Ann has, it is difficult to give any definite answers. Ann seems to excel in at least two intelligences: *linguistic* and *musical*, however, it is not possible to say that she has a high linguistic intelligence since her ability to learn languages goes beyond human communication. In this sense, her musical intelligence may become relevant since she seems to be able to recognise tones and pitches which do not belong to the range of discrimination of phonemes. Then, she reproduces sounds which are outside the field of human beings in order to "communicate", as she says, with other species. But, as not enough evidence is given in order to claim for more intelligences involved in Ann's case, Stevick lacks content and further explanations in terms of the theory of MI.

6.4. The Self-Aware Learner

Finally the last case to be analysed is Gwen. She is the only linguist professional of the study. At the time of the investigation, she was learning and teaching Japanese at the same time.

Gwen has knowledge of grammar rules, structures and everything regarding a language, which may be an advantage when she has to learn a new language. Her underlying knowledge made the development of a formal method of study the target language easier for her. However, she failed in the phonetic area of Japanese as she had difficulties in developing an adequate accent in Japanese. She declared that it was achieved through what she called 'osmosis', the "sinking in" which comes after a formal training of a specific knowledge.

In order to learn Japanese, she consciously introduces specific points of grammar she had recently learned into real conversations (Stevick 1990). In that way, she produces sentences in the foreign language where she links the rule she is using and the meaning she wants to convey in Japanese. Also, a very important factor in Gwen's learning is that she is not afraid of making mistakes in the foreign language and that she is willing to accept corrections from native speakers, which makes her a risk-taking person.

According to Rebecca Oxford Gwen is a *kinaesthetic learner*, because she learns through active participation and experiences in the language she is learning.

Regarding learning strategies, she shows *cognitive strategies* such as practicing naturalistically, but due to her knowledge about languages, she mainly applies *metacognitive strategies*. She centres her learning towards a specific task or feature of the language; she knows about language structure and learning processes and evaluates her development. Her *affective strategies* consist of taking risks, and her *social* ones cover working with native speakers and developing a cultural understanding of the language she is learning.

Gwen, just like Derek, makes use of her *mathematical intelligence* to learn the language. She is also aware of the importance of motivation, therefore, her *intrapersonal intelligence* becomes crucial since she can detect her mood, feelings, and other mental states that are relevant in her process of learning a second language.

We have included this last chapter here because, just like E. Stevick, we also conclude that there are many different ways to learn a foreign language but the best one is the one that makes the individual feel more comfortable and sure about what he is learning.

All the subjects of this study depend on different areas of their learning to understand the new language. For instance, Derek has to study formally, while Ann only needs to hear and reproduce new sounds to learn the language. The individuals also learn different aspects of the language better, even though these do not fit into any formal way of language instruction.

FINAL CONSIDERATIONS

The different theories and approaches presented in this thesis about learning and the learning of an L2 provide a new conception on how the teaching of a foreign or second language should be conducted and conceived. They are all related to learner-centred education, a concept that should be taken into consideration in present and future language pedagogy.

A key tenant of the learner-centred view is that each learner is different and that effective teaching needs to take into account concepts such as aptitude, strategies, abilities, and such, aspects that the traditional language-centred paradigm does not consider as a relevant factor.

In the learner-centred paradigm students participate in the learning process by developing and choosing learning strategies and establishing learning goals. They are also able to evaluate their own progress. Hence, learner-centred education encourages students to take responsibility into their learning and helps them gain confidence in their ability to use the language.

The concept of learner-centredness also entails the idea of the teacher's creativity,

to tailor their lessons to suit learners' different learning styles and preferences. Therefore, students should be consulted in the development of a teaching program and the teaching methods adopted by the teacher must be flexible so that they can be adapted to the learners' needs and interests.

Consequently, the study of individual differences makes teachers focus on the actual process of learning by appealing to the unique qualities of the students. This, in turn, enables most of them to learn in their preferred ways as much as they can, rather than being passive recipients of information with almost no participation in the process. Furthermore, when all these aspects are taken into account, the emotional environment of learning also proves to be crucial for successful achievement.

We may also conclude that findings in neuroscience related to psychological, cognitive and affective domains, as well as social factors and their implications in the learning process, are of utmost importance for the conception of learning. Thus, we consider that theories of language teaching and language learning should be supported by these findings. On account of this, an interdisciplinary task force should be established in the pedagogical field so that a wider source of data would provide them with information that should improve the educational practice.

Brain Based Education, Mastery Learning, Learning Strategies and Learning Styles as well as the educational implications of the theory of Multiple Intelligences are comprehensible approaches that are characterised by their flexibility and the possibility they give of being interpreted and applied under specific students' needs. As these proposals are subject to modifications, they should be revised and updated over time as new practices emerge.

All of these points suggest the beginning of a research agenda. Much research remains to be done on the role individual differences play at the highest levels of proficiency. Still further research must be done in relation to how individuals learn languages, why they undertake and succeed in the learning of an L2, and on the existing differences among aptitudes, styles, strategies and motivation, among others, that people have and yet are able succeed in their learning.

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APPENDIXES

Chapter Three

Table 1: Main individual differences according to three different authors.

Altman (1980)	Skehan (1989)	Larsen-Freeman and Long (1991)
1 Age	1 Language aptitude	1 Age
2 Sex	2 Motivation	2 Socio-psychological factors

		a motivation b attitude
3 Previous experience with language learning	3 Language learning strategies	3 Personality a self-esteem b extroversion c anxiety d risk-taking e sensitivity to rejection f empathy g inhibition h tolerance of ambiguity
4 Proficiency in the native language	4 Cognitive and effective factors a extroversion/introversion b risk-taking c intelligence d field independence e anxiety	4 Cognitive Style a field independence/dependence b category width c reflexivity/impulsivity d aural/visual e analytic/gestalt

5 Personality factors		5 Hemisphere specialization
6 Language Aptitude		6 Learning Strategies
7 Attitudes and motivation		7 Other factors e.g. memory, sex
8 General Intelligence (IQ)		
9 Sense modality preference		
10 Sociological preference (e.g. learning with peers vs. learning with the teacher)		
11 Cognitive Styles		
12 Learner Strategies		

Table 2: Summary of P. McIntyre and R. Gardner's model of the role of anxiety in language learning.

Stage	Type of anxiety	Effect on learning
Beginner	Very little. Restricted to state anxiety.	None.
Post-Beginner	Only if negative expectations are developed based on bad learning experiences.	Nervousness and poor performance.
Later	Poor performance hence continued bad learning increased anxiety.	Continued poor performance.

Table 3: Logically possible learner types. (Skehan, 1989)

Learner Number	Phonemic coding ability	Language analytic ability	Memory	Learner type
1	+	+	+	General, even high aptitude
2	+	+	-	Good auditory and analytic ability, poor memory
3	+	-	+	Good auditory and Memory abilities; poor analysis
4	+	-	-	Good auditory ability; poor otherwise
5	-	+	+	Poor auditory; Good analysis and memory
6	-	+	-	Poor auditory and memory; Good analysis
7	-	-	+	Poor auditory and analysis Good memory
8	-	-	-	Evenly poor aptitude

Figure 1: Direct Strategies.

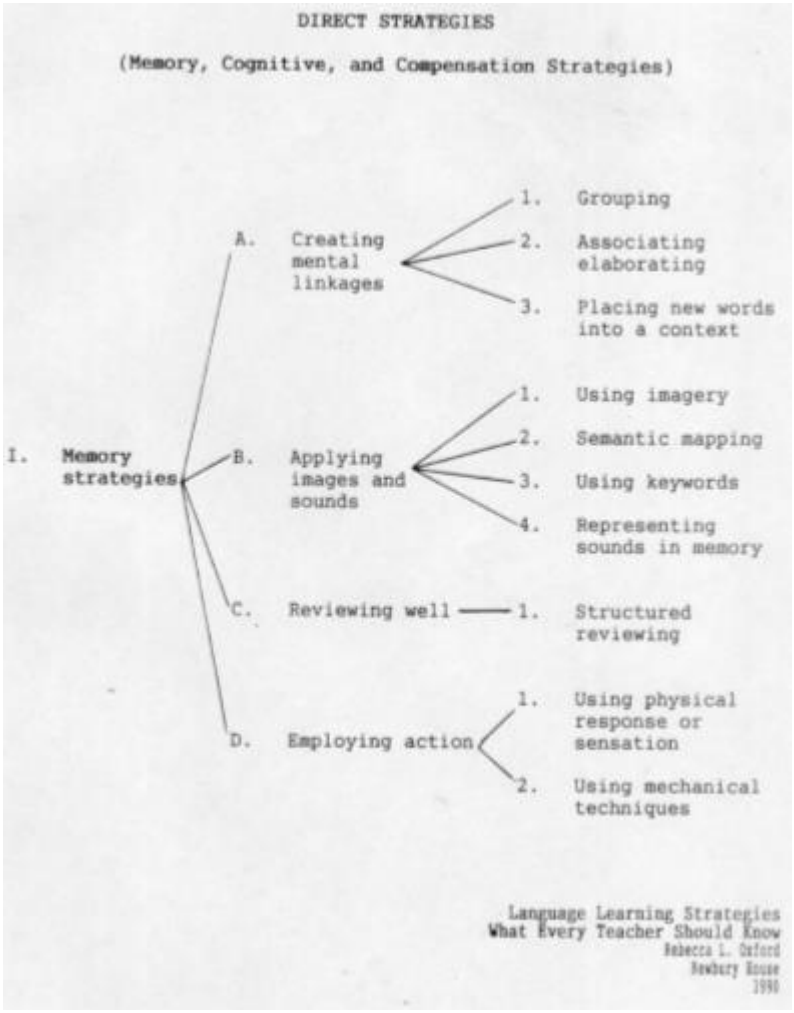


Figure 2: Indirect Strategies.

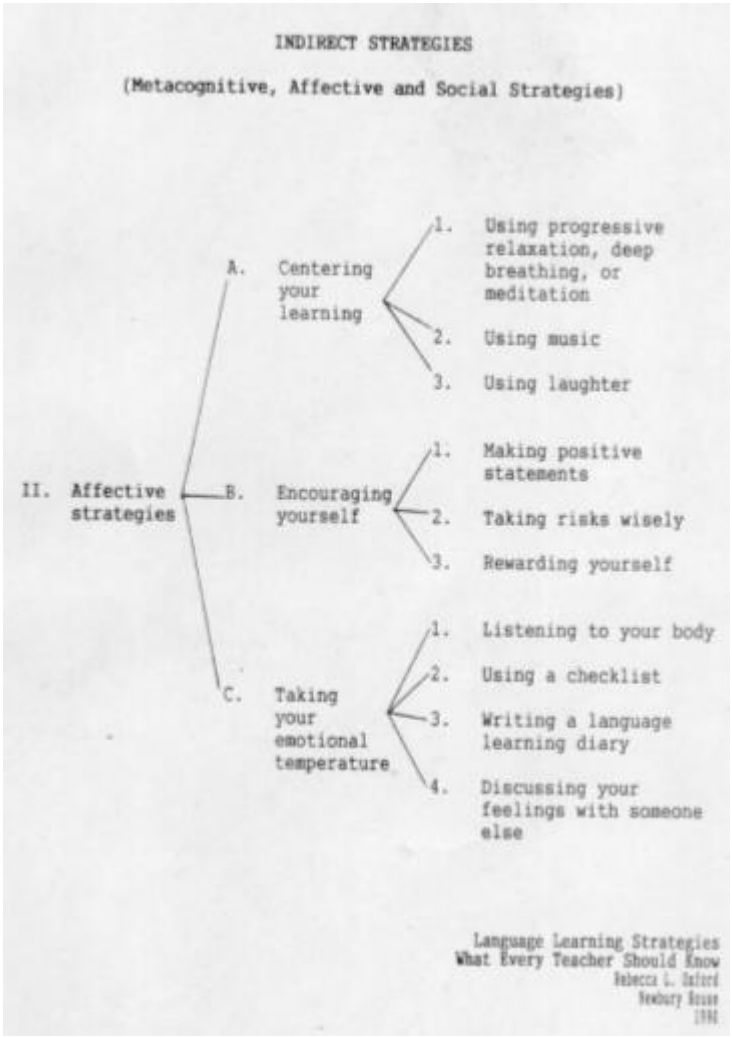
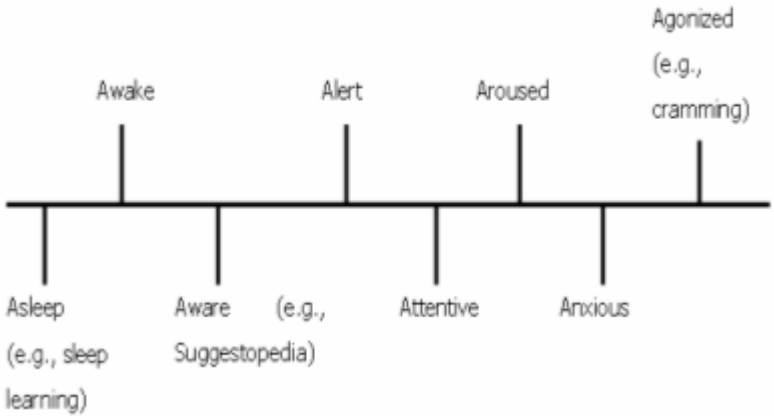


Figure 3: Mental States of Attention and Learning.



Agonized (e.g., cramming)

Table 4: Variables that interact to influence school learning success.

Individual	Instruction
Aptitude	Quality of instruction
Ability to understand instruction	Opportunity to learn
Perseverance	

Figure 4: Interaction of the variables included in Bloom's Model of School Learning.

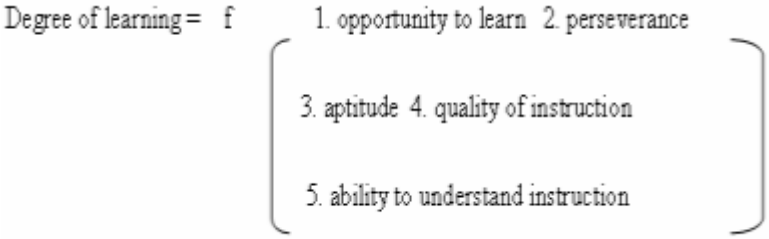
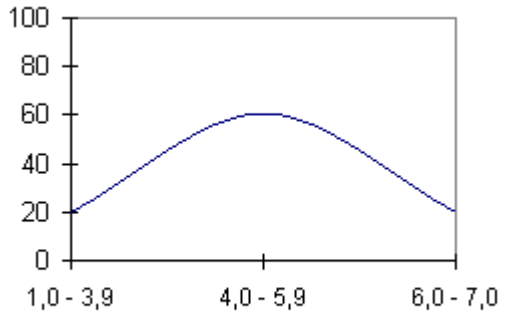
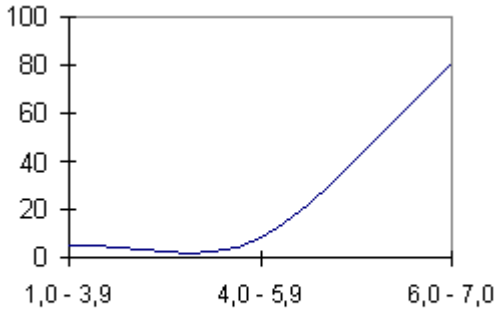


Figure 5: Distribution of school achievement in both types of instruction (according to the grading system in Chile).



Normal Curve



Mastery Learning Curve

Chapter 4

Figure 1: Hippocampus.

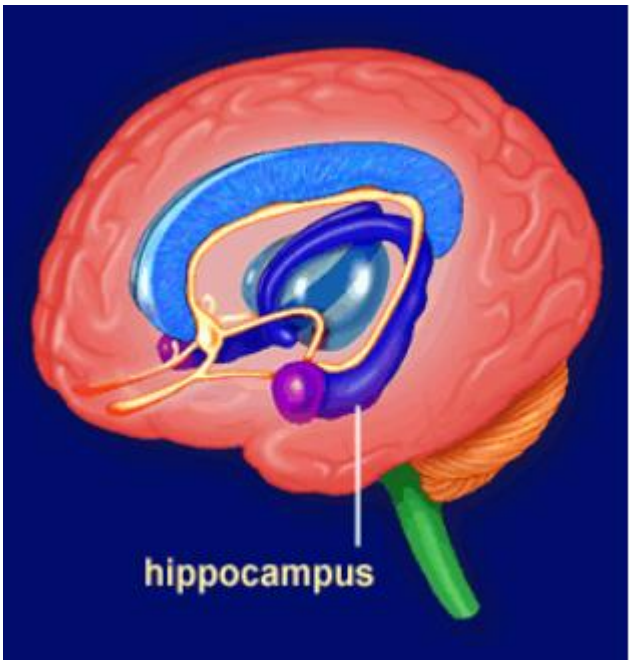


Figure 2: Amygdala.

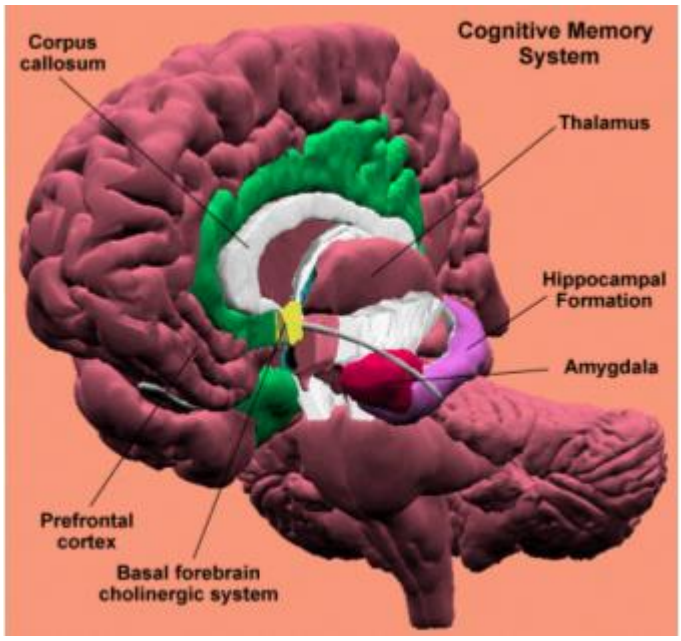


Figure 3: The two hemispheres.

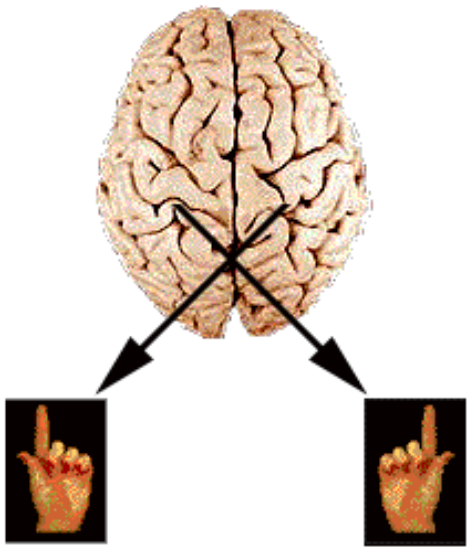


Figure 4: Corpus callosum.

Figure 5: Broca’s and Wernicke’s areas.

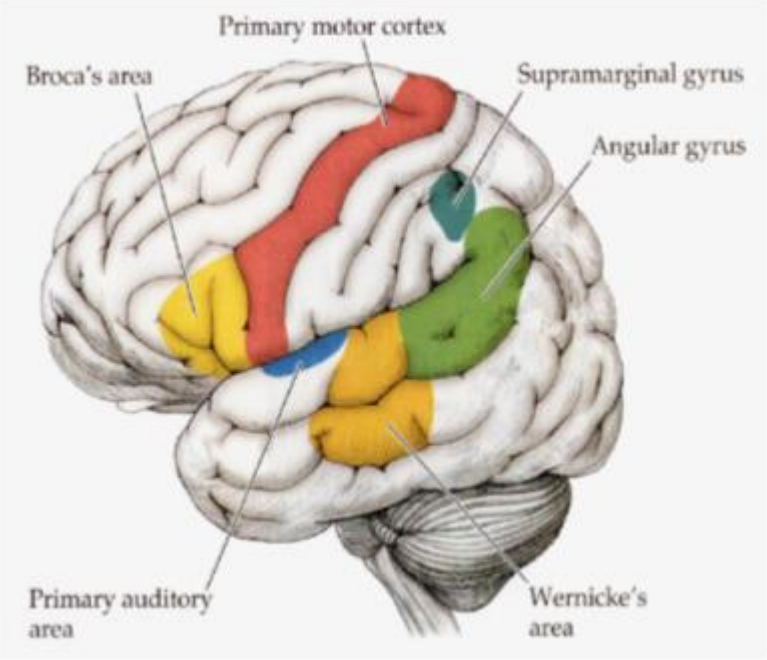


Figure 6: Wernicke-Geschwind Model.

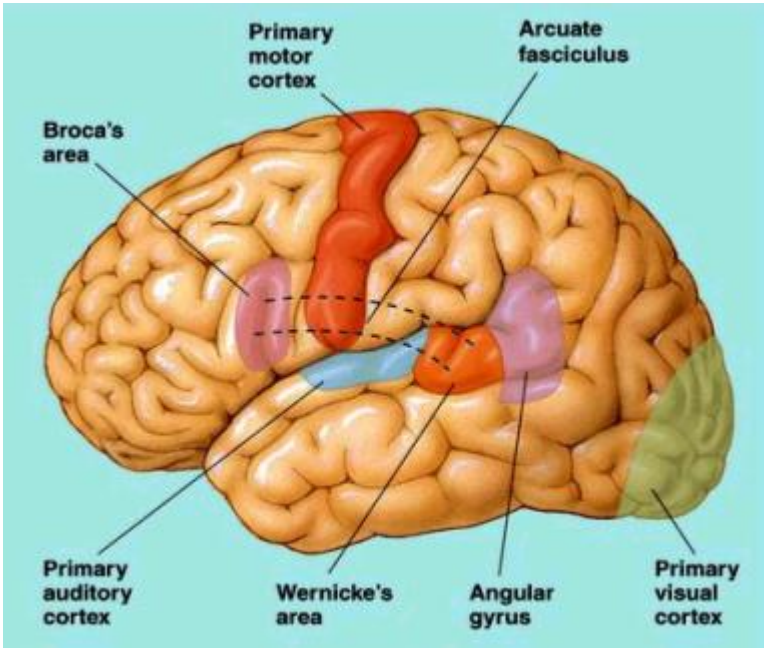


Figure 7: Alpha and Beta Waves (Brian Morrisey).

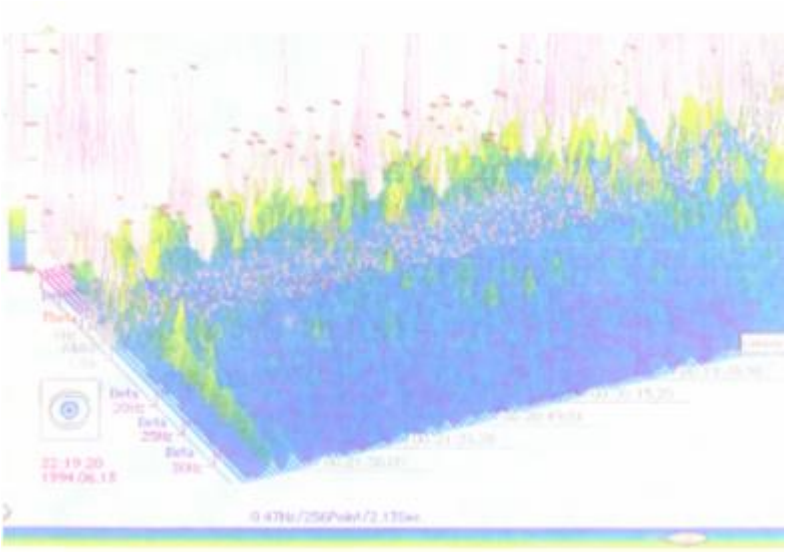


Figure 8: The cerebellum, the striatum and other basal ganglia.