Trabajo Fin de Máster

The age factor in aural perception in an instructed setting: implications for secondary teaching

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Abstract

It is commonly believed that the age at which second language learning begins plays a key role on learner's L2 proficiency. Likewise it is often argued that the younger second language acquisition starts, the better. Additionally, it is often claimed that some foreign language skills can only be successfully acquired before a certain age, such as native aural perception. However, recent studies in instructed settings suggest that an early start does not account for differences in L2 proficiency. Instead, age of testing and length of exposure are believed to explain the differences in learners' performance. This study was set to determine if age of onset, age of testing and length of exposure do actually have an effect upon second language acquisition in formal settings in terms of aural perception and discrimination. Two different analyses have been carried out in order to determine age effects upon aural L2 performance. On the one hand, a comparison of L2 aural performance was conducted between two groups with the same length of exposure but with a difference of two years in both their age of onset and their age of testing. On the other hand, a correlation was carried out between aural perception and discrimination proficiency and age of onset, age of testing and length of exposure (respectively). The results of this study, in line with previous research, suggest that age of testing and -to a lesser extent- length of exposure explain differences in learners' proficiency in instructed settings. The implications of such findings for ELT are discussed at the end of this project.

Keywords: instructed settings, age of onset, age of testing, length of exposure, aural perception.

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1. Overview

There are many factors that influence successful second language acquisition such as personality, intelligence, aptitude, motivation, learning style or starting age. The impact of subjective factors such as motivation or personality on success in second language acquisition in formal settings is very straightforward. However, the relationship between age and successful second language acquisition is rather complex and a deep understanding of this factor is necessary for ELT in secondary and language schools. This is why this research has been carried out as a final project.

In this project, the first section deals with the general **theoretical backgrounds** on which this research draws. Key notions which define the influence of age on second language acquisition are tackled. For instance, a distinction is made between the effect of age upon rate of acquisition and the effect of age upon ultimate attainment. In addition, the influence of age on different second language components is also believed to be different. Also, as explained in greater detail in the **literature review**, research on the effect of age upon L2 proficiency has been carried out under different conditions. Most findings have been obtained in naturalistic or immersion settings. However, recent researchers have also started to study the effect of age upon L2 performance in instructed settings. The main difference between naturalistic, immersion and instructed settings for empirical purposes is that the kind of exposure that learners have had varies significantly. Nonetheless, a summary of <u>general age-related findings</u> is provided in the first part of this study's literature review. Then, in order to frame this research more precisely, a specific <u>review of previous studies</u> dealing with the influence of age on aural perception and discrimination in formal settings is carried out.

In this project **empirical research** has been carried out in order to confirm some of the conclusions drawn from the literature review which are, beyond a shadow of doubt, relevant to second language teaching. Do early starters actually attain native-like proficiency in oral perception in instructional settings? Are early starters better than late starters? Is the effect of the age factor a matter of age of testing instead? Provided that this is just a final MA project, research has been limited to only one language component: aural comprehension. In addition, the number of participants and method were also limited. Despite the limitations of this study, the results obtained by this

empirical research are in line with recent studies, as it is explained in greater detail in the **discussion** section.

Finally, an extensive reflection about the practical **implications** of the influence of the age factor on aural perception in particular, and second language acquisition in general, is provided.

2. Theoretical background

According to Lightbrown and Spada (2006), the relationship between age and success in second language acquisition is complex and controversial. This idea will be developed below. However age is not a stand-alone factor which explains differences in L2 proficiency. Gardner (1972) shows that positive motivation is associated with a willingness to keep learning, which could result in more successful second language acquisition. Actually, research has suggested that both integrative and instrumental motivation (Gadner and Lambert, 1972) are related to successful L2 acquisition. As a matter of fact, social factors such as the power relationship between learners' L1 and L2 have an effect on motivation (Lightbrown and Spada, 2006). Aptitude, considered as learners strengths or weaknesses for language components (Lightbrown and Spada, 2006) is also believed to account for different degrees of L2 proficiency. In addition, these authors also suggest that learning styles have an impact on successful L2 learning, and field-independent individuals seem to be more successful L2 learners. Finally, some personal characteristics such as an extrovert personality, inhibition or anxiety have been proposed to influence second language acquisition.

In this section, **general notions** related to the reasons and the different dimensions of the age factor drawn from the literature are discussed. First of all, the main <u>causes</u> for the importance of age in second language learning argued in literature are tackled. Then, a distinction often made by many authors when approaching age effects on second language acquisition is reviewed (<u>ultimate attainment *vs*. rate</u>). Finally, theories which postulate an effect of age on different <u>language components</u> are assessed. Findings provided by research related to these concepts can be found on the first section of the literature review.

2.1. Causes

The reasons which explain the effect of age on second language acquisition are usually grouped in two main types according to their nature. They are either biologically-grounded or related to the learning environment.

As to the **biological arguments**, the main support for the claim that starting age is a decisive factor in second language acquisition due to biological reasons comes from the advocates of the Critical Period Hypothesis. This theory is based on the innatists' beliefs of how languages are learnt. According to Chomsky (1959), language is developed in biological brain structures as other biological functions do (such as walking). In Chomsky's opinion, children are born with an <u>innate ability</u> to acquire the complex underlying rules of a language when provided with samples of the language. This is the reason why despite being exposed to incoherent or incomplete chunks of the language, they can produce grammatically correct sentences. Likewise, as stated by Lenneberg (1967), if no exposure is available, the genetic advantage of the Critical Period disappears and thus language acquisition is no longer possible with innate mechanisms.

In line with this theory, neuropsychological research has shown that even if language activity is not localized, it mainly takes place in the left hemisphere in right handed individuals. Therefore, second language learning has to take place while functions are flexibly set, namely before **lateralization**, so that the L2 follows pre-programmed connections for languages. Lenneberg (1967) argued that after lateralization takes place -within puberty-, those areas of the brain devoted to language learning become fixed. Lateralization thus is the beginning of the end of the optimal period for learning a language. Indeed, Vaid (1983) concluded that individuals who acquire a second language later in life show more right hemisphere involvement.

LEFT HEMISPHERE		RIGHT HEMISPHERE
Phonology		*Non verbal information*
Morphology		*Visuospatial information*
Syntax		*Intonation*
Function words		*Nonliteral meaning*
Inflections		*Ambiguity*
Tone systems		*Pragmatic abilities*
Much lexical knowledge		*Some lexical knowledge*
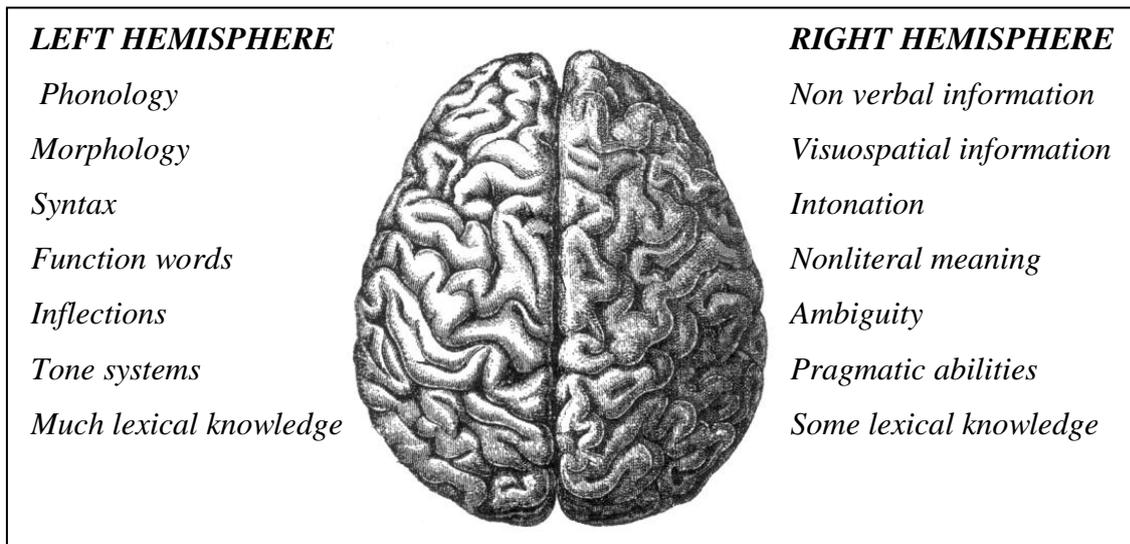
Figure 1: Brain lateralization. Adaptation from Saville-Troike (2006)

The concept of **plasticity** is related to that of lateralization. Research has shown that when a brain area is damaged in early childhood, brain plasticity allows another area to take over the functions of the damaged area, avoiding permanent impairment. However, according to Penfield and Roberts (1959) after puberty, plasticity decreases and therefore attaining native like proficiency is almost impossible.

Myelination has also been proposed as a biological factor explaining the effect of age (Long, 1990). It consists of the development of white-matter substance around the brain's nerve fibres which protect the nerves. This process enables faster conduction of information across nerve cells. It takes place within the first 10 -12 years of life.

There are other biological or maturational explanations for the age factor. The **Competition Hypothesis** laid out by Felix (1985) claims that access to the innate acquisition system has to compete with the problem solving system which is developed within the stage of formal operations described by Piaget. Likewise, the **Fundamental Difference Hypothesis** proposed by Bley Vroman (1989) suggests that adults can not rely on innate mechanisms (such as the access to Universal Grammar) but on problem solving mechanisms instead.

On the other hand, Long (1990) points out that there may not be a **cut off age** for the critical period but different critical periods which pose different problems at different

language levels (for instance, phonology is thought to be acquired earlier than syntax). This is further discussed in the section about age and language components. In any case, this argument could account for the exceptional cases documented of native like levels on late second language learners -such as Julie (Ioup, 1994). Indeed, Knudsen (2004), based on animal studies, highlighted that a difference should be made between the concept of critical and sensitive period. Knudsen (2004) argues that experience has a crucial impact on the brain. In the light of this, he claims that if subjects are deprived access to information that is key for normal development, performance is altered permanently -for instance, ocular representation in the cortex of kittens can only be developed within 30-80 days of life. This accounts for the existence of a critical period. On the other hand, when the effect of the experience on the brain is strong during a limited period of time in development, the term to define that period is "sensitive period" -for example, owls' ability to process spatial auditory information. The latter experience allows adaptative information organisation and fundamental brain architecture modification. However, if problems arise during such a period, they can be compensated and if problems disappear, impairment will be restored if strong exposure is available.

To some authors, such as Svirsky *et al.* (2007), the sensitive period is shorter than it is commonly thought (two years of age) according to the conclusions reached on their studies of deaf babies receiving an implant by using sign language. Therefore, no agreement can be found as to the onset and the end of either the critical or the sensitive period.

Regarding **environmental factors**, the main ground for these is the "affective purity" argument (Genesee, 1978). The "affective purity" argument, based on Gardner and Lambert´s findings (1972), argues that children learn languages better due to the fact that less affective predispositions interfere in their learning process. Marinova-Todd *et al.* (2000) also pointed out that socio-educational and motivational factors are different in children and adults' lives and that these factors are the ones that actually account for the effect of age. To Osterhout *et al.* (2008) the main cause for different performance is the degree of second language **activation** due to exposure and not so much due to the result of our brain's architecture shaping linguistic experiences. This view lines up with construction-based theories (Tomasello, 2003). To connectionists such as Ellis (2002)

the frequency of encounter with a second language strengthens brain connections underlying the knowledge of such language. However, once connections are well established -for instance, in the first language- they are difficult to undo in order to accommodate a second language.

Birdsong (1999) summarized the mechanisms suggested by different authors to explain the effect of age on learning a foreign language. A version of such a table is presented below, as a conclusion to this section. Although he does not line up with CPH advocates, he admits that there are clearly maturational effects evident in second language acquisition and thus the ability to acquire a language declines gradually with age.

	HYPOTHESIS	DESCRIPTION
BIOLOGICAL REASONS	*Loss of (access to) the language learning faculty.*	Innatists (Chomsky) believe that there is a CP in which languages are to be learned. Evolution ensures that these mechanisms are left aside after a period of time so as not to incur costs.
	Use it and then lose it	Likewise, Lenneberg argues that when lateralization takes place, innate mechanisms can not be used.
	Loss of neural plasticity	Penfield and Roberts suggest that less plasticity inhibits native-like proficiency.
	Maladaptive gain of processing capacity with maturation	Felix's Competition Hypothesis and the Fundamental Difference Hypothesis state that different problem solving learning styles prevent innate SLA mechanisms
	Learning inhibits learning	Connectionists argue that once neural connections are established, they are difficult to undo.
	No agreement as to the bounds of the sensitive or the critical period can be found. Long pointed out that there may be different **cut off ages** to different language components acquisition.	
ENVIRONM. REASONS	*Affective filter*	Gadner claims that increased affective predispositions on adults affects SLA. Marinova-Todd et al. includes socio-economical factors as well.
	Use it or lose it	Osterhout argues that the degree of activation determines performance

Table 1: Summary of explanations of age-related constraints in second language acquisition (adapted from Birdsong 1999: 2-9)

2.2. Rate vs. ultimate attainment

When discussing age effects on second language acquisition, a distinction between the two following dimensions is essential: **rate** and **ultimate attainment**. Rate refers to the speed at which language acquisition happens. Ultimate attainment describes the eventual level of performance of the individual in the foreign language.

On the one hand, as far as ultimate attainment is concerned, according to authors such as Patwoski (1980) or Johnson and Newport (1989), in line with the CPH, an early start is a predictor of success in second language acquisition. In other words, there seems to be an agreement among experts to support the idea that <u>early starters obtain a better ultimate attainment than late starters</u>. Findings of research which has tackled this issue are provided in the first section of the literature review.

On the other hand, Krashen, Long and Scarcella (1979) reviewed 23 studies of L2 learning published between 1962 and 1979 and concluded that <u>older learners acquire second language at a faster pace than younger ones</u>. They argue that older learners may obtain better results because of the fact that measure tests involve cognitive maturity which is mainly present in adolescents and older learners. However, Snow and Hoefnagel-Höhle (1978) point out that even if older learners seem to have an advantage in the short run, younger learners will eventually catch up or surpass late starters. According to Long (1990), this advantage may disappear in naturalistic settings in just one year.

So, from the information presented above, there seems to be an agreement among experts. Most researchers suggest that older learners may have an important advantage compared to younger learners: **older learners seem to learn faster in the early stages of second language learning**, and they particularly outperform young learners in grammatical features, **but young learners have an advantage in the long run**. The advantage of older learners is also discussed in the literature review of instructed settings' studies.

Two main **reasons** have been given for this. The first is that it is believed that older learners' <u>cognitive development</u> plays an important role on this rapid improvement. In

other words, different cognitive maturity levels result in different learning styles. DeKeyser (2000) argues that while young learners present a more implicit/ innate learning style, old learners learn more explicitly. The fact that late starters perform better in tests that are related to the explicit knowledge of the language –as grammar tests- account for this distinction. Explicit learning is knowledge expressed in the form of rules or definitions whereas implicit knowledge can be inferred, because of observed performance, although it cannot be clearly described. Implicit learning thus involves intensive exposure. It entails a slow and gradual process, which is typically available in naturalistic settings. Therefore, considering that younger learners obtain higher proficiency levels and that the reasons which explain the initial advantage are maturational, older learners appear to enjoy this advantage only in the short and in the medium term and not referring to all language components, but just to the ones which are believed to be learnt more explicitly –for example, grammar. However, Zurawski (2006) makes a point in this issue: children tend to absorb language only through massive amounts of exposure. The second reason is that older learners' literacy experience enhances the acquisition of some L2 features (Cummins & Nakajima, 1987)

2.3. Age effect on different language subcomponents

As Long suggests (1990), age may have a different effect on different language components. In Ortega's review (2009), two main components of language are said to be affected by starting age: morphosyntax and phonology.

Regarding **morphosyntax**, it is believed to be linked to biological constraints. However, Ullman (2001) suggests that syntax and semantics rely on different mechanisms. While syntax involves computational learning mechanisms, semantics draws on associative learning mechanisms and is thus free of biological constraints. This difference is also explained referring to these innate mechanisms as the "tuning in" of a Universal Grammar that is built-in in individuals and to which post-pubertal second language learners do not have access. However, there is no strong evidence for this, as Singleton points out (1995).

Scovel (1988) believes that **pronunciation** is the only component of language which is physical and demands neuromuscular programming and thus the feature more affected

by lack of early exposure. In Flege's opinion (1999), this is because from the age of 5-7, phonetic categories are stabilized and new phonetic items are processed through the L1 filter (so, not due to a <u>maturational</u> but to a <u>psychoperceptual</u> constraint). In other words, individuals are not able to achieve a native accent in their L2 if they acquire it later not due to the fact that they have lost the ability to learn to pronounce (maturational grounds) but because they have learned to pronounce L1 so well that new phonetic categories are filtered by L1.

On the other hand, Cummins and Nakajima (1987) suggest that previous literacy experience has a positive impact on literacy skills acquisition.

According to Osterhout *et al.* (2008), the differences in performance depend on <u>activation level</u> and not on the age of acquisition, lining up with advocates of environmental grounds for the age effect. Likewise, other authors (e.g. Ioup, 1994) call into question the limitations of CPH given that there are exceptional cases of proficiency in post-puberty starters and claim that motivation is the feature which plays the key role. As it has been stated above, several cases have been reported of late starters who have apparently attained native like proficiency, as Julie (Ioup, 1994).

Finally, different authors suggest different **age limits** for the components mentioned above. Lenneberg considers that the higher bound of the critical period is placed at puberty. However, Seliger (1978) according to the conclusions drawn from studying patients with aphasia suggested that there are different schedules for different abilities. In line with Seliger, Long (1990) situates the higher bound for phonology at the age of 6 and the higher bound for morphosyntax at the age of 17. As it has been also pointed out above, different learning styles and cognitive maturity are said to account for the difference above.

3. L2 literature review

As stated above, age has an important influence in successful second language acquisition to a different extent depending on the conditions of exposure. So, first of all, findings which support the theoretical background reviewed above are briefly presented, given that for years, they have been references of age research. However, these studies

have been carried out in **naturalistic settings**. Yet, recent studies have shown that the findings of naturalistic settings cannot be extrapolated to instructed settings. Therefore, a deeper presentation of a rather recently studied dimension of the age factor, which is much more significant to this project, is carried out afterwards: research dealing with the effect of age upon **the L2 classroom** will thus be reviewed. A brief chronological revision is carried out as an introduction to previous studies closely linked with the scope of this project. Finally, after clarifying the empirical grounds for the influence of age factor on second language acquisition, and particularly on aural perception, we will present this study's hypotheses, which will be undoubtedly helpful for teaching purposes.

3.1 Age factor: reference findings

First of all, as to the **causes** of the age factor, the cases of Victor or Genie (Itard, 1962; Curtiss, 1977) and deaf children who receive late diagnose (Mayberry, 1993) provide evidence for the Critical Period Hypothesis. Likewise, Patwoski's findings (1980), among others, suggest that age of start is a predictor of successful L2 acquisition. So, because there are empirical studies which support the theory that better ultimate attainment is achieved by early starters, evidence in favour of the CPH seems to be consistently provided, as it will be seen below.

Secondly, several studies have dealt with the two **dimensions** influenced by age discussed above: rate and ultimate attainment. These studies have compared early and late starters' native-likeness. Below, an outline of the most outstanding studies in this field is laid out in order to understand the conclusions reached by their authors.

First of all, research on ultimate attainment is discussed. One of the main studies dealing with the effect of age of onset on ultimate attainment has already been mentioned in this project. Patwoski (1980) conducted a study to confirm the hypothesis that only individuals who had begun learning a second language before the age of fifteen could achieve full, native-like mastery of the language. In other words, apart from seeking confirmation of early starter's ultimate attainment, he would provide evidence in favour of the CPH. To do so, lengthy interviews with sixty-seven highly

educated immigrants to the United States were recorded. Their age of arrival was different but they had all lived in the United States for more than five years. Fifteen highly educated native Americans were also recorded to set the second language speakers' target language. Five minute samples of such interview were transcribed and provided to judges who had to score individuals' performance from 0 to 5 (5 being the level of English expected from an educated native speaker). The judges were given transcribed samples so that they did not judge learners' accent but rather their overall language.

The results are summarized in the figure below. As expressed in the figure, the findings were very clear and were in line with literature: <u>the earlier second language learning starts, the better</u>. Actually, thirty two out of thirty three early learners were rated 4+ or 5. This homogeneity provides strong evidence for the CPH and the hypothesis of Patwoski: an early start is a predictor of success in second language acquisition. On the other hand, the variation in the post-puberty group and the average 3+ score obtained by that group point out to further factors in order to explain success in older learners.
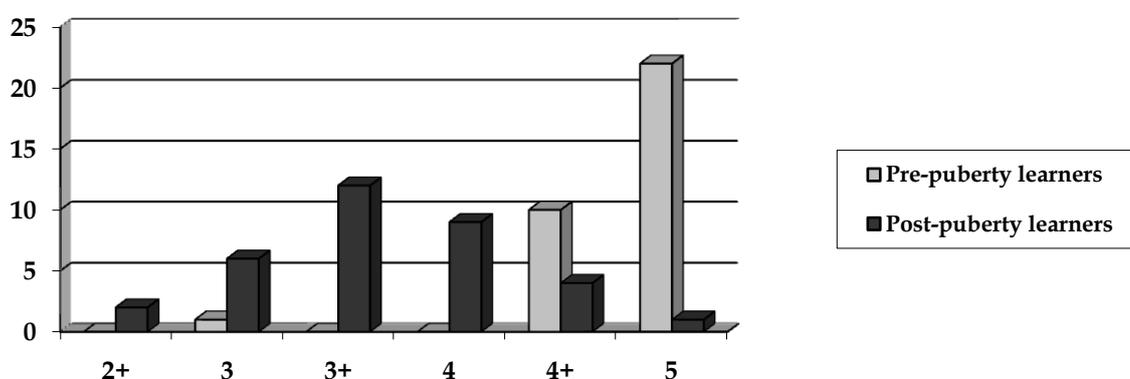

Figure 2: Number of speakers' and proficiency rating in Patwoski's study (1980)

Johnson and Newport (1989) studied the grammatical judgement of forty-six Chinese and Korean speakers who had started to learn English at different ages. The individuals were University students who had been living in the United States for at least three years. A comparison group of twenty three native speakers of English was included. Sentences that tested twelve rules of English morphology and syntax were heard and subjects had to indicate if they were correct or not. On the one hand, early start (age of arrival on the US between three and fifteen) was found as a significant predictor of

success in the test. Indeed, the group who had arrived between the age of 3 and 7 scored within the range of the control group. Late starters (age of arrival between 17 and 39) scored variably (see Figure 3).
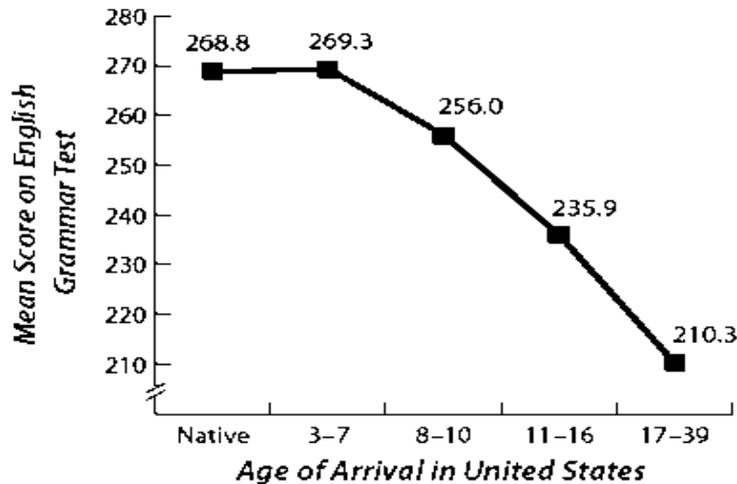

Figure 3: Age of arrival and grammaticality test results (Johnson & Newport, 1989)

DeKeyser (2000) replicated the Johnson and Newport study with Hungarian immigrants to the United States and found similar results. Early arrivals scored above 180 –which was the threshold for nativeness- whereas late arrivals scored under 180 (see Figure 4). Therefore, he reached the same conclusion: <u>those who begin learning a language earlier achieve higher second language proficiency in the long run than those beginning as adults.</u>
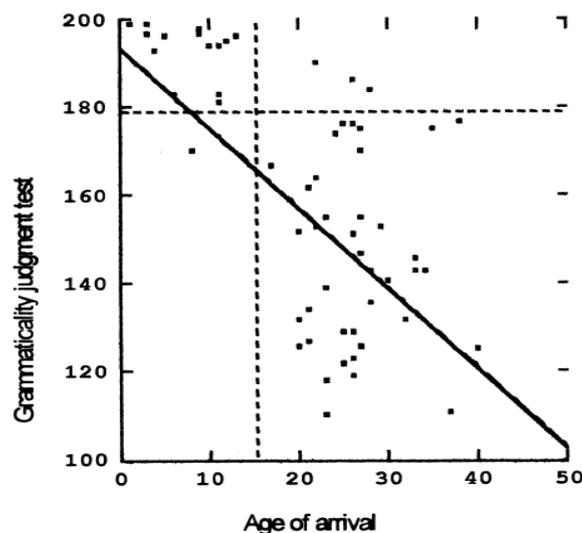

Figure 4: Age of arrival and grammaticality judgment results (DeKeyser, 2000)

So, apart from Patwoski's findings (1980), Johnson & Newport (1989) and DeKeyser's results provide evidence for the CPH.

On the other hand, a lot of research has approached the effect of age on **rate** of second language acquisition. Findings of research carried out on naturalistic settings are summarized below.

Snow and Hoefnagel-Höhle (1978) conducted a study in Holland in which they observed the progress of a group of English speakers learning Dutch as a second language. The sample studied included children, adolescents and adults. A wide range of instruments were used to measure different types of language use and knowledge. One group of native speakers and one group of advanced learners were used as control groups. The subjects of the study were tested within six months of their arrival in Holland and within six weeks of starting school or work. Four months and eight months later they were tested again.

In the first test, adolescents obtained the best results, followed by adults and children. However, in the second test, children were catching up and some even surpassed adults' performance. <u>Overall, adolescents performed best</u>. Below, a sample of the groups' progress in one of the measures used (sentence judgment errors) is provided.
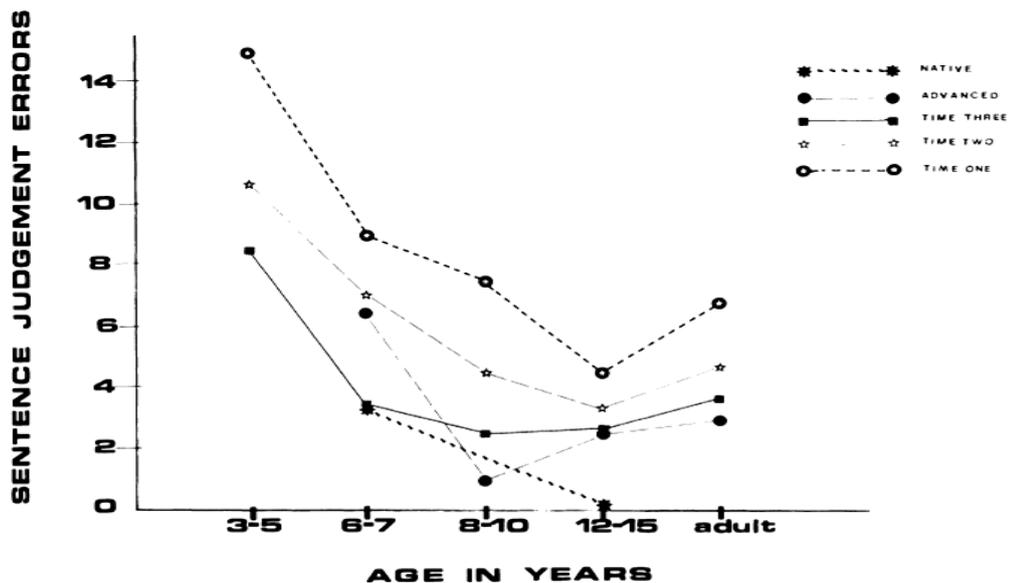

Figure 5: Rate of acquisition of English speakers in Holland (Snow & Hoefnagel-Höhle, 1978)

As it has already been pointed out, Krashen, Long and Scarcella (1979) reviewed 23 studies of L2 learning published between 1962 and 1979 and concluded that <u>older learners acquire second language at a faster pace than younger ones</u>. They argue that older learners may obtain better results because of the fact that measure tests demand cognitive maturity, which is mainly present in adolescents and older learners. DeKeyser (2000) provided support for this idea in his study, in which adults who scored within native levels had high levels of verbal analytical ability (Figure 3).

On the other hand, Oyama (1976) and Patwoski (1980) carried out five long-term studies which showed that young starters obtained higher levels of proficiency after five years of residence in the L2 environment. A decade later, Long (1990) reassessed the existing evidence and reached the same conclusion: <u>the advantage for adults disappears after a period of about one year in naturalistic settings</u>.

The table below summarizes the conclusions reached from research findings in naturalistic settings.

(Naturalistic research)	**Pre-puberty learners**	**Post-puberty learners**
ULTIMATE ATTAINMENT (Patwoski; Johnson & Newport; DeKeyser)	High, almost native-likeness	Varied, average proficiency generally.
RATE (Snow & Hoefnagel-Höhle; Krashen, Long and Scarcella; Oyama)	Slower	Faster at the beginning particularly with certain language components

Table 2: Summary of age effects from literature.

Finally, as far as research on the effect of age upon **different language components**, the most relevant findings are commented below.

Actually, thanks to neuro-imaging techniques measuring the activation patterns of neural networks which take part in different cognitive operations, in-depth research has been carried out. Research using this technique has yielded interesting findings

concerning the existence of a critical period in L2 **morphosyntax** acquisition: late starters were observed to use different brain areas than those of early starters when they were given syntactic stimuli. Neville (2001), in her studies conducted with Chinese-English speakers, and other researchers found evidence that in late bilinguals syntactic processing differs from monolinguals and early bilinguals. However, when dealing with semantic stimuli, these differences dissipate. Actually, Patwoski, Newport and Johnson or DeKeyser's studies were mainly based on syntactic elements and early starters clearly outperformed late starters. So, such findings suggest that learning syntactic functions is different from learning semantic features and that syntax acquisition is thus limited by biological constraints.

Regarding **phonology**, after a thorough revision of previous studies, Scovel (1988) concluded that non-native speaking samples are consistently detected by native-speakers. Flege (1999) gives grounds for Scovel's proposal on the conclusions of the study he carried out with 240 native Korean speakers learning English. Their use and education in L2 were related to morphosyntactic results but not to those of pronunciation, suggesting thus that pronunciation is closely linked to biological schedules. In Oyama's research (1976) male immigrants to the United States who had been there for various amounts of time were judged for degree of accent in English. Her findings provide evidence of the effect of the age of arrival on higher performance levels: adults failed to reach native-like proficiency in their L2. She noticed that their progress seemed to level off at a certain stage, a phenomenon which is usually called "fossilization" or the permanent cessation of second language development and thus the existence of a sensitive period for phonologic acquisition was argued.

Nonetheless, Nikolov (2000) studied thirty-three individuals -Hungarians learning English as a Foreign Language and individuals with different mother tongues learning Hungarian as a Foreign Language- who had acquired native-like accent despite learning the L2 after puberty. Of these, eleven were mistaken for native speakers. Bongaerts (1999) published case studies of late learners showing native-like pronunciation features. Neufeld (1979) conducted a short laboratory experiment with adults who showed that they could be trained to perceive and produce foreign language sounds in a native-like manner. However, Long (1990) questioned the application of such experiment to real life conditions.

As to the relevance of previous **literacy experience** in the L2, Cummins and Nakajima (1987) conducted a study with 237 Japanese children in Canada in which the authors observed that older learners were more likely to have strong reading skills and to a lesser extent, better L2 writing skills.

(Naturalistic research)	Pre-puberty	Post-puberty
Morphosyntax acquisition (Long→ higher bound at age 16)		
Syntactic processing (Computational mechanisms, Ullman)	DIFFERENT (Neville)	
Semantic processing (Associative mechanisms, Ullman)	SIMILAR	
Phonologic acquisition (Long→ higher bound at age 6)		
(Biological constraints or motivation?)	Better due to biological adv. (Scovel, Flege and Oyama's)	Motivation is the key (Nikolov & Bongaerts)
Literacy skills	Worse	Better
	(Cummins and Nakajima)	

Table 3: Summary of age effects on different language components.

Having dealt with the basic concepts and evidence related to age, a more significant literature review for secondary teaching will be provided in the next section.

3.2. The age factor in instructed settings

> "With very few exceptions (…) the L2 learning context has not been included as an important factor in the discussion of the CPH, and findings from second language learning in naturalistic contexts have been generalized to foreign language learning in instructed contexts." (Muñoz, 2006:6)

However, as Singleton noted (1995), school-based studies cannot address ultimate attainment, as formal learning environments typically do not provide learners with the **amount of exposure** needed for the age advantage of young learners to emerge. Such advantage appears in naturalistic settings, as seen above, in about a year. However, 18 years' exposure in instructed settings would be necessary to match one year's exposure in naturalistic settings. Therefore, the results of previous research in instructed settings will differ from the ones in naturalistic settings mainly because of such minimal exposure and very few opportunities to engage in authentic and meaningful communication.

One of the earliest studies in Second Language acquisition within instructed settings was carried out by Thorndike (1928) with students learning Esperanto. He concluded that old learners acquired Esperanto faster. Justman and Nass (1956) also reached the same conclusion a long time ago. They conducted a study with English Speaking learners of French in New York and noticed that very early starters performed no better in final exams than late starters. However, in a replication of that study with Spanish learners the findings were the opposite. In line with Thorndike (2006) Asher and Price (1967), Ekstrand (1976) and Grinder *et al.* (1962) - as cited in Muñoz (2006) - observed that given the same time of exposure (25 minutes, 18 weeks and 1 year respectively), adults performed better than children. These results thus confirm that, as in naturalistic settings, <u>in instructed settings adults have faster learning rate</u>. Likewise in the study with English learners in primary schools carried out in Sweden, Stern (1963) detected that late starters were better at pronunciation and listening skills. In addition, in Burstall's study (1974) under the framework of the NFER (National Foundation for Educational Research in England and Wales) the results of learners who had started French instruction at the age of 8 and students whose instruction had began at the age of

11 were compared. Early starters were found to perform worse than late starters. So, from these first studies on second language acquisition within formal contexts the conclusion reached is that **given the <u>same amount of instruction</u>, old starters will learn the same or even more than young starters**. Even when more instruction is provided to early starters -3600 hours-advantage (Cummins, 1983) - early starters may get lower overall results. Likewise Oller and Nagato (1974) conducted a study in Japan with Grade 11 students who began English instruction in primary school and students who began in secondary school. The authors found that despite different exposure time, late starters caught up early starters. They found no significant differences except for listening comprehension skills, in which early starters outperformed late starters. This finding could be related to Scovel's (1988) emphasis on the importance of an early start for biological constraints in phonology. However, in the EPAL experiment in Sweden (Holmstrand, 1982) no significant differences were found. In Grade 6, learners who had started learning English in Grade 1 did not outperform learners who had started learning English in Grade 3.

As pointed out above, and argued by Cummins and Nakajima (1987), this could be due to different learning styles and the interdependence of academic skills. In other words, due to students' different **cognitive maturity**, late starters may have outperformed early starters. Also, not enough time of exposure is given to young learners in order to catch up (Singleton, 1995). In such studies, early starters have not been given time enough to take advantage of their innate learning mechanisms and not only because not enough time has been provided, but also because, probably, there has not been intensive exposure (Zurawski, 2006)

Yet, Genesee *et al.*'s findings pointed out that the advantage of early instruction is that, in the long run, more instructional time is provided. Thus, Genesee, in a paper published in 1978 in which he tackles second language instruction, advocates that an early beginning followed by work at a secondary level is the most beneficial language policy. He argues that even if late age of onset results in better language efficiency, early instruction provides extended opportunities for language learning.

Recently, two comprehensive studies which have shed light on the effects of age in instructed settings have been conducted in Spain: **the Basque Country project and the**

BAF Project. In both studies, there is a particular focus on aural perception, which will be discussed in detail in the subsection 2.2.1. Nonetheless, the results of the previously-mentioned studies are presented below placing an emphasis on the results of the listening comprehension tests.

In 2003, Garcia-Mayo publishes the results of the <u>Basque Country project</u>. This project took place in the late 1990s, when the age of onset of formal foreign language instruction was being changed from 10 to 8 years. A longitudinal analysis was carried out in order to study age differences in foreign language learning.

Cenoz's research (2002) is framed within the above-mentioned extensive project. She studied the effects of age on learning English, approached as third language acquisition. Sixty elementary and secondary students took part in this study: the first group's age of onset was 7-8 whereas the second group's age of onset was 10-11. This gap in the beginning of English instruction was due to a change in Spanish law in 1993 as to when foreign language acquisition had to start, as pointed out before. All the subjects were tested after the same time of exposure: 564 hours. The instruments used for measuring included two oral tests which were based on a picture story and on a story dealt with in class; a listening comprehension test, a cloze test, a grammar test and a composition. The results provide support for the findings of previous studies: the hypothesis of old learners' better performance seems to be confirmed. **In general, late starters obtained higher results in instructed settings**. Although marginally, the differences in listening comprehension were found to be significant (see Figure 6).
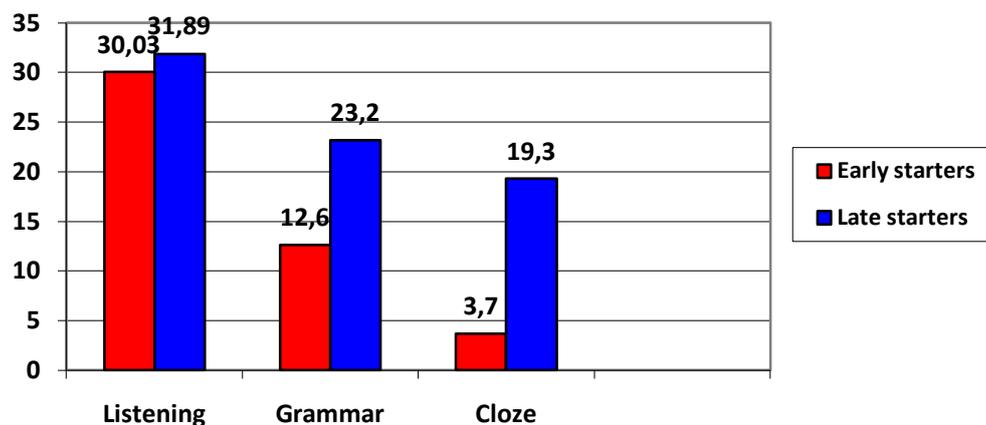
Figure 6: Listening, Grammar and Cloze results from Cenoz's study (2002)

On the other hand, Carmen Muñoz *et al.* started the Barcelona Age Factor Project in 1995, taking advantage of the changes in the age of start of onset of EFL instruction as well. They aimed at studying the effects of the age of onset on language acquisition. In their study, they included individuals whose age of onset was 11 and individuals whose age of onset was 8 (due to the fact that the new timing was being progressively implemented). In addition, three other less numerous groups with individuals who had begun English instruction at the age of 14, 2, 6 and 18 or older were included. These groups were to be tested three times: after 200 hours of instruction, 416 hours and 726 hours. However, provided that the study was carried out during an extended period of time, comparisons between all groups was not always possible.

As to the measures used in this study, the following tests were included: dictation (in English, Catalan and Spanish), cloze (in English, Catalan and Spanish), listening comprehension, grammar, written composition, oral narrative, oral interview, phonetic imitation, phonetic discrimination and role-play. The results commented on the article (Muñoz, 2006) support the idea that older learners have an advantage over young learners when provided with the same amount of exposure. Indeed, the differences showed a linear increase after the different testing times. However at different testing times, it was observed that aural skills did not show such a significant difference and cognitive maturity was thus identified as a factor which plays an important role. On the other hand, the authors concluded that whereas morphosyntactic skills seem to be very influenced by age, listening skills seem to be more affected by the length of exposure.

In conclusion, when subjects are tested at the same age (and thus have a similar cognitive maturity, learning style and literacy experience (DeKeyser, 2000; Cummins and Nakajima, 1987), given the advantage of longer time of exposure (Johnstone, 2002; Genesee, 1978), early starters surpass late starters. In other words, it seems that, an **early start even in formal contexts results in better ultimate attainment.**

3.2.1 Aural perception in formal settings

Flege (1999) suggests that age 5-7 is the age at which L1 phonetic categories are established. Therefore, if second language acquisition begins after that age, individuals will tend to identify vowel segments of the L2 based on L1 phonetic categories although consonant sounds may not depend on the age at which L2 acquisition starts. This slight difference is because as Flege (1999) argues, in those instances in which the phonetic distance between an L1 sound and an L2 sound is perceived to be smaller L2 learners appear to produce the L2 sound with intermediate values between the typical values of L1 sounds and those of L2 sounds. However, when enough exposure is provided, learners may end up distinguishing between L1 and L2 phonetic categories. Indeed, in Bongaerts (1999) *et al.* research, this theory is confirmed with cases of native-likeness at a phonological level in late starters. However, as in the case of Cebrian (2003) and Rallo (2003) (as cited in Fullana, 2006) this is mainly the case of individuals studying a University degree in the foreign language in question. Nonetheless, this study is concerned about secondary education.

In the Barcelona Age Factor project and the Basque Country project, aural perception was looked into in terms of discrimination and in terms of listening comprehension –as it has already been pointed out.

On the one hand, the aim of Fullana's study (2006) -carried out within **the BAF project**- was to analyse the effect of age and the length of exposure on learners' perception and production of the L2. Learners who participated in this study had only been in contact with English in formal instruction settings. The instrument used was a perceptual task, a same-different discrimination task with twenty minimal pairs -of which thirteen were different. Out of the twenty minimal pairs, eight stimuli focussed

on vowel sound oppositions and five on consonant sound oppositions. Also, thirty-four items were asked to be repeated, consisting of problematic features for Spanish native speakers (tense/lax vowel distinction, word-final consonant voicing and consonant clusters in both word-initial and word-final position). Learners were tested after 200, 416 and 726 hours of instruction respectively. On the two first testing times, the findings suggested that early starters (8 years old) performed significantly worse than late starters on consonant discrimination. However, after 726 instruction hours differences were not significant. For vowel discrimination, early starters caught up after just 416 hours of instruction.
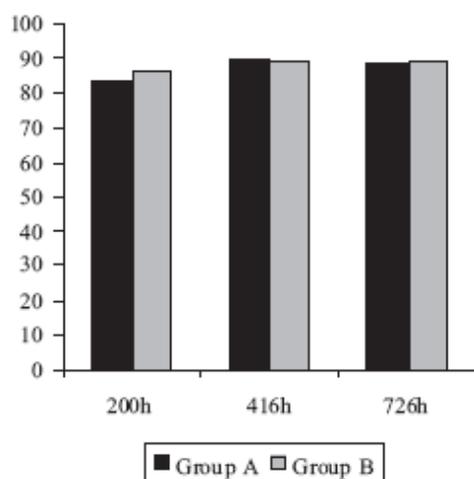
Figure 7: Percent correct identification scores on /ɛ/ as a function of onset age and exposure (Fullana, 2006).

Likewise, late starters outperformed early starters in the listening comprehension test which Muñoz (2006) carried out -also within the BAF project. The task consisted of a picture selection test in which subjects were asked to match 30 heard utterances in increasing difficulty order to the picture they matched. The results showed a linear correlation between age of testing and performance (see Figure 8a). As discussed above, this provides grounds for the cognitive explanation of the age factor (DeKeyser, 2000; Cummins & Nakajima, 1987). In terms of age of onset, given the same length of exposure, early starters were not observed to catch up (see Figure 8b). So, late starters seem to outperform early starters in instructed settings in listening comprehension, but it is not clear if it is due to their superior cognitive maturity or not. A test on subjects with

the same length of exposure, the same age of testing but different ages of onset could have shed light on this issue.
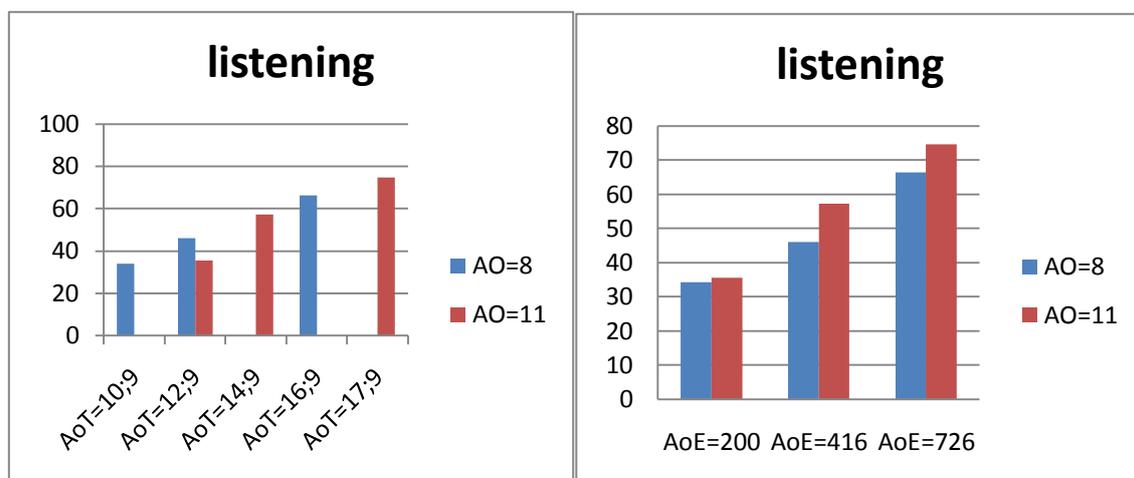

Figure 8: Listening results from Muñoz (2006) according to learner's age of testing –AoT- (8a) and according to learners' age of onstet –AoO- and length of exposure –here Age of Exposure, AoE- (8b).

On the other hand, García Lecumberri and Gallardo (2003) have also carried out a study -within the **Basque Country project**- in order to determine the influence of age on aural perception. They conducted a study with Basque-Spanish bilinguals learning English as a third language. The authors sought to determine if the age of onset played an important role in aural perception. Age of onset of the three groups analysed were 4, 8 and 11 years old. A total of 20 subjects were analysed after 6 years of formal instruction. To rate their perception skills, they were administered a test which consisted of a 45 minimal pair discrimination task -containing 23 consonants and 23 vowels. Monosyllable minimal pairs were chosen in order to draw students' attention to the phonemes, which were chosen according to previous research findings on difficulties and the authors own experience -including initial positions such as "goat" and "coat" and final positions such as "bag" and "back". Instead of being similar or not, they had to choose a card with the meaning or a word to which the stimuli was related. Older students outperformed the other two groups in sound discrimination so, again, the older the better discrimination. These findings do not seem to support the hypothesis that an earlier age of onset is a favourable factor in aural perception.

AGE EFFECT ON INSTUCTED SETTINGS		
GENERAL STUDIES		
Author	**Study**	**Conclusion**
Thorndike (1928)	Esperanto learners	Older learners faster
Justman & Nass (1956)	French learners	Early starters perform no better than late starters
Asher and Price (1967) Ekstrand (1977) Grinder *et al.* (1962)	25' exposure 18 weeks' exposure 1 year exposure	Older learners have an advantage at the beginning
Burstall (1974) *Pilot Scheme*	16-year-old English speakers introduced to French at age 8 or 11	Older students better than younger ones on all measures
Oller & Nagato (1974)	Japanese studying English tested on Grade 11 either starting in primary or in secondary school.	No differences found
Holmstrand (1982) *EPAL experiment*	Sweden speakers introduced to English at different grades	No differences found
Cenoz (2002)	Spanish speakers introduced to English at age 11 and 8.	Except in pronunciation, the older the better.
BAF Project (2006)	Spanish speakers introduced to English at age 11, 8 and 4.	The older the better in all measures

Table 4: Summary of general studies on the influence of age in instructed settings.

AGE EFFECT ON INSTUCTED SETTINGS AURAL PERCEPTION RESEARCH		
Author	**Study**	**Conclusion**
Fullana (2006)	BAF Project (AoO 8 and 11) Minimal pairs and production	The older the better, although after 726 hours of exposure differences were minimal.
Muñoz (2006)	BAF Project (AoO 8 and 11) Listening comprehension	Late starters outperform early starters, although AoT seems significant.
Lecumberri and Gallardo (2003)	Basque Country project 20 subjets (AoO 4, 8, 11) 45 minimal pairs	The older the better

Table 5: Summary of aural perception-related studies on the influence of age in instructed settings.

4. Empirical study

4.1. Research question

Based on the literature review conducted above, we are now in a position to set up the relevant research questions and hypotheses.

This study aims at providing further data on this recently studied field: **the effect of age on instructed settings, particularly on aural perception,** which is one of the most controversial components affected by age as seen on the literature review. The effect of age of onset on aural perception in naturalistic contexts seems to be clear. Scovel (1988) and, particularly, Flege (1999) offer wide evidence of negative impact of a late start on successful aural perception. However, no agreement can be found on whether there is a clear correlation between age of onset and better aural skills on instructed settings or not. In instructed setting research, a late age of onset seems to favour better aural

perception skills (Cenoz, 2002; Garcia-Lecumberri & Gallardo, 2003; Muñoz, 2006; Fullana, 2006). However, previous findings also suggest that cognitive development, expressed by learners' age of testing, plays an important role on learners' performance, together with length of exposure (Muñoz, 2006)

In this research, the independent variable is the performance on **aural perception**. On the other hand, **age** constitutes the dependent variable. Nonetheless, age is going to be tackled from different perspectives, according to what is inferred from the literature review. First of all, the effect of the age of onset (AoO) on aural perception will be measured. Due to the fact that –as explained below- one of the groups will have an age of onset which can be placed on the threshold for the critical period for successful phonetic acquisition (6 years old), this possible advantage will be analysed. Secondly, as it has been suggested (Muñoz, 2006; DeKeyser 2000) the effect of cognitive maturity, which is to say, of age of testing (AoT) will be measured. Finally, the effect of another important variable often mentioned in previous papers (Johnstone, 2002; Muñoz, 2006), namely, the length of exposure (LoE), will be also observed. Length of exposure is believed to be a beneficial factor in better L2 acquisition and it is the key argument for advocators of an early start (Genesee, 1978).

This study intends to show that the age factor on instructed settings is related to a greater extent to rate of acquisition and not ultimate attainment, in line with recent findings in instructed settings and contrary to what is commonly believed. As it has already been pointed out, the limited amount of exposure that instruction in a foreign language provides does not allow early starters to take advantage of their innate mechanisms (DeKeyser, 2000). Because of this, despite the fact that learners have not surpassed the cut off age for the critical period for phonetic acquisition, they will not be able to attain native-like performance in aural perception. The first hypothesis of this research (H1) thus stipulates that an early age of onset does not guarantee a better linguistic attainment.

H1: "In instructional contexts, in which minimal exposure are provided, early starters cannot take advantage of their innate language learning mechanisms and thus do not attain native like proficiency in aural perception." So, an early age of onset does not guarantee a better linguistic attainment".

> Early start ≠ native like proficiency

The second hypothesis of this research (H2) is in line with the main results recently yielded by literature in terms of aural perception in instructed setting (Muñoz, 2006; Fullana, 2006; Garcia-Lecumberri & Gallardo, 2003; Cenoz, 2002), which are supported by results on general language skills acquisition studies in instructed settings (Muñoz, 2006; Mayo, 2003; Holmstrand, 1982; Burstall, 1974). It stipulates that an early start (or an early <u>age of onset</u>) does not entail better performance in instructed settings.

H2: "In instructional contexts, early starters will not perform better than late starters in aural perception".

> Aural perception: Early starters ≤ Late starters

The third hypothesis of this study (H3) seeks to confirm what DeKeyser (2000), Cummins and Nakajima (1987) or Krashen, Long and Scarcella (1979) argue: cognitive maturity and previous literacy experience account for the better performance of older students. These authors argue that the age at which learners' are tested, that is, learners' <u>age of testing</u>, plays an important role in their performance. As discussed above, Muñoz findings (2006) gave ground for this explanation. When the results on the measure tests were compared taking into account learners' age of testing, the older the learners' were, the better they performed. If in H2 early/late starters referred to learners' age of onset, that is, the age at which L2 acquisition started, a new concept will be introduced for this hypothesis, that is, age of testing. Hence, younger/older learners will relate to learners' chronological age, the age at which they are tested.

H3: "In instructional contexts, older learners will outperform younger learners"

> Aural perception: Younger learners ≤ Older learners

Finally, the last hypothesis of this research (H4) aims at confirming what many authors (Zurawski, 2006; Johnstone, 2002) point out to be the main advantage of an early start in instructed settings: it increases learners' exposure to L2, hence learners' ultimate attainment. In line with them, Muñoz (2006:34) concludes that "*second language learning success in a foreign language context may be as much a function of exposure as of age*". So, H4 is formulated as follows:

H4: "Subjects with longer length of exposure (LoE) will outperform subjects with shorter length of exposure (LoE) in aural perception"

↑ LoE = ↑ Aural perception

↓ LoE = ↓ Aural perception

4.2. Method

4.2.1 Subjects and instruments

Due to time and resources constraints, the scope of this research remains limited. Given that this project was started in February, data could not be collected until the second week of May, within the last weeks of the academic year. Teachers were thus reluctant to let students participate in the study[1]. So, this study has been carried out with the subjects available.

In total, **sixty-four EFL learners** in instructed settings have been included in this study. Only three subjects having retaken two or more academic years were excluded. Subjects who have been included in this study are currently studying grade 10, grade 8 and grade 4 in state schools. The exposure that all of them have had to English is only through formal instruction. None of them have had remarkable stays abroad. Due to the recent changes undergone by the primary education system -to comply with the latest national regulation regarding foreign language learning- there were important differences in the age of onset of the subjects included in the study. This has allowed a creation of two comparison groups with similar characteristics (early/late starters –highlighted in Table

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[1] Additional limitations of this study are commented on *4.5.Limitations of this study*

6) to carry out between-group analysis and a correlational analysis with all the subjects included in this study (all the subjects in Table 6).

Comparison groups have been created according to similar average <u>length of exposure</u> (7.54 years for early starters and 7.17 years for late starters). Early starters' average <u>age of onset</u> was 5.38 whereas late starters' average age of onset was 7.73. Finally, average <u>age of testing</u> of early starters was 12.92 while late starters' average age of testing was 14.90. Thirteen subjects composed the group of early starters. A higher number of subjects, twenty three, could be found for the group of late starters.

All the subjects in Table 6 (including comparison groups' subjects) were included in the **correlational analysis**, since subjects were very varied in terms of their combinations of age of onset, age of testing and length of exposure.

		AGE OF ONSET							
		3	5	6	7	8	9	10	12
AGE OF TESTING	8			2					
	9		4	2					
	12	1	3						
	13	1	5	5		2	1	1	1
	14			2	3				
	15			8	3	17		1	1
	16			1					

Table 6: Number of subjects included in the study according to their age of onset and their age of testing. Early/late starters included in the between group comparison are highlighted. All the subjects in the table were taken into account to carry out correlational analysis.

In order to obtain the most empirical and significant results possible, being aware once again of the limitations of this study, several **instruments** were chosen to carry out this research.

The first instrument consisted of a discrete point test; **a same-different discrimination task pairs** externally validated (Fullana, 2006) which included eighteen minimal pairs (see Appendix 1). Even if the number of items on this test was lower than the number on previous studies, they were chosen according to the same criteria. A total of ten vowel and eight consonant minimal pairs were included. As in Lecumberri and Gallardo's study (2003), monosyllable minimal pairs were chosen whenever possible in order to draw students' attention to the phonemes. The latter were chosen according to previous research findings on difficulties (Fullana, 2006; Lecumberri and Gallardo, 2003) and in accordance with the pairs chosen on previous studies. Out of the eighteen minimal pairs, six were distracters. Provided that British accent is the variety commonly taught in state schools, a male British native speaker recorded the minimal pairs with an interval of five seconds between stimuli. A table was provided to students in which they had to write a cross down either on the "similar" or on the "different" column depending if they believed that the pair was made of two identical words or of two different words. The minimal pairs were recorded in a random sequence so that students did not notice what phoneme they had to focus on (vowel/consonant). Subjects were given one point for each correct answer-whether the correct answer was "different" when the minimal pair was different or "similar" if the minimal pair was similar. Otherwise, student got zero points.

1.Seat – Sit

2.Ship – ship

3.Man -men

Sample 1: Minimal pairs' discrimination task, stimuli 1 to 3.

The remaining tests were integrative, that is, not only mere aural discrimination was at stake, but listening-comprehension skills. The first of the remaining tests was also based on an already tried instrument. It consisted of a **short listening comprehension task (SLC)** based on the one used by Muñoz *et al.* (2006) in the BAF Project (see Appendix 1). This task was already graded on difficulty, trialled and improved. Moreover, its internal consistency had already been estimated. This short listening comprehension test consisted of a picture selection task in which subjects were asked to match the utterance they heard to one of three pictures presented. The first three items were taken from the

BAF Project's test. For the rest of the items, the sentences validated by Muñoz *et al.* (2006) were kept but as the original pictures could not be found, they were created following Muñoz's pattern (2006). The language used in the stimuli was simple and related to everyday vocabulary. A total of ten items were included, selected from the items in Muñoz's (2006). The items consisted of full sentences, simple at the beginning and complex towards the end. They were presented in increasing order of difficulty. When revising this instrument, the last part of the fifth sentence was omitted in order to simplify picture selection. Likewise, for visual reasons, the words "belt" and "watch" (in Muñoz, 2006) were changed to "flower" and "ball" respectively. When revising this instrument, it was decided to widen the space between pictures by one additional centimetre to avoid subjects' visual confusion. A male British native speaker recorded the utterances with an interval of 5 seconds between stimuli. Subjects were given one point for each correct answer. They were given zero point for each incorrect answer.

4.Which elephant has big eyes and small ears?
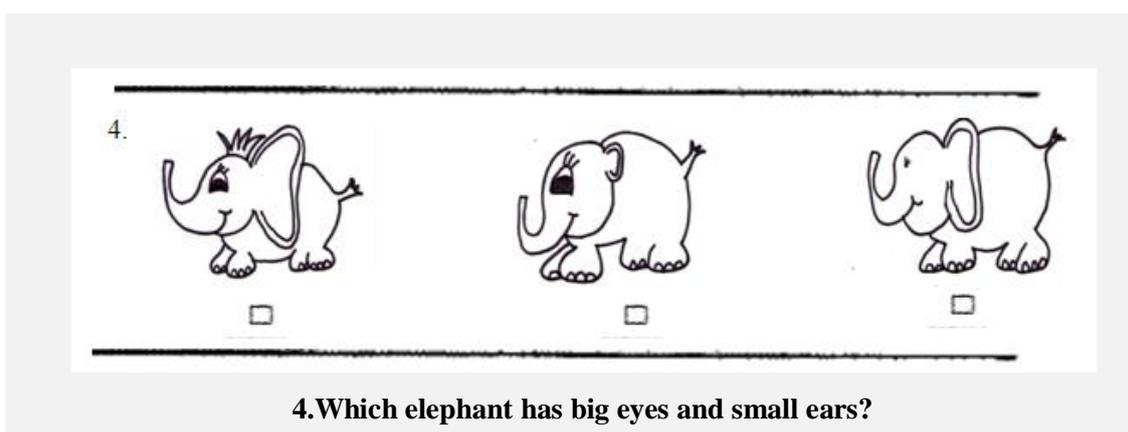
Sample 2: Short listening-comprehension, stimulus 4.

The final instrument was a **long listening comprehension task (LLC)** in which students were asked ten questions which had to be answered by selecting a picture after listening to a short conversation (see Appendix 1). The first five stimuli were shorter - about 30 seconds- and easier -particularly concerning speeches' speed. The remaining five stimuli were a little bit more difficult -about 40 seconds length and faster speech speed. Thus, this task was divided into task 3a and task 3b. To make sure that the task matched the level of the students, stimuli were taken from Cambridge KET -easier half- and PET -more difficult half- exam samples. Cambridge KET exams corresponds to the level students are expected to have by grade 8 whereas the level of PET exams is the one which grade 10 students should have attained, since in the state schools where the

tests were administered, students at those levels are offered the possibility of taking KET and PET exams at grade 8 and 10 respectively. This meant that the accent for the latter stimuli was consistent with the accent of the former ones. Likewise, the language used in the utterances remained familiar to the subjects' day to day lives, although in increasing order of difficulty. The interval between stimuli was kept at 5 seconds. Subjects were given one point for each correct answer.
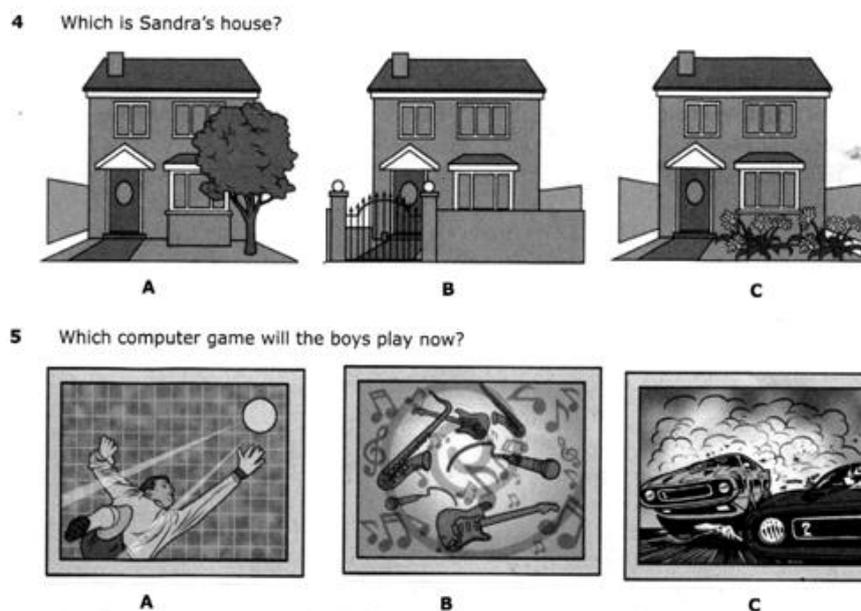
Sample 3: Long listening-comprehension, stimuli 4 and 5.

Finally, a second version of this set of tasks was created only by changing the order of the pictures. By doing so, testees could be administered randomly with the two different versions of this battery of tests so that they focussed on their answers and not on their partner's answers. Subjects were allowed to listen to each stimulus only once. The results of the test were assessed taking into account the total number of correct answers –one point was given per correct answer.

In addition, a background questionnaire was elaborated in order to obtain general information about the subjects (see Appendix 1). The questionnaire included questions about testees' date of birth, their mother tongue, the language they used at home, the age at which they began learning English or the kind of exposure they have had to English language. This questionnaire was particularly useful to dismiss subjects to be included in the study either because Spanish either was not their mother tongue or because they

had re-taken two or more academic years. The questionnaire was written in Spanish. Likewise, the instructions for the testees provided in the tests were given in Spanish. Subjects age of onset, age of testing –provided in the questionnaire- and length of exposure –calculated from the information of the questionnaire- were taken into account in order to make the correlations.

4.2.2. Procedure

Instruments were provided to four different groups within their English lessons. In most of the cases the teacher was not present in the classroom while the test was being carried out. However, in order to control subjects' attention, the teacher made it clear at the beginning of the test that it would be taken into account in the students' global assessment. Two of the groups in which the test was carried out were full groups -from which the two comparison groups could be withdrawn, as shown in the highlighted areas in Table 6. The remaining groups were partial groups.

Data collected was coded prior to statistical analysis. Both the answers to the different categories of the questionnaire and the scores on the different tests were entered in an Excel database. The nature of the information provided from the background questionnaires is rather qualitative, as it helped contextualise subjects. The information withdrawn from the tasks was quantitative, and the scores were organised and analysed in order to confirm the research hypothesis and reach further conclusions.

Due to time and resources constraints, the **software** used to analyse data collected by this research was limited to Microsoft Excel on the one hand and EZAnalyzer on the other. This software allowed data organisation, tables' creation, means calculation, means graphics elaboration, and also the application of inferential statistics: correlation calculation or T-test calculations. First of all, an **independent-group comparison** between the two groups -based on average number of right answers- was carried out with the help of **independent-samples t-test**. Secondly, a **correlation** was conducted for all subjects based on the different variables this study aims at observing – namely age of onset, age of testing and length of exposure and its effect on L2 aural perception- with the help of **Spearman r correlation test**. The results are presented below.

4.3. Results

Despite the lack of time and resources, this study provided significant results with implications for the TEFL in instructed settings. First of all, a comparison of the two groups' performance based on learners' **age of onset** (early starters *vs.* late starters) has been carried out. The average number of correct answers of each group has been compared and the independent-samples t-scores have been calculated to estimate if the differences were significant or not.

As shown in the charts below, although apparently late starters performed only slightly better than early starters in the short listening comprehension task, such differences were found to be significant.

In the **target discrimination task**, late starters performed better than early starters (7.53 average correct answers *vs.* 7.15 for early starters). However, such difference was not found to be significant (t = 0.396, p = 0.391).
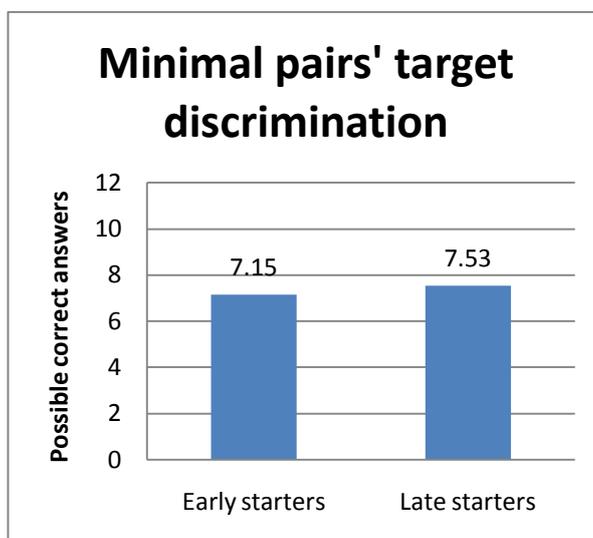
Chart 1: Results for task 1. Target consonant and vowel discrimination -between group comparison.

Likewise, late starters performed slightly better than early starters both on target **vowel discrimination** and on target **consonant discrimination**. The former group obtained an average of 5.44 correct answers for vowel discrimination and of 2.03 correct answers for the target consonant discrimination. The latter obtained 5.31 average correct answers

for target vowel discrimination and 1.69 average right answers for target consonant discrimination (see chart below). However, these differences were not significant in the case of target vowel discrimination (t = 0.362; p = 0.72) although remarkable –not significant- in the case of target consonant discrimination (t = 1.259; p = 0.217).

As far as the **short listening comprehension task** is concerned, the gap widened and the difference on the average number of correct answers between groups increased. As it can be seen on the chart below, late starters' average correct answers' was 6.28 whereas early starters' average was just 4.85. Moreover, this difference was found to be significant (t=2.804; p=0.009). So, late starters outperformed early starters in the short listening comprehension task.
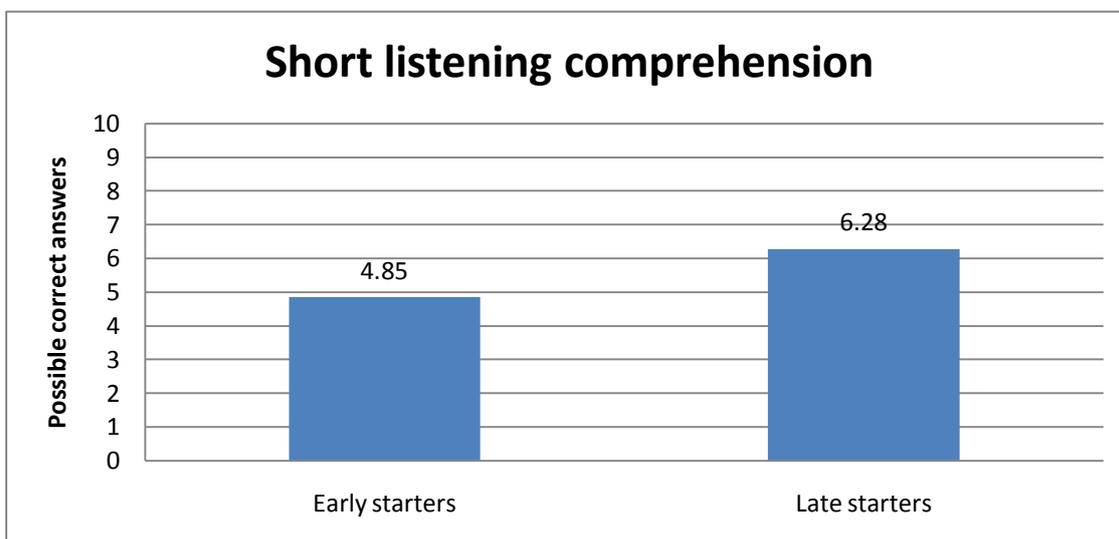
Chart 2: Results on Task 2. Short listening comprehension performance –between group comparison.

Finally, on the chart below, the results of the comparison between early starters and late starters' performance on the **long listening comprehension task** are provided. Despite the similarity between both groups' average correct answers, the difference between the groups' performance is just about significant (t=2.043; p=0.050). Therefore, late starters performed again better than early starters. Early starters' average result was 5.38 correct answers whereas late starters' average result accounted for 6.64 correct answers.
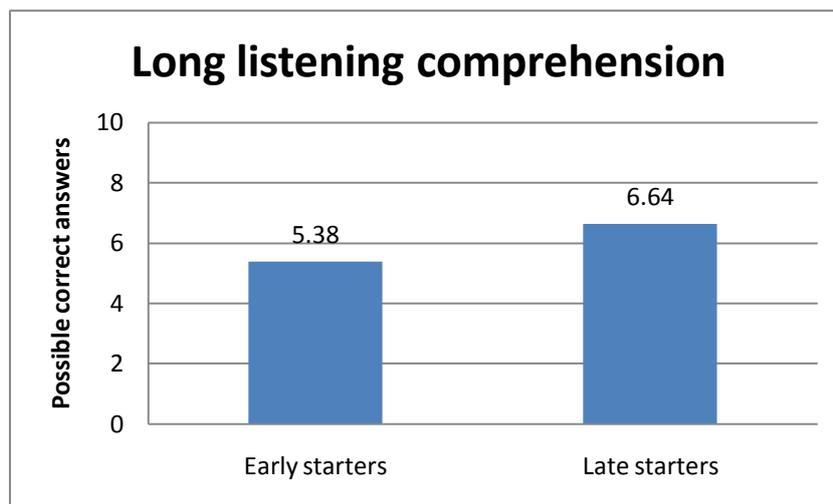
Chart 3: Results for Task 3. Long listening comprehension results –between group comparison.

In sum, the results from the between group comparison entail that given the same amount of exposure, late starters will perform better than early starters on listening comprehension tasks, although minimal differences are found. A possible explanation for not having found a significant difference on task 1–minimal pairs discrimination tasks- is suggested in the section *4.5 Limitations of this study*.

On the other hand, a **correlation analysis** was carried out in order to draw conclusions from the whole sample, which accounted for 64 scattered subjects in total. Three correlations were looked into: the effect of age of onset (AoO) on the performance of the three different tasks, the influence of age of testing (AoT) on the results of the tests and the impact of length of exposure (LoE) on the performance of such tasks. These correlations are summarised below:

(i)   AoO ↔ task 1 [Minimal pairs discrimination task]

(ii)   AoO ↔ task 2 [Short listening-comprehension task]

(iii)   AoO ↔ task 3 [Long listening-comprehension task]

(iv)   AoT ↔ task 1[Minimal pairs discrimination task]

(v)   AoT ↔ task 2 [Short listening-comprehension task]

(vi)   AoT ↔ task 3 [Long listening-comprehension task]

(vii)   LoE ↔ task 1 [Minimal pairs discrimination task]

(viii) LoE ↔ task 2 [Short listening-comprehension task]

(ix)   LoE ↔ task 3 [Long listening-comprehension task]

Regarding the **correlation** of the **age of onset** (**AoO)** and the performance on the **minimal pairs target discrimination** test, a remarkable positive correlation –not significant- was found between AoO and discrimination (r = 0.208; p = 0.10). This entails that late starters seem to be better at aural perception than early starters. That is, this result suggests the later the exposure start, the better subjects discriminate L2 sounds. Anyway, a possible explanation for this weak correlation is discussed on section 4.5.
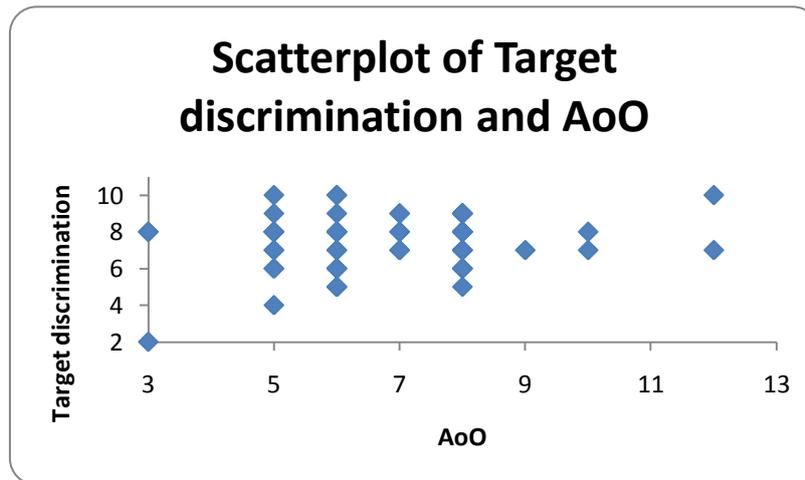
Scatterplot 1: Correlation between age of onset and overall performance on Task 1 –minimal pairs target discrimination task.

Regarding the correlation between the **age of onset** (AoO) and the performance on the **short listening comprehension task**, a positive remarkable correlation between AoO and level of performance was found (r = 0.212, p = 0.092). This is shown on the scatterplot below. This important correlation suggests that the higher the AoO, the higher the performance on the short listening comprehension task. In other words, the older subjects are exposed to English, the better they will perform on short listening comprehension tests.
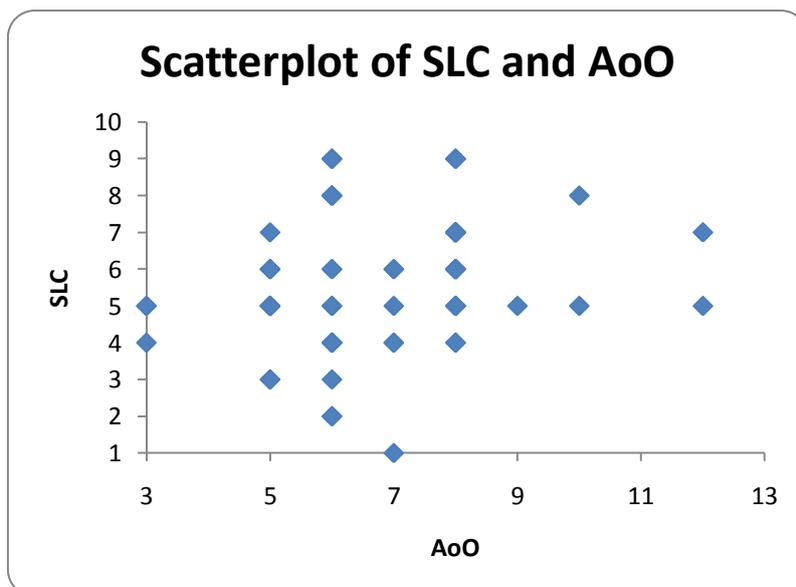
Scatterplot 2: Influence of AoO on short listening comprehension task.

In addition, no correlation was found between age of onset (AoO) and the performance on the **long listening comprehension**. (r = 0.020; p = 0.876).
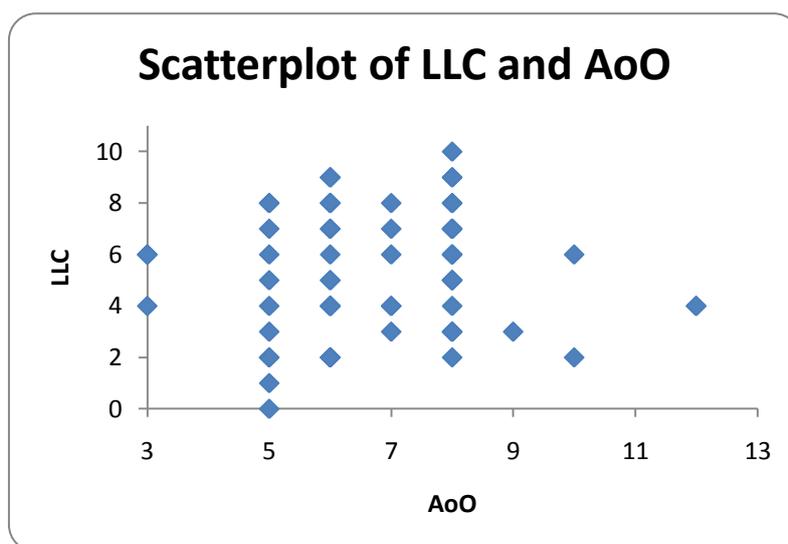
Scatterplot 3: Influence of AoO on long listening comprehension task.

Age of testing has been defined (Muñoz, 2006; DeKeyser, 2000; Cummins and Nakajima, 1987; Krashen, Long and Scarcella, 1979) as a key factor which accounts for L2 learners' performance in instructed settings. It is argued that cognitive maturity and previous literacy experience explain the rapid L2 acquisition on old learners. So, the impact of the **age of testing (**AoT) on the learners' performance in **the instruments** used in this study are presented below.

Regarding the results on the first task –**minimal pair discrimination** task-, only a slight correlation was found between **age of testing** and the performance on the target discrimination task (r=0.153; p=0.226), but a possible explanation for this is offered in section 4.5. This seems to suggest that cognitive maturity has a positive impact on L2 sounds discrimination.
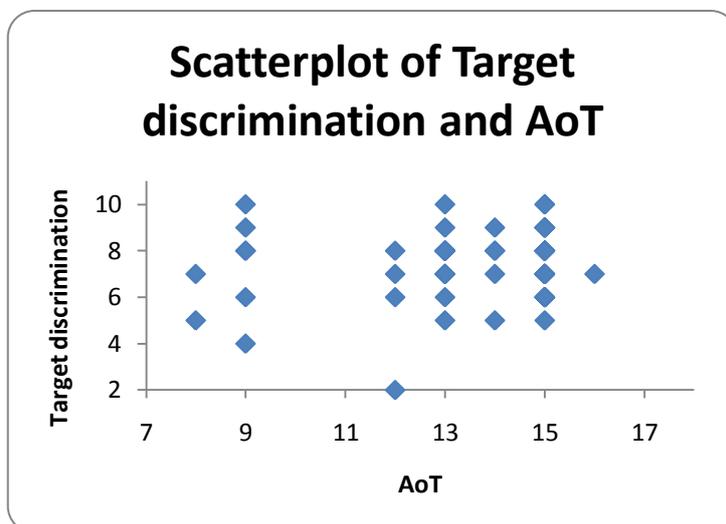
Scatterplot 4: Correlation between AoT and performance on the minimal pairs' target discrimination task.

Nevertheless, correlations on the listening comprehension task provided interesting results. On the one hand, a significant positive **correlation** was found between **age of testing** (AoT) and a higher performance in the **short listening task** (r = 0.432, p < 0.001), as shown in the scatterplot below. In other words, the older the learner is, the better he or she will perform on short listening comprehension tests.
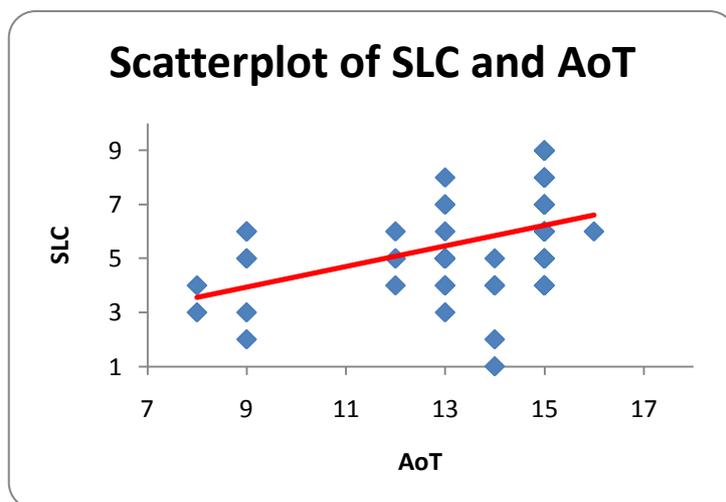
Scatterplot 5: Correlation between AoT and performance on the short listening comprehension.

Furthermore, a significant positive **correlation** was also found between **age of testing** (AoT) performance on the **long listening task** (r = 0.600, p < 0.001), as presented in the scatterplot below. So, in line with the short listening test results, this findings support the idea that cognitive maturity has a positive impact on long listening comprehension. That is, the older, the better listening comprehension performance in instructed settings.
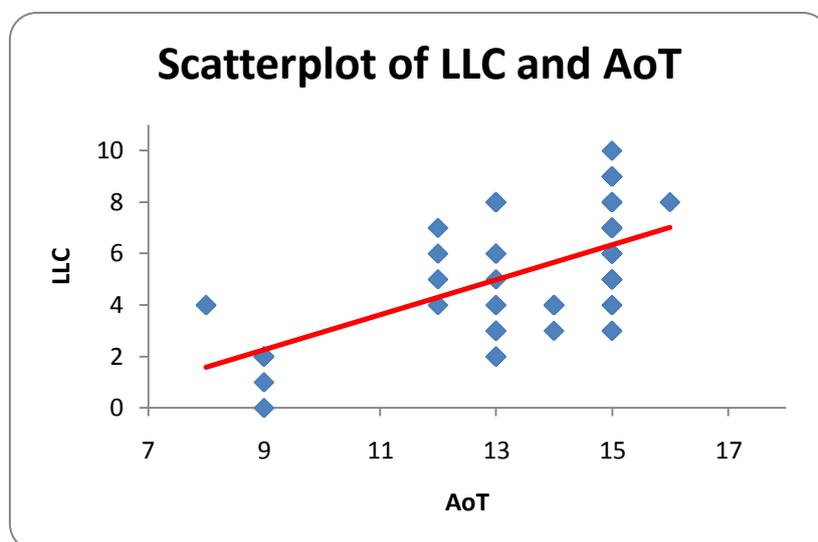
Scatterplot 6: Correlation between AoT and performance on the long listening comprehension task

Finally, as Muñoz (2006:34) puts it "*second language learning success in a foreign language context may be as much a function of exposure as of age*". In addition, many authors (Johnstone, 2002; Zurawski, 2006; Genesee, 1978) argue that the main advantage of an early start in instructed settings is increased exposure. This is also what the results which are presented below seem to suggest.

Regarding the **correlation** between **length of exposure** (LoE) and minimal pairs' **target discrimination** task, no significant correlation was found (r = -0.024; p = 0.850).
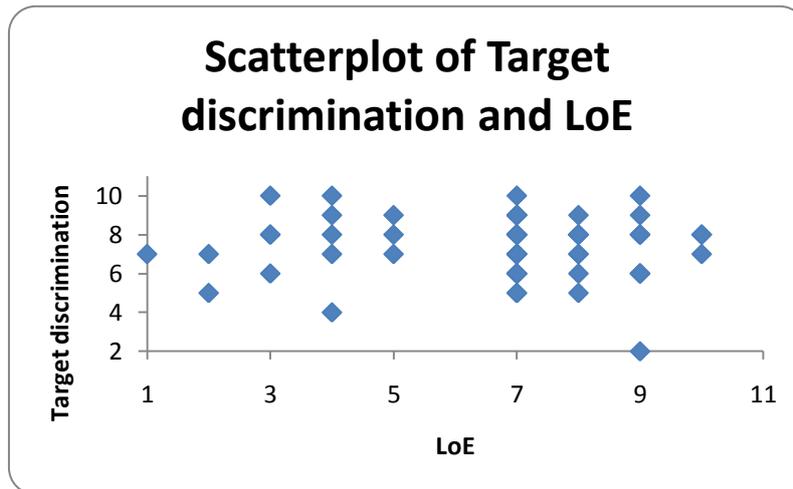
Scatterplot 7: Correlation between LoE and performance on the minimal pairs' discrimination task.

However, a significant positive correlation was found between **length of exposure** (LoE) and performance on **short listening comprehension task** (r = 0.250, p = 0.046), as shown in the scatterplot below.
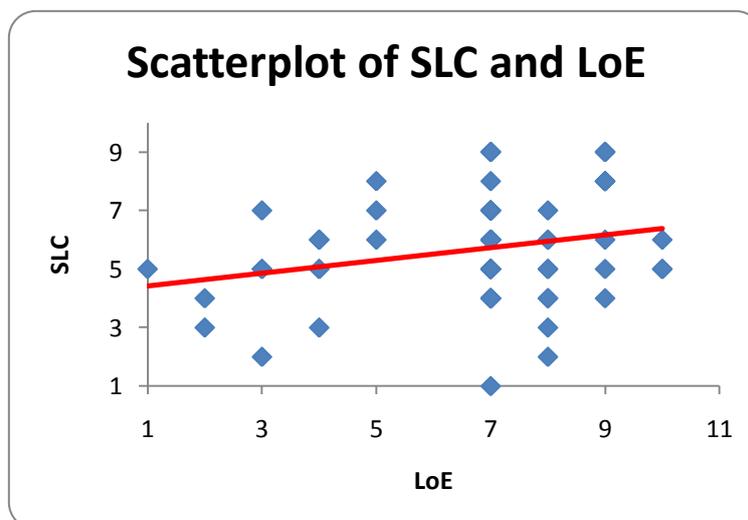
Scatterplot 8: Correlation between LoE and performance on the short listening-comprehension task.

Finally, the **correlation** of **length of exposure** and performance on the **long listening comprehension** task was also found to be significant (r = 0.583, p < 0.001). In other words, length of exposure seems to have a positive impact on listening skills. The latter correlation is presented in the scatterplot below.
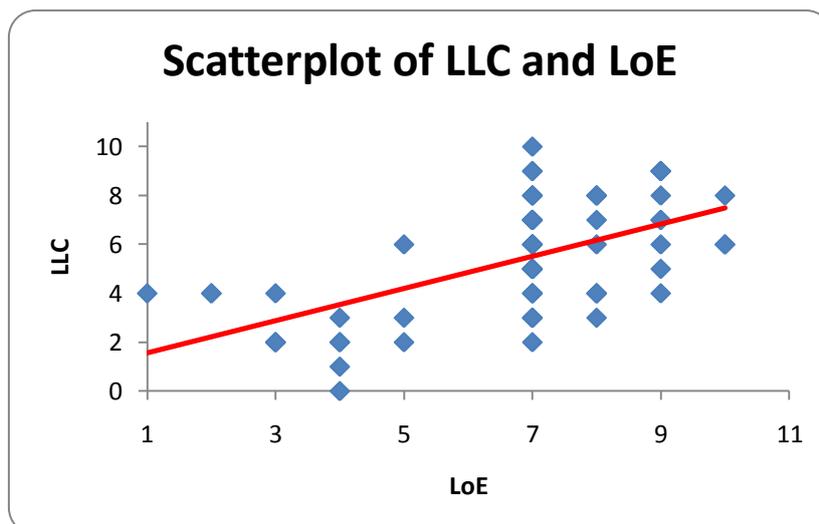
Scatterplot 9: Correlation between LoE and performance on the long listening-comprehension task.

To sum up, given the same amount of exposure in formal settings, differences between early starters and late starters are in favour of late starters. However, there seems to be a very weak correlation between **age of onset** and performance on sounds discrimination and short listening comprehension and no correlation at all between age of onset and long listening comprehension. Apart from that, **age of testing** significantly correlates with better listening comprehension and so does **length of exposure**, although to a lesser extent. These results are discussed on the next section.

4.4. Discussion

The aim of this research was to provide data on the influence that the age factor has on aural perception in instructed settings. Despite the limitations of this study, significant findings have been obtained.

The first hypothesis formulated in this study (**H1**) is already supported by previous instructed setting researchers (**early start ≠ native like proficiency**). Zurawski (2006) argues that in order to take advantage of innate mechanisms, massive exposure is needed. Therefore, even if early starters' age of onset is 5-6 years old –hence within the biological schedule for phonology acquisition (Scovel, 1988; Flege, 1999) -the amount of exposure received will inhibit taking advantage of innate mechanisms and thus native like perception of L2 phonological system. This is because, as Singleton (1995) points

out, learning environments typically do not provide learners with the **amount of exposure** needed for the age advantage of young learners to emerge –as naturalistic environments do (Snow and Hoefnagel-Höhle, 1978). Furthermore, previous findings on aural perception in instructed settings were in line with this hypothesis (Muñoz, 2006; Fullana, 2006; Lecumberri and Gallardo, 2003; Cenoz, 2002).

As it was hypothesized, in none of the tests did early starters attain native-like levels. In other words, an early start does not guarantee native like proficiency. The reason for this seems to be clear in literature: limited exposure in pre-puberty learners', even if innate mechanisms are still available, does not lead to language proficiency (Johnstone, 2002; Zurawski, 2006). This finding main implication has to do with what secondary school teachers should expect from their students. On the one hand, unless learners have gone through a well-developed form of instruction- , they will not have a proficient command of their L2. On the other hand, an early start in such minimal exposure conditions will not allow acquisition through innate mechanisms. There is a deeper implication which is out of the scope of this project but which should not be overlooked. This finding should definitely trigger some reflection upon the implementation of foreign language instruction policies. In Johnstone's words (2002:19) "*an early start involving a few minutes per day from a teacher who, however willing, is not confident or proficient in the language, and based on the assumption that things will succeed simply because 'younger – better', is unlike to meet expectations*".

Regarding **H2**, it has been suggested that age of onset in instructed settings favours late starters (**Age of onset and L2 aural perception: Early starters ≤ Late starters**). The results of this study seem to support it – in the t-test **comparison**, late starters obtained a higher average of correct answers. Nonetheless the difference between early/late starters' performance was significant only in the case of the short listening comprehension task. Furthermore, in the **correlational analysis**, no clear correlation was found between learners' age of onset and their performance in the tasks. In other words, age of onset seems to influence learners' performance in instructed settings in favour of late starters but it can not be said to be a stand alone factor which accounts for the differences. So, despite the fact that in naturalistic settings early starters have been shown to surpass late starters (Snow & Hoefnagel-Höhle, 1978) after a year of exposure

(Long, 1990), this study's findings, in line with previous instructed research, show that instructed settings are to be analysed separately.

Yet, recent longitudinal studies in aural perception (e.g.: Muñoz, 2006; Fullana, 2003) found a stronger correlation between age of onset and aural perception in favour of late starters. In such studies, early starters caught up at the third testing time –after 726 hours of instruction, that is, after about 5 years of instruction. Since this study was carried out after 7-8 years of instruction, this fact could account for the lack of significant differences between the performance of early starters and late starters – except in the short listening comprehension task. Thus, less than 18 years of instruction may be necessary for early starters to catch up in instructed settings. These findings are also in line with the results of more global studies (Oller & Nagato, 1974; Holmstrand, 1982) in which no differences in general L2 performance was found.

Nonetheless, another possible reason for not having found a significant difference -but in the short listening comprehension task- could be the fact that the difference between the comparison groups' ages of onset was not wide enough. Such two years' difference could be argued to be minimal since it only accounts for just about 300 hours of instruction. This probably does not provide learners with a big difference in terms of **amount of exposure** for a difference between early/late starters to emerge (Singleton, 1995) –although it is worth noting that it has been the gap chosen in previous studies (e.g.: Cenoz, 2003).

In addition to that, Snow and Hoefnagel-Höhle (1978) would argue that given the amount of exposure early starters have had, they are still on the first stages of second language acquisition and not ready yet to surpass late starters.

Finally, Muñoz *et al.* (2006) conclude their study suggesting the hypothesis that cognitive maturity development accounts for the decrease of the differences. The latter theory underlies this study's third hypothesis.

So, as far as H3 is concerned (**Age of Testing –AoT- and L2 aural discrimination/comprehension: Younger learners ≤ Older learners in instructional contexts**), the results yielded by this study are in line with previous findings (Cummins

and Nakajima, 1987; Krashen, Long and Scarcella, 1979; Muñoz, 2006). Although no significant **correlation** was found between age of testing and performance on the minimal pairs' discrimination task –probably due to the reasons argued in *4.5*; strong significant correlations were found between learners' age of testing and their performance on the short listening comprehension task and the long listening comprehension task. In other words, in instructed settings, the older you are, the better listening skills you will develop. That is, that cognitive maturity seems to play a very important role in learners' performance in aural perception.

This is in line with Muñoz's conclusions (2006, see Figure 8). Two factors could explain this. On the one hand, learners' experience in literacy skills and discourse handling (Cummins and Nakajima, 1987; Johnstone, 2002) play an important role since learners' are immersed in instruction in compulsory secondary school. On the other hand, such a significant correlation has been found probably because subjects are in the midst of the process of changing from children to adults. This entails that they are going through a sharp cognitive development which account for the cognitive differences that have been pointed out as explanations of chronological improvement of learners' performance (Krashen, Long and Scarcella, 1979), and not only related to syntax. Those are also the reasons why older learners are believed to be more efficient learners (Johnstone, 2002). So, according to this findings, contrary to Flege (1999) or Scovel's (1988) arguments in favour of an advantage on the part of young starters; in aural perception, older learners outperform younger learners in instructed settings.

Therefore, contrary to what has been observed in naturalistic settings (e.g.: Patkwoski, 1980) the influence of literacy skills and learners' cognitive maturity is a key factor which accounts for significant differences in L2 aural acquisition in instructed settings.

Finally, the last hypothesis of this research (**Length of exposure and L2 aural perception: ↑ LoE = ↑ Proficiency; ↓ LoE = ↓ Proficiency**), seems to be confirmed as well. Except for the target discrimination task (see section 4.5), in both listening comprehension tasks there has been a statistically significant correlation between length of exposure and proficiency in aural perception. Muñoz (2006) and Cenoz (2003) also concluded that influence of length of exposure upon learners' proficiency was important –although the correlation was weaker than that of age of testing and performance. In

other words, these findings support the benefits of an early start argued by Zurawski (2006) or Johnstone (2002) -among others-, who admit that although a few hours a week are not enough, they provide longer exposure in the long run. So, even if no clear advantage on the part of early starters has been found in instructed settings research, an early start provides longer exposure and lead, in Zurawski's (2006:4) words "*to build motivation and a 'taste' for language learning*".

Nontheless, contrary to Muñoz's statement that "*(...) second language learning success in a foreign language context may be as much a function of exposure as of age*" (Muñoz, 2006:34), this study has found that age of testing is a much stronger predictor of successful language learning in instructed settings than length of exposure and, even more, than age of onset.

4.5. Limitations of this study

This study has encountered several limitations due to its timing and resources.

First of all, as it has been already mentioned, given that this project started in February, instruments were not ready until the first week of May. Data thus could not be collected until the second week of May. This had several implications in terms of **sample** choice. Firstly, teachers were facing the end of the academic year: they were in the midst of an important revision period. Therefore, they were reluctant to participate in the study since the total time needed for data collection in each group was 30' (15' for questionnaire completion and instructions and 15' for the three tasks) and classes are 60' long, which meant that they had very little time for the lesson in which data were collected. In order to disturb the least, data were taken from two complete groups only. This led me to take data from scattered groups in order to be able to carry out a wide correlational analysis. Secondly, when data were taken from the two full groups, many subjects from one of the groups had to be dismissed for the between-groups' analysis. As it has already been pointed out, new law implementation is being carried out gradually so a wide range of ages of onset can be found in secondary learners nowadays. So, as many learners from grade 8 in particular did not fulfil the requirements to be placed in their group -due to a later start they did not comply with the mean time of exposure required for that group-. Fairly unequal groups were thus left

for comparison. Thirdly, the exact conditions under which the data were collected were impossible to be kept because the groups did not have English lessons at the same period and the amount of students per class was different.

Secondly, the unequal amount of students per class resulted also in unequal listening conditions. Had good resources been provided, the recording of the minimal pairs would have been done in high quality and hence reproduced also in very high quality. However, the recording of the minimal pairs' task did not have an excellent quality and in Grade 11-where up to 33 students were administered the test at the same time- if the sound was turned up, it resulted in bad sound quality. This did not happen in the rest of testing times since groups were smaller. In other words, late starters or older students could have performed much better if they have had a better stimuli's quality. However, due to time constraints, data collection could not be repeated and their performance had to be analysed taking into account the limitations just mentioned.

Finally, the **software** used to analyse the data is not SPSS (Statistical Package for the Social Sciences), the one usually used in this kind of research. A good command of SPSS requires several months of training; hence I opted for Excel together with EZAnalyze, basic software to perform inferential statistics.

5. Implications for ELT in secondary schools.

This project has been carried out in order to help teachers understand the complex and close relationship between the age factor and second language acquisition and, particularly, aural perception for teaching purposes. This is the reason why this project finishes with a section in which the pedagogical implications of the results yielded by this study are discussed.

> *"Whether or not the required language competencies are acquired will depend as much on pedagogical considerations as on time or age factors alone"* (Genesee 1979:152)

So, since age plays a very important role in second language acquisition and so does pedagogy, it is deemed necessary to present this research's implications for ESL teaching. Two major facts have been observed in this research, in line with previous studies.

5.1. Cognitive maturity plays a key role in instructed settings.

In my opinion, the most significant fact is that, in line with what Krashen, Long and Scarcella (1979) suggest, cognitive maturity has been found to be a crucial factor for L2 aural perception. A very strong correlation was found between age of testing and performance. Therefore, in instructed settings, **explicit learning mechanisms (DeKeyser, 2000) do not seem to apply only to rules' acquisition but to what are considered less explicit language skills -such as aural perception- as well**. In Johnstone's (2002) list of advantages for old learners, two explanations are offered for this. On the one hand, he points out that <u>adults are more experienced</u> in handling discourse conversation and are thus more adept at negotiating meaning or gaining feedback. On the other, in line with Cummins and Nakajima (1987), he explains that <u>older learners count on acquired L1 literacy skills</u> –which are of great help, for instance, to scan the information for important ideas or to guess new vocabulary by the context of listened texts-. Older learners have also acquired a wider range of strategies for learning to listen.

This is good news for secondary teachers, since it would entail that listening skills can also be learnt explicitly. Consequently, listening should not be a skill "taken for granted" anymore (Hedge, 2002). Otherwise, that is, if listening ability was automatically developed by exposure, age of testing would not have been found to be the best predictor of aural perception. This has implications at two different levels: at **content** and at an **organisational** level.

As to contents, this finding should encourage teachers to <u>include listening comprehension tasks</u> and to prepare them in order <u>to help learners' explicit acquisition</u>. Taking into account Johnstone's (2002) ideas, L1 listening strategies and experience are incorporated into L2 listening skills. Thus, teachers can make this process easier for learners by making such extrapolation explicit. For instance, tasks placing emphasises

on analysing the impact of L2 intonation on the intention of the speaker –is the speaker emphasizing something? is he expressing a happy feeling?-; detecting formal or informal speech due to the lexis choice –working thus with bottom up listening processes- or practising at predicting what is going to be said given a context – top-down approach- are examples of varied tasks which could be included in order to make the most of old learners' learning efficiency. That is, taking advantage of learners' cognitive maturity. A TBA to aural perception would thus guarantee that the focus is on cognitive strategies which have to be explicitly learnt in L2 (e.g.: skimming or scanning while listening, despite not fully understanding) and not on mere meaning regurgitation. So, despite having a clear purpose, tasks would give students flexibility so that they get involved in their own way (according to their own strategies' choice) and raise their awareness of the foreign language processes.

Teachers will have to carefully choose such tasks and materials in order to make the most of old learners' explicit learning capacity and boost their efficiency. Purposeless tasks, just for the sake of listening, would hence not be advisable for old learners.

Apart from the suggestions discussed above, efficiency can also be enhanced encouraging old learners to actively take part in their learning process. For instance, they can be asked to complete a European Portfolio (see Appendix 2), in which they will explicitly assess their listening skills (from understanding a recognised word in slow speeches, to understanding the main point of radio programme or broadcast delivered fast and with accent).

On the other hand, making the most of students' literacy experience means being thoroughly coordinated with the rest of the teachers to have a similar or a complementary sequencing of contents as far as aural perception is concerned. This could apply to topic selection within two or more subjects –to boost learners' efficiency due to enhanced context activation- or to language skills, even if it is on two different languages. For instance, the basis of a certain spoken discourse type can be tackled both in L1 and L2 at the same time to enhance explicit acquisition of discourse awareness.

5.2. Increased length of exposure enhances proficiency in instructed settings.

In line with Johnstone (2002), Zurawski argues that:

*"(...) starting early can lead to mastery of a foreign language (...) only if it is taught through a well-developed form of total immersion instruction. **A program consisting of a few hours of foreign language teaching per week is not enough**"* (Zurawski, 2006:4)

So, although length of exposure has been found to account for aural perception to a lesser extent than age of testing, it has appeared to be more significantly correlated to performance in instructed settings than age of onset. Actually, this is probably due to the fact that the little L2 exposure that learners' in instructed settings have (Johnstone, 2002; Zurawski, 2006) does not allow early starters to catch up or surpass late starters in aural perception. Indeed, Singleton (1995) estimates that eighteen years of instruction in the foreign language in a formal setting would be needed to attain the same amount of exposure to the target language that is achieved after one year in an L2 naturalistic setting. To make it more visual, an estimate of the exposure learners have in different contexts is presented below.

Foreign language instruction in formal setting		
4 hours * 4 weeks * 9 months =	144 hours /year (16 hours / month)	
Immersion formal programme		
4 hours * 20 days * 9 months =	720 hours / year (80 hours / month)	
Naturalistic setting		
8 hours * 365 days =	2920 hours / year (240 hours / month)	
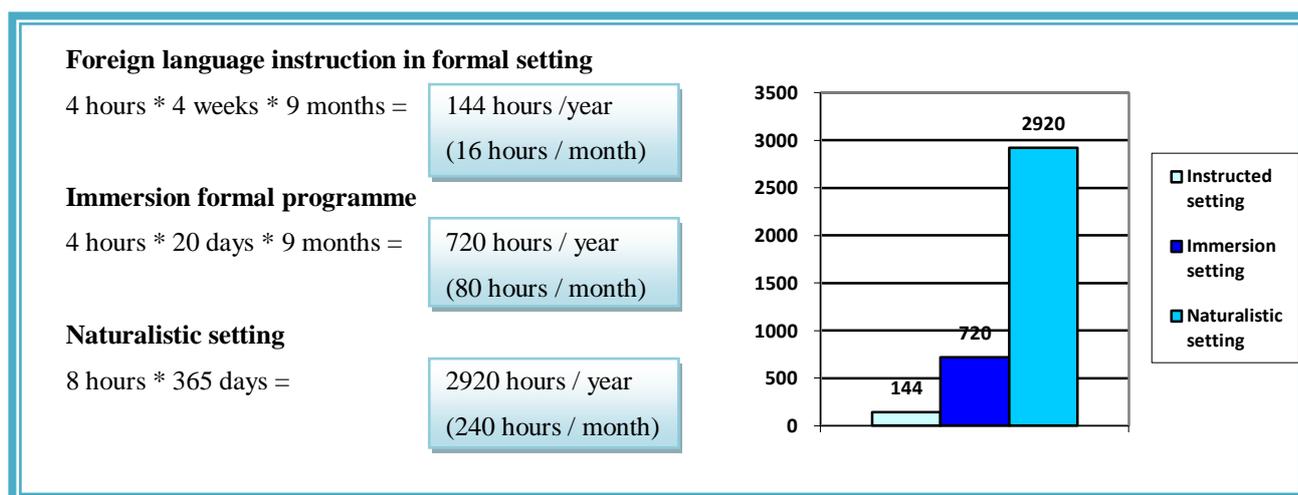
Table 6: An estimate of length of exposure per year in different settings.

Therefore, an early start with little input, and very often, bad input –not confident teachers (Johnstone 2002)-, will not lead to learners' taking advantage of their innate

learning mechanisms. In line with Johnstone, García Lecumberri and Gallardo (2003) point out, the kind of input learners' receive can have a negative impact on their performance. In other words, non-native teachers who are not confident enough or who neglect the use of L2 in the classroom may result in a negative impact on learners' L2 acquisition. Moreover, since secondary learners may still be pre-puberty ones and have plasticity, intensive quality exposure is deemed crucial to make the most of the innate mechanisms they may still have active.

> *"(...) Younger learners may be greatly deprived of their potential advantage when there is not enough exposure and contact with the language for L2 to proceed in the same way as L1 learning." (Muñoz, 2006)*

In addition, Osterhout (2008) argues that <u>language activation</u> is a key element in second language acquisition. Actually, Muñoz and Llanes (2009) have already shown the gains of a short stay abroad not only in aural perception. Therefore, given the importance of this factor together with the remarkable role of length of exposure in aural performance and the fact that it can possibly have a positive impact –if it is intense- on learners' innate learning mechanisms, exposure should be promoted as much as possible. Both within classroom exposure and out of classroom exposures should be maximized. Therefore, on the one hand, teachers will have to provide good input themselves – making sure their language level is still optimal, not using their L1 in order to create authentic communicative needs in the classroom (Cenoz, 2002)- and make sure they make the most to turn as much as possible instruction hours into learning time (Genesee, 1979). On the other, teachers should be up to date as to stay-abroad programs available to their students and encourage them to participate (e.g: grants to take part in immersion English programs, Comenius, E-twinning or private initiatives) or encourage them to have intensive practice (see Appendix 3).

Finally, in order to increase the amount of input students obtain and its quality (as much as possible), bilingual schools should take a step forward and promote their teachers language training to implement a real <u>Content and Language Integrated Learning</u> (CLIL) program. In other words, a program to introduce students to new ideas and concepts in traditional curriculum subjects using the foreign language as the medium of communication. As it is shown in the table above, just by having students immerse in

the foreign language during school hours the total amount of exposure hours would increase by more than 400 per cent.

6. Conclusion

Despite the limitations of this study, a significant insight of the effect of age on aural perception together with its implications for second language teaching has been gained through this project.

Many common misconceptions which affect every day teaching practice have been dealt with in this project, such as the common assumption of "the younger the better" or the underestimation of old learners' potential. Also, important concepts related to the age factor, such as the CPH or the influence on different subcomponents, have been reviewed in depth in order to discriminate what is applicable to formal instructional settings and what is not.

Apart from that, the findings of this study support recent approaches to the age effect on second language acquisition in instructional settings. Recent research is swinging away from traditional theories which place all the emphasis on age of onset (AoO). Muñoz (2006), Cenoz (2002) and other recent authors are providing longitudinal data which show that cognitive maturity or age of testing (AoT) and length of exposure (LoE) –to a lesser extent- are indeed two key elements in success in second language in instructional settings.

This has very important implications for second language teaching at secondary levels, which have also been provided in this work. Taking the findings of this study into account, an instruction which maximizes students' cognitive resources and provides thorough exposure will result in greater language proficiency, rather than just a poor early start, in terms of the quality and the quantity of input available.

To conclude, further research is still needed to have a full picture of the effects of age on aural perception and on second language acquisition in instructional settings, given that more longitudinal studies focussing on the impact of age of testing in L2

proficiency in instructed settings is deemed necessary. Nonetheless, the draft provided up to date entails important implications for secondary school teachers which are to be incorporated in order to move on with that continuous quest for the best teaching practice.

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8. Appendices

8.1. Appendix 1: Instruments. Versions A&B

[version a]

<u>Cuestionario previo</u>

Nombre y apellidos:…………………………………………………………………………………

Fecha de nacimiento:……………………

Lengua materna:………………………………...

Lengua materna de tu padre………………. Lengua materna de tu madre……………

Lengua que hablas en casa……………………….

Sexo: ☐ Mujer   ☐ Hombre

Curso y grupo en el que estás…………………

Nota en inglés el curso pasado………… Nota en inglés en el segundo trimestre………

¿En qué curso empezaste a aprender inglés? ……………………

¿Has estado apuntado a clases particulares de inglés? (profesor particular, academia)…

Si has respondido sí, ¿En qué curso/s?...

 ¿Cuántas horas a la semana?...

¿Has realizado alguna estancia larga (más de un mes) fuera de España? ....

Si has respondido sí ¿dónde?...

…………………………………………………………………………………………..

…………………………………………………………………………………………

Vas a escuchar parejas de palabras en inglés. Si crees que las dos palabras son iguales, pon una "x" en la casilla "similar". Si crees que las dos palabras son diferentes pon una "x" en "different".
Atención: sólo vas a escuchar una vez cada frase.

	Similar	**Different**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

1. Seat – sit
2. Ship – ship
3. Man – men
4. Cat – cat
5. And – and
6. Bus – buzz
7. Vote – boat
8. Cab – cap
9. Gone – gun
10. Serve – serve
11. Dead – debt
12. Still – steal
13. Cop – cup
14. Gibbon – given
15. Zoo – zoo
16. Bug – bug
17. Bare – pair
18. Bad – bed

PRUEBA 2. Instrucciones:
Vas a escuchar una serie de frases en inglés. Señala con una "x" el dibujo que corresponda con cada frase.
Atención: sólo vas a escuchar una vez cada frase.

1.

2.

3.

4.

5.

6.

☐   ☐   ☐

7.

☐   ☐   ☐

8.

☐   ☐   ☐

9.

☐   ☐   ☐

10.

☐   ☐   ☐

1. The boy is wearing black shoes
2. There are three children in the garden
3. The bird is under the chair
4.Which elephant has big eyes and small ears?
5. The girl's teacher is reading

6. The boy is going up the hill
7. These people have just missed the train
8. The father is giving a flower to him an a ball to her
9. The boy is as tall as the girl
*10. If it hadn't snowed, I would have gone to the zoo*

Vas a escuchar una serie de conversaciones en inglés. Señala con una "x" el dibujo que corresponda a la respuesta a la pregunta formulada.

**Atención: sólo vas a escuchar una vez cada conversación.**

1 When must they give the homework to the teacher?

Monday	Wednesday	Friday
A	B	C

2 What will Melissa and her Mum buy?

A   B   C

3 What time does the basketball match begin?

A   B   C

4 Which is Sandra's house?

A   B   C

5 Which computer game will the boys play now?

A   B   C

PRUEBA 3b. Instrucciones:
Vas a escuchar una serie de conversaciones en inglés. Señala con una "x" el dibujo que corresponda a la respuesta a la pregunta formulada.
Atención: sólo vas a escuchar una vez cada conversación.

**1** What regular exercise does David do at the moment?

A ☐   B ☐   C ☐

2 What should Suzie take to Emma's house?

A ☐   B ☐   C ☐

3 Which kind of T-shirt did the boy choose?

sun
sun
sun

A ☐   B ☐   C ☐

4 What frightened the man?

A ☐   B ☐   C ☐
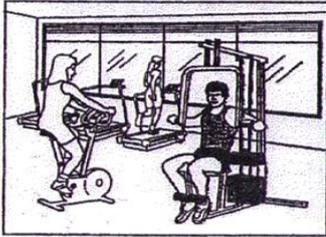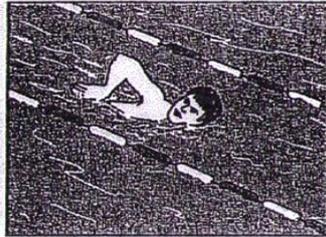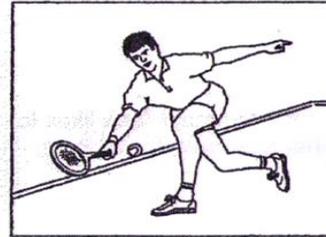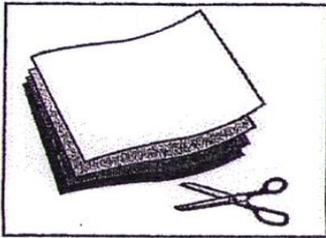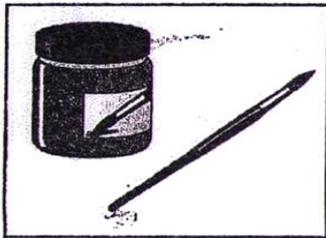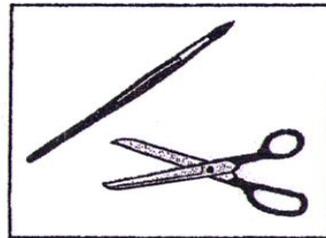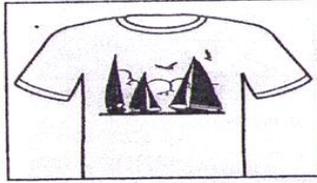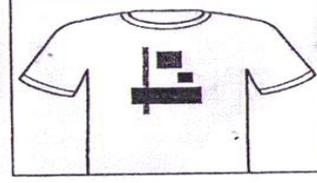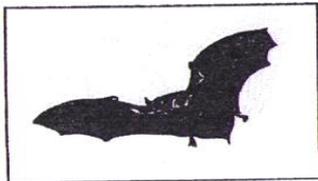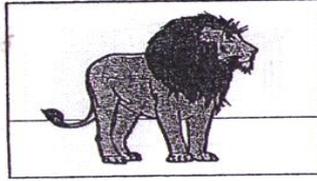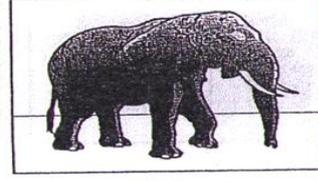
5 Where is the man calling from?
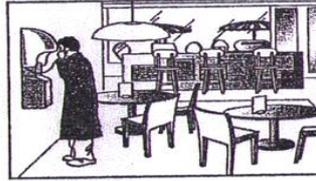
A ☐   B ☐   C ☐

[version b]

Cuestionario previo

Nombre y apellidos:………………………………………………………………………………

Fecha de nacimiento:……………………

Lengua materna:…………………………………...

Lengua materna de tu padre……………….. Lengua materna de tu madre……………

Lengua que hablas en casa………………………

Sexo:　☐ Mujer　☐ Hombre

Curso y grupo en el que estás…………………

Nota en inglés el curso pasado………… Nota en inglés en el segundo trimestre………

¿En qué curso empezaste a aprender inglés? ……………………

¿Has estado apuntado a clases particulares de inglés? (profesor particular, academia)…

Si has respondido sí, ¿En qué curso/s?..

 ¿Cuántas horas a la semana?...

¿Has realizado alguna estancia larga (más de un mes) fuera de España? ....

Si has respondido sí ¿dónde?...

………………………………………………………………………………………………

………………………………………………………………………………………………

PRUEBA 1. Instrucciones:
Vas a escuchar parejas de palabras en inglés. Si crees que las dos palabras son iguales, pon una "x" en la casilla "similar". Si crees que las dos palabras son diferentes pon una "x" en "different".
Atención: sólo vas a escuchar una vez cada frase.

	Different	**Similar**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

1. Seat – sit
2. Ship – ship
3. Man – men
4. Cat – cat
5. And – and
6. Bus – buzz

7. Vote – boat
8. Cab – cap
9. Gone – gun
10. Serve – serve
11. Dead – debt
12. Still – steal

13. Cop – cup
14. Gibbon – given
15. Zoo – zoo
16. Bug – bug
17. Bare – pair
18. Bad – bed

Vas a escuchar una serie de frases en inglés. Señala con una "x" el dibujo que corresponda con cada frase.

Atención: sólo vas a escuchar una vez cada frase.

1.

2.

3.

4.

5.

6.

□   □   □

7.

□   □   □

8.

□   □   □

9.

□   □   □

10.

□   □   □

1. The boy is wearing black shoes
2. There are three children in the garden
3. The bird is under the chair
4.Which elephant has big eyes and small ears?
5. The girl's teacher is reading

6. The boy is going up the hill

7. These people have just missed the train
8. The father is giving a flower to him an a ball to her
9. The boy is as tall as the girl
10. If it hadn't snowed, I would have gone to the zoo

Vas a escuchar una serie de conversaciones en inglés. Señala con una "x" el dibujo que corresponda a la respuesta a la pregunta formulada.
Atención: sólo vas a escuchar una vez cada conversación.

1 When must they give the homework to the teacher?

Monday	Friday	Wednesday
A	B	C

2 What will Melissa and her Mum buy?

A   B   C

3 What time does the basketball match begin?

A   B   C

4 Which is Sandra's house?

A   B   C

5 Which computer game will the boys play now?

A   B   C

Vas a escuchar una serie de conversaciones en inglés. Señala con una "x" el dibujo que corresponda a la respuesta a la pregunta formulada.
**Atención: sólo vas a escuchar una vez cada conversación**.

1   What regular exercise does David do at the moment?

A ☐   B ☐   C ☐

2   What should Suzie take to Emma's house?

A ☐   B ☐   C ☐

3   Which kind of T-shirt did the boy choose?

A ☐   B ☐   C ☐

4   What frightened the man?

A ☐   B ☐   C ☐

5   Where is the man calling from?

A ☐   B ☐   C ☐

8.2. Appendix 2: European Language Passport

Mi perfil lingüístico / My language profile

Evalúate tus competencias / Assess your language skills.

Mi lengua materna: _____

_____

_____

Mis otras lenguas: _____

_____

_____

Idioma		A1	A2	B1	B2	C1	C2
	Escuchar	▓	▓	▓			
	Leer	▓	▓	▓			
	Conversar	▓	▓	▓			
	Hablar	▓	▓	▓			
	Escribir	▓	▓	▓			

Ejemplo / Example

Evalúate tus competencias.

Assess your language skills.

		A1	A2	B1	B2	C1	C2
	Escuchar						
	Leer						
	Conversar						
	Hablar						
	Escribir						

Escuchar / *Listening*

Conversar / *Spoken Interaction*

Escribir / *Writing*

Leer / *Reading*

Hablar / *Spoken production*

		A1	A2	B1	B2	C1	C2
	Escuchar						
	Leer						
	Conversar						
	Hablar						
	Escribir						

8.3. Appendix 3: Ideas to promote L2 exposure.

INITIATIVE	FURTHER DETAILS
Ayudas para cursos de lengua inglesa durante el verano destinadas a jóvenes de entre 16 y 30 años, en régimen de concurrencia competitiva	In March students between the <u>ages of 16 and 30</u> who receive a grant from the Ministry of Education can apply for a grant which can be up to 2600 € to attend an **English course abroad**
Ayudas para participar en el Programa de Inmersión lingüística en colonias de verano en inglés	In February students of the first year of compulsory education (under 13) studying in state schools can apply for a grant from the Spanish Ministry of Education to go to an English speaking summer camp in Spain.
Convocatoria de ayudas para un curso intensivo de inmersión lingüística en inglés, en España, durante el mes de julio, en régimen de concurrencia competitiva	Also in March, students doing the first year of post compulsory secondary education having obtained a mark of at least 7 out of 10 in the fourth year of compulsory education (and already receive a grant) can apply to obtain a grant from the Ministry of Education to attend an **English immersion course in Spain**.
Individual Mobility Programme (Comenius)	In schools which already take part in the **Comenius** Programme, since 2008, students can apply for an Individual Mobility Programme. This allows the student to study 3 to 10 academic months abroad, in another country of the European Union. This program also supports the recognition of the studies done abroad. Other Comenius programmes include shorter **exchange visits** and **meetings** of up to 3 days with schools from different European countries to deal with a topic.
E-twinning	**E-twinning** is a program created to foster cooperation between schools at a European level making use of Information Technologies. It is a program which belongs to the Comenius programme which can be applied by the school. As Johnstone points out (2002), this may lead to joint projects of different subjects (e.g.: Art, Geography or Economics) in which language acts as facilitator
Private initiatives	**Taking private initiatives,** such as making information available about possible real summer camps in the UK to parents, seeking individual exchange partners in different schools or providing extra activities such as an English-speaking cinema discussion group or a theatre group.
School initiatives	**Maximizing real communicative situations** to work with aural perception through activities such as the ones proposed on the first implication in order to raise students' interest in L2 and thus motivate them to be in contact with the language
	Forstering **customized autonomous work** so that students work with L2 from the perspective they enjoy the most. By doing so, exposure to L2 will be enjoyable and undoubtedly beneficial for the learner.

8.4. Appendix 4: Complete data

[groups A & B]

Full name	variable a	Academic year	Sex	Birth year	AoT	AoO	LoE	Total vowel discrimination	Target vowel discrimination	Total consonant discrimination	Target consonant discrimination	Target discrimination	Total discrimination	SLC	LLC
AMH	group a	2 ESO	M	1997	13	5	8	9	6	5	2	8	14	7	4
PEA	group a	2 ESO	M	1997	13	6	7	4	3	5	2	5	9	4	2
RGA	group a	2 ESO	M	1997	13	6	7	9	6	3	2	8	12	4	5
ROB	group a	2 ESO	F	1996	14	6	8	6	4	4	1	5	10	2	4
RVS	group a	2 ESO	M	1997	13	6	7	10	7	6	3	10	16	8	8
RQA	group a	2 ESO	F	1997	13	5	8	8	5	4	1	6	12	3	3
RPA	group a	2 ESO	M	1997	14	6	8	10	7	4	1	8	14	4	4
ABB	group a	2 ESO	F	1997	13	5	8	8	5	4	1	7	12	5	8
DC	group a	1 ESO	F	1998	12	5	7	9	6	4	1	7	13	5	6
SSA	group a	1 ESO	M	1998	12	5	7	6	5	4	1	6	10	6	7
MMA	group a	2 ESO	F	1997	13	5	8	6	4	7	4	8	13	5	6
MPJ	group a	2 ESO	F	1997	13	5	8	8	5	4	1	7	12	5	8
LGA	group a	1 ESO	M	1998	12	5	7	8	6	5	2	8	13	5	5
RGM	group b	4 ESO	F	1995	15	8	7	8	6	4	2	8	12	7	7
VVJ	group b	4 ESO	M	1995	15	8	7	10	7	4	2	8	14	9	7
ZSM	group b	4 ESO	M	1995	15	8	7	8	6	6	3	9	14	9	8
OLJ	group b	4 ESO	M	1995	15	8	7	6	3	3	2	8	9	6	6
MPN	group b	4 ESO	F	1995	15	8	7	8	5	6	3	5	14	7	5
OCM	group b	4 ESO	F	1995	15	8	7	6	5	4	2	8	10	5	7
PTM	group b	4 ESO	M	1995	15	7	8	9	6	4	2	8	13	6	6
BPA	group b	4 ESO	M	1995	15	8	7	7	6	4	3	8	11	6	5
FCJ	group b	4 ESO	M	1995	15	8	7	9	6	3	1	9	12	4	5
CE	group b	4 ESO	F	1995	15	7	8	7	5	2	1	7	9	4	7
CCA	group b	4 ESO	M	1995	15	8	7	9	6	3	1	6	12	7	9
CMR	group b	4 ESO	F	1995	15	8	7	6	4	4	2	7	10	6	6
DGA	group b	4 ESO	F	1995	15	8	7	10	7	4	2	6	14	9	8
MCJ	group b	4 ESO	M	1995	15	8	7	8	5	6	3	9	14	5	5
LPA	group b	4 ESO	M	1995	15	8	7	7	4	4	2	7	11	5	3
LGC	group b	4 ESO	F	1995	15	8	7	7	5	4	2	6	11	7	10
HVF	group b	4 ESO	M	1995	15	8	7	8	5	6	3	7	14	7	7
BMR	group b	4 ESO	F	1995	15	7	8	8	6	3	1	9	11	6	8
FSF	group b	4 ESO	M	1995	15	8	7	10	7	4	2	7	14	6	6
FLL	group b	4 ESO	F	1995	15	8	7	8	5	4	2	9	12	6	9
Early starters					####	5,38	7,54	7,77	5,31	4,54	1,69	7,15	12,31	4,85	5,38
Late starters					####	7,73	7,17	7,94	5,44	4,12	2,03	7,53	12,06	6,28	6,64

[all subjects]

Full name	Academic year	Sex	Birth year	AoT	AoO	LoE	Target discrimination	Total discrimination	SLC	LLC
FBH	2 ESO	F	1996	14	7	7	9	14	1	3
HMC	2 ESO	F	1996	14	7	7	7	12	5	4
MMP	2 ESO	M	1996	15	8	7	6	12	4	4
MHA	2 ESO	M	1997	13	5	8	8	14	7	4
PEA	2 ESO	M	1997	13	6	7	5	9	4	2
RGA	2 ESO	M	1997	13	6	7	8	12	4	5
ROB	2 ESO	F	1996	14	6	8	5	10	2	4
RPI	2 ESO	M	1997	13	10	3	8	13	5	2
RVS	2 ESO	M	1997	13	6	7	10	16	8	8
RQA	2 ESO	F	1997	13	5	8	6	12	3	3
RMM	2 ESO	M	1997	13	8	5	9	12	7	3
RAL	2 ESO	F	1996	15	8	7	9	15	5	3
SMM	2 ESO	M	1997	13	12	1	7	13	5	4
SCA	2 ESO	F	1997	13	9	4	7	13	5	3
RPA	2 ESO	M	1997	14	6	8	8	14	4	4
PAA	2 ESO	M	1996	14	7	7	8	13	4	4
JDF	2 ESO	M	1997	13	8	5	8	10	6	2
ABB	2 ESO	F	1997	13	5	8	8	12	5	8
MPJ	2 ESO	F	1997	13	5	8	7	12	5	8
DC	1 ESO	F	1998	12	5	7	7	13	5	6
SSA	1 ESO	M	1998	12	5	7	6	10	6	7
LGA	1 ESO	M	1998	12	5	7	8	13	5	5
ZYN	2 ESO	F	1997	13	3	10	8	13	5	6
MMA	2 ESO	F	1997	13	3	10	8	13	5	6
MHV	1 ESO	M	1998	12	3	9	2	8	4	4
RDD	4 ESO	M	1995	15	6	9	8	13	9	8
RGM	4 ESO	F	1995	15	8	7	8	12	7	7
VVJ	4 ESO	M	1995	15	8	7	8	14	9	7
ZSM	4 ESO	M	1995	15	8	7	9	14	9	8
RAE	4 ESO	M	1995	15	6	9	6	10	6	9
GAJ	4 ESO	M	1995	15	6	9	6	9	9	9
MCG	4 ESO	F	1995	15	6	9	8	11	8	9
OLJ	4 ESO	M	1995	15	8	7	8	9	6	6
MPN	4 ESO	F	1995	15	8	7	5	14	7	5
OCM	4 ESO	F	1995	15	8	7	8	10	5	7
PTJ	4 ESO	M	1995	15	10	5	7	14	8	6
PTM	4 ESO	M	1995	15	7	8	8	13	6	6
BPA	4 ESO	M	1995	15	8	7	8	11	6	5
FCJ	4 ESO	M	1995	15	8	7	9	12	4	5
CE	4 ESO	F	1995	15	7	8	7	9	4	7
CCA	4 ESO	M	1995	15	8	7	6	12	7	9
CMR	4 ESO	F	1995	15	8	7	7	10	6	6
DGA	4 ESO	F	1995	15	8	7	6	14	9	8
MCJ	4 ESO	M	1995	15	8	7	9	14	5	5
MCP	4 ESO	F	1995	16	6	10	7	10	6	8
PLA	4 ESO	M	1995	15	8	7	7	11	5	3
LGC	4 ESO	F	1995	15	8	7	6	11	7	10
HVF	4 ESO	M	1995	15	8	7	7	14	7	7
LCE	4 ESO	M	1995	15	6	9	10	15	5	6
ASJ	4 ESO	M	1995	15	12	3	10	14	7	4
BMR	4 ESO	F	1995	15	7	8	9	11	6	8
FSF	4 ESO	M	1995	15	8	7	7	14	6	6
FLL	4 ESO	F	1995	15	8	7	9	12	6	9
GGL	4 ESO	F	1995	15	6	9	8	10	8	7
GM	4 ESO	F	1995	15	6	9	9	13	9	5
ARG	4 ESO	M	1995	15	6	9	6	11	8	7
VAE	4 primaria	F	2001	8	6	2	7	12	3	4
RGD	3 primaria	M	2002	9	5	4	8	12	6	1
BA	4 primaria	M	2001	9	5	4	9	15	6	2
SJ	4 primaria	M	2001	9	5	4	10	16	3	0
CLS	4 primaria	F	2001	9	6	3	8	14	5	2
CCC	4 primaria	F	2001	9	5	4	4	9	5	2
ORP	3 primaria	F	2002	8	6	2	5	11	4	4
PGM	4 primaria	F	2001	9	6	3	6	12	2	2

8.5. Appendix 5: EZAnalyze results report.

EZAnalyze Results Report - Independent T-Test of group group a and group b on Target discrimination							
	variable a	**group a**	**group b**				
Mean:		7,154	7,550				
Std. Dev:		1,405	1,191				
N:		13	20				
Mean Difference:		,396					
T-Score:		,870					
Eta Squared:		,022					
P:		,391					

### Independent Samples T-Test of group a and group b on Target discrimination

EZAnalyze Results Report - Independent T-Test of group group a and group b on Target vowel discrimination

variable a	group a	group b
Mean:	5,308	5,450
Std. Dev:	1,182	1,050
N:	13	20
Mean Difference:	,142	
T-Score:	,362	
Eta Squared:	,004	
P:	,720	

### Independent Samples T-Test of group a and group b on Target vowel discrimination
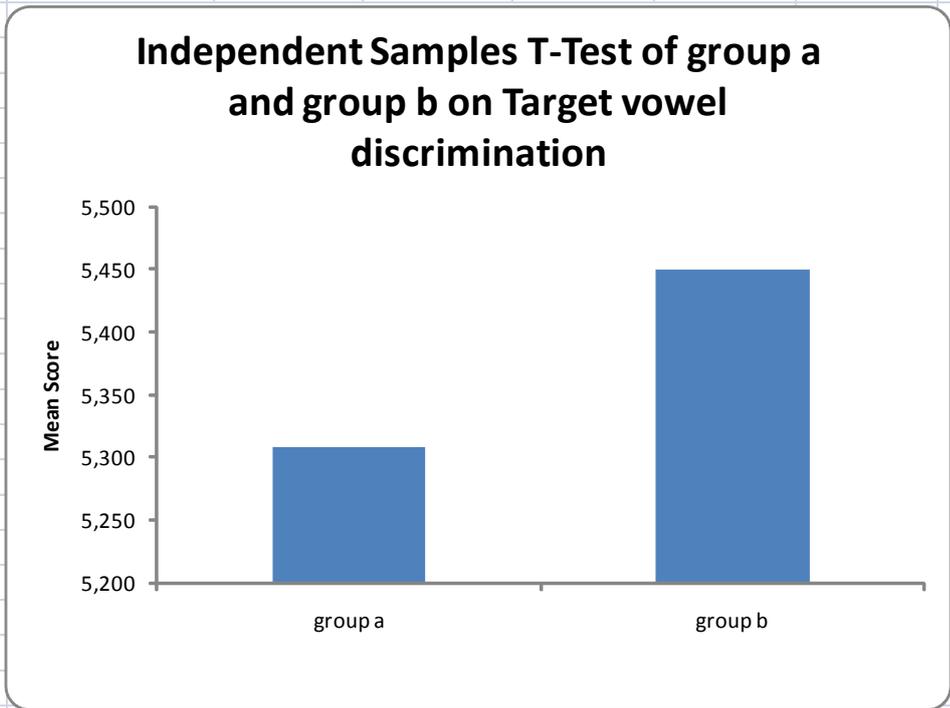
EZAnalyze Results Report - Independent T-Test of group group a and group b on Total consonant discrimination

	variable a	group a	group b			
Mean:		1,692	2,050			
Std. Dev:		,947	,686			
N:		13	20			
Mean Difference:		,358				
T-Score:		1,259				
Eta Squared:		,046				
P:		,217				

Independent Samples T-Test of group a and group b on Target consonant discrimination
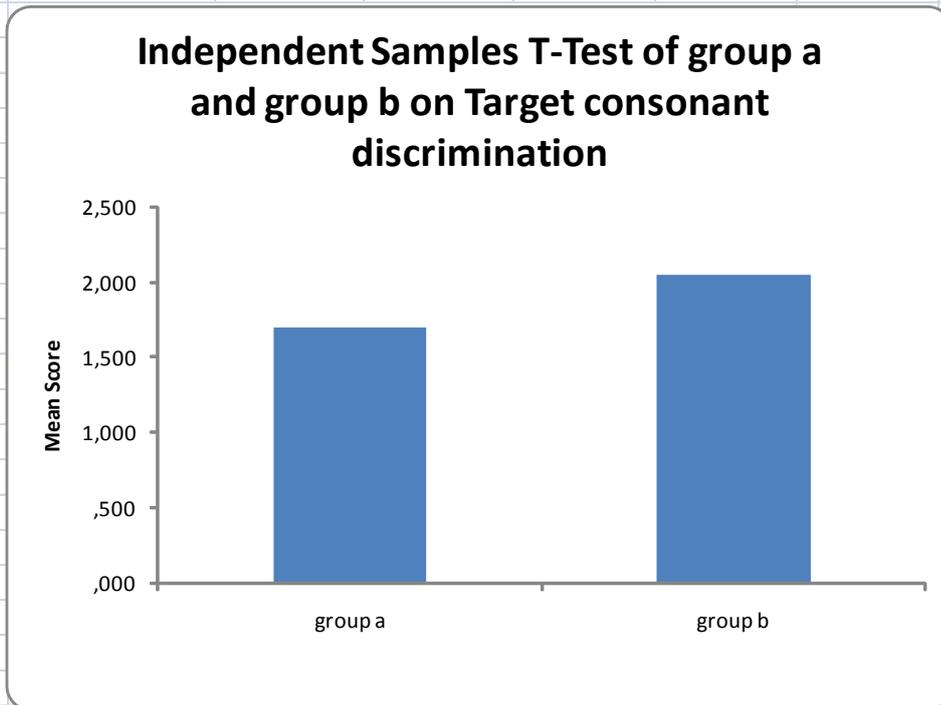
EZAnalyze Results Report - Independent T-Test of group group a and group b on SLC

variable a	group a	group b
Mean:	4,846	6,350
Std. Dev:	1,573	1,461
N:	13	20
Mean Difference:	1,504	
T-Score:	2,804	
Eta Squared:	,192	
P:	,009	

Independent Samples T-Test of group a and group b on SLC
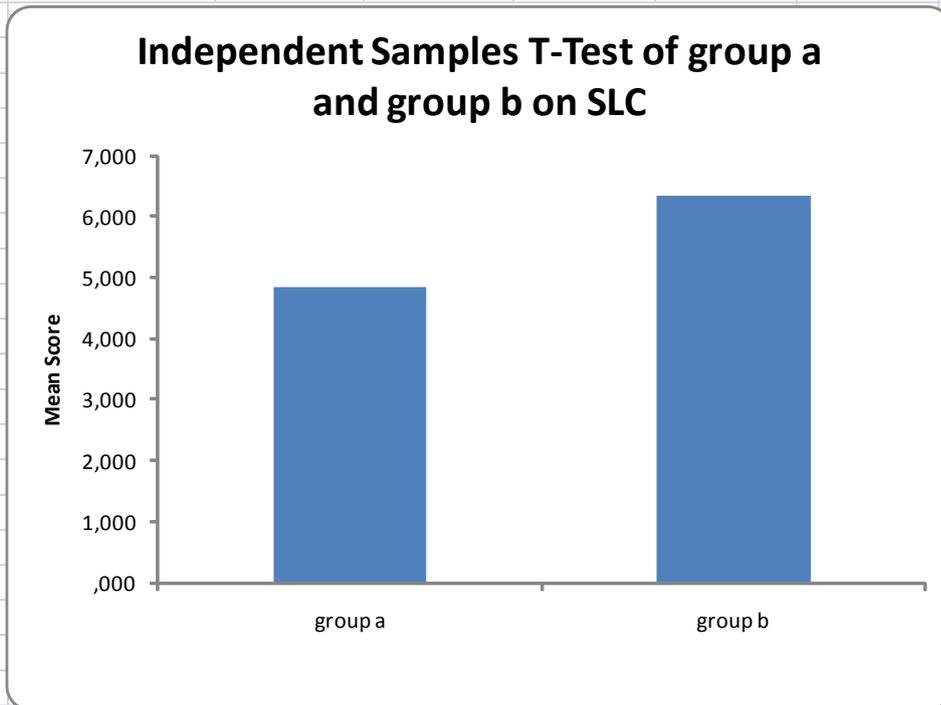
EZAnalyze Results Report - Independent T-Test of group group a and group b on LLC

variable a	group a	group b
Mean:	5,385	6,700
Std. Dev:	1,981	1,689
N:	13	20
Mean Difference:	1,315	
T-Score:	2,043	
Eta Squared:	,112	
P:	,050	

Independent Samples T-Test of group a and group b on LLC
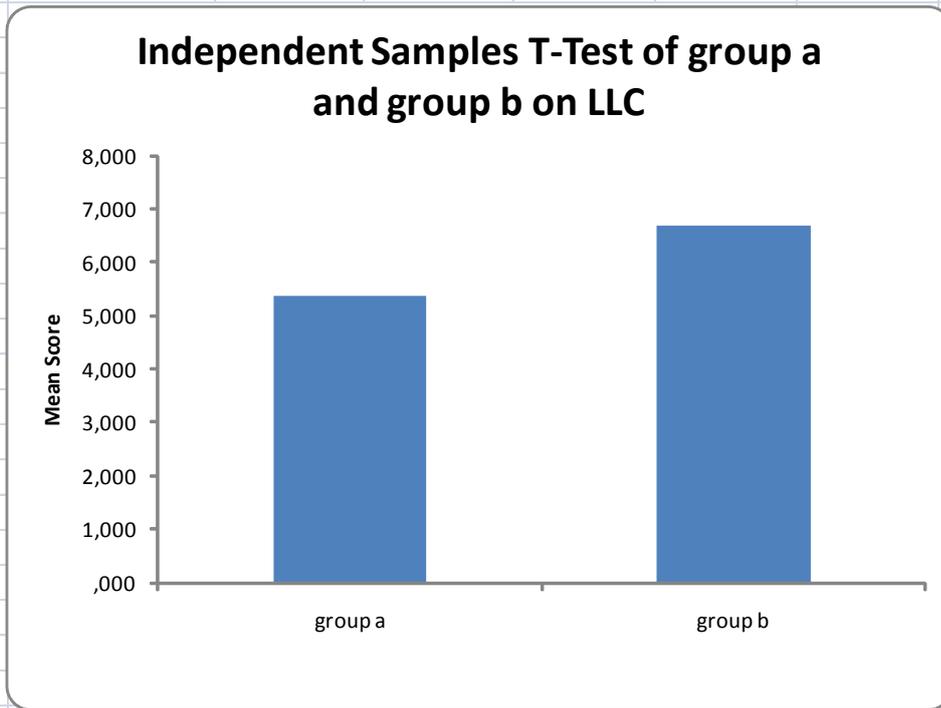
EZAnalyze Results Report - Correlation of Target discrimination with AoO

Pearson Correlation	,208	
N	64,000	
P	,100	

The observed correlation is not statistically significant

Scatterplot of Target discrimination and AoO
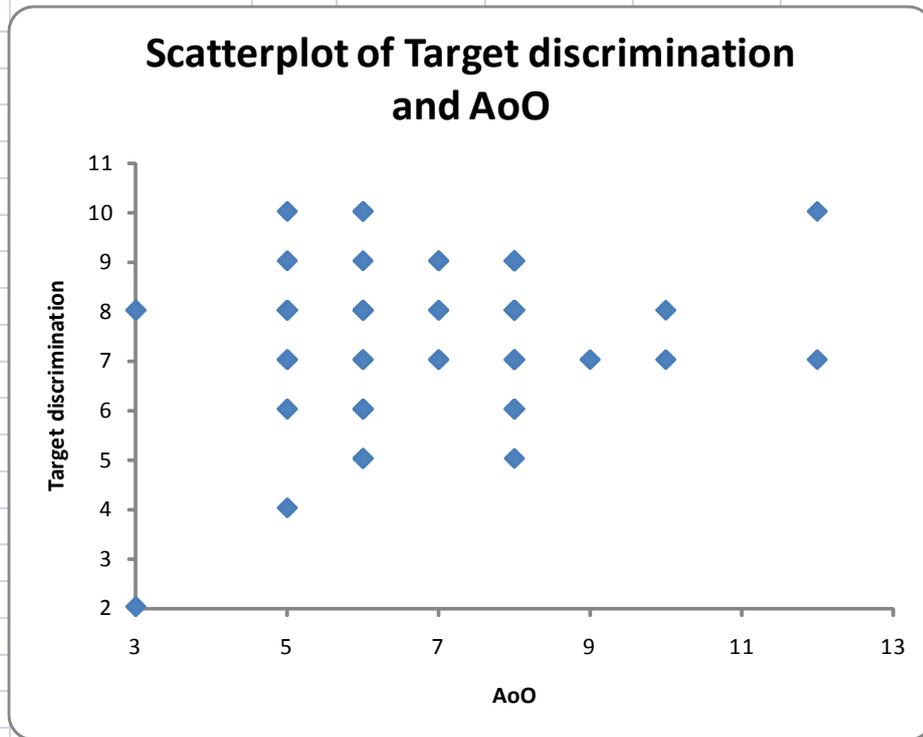
EZAnalyze Results Report - Correlation of SLC with AoO

Pearson Correlation	,212	
N	64,000	
P	,092	

The observed correlation is not statistically significant

Scatterplot of SLC and AoO
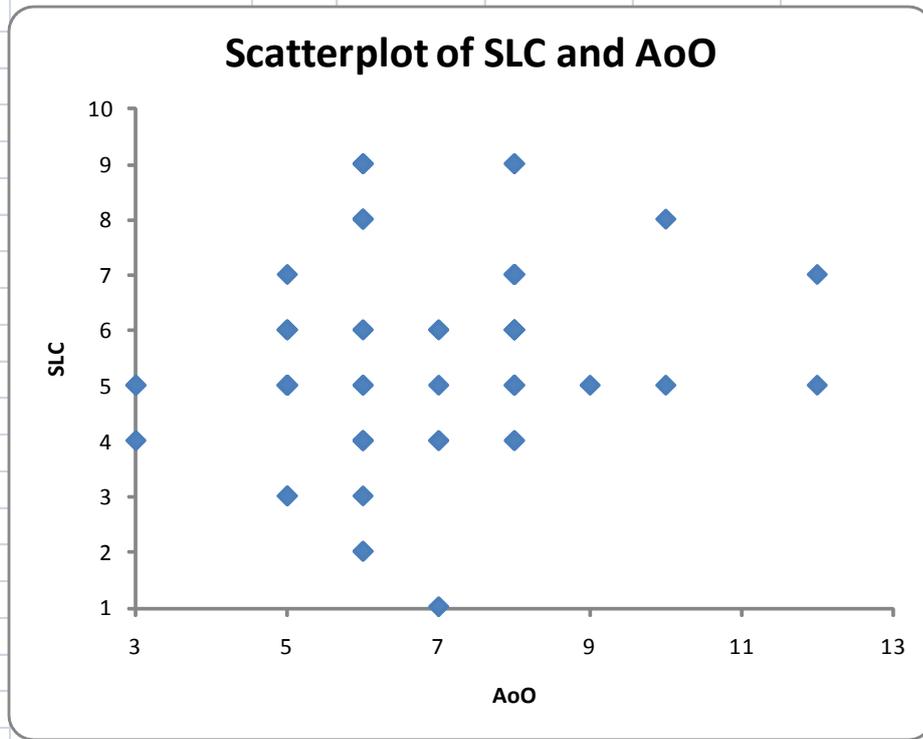
EZAnalyze Results Report - Correlation of LLC with AoO

Pearson Correlation	,020
N	64,000
P	,876

The observed correlation is not statistically significant

Scatterplot of LLC and AoO
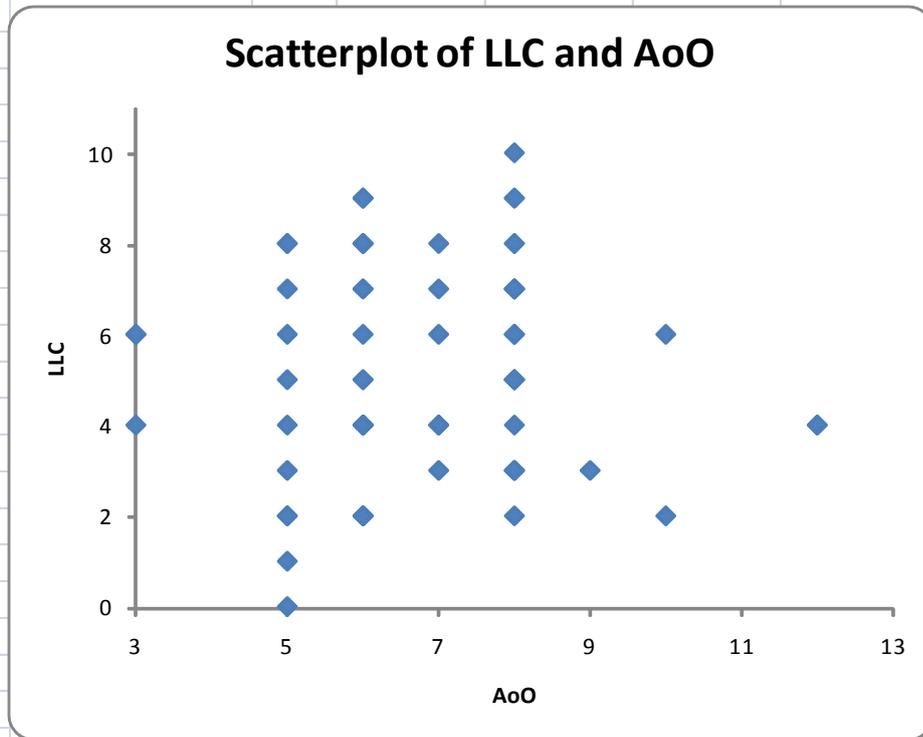
EZAnalyze Results Report - Correlation of Target discrimination with AoT

Pearson Correlation	,153	
N	64,000	
P	,226	

The observed correlation is not statistically significant

Scatterplot of Target discrimination and AoT
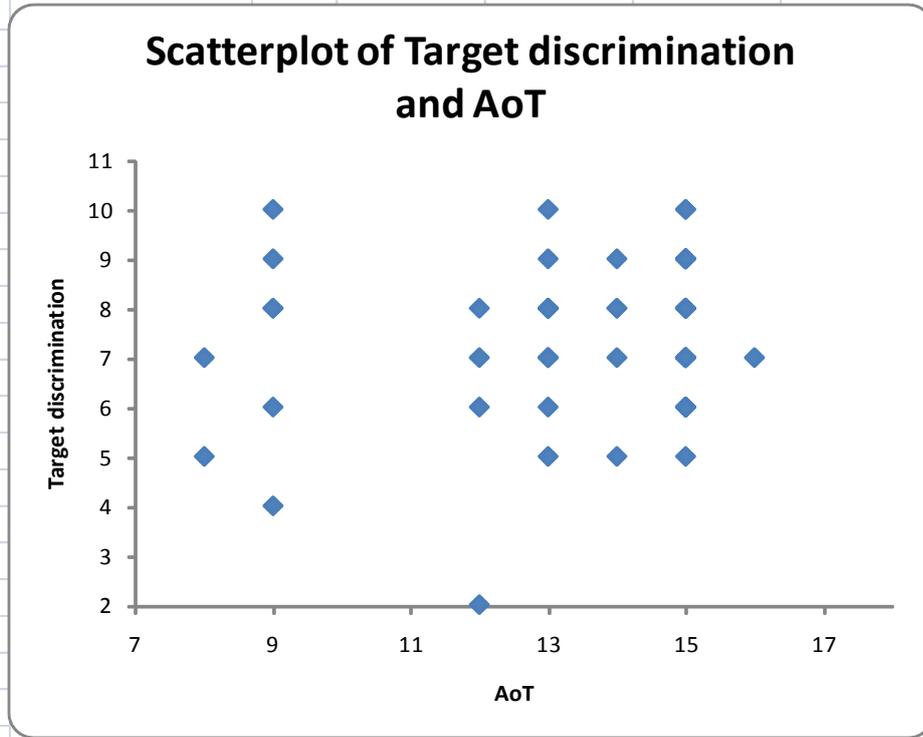
EZAnalyze Results Report - Correlation of SLC with AoT

Pearson Correlation	,432	
N	64,000	
P	,000	

The observed correlation is statistically significant

Scatterplot of SLC and AoT
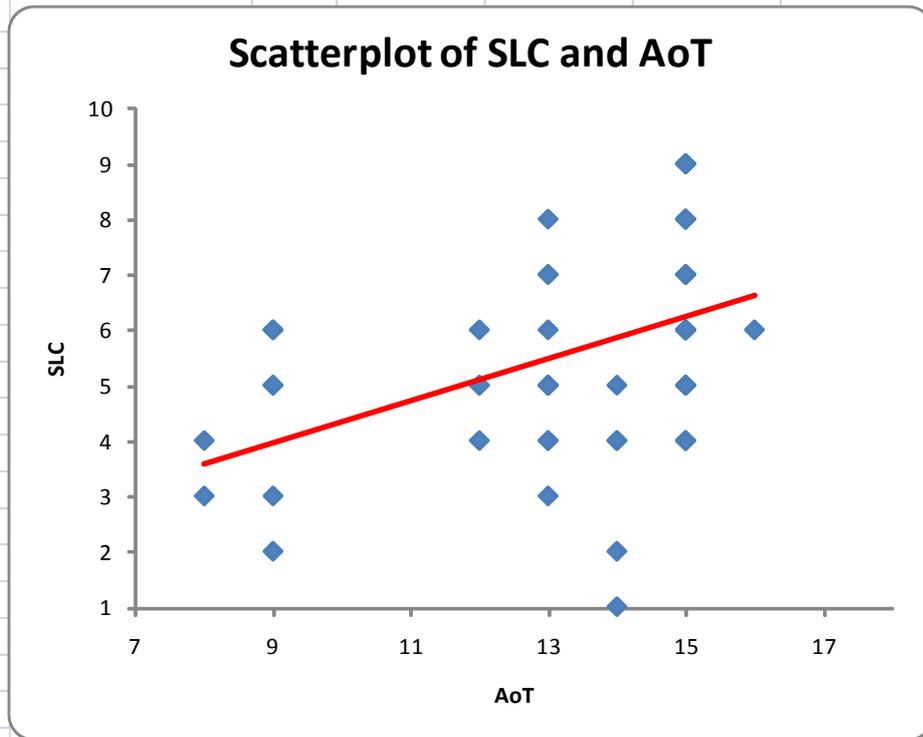
EZAnalyze Results Report - Correlation of LLC with AoT

Pearson Correlation	,600	
N	64,000	
P	,000	

The observed correlation is statistically significant

Scatterplot of LLC and AoT
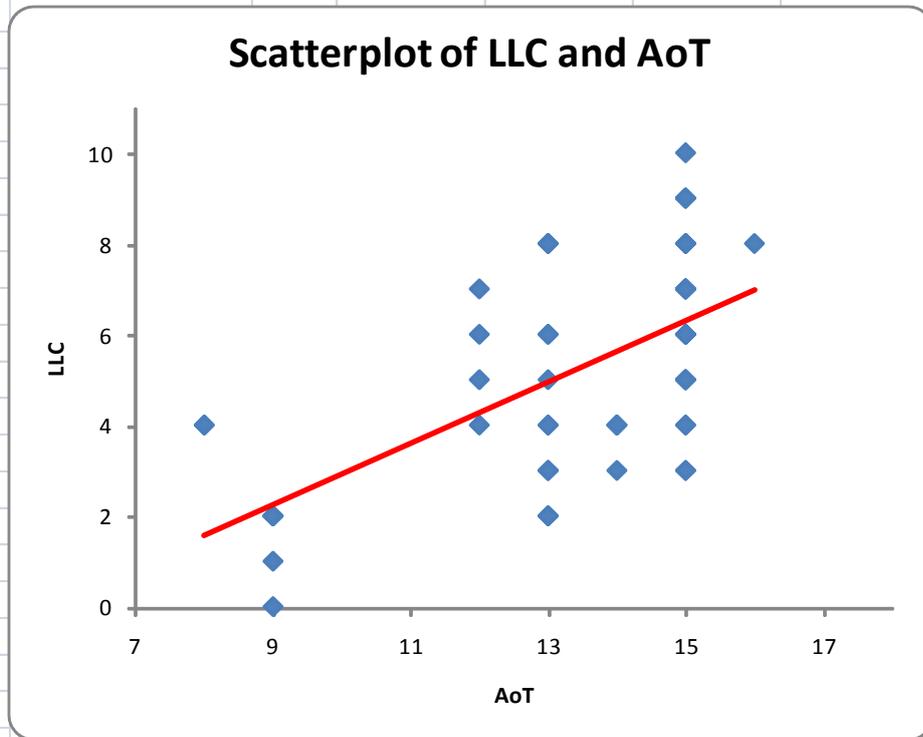
EZAnalyze Results Report - Correlation of Target discrimination with LoE

Pearson Correlation	-,024
N	64,000
P	,850

The observed correlation is not statistically significant

Scatterplot of Target discrimination and LoE
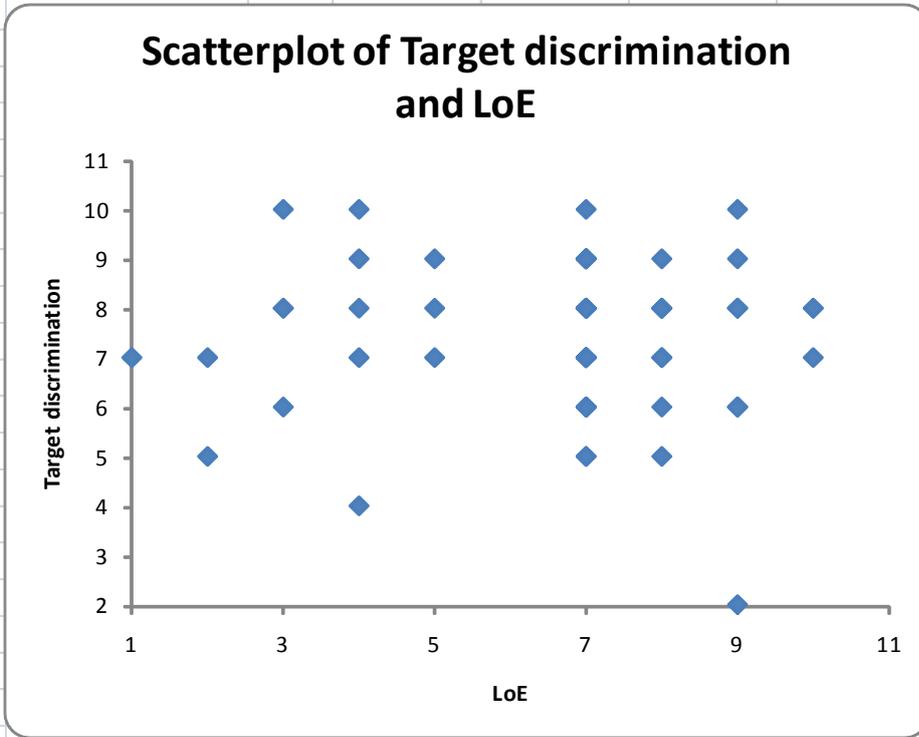
EZAnalyze Results Report - Correlation of SLC with LoE

Pearson Correlation	,250	
N	64,000	
P	,046	

The observed correlation is statistically significant

Scatterplot of SLC and LoE
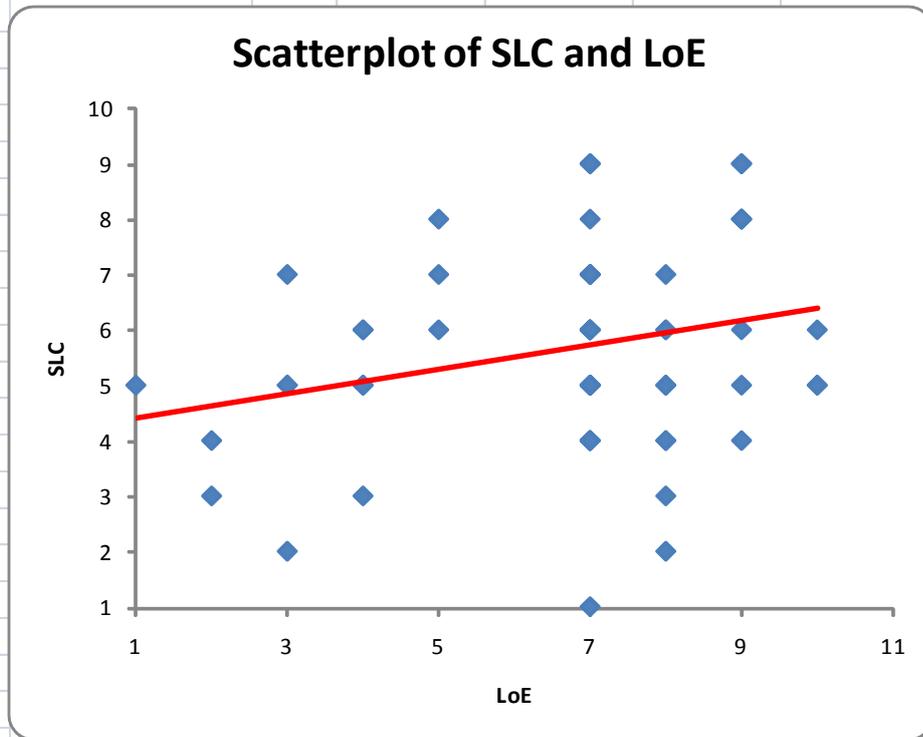
EZAnalyze Results Report - Correlation of LLC with LoE

Pearson Correlation	,583	
N	64,000	
P	,000	

The observed correlation is statistically significant

Scatterplot of LLC and LoE