



Individual Differences in Adult Learners of English as a Foreign Language at Two Levels of Proficiency

Gemma Artieda Gutiérrez

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**INDIVIDUAL DIFFERENCES
IN ADULT LEARNERS OF ENGLISH AS A FOREIGN LANGUAGE
AT TWO LEVELS OF PROFICIENCY**

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'Live as if you were going to die tomorrow.
Learn as if you were going to live forever.'

Mohandas Gandhi

Declaration

I hereby declare that this thesis, which I submit for assessment for the candidature to the degree of Philosophy Doctor at the University of Barcelona, is entirely my own work, and that utmost care has been taken to properly cite and acknowledge the work of other authors. This dissertation has not been previously submitted to any other university for a degree.

Signed: Gemma Artieda i Gutiérrez

Date: Barcelona, 30th of September, 2013

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Abstract

In today's globalised world it is becoming increasingly common that adults need to learn new languages at any age. And while the number of foreign language adult learners keeps growing, there is still a dearth of research aiming at elucidating what individual differences explain variation in foreign language learning outcomes in students placed in schools which do not have any entry requirements. This study investigated which individual differences impact second language acquisition at two levels of proficiency out of a set of four IDs: language aptitude, L1 literacy, motivation and orientations, and age; with a special focus on language aptitude and L1 literacy. Finally, the study aimed at explaining the possible interactions amongst the four IDs under scrutiny.

Two groups of adult EFL learners at two different levels of proficiency (beginners, $n = 52$, and upper intermediate learners, $n = 88$), were tested on a number of variables composing the four constructs, and on five L2 language dimensions. It has been speculated that different IDs may have different impacts at two levels of proficiency; in terms of language aptitude, it has been hypothesised that for low-proficiency students, the faster learning students will exhibit higher levels of auditory ability, while analytic ability is expected to contribute in a similar manner at beginner and advanced levels (Skehan, 1989). Concerning L1 literacy, the hypothesis is that at beginner levels L1 literacy will play a much more prominent role than for advanced learners, providing support for the threshold hypothesis (Cummins, 1979a), and the linguistic coding differences hypothesis (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995).

Findings did not confirm a differential impact of language aptitude in L2 learning at two levels of proficiency when looking at a global language aptitude score; however, when looking at language aptitude components, results confirmed the hypothesised prominent role of auditory ability for beginners and a role for analytic ability at the two proficiency levels, although the impact of the latter was larger in the upper intermediate learners' group. For L1 literacy, the hypothesis that L1 literacy would play a key role for beginners and not for upper intermediate learners was confirmed. This is consistent

with the main tenet of the linguistic coding differences hypothesis that L1 skills serve as the foundation for L2 learning, as well as for the purported existence of a threshold of L1 literacy which learners need to attain for cross-linguistic transfer to occur. Results for motivation and orientations were also different for the two proficiency groups: while professional orientations explained variance in the beginner group, in the upper intermediate learners' group motivation was the variable that correlated with L2 learning. Finally, age at testing was the variable exerting the largest impact on L2 development in the beginner group, while it did not have any impact on the upper intermediate learner group. However, when L2 development scores were disaggregated in five L2 dimensions, findings were asymmetric: while age at testing impacted four out of five dimensions for beginners, there was only one skill which was strongly impacted in the upper intermediate learner group: L2 listening.

The study also investigated the interactions amongst variables by applying multiple regression analysis and PLS modelling. In the model obtained for beginners, only three variables were predictive: academic development, L1 literacy, and age at testing. Conversely, the predictive variables in the model for upper intermediate learners were motivation, language aptitude, and reading habits.

As a conclusion, findings suggested that different IDs impact L2 learning differently at two levels of proficiency for this participant sample. In addition, the study provided insights as to which were the language aptitude components having an influence at each stage, and what L2 language dimensions were impacted by language aptitude and L1 literacy. Finally, and to the best of the author's knowledge, this is the first study in second language acquisition to use PLS-SEM to explore complex relationships amongst latent constructs.

Resum

En el món globalitzat que ens envolta és cada cop més comú que els adults necessitin aprendre idiomes a qualsevol edat. I mentre el nombre d'adults que estudia continua creixent, hi ha una manca de recerca que investigui quines diferències individuals expliquen la variació en els resultats d'adquisició de llengües estrangeres dels alumnes que estudien en centres on no hi ha cap requisit acadèmic d'admissió. Aquest estudi investiga quines són les diferències individuals que tenen impacte en l'adquisició de segones llengües en dos nivells de llengua estrangera, d'un conjunt de quatre diferències individuals: aptitud lingüística, nivell de primera llengua, motivació i orientacions, i edat; amb un interès especial en el paper de l'aptitud lingüística i del nivell de primera llengua. Finalment, l'estudi té com a objectiu explicar les possibles interaccions entre les quatre diferències individuals investigades.

Els participants són dos grups d'estudiants adults d'anglès com a llengua estrangera, situats en dos nivells diferents (nivell inicial, $n = 52$; nivell intermedi-alt, $n = 88$). Els subjectes van prendre part en tests que mesuraven els quatre constructes investigats i cinc dimensions lingüístiques de la segona llengua. S'ha especulat que diverses diferències individuals poden tenir un impacte diferent en funció del nivell de llengua estrangera. Pel que fa a aptitud lingüística, la hipòtesi planteja que, en nivells inicials, els alumnes que progressen més ràpidament són aquells que tenen un nivell més alt d'aptitud auditiva, mentre que la capacitat analítica és igual d'important a tots els nivells (Skehan, 1989). Respecte al nivell de primera llengua, la hipòtesi suggereix que pot tenir un paper fonamental en els nivells inicials. Això seria coherent amb la hipòtesi del llindar (Cummins, 1979a), i la hipòtesi de les diferències en la codificació lingüística (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995).

Els resultats no confirmen que hi hagi un impacte diferencial de l'aptitud lingüística segons el nivell de llengua estrangera si es mira l'aptitud lingüística com a una puntuació resum dels tests dels components. En canvi, si es miren els components individuals d'aptitud de forma independent, els resultats confirmen el paper

primordial que té l'aptitud auditiva per als principiants, i també que la capacitat analítica és important per ambdós nivells, tot i que té un impacte major sobre el grup intermedi-alt. Pel que fa al nivell de primera llengua, els resultats confirmen la hipòtesi que té un paper clau per als principiants que no té en el nivell intermedi-alt. Aquests resultats són coherents amb el principi bàsic de la hipòtesi de les diferències en la codificació lingüística, que sosté que les habilitats lingüístiques de la primera llengua són la base sobre la que es fonamenta l'adquisició de segones llengües. A més, confirma també la suposada existència d'un llindar de nivell de primera llengua que cal superar per a poder activar la transferència de competències lingüístiques entre llengües. Els resultats per motivació i orientacions també són diferents en funció del nivell de segona llengua: en el nivell inicial, la orientació professional explica la major part de les diferències; en canvi, en el nivell intermedi-alt la variable que mostra correlacions amb aprenentatge de segona llengua és la motivació. Finalment, el factor edat en el moment de prendre els tests és la variable que té un impacte més gran en el desenvolupament de la segona llengua en el grup inicial. En canvi, l'edat no juga cap paper en el nivell intermedi-alt. Tot i així, quan els resultats de desenvolupament de la segona llengua es categoritzen per dimensió lingüística, els patrons són asimètrics: l'edat té efecte en quatre de les cinc dimensions lingüístiques en el grup inicial, mentre en el grup de nivell intermedi-alt només una dimensió mostra els efectes de l'edat: la comprensió oral.

Aquest estudi també investiga les interaccions entre les variables, utilitzant anàlisis de regressió múltiple i models d'equacions estructurals del tipus PLS. En el model obtingut per al nivell inicial, només tres variables tenen valor predictiu: desenvolupament acadèmic, nivell de primera llengua, i edat. En canvi, les variables predictives del model generat pel grup intermedi-alt són motivació, aptitud lingüística, i hàbits de lectura.

Com a conclusió, els resultats suggereixen que les diferències individuals tenen un impacte diferencial sobre l'adquisició de segones llengües en funció del nivell de segona llengua per a la mostra de població d'aquest estudi. A més, l'estudi proporciona informació sobre quins són els components d'aptitud lingüística més rellevants per a cada nivell, a més de quines són les dimensions lingüístiques de la segona llengua que pateixen més els efectes tant

de l'aptitud lingüística com de la llengua materna. Finalment, i que l'autor sàpiga, aquest és el primer estudi en el camp de l'adquisició de segones llengües que utilitza models d'equacions estructurals PLS per estudiar relacions complexes entre constructes latents.

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To my mum and my brother, who are always by my side.

To dad, who is and will always be alive in my heart.

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CHAPTER 1

Individual Differences

1.1 Individual Differences: A Review of the Research

Individual differences (IDs) have been studied for a long time in the field of psychology. In this field, the term is self-explanatory: following Dörnyei (2005), IDs are characteristics which make individuals different from each other from a psychological perspective.

A key feature of IDs is that, in mainstream psychology, they are assumed to be relatively stable: individualizing characteristics need to show continuity over time. As Dörnyei (2005) puts it,

[...] ID constructs refer to dimensions of enduring personal characteristics that are assumed to apply to everybody and on which people differ by degree. Or, in other words, they concern stable and systematic deviations from a normative blueprint. (p. 4)

In the domain of second language acquisition, IDs can be defined as the explanatory factors which account for second language learners' differences in rate of acquisition and ultimate attainment. Research on IDs has attracted many scholars due to the high correlations with language learning success obtained

for instance by language aptitude or motivation, ranging (mostly) from .20 to .60 (Dörnyei & Skehan, 2003). With such remarkable correlation indexes, it is intriguing that IDs have not been more systematically researched. Empirical studies have been much more concerned with research on second language acquisition universals, such as route of morpheme acquisition, or the role of input, than with IDs. Until recently, no efforts have been made either to integrate IDs with mainstream second language acquisition constructs, or to build theory. The research community is not always in agreement on the reason why this area has lagged so far behind other second language acquisition areas: Dörnyei and Skehan (2003) say that they can only conclude that 'the study of most areas of IDs in language learning is simply not fashionable' (p. 589). In their introduction to IDs, Sawyer and Ranta (2001) give theoretical and methodological reasons for this lack of progress in ID research: the first reason is the limitations inherent to correlational research designs, which point to relationships between variables but from which causality cannot be inferred. Secondly, they mention how difficult it is to find valid measures of learners' traits and characteristics; notwithstanding the additional complexity of the interaction between learners' traits and the different learning contexts. Finally, the lack of work on theoretical foundations has hindered empirical research on the area to a great degree. As Ellis puts it, there is a 'need for an overarching theory to explain how these different factors influence both the rate/success of learning and the processes involved in L2 acquisition' (Ellis, 2004:546).

Possibly, the first noteworthy effort to integrate IDs into mainstream SLA theory is Skehan's (1989) proposal to link aptitude components to stages of information processing. In his model, he linked phonemic coding ability with input, language analytic ability with central processing, and memory with output. Although limited to language aptitude, these proposed connections are

important because the putative SLA processes can be linked to differences between learners. This clearly takes theory one step beyond the consideration of IDs as isolated variables and integrates them into mainstream second language acquisition theory. In addition, this segmented view permits a finer level of empirical research, as well as being grounded in a cognitive view of SLA.

Totally different was Snow's approach (1978), who questioned that IDs existed in isolation and proposed that, rather, there were combinations of levels of some variables contributing to learning success. Snow built on Cattell's (1987) work, which studied the influences of different variables in isolation and then analysed them by using a multiple-regression framework. Instead, Snow developed the aptitude complex construct, according to which there was an additional value in the combination of the constituents 'which could not be accounted for by consideration of the individual traits' (Ackerman, 2003:87). The beauty of this construct is twofold: on the one hand, it is already hinting at the complexity of the interaction between individual variables; on the other, it is specific enough to allow for empirical research and hypothesis testing. Four trait complexes have been identified so far: the social trait complex, the clerical-conventional trait complex, the science-math trait complex and the intellectual-cultural trait complex. In an empirical study involving both college students and adults up to age 62, Ackerman (2003) found a positive relationship between two trait complexes and knowledge and ability: the science-math trait complex and the intellectual-cultural trait-complex. The science-math trait complex is associated with investigative interests and visual perception, math reasoning ability and realistic interest, and it is not associated with any specific personality trait. In contrast, the intellectual-cultural trait-complex, although also associated with investigative interests, relates to the educational and experiential aspects of intelligence (crystallised intelligence), an artistic

orientation and personality traits of openness to experience and intellectual engagement, associated with literary, artistic, and cultural interests and abilities.

This interplay between affective IDs and cognitive IDs was also supported by the work of Sparks and Ganschow (1991, 1995), who suggested that affective factors should not be studied separately from cognitive factors. Recently, Ellis and Larsen-Freeman proposed that IDs are in constant interplay in the world of the learner, which is continuously being reconfigured (Ellis and Larsen-Freeman, 2006).

An effort to identify what Dörnyei calls 'higher-order amalgams of learner characteristics' (2009:262) is Robinson's framework for research into the effects of cognitive abilities on second language acquisition: the aptitude complexes and learning conditions interaction in SLA, also known as the Aptitude Complex/Ability Differentiation Framework, which holds that variation in second language learning outcomes in one environment or task will be greater for groups of learners with more differentiated abilities than for groups of learners with less differentiated abilities. The concept of abilities being more or less differentiated is based on the Ability Differentiation Hypothesis (Deary et al., 1996), which states that among adults and high-IQ groups abilities are better differentiated, namely, there are multiple abilities and a weaker general intelligence *g* factor, unlike for children and low-IQ groups. For the latter, a stronger *g* factor is to be found. A more detailed account of the Aptitude Complex/Ability Differentiation Framework can be found in chapter 2.

Lastly, and pioneered by Dörnyei in 2009, the most state-of-the-art proposal concerning ID research conceives language as a complex adaptive

system, and emphasizes the importance of individual-level variation embedded in context: this theory highlights the fact that the interaction between the learner and the environment is of paramount importance. If that is the case, then, language is not user and context independent, as cognitive linguists believe, but it is largely situated in that ‘learner attributes display a considerable amount of variation from time to time and from situation to situation’ (Dörnyei, 2009:232). A key aspect in this theory is that we move from a modular or componential approach to IDs to a systemic approach, in which ‘IDs in mental functions typically involve a blended operation of cognitive, affective and motivational components’. (Dörnyei, 2009:234). Dörnyei suggests that by identifying higher level optimal constellations of cognition, motivation and affect we can in turn identify different paths in second language acquisition – this would make the learner’s progress predictable and therefore researchable. This is undoubtedly a challenging as well as an exciting proposal for research in this area.

The following sections deal with current topics on IDs, such as ID taxonomies, and present the choice of IDs for this piece of research. Then the chapter explains what IDs have an influence on and when; and finally it reviews how IDs have been measured in previous research. The final two sections of the chapter present two of the most important IDs in SLA: motivation and age.

1.2 Taxonomy and Choice of IDs for this Dissertation

Another area of controversy in ID research is the taxonomy of IDs. There is not a widely approved list of IDs, and so different researchers have included different IDs in their lists over time. Larsen Freeman and Long (1991) include the following IDs: age, aptitude, motivation, attitude, personality, cognitive

style, hemisphere specialization, memory, awareness, will, language disability, interest, sex, birth order, and prior experience. Ellis (2004) recognises that there is an overwhelming list of factors in the literature, and offers a categorization of the most relevant factors into four groups, as follows: the first group contains ‘abilities’ (i.e., cognitive capabilities for language learning); the second group contains ‘propensities’ (i.e. cognitive and affective characteristics involving readiness or orientation to language learning); the third category is named ‘learner cognitions about L2 learning’ (conceptions and beliefs about L2 learning), and the last group is ‘learner actions’ (i.e., learning strategies). See the list of variables included in each category in table 1.01:

Table 1.01 *Factors Responsible for IDs in L2 Learning*

| IDs | |
|---|--|
| Categories | Factors |
| 1. Abilities | Intelligence Language Aptitude Memory |
| 2. Propensities | Learning Style Motivation Anxiety Personality Willingness to communicate |
| 3. Learner cognitions about L2 learning | Learner beliefs |
| 4. Learner actions | Learning strategies |

From Ellis, R. (2004). *IDs in Second Language Learning*. In Davies, A., and Elder, C. *The Handbook of Applied Linguistics*. (pp. 525-551). Oxford: Blakwell.

Note that age does not appear in the table. This is so because Ellis (2004) considers that age does not belong to any of the four categories, but rather it

affects the four of them (abilities, propensities, cognitions and actions), as well as the psycholinguistic processes involved in L2 learning.

Dörnyei (2005) lists personality, ability/aptitude and motivation as the core learner variables, and other IDs such as learning styles, language learning strategies, anxiety, self-esteem, creativity, willingness to communicate and learner beliefs as optional variables, on the grounds that the latter have a weaker explanatory power and that they have not generated as much research as the core variables. However, he admits that the classification of IDs is rather loose.

Robinson (2012a) proposes a classification of IDs in three facets:

- Cognitive abilities, for instance: memory, attention, reasoning, and language aptitude.
- Affective abilities, such as emotion and anxiety.
- Conative abilities, such as self-regulation and motivation.

There is a fundamental difference between cognitive abilities and affect and conation: the growth and decline of cognitive abilities display a clear inverted U-shape across the lifespan which affect and conation do not show.

It is beyond the scope of the current dissertation to discuss all the variables listed above and the different categorizations according to which they could be classed. The choice of variables for this piece of research is motivated by a preliminary study (Artieda, 2010) which left a number of open questions worth further investigation. Conducted in a formal learning setting, the study explored the adult data available from a broader research project which investigated age effects in second language acquisition in formal settings (for a full account, see Muñoz, 2006). The original Barcelona Age Factor (BAF) project

comprised four age groups, from 8 year-olds to adults. For the 2010 study, subjects were selected to include only adult learners. The effects of age and other individual factors in the rate of learning of two groups of learners of English as a foreign language with two different levels of proficiency were investigated. Group A learners had 200 hours of instruction ($n = 51$), and group B learners had 416 ($n = 14$). The complete set of variables studied was as follows: age, sex, tertiary education, previous language experience (proficiency), previous language experience (in years), English grades previous year, motivation, and L1 literacy.

Possibly the most relevant finding of the study was that different factors had different impact on the learning process at two levels of the proficiency ladder. Results were very different for the two groups. Concerning age, it is worth mentioning that correlations with first age of instruction were not significant for any of the groups. Only a moderately significant correlation was found when group A was disaggregated into two sub-samples with a cut-off age of 24 and limited to the scores in the listening test, with scores more favourable to the younger age group. This was consistent with other studies identifying different adult age groups behaving differently, which suggested different underlying processes occurring in different age ranges in adulthood (Seright, 1985; Singleton and Ryan, 2004). There were other variables yielding insignificant correlations indexes for both groups: sex, tertiary education, and previous language experience (in years).

For group A, there were low to moderate correlations with the following variables: L1 literacy, previous foreign language proficiency, English grades previous year, and motivation. The strongest correlation indexes were obtained by L1 literacy and previous language proficiency, as reported in table 1.02.

Table 1.02 *Age and Other Variables Affecting Rate of Learning in Adult SLA -Correlations*
Pearson r –Group A

| Variable | Cloze | Dictation | Multiple Choice | Listening |
|--|-------|-----------|-----------------|-----------|
| Years of Study of Previous Foreign Language (n=51) | n.s. | n.s. | n.s. | n.s. |
| Previous Foreign Language Proficiency (n=45) | .47** | .40** | .31* | n.s. |
| English Grades Previous Year (n=50) | .45** | n.s. | .49** | .33* |
| Motivation (n=51) | .28* | n.s. | .32* | n.s. |
| L1 Literacy (n=51) | .47** | .39** | .39** | .34* |

* $p < .05$, ** $p < .01$, n.s. = non-significant

A multiple regression analysis was conducted with the variables yielding the strongest correlation indexes, and the strongest factor continued to be L1 literacy, showing a .47 correlation index with the cloze test and higher than .30 for the dictation, multiple choice and listening tests. The second highest correlated factor was previous foreign language proficiency, in the range of .36 with the cloze test results and .40 with the dictation. Any impact of motivation disappeared when this variable was included in the multiple regression analysis (see table 1.03).

Table 1.03 *Age and Other Variables Affecting Rate of Learning in Adult SLA –Multiple Regression. Group A*

| Language Tests | L1 Literacy | | Previous Foreign Language Proficiency | | Motivation | |
|-----------------|-------------|-------------|---------------------------------------|-------------|------------|-------------|
| | Beta | Adjusted R2 | Beta | Adjusted R2 | Beta | Adjusted R2 |
| Cloze Test | .474* | .207* | .365* | .316* | n.s. | n.s. |
| Dictation Test | .307* | .211* | .400* | .141* | n.s. | n.s. |
| Multiple Choice | .399* | .140* | n.s. | n.s. | n.s. | n.s. |
| Listening Test | .348* | .101* | n.s. | n.s. | n.s. | n.s. |

* $p < .05$, n.s. = non-significant

Conversely, for group B the picture was totally different. Only one of the variables reached significance; motivation, showing a strong, positive correlation with dictation $r = .54, n = 14, p < .05$, and listening test scores $r = .57, n = 14, p < .05$. Unfortunately, sample size was too small to allow for multiple regression analysis; but results seemed to suggest a change in the balance of the variables at different stages of proficiency.

In the limitations section of the research paper, it was acknowledged that it was unfortunate that there was not a language aptitude measure in the data set. L1 literacy is traditionally not included as an ID and there may be an overlap with the skills that are measured with language aptitude tests. Having a language aptitude measure could have helped explain that potential overlap.

In light of the above, the IDs included in this dissertation as variables were mostly motivated by the study just reported to try to shed light on what the previous study left unanswered: the possible role played by language aptitude in adult learners of English as a foreign language and its potential interaction with L1 literacy. For that purpose, the current empirical study includes language aptitude, L1 literacy, motivation and orientations, and age as the main variables under scrutiny.

1.3 IDs: What do they Influence and When?

The Fundamental Difference Hypothesis addressed what is known as the logical problem of foreign language learning¹ by positing that, in children, this gap is filled by access to Universal Grammar (UG), whereas in adult learners, the domain-specific language acquisition device (LAD) has ceased to operate, and it is replaced by general problem-solving principles and strategies.

¹ The logical problem of foreign language learning is the gap between the experience available and the competence forms that the learner eventually attains (Bley-Vroman, 1990).

Consistent with the generative paradigm, this hypothesis was initially formulated by Bley-Vroman in 1990 to provide an explanation to the alleged nine fundamental features of adult foreign language learning, namely: lack of success, general failure, variation in success, course and strategy, fossilisation, indeterminate intuitions, importance of instruction, negative evidence and the role of affective factors. What these characteristics have in common is that they seem to be universal among adult foreign language learners; that is to say, very few individuals seem to behave differently, and those who do are considered exceptional or talented learners.

Underlying this hypothesis is the main assumption that child first language acquisition and adult foreign language acquisition processes are fundamentally different. Unlike adults, all children are considered to master their L1 sooner or later with incidental variation unless there is some kind of impairment, and this mastery is independent of differences in input or instruction. In addition, children's acquisition of the L1 does not fossilise: it improves until it reaches success. Children develop the ability to make correct grammaticality judgements by means of intuitions, and negative feedback does not seem to be necessary for the child to master their L1. Finally, affective factors like motivation or affect, which greatly impact adult foreign language acquisition, do not seem to play a significant role in child L1 learning.

One of the main assumptions of the Fundamental Difference Hypothesis is the one which states that there is no variability in outcomes in L1 acquisition in children, but rather, to use Bley-Vroman's words (1990), what is found is *uniform success*(my Italics). According to this hypothesis, whereas general lack of success is the most striking characteristic of adult foreign language learning, 'normal children inevitably achieve perfect mastery of the language' (p. 43).

Other researchers disagree with the idea that there are no IDs in L1 acquisition. The Bristol Language Project (Wells, 1981, 1985) studied 125 children born in the Bristol area between 1969 and 1972 belonging to a variety of social classes while they were acquiring their L1. Key findings in this project were: systematicity in the route of development; development being influenced by the interactions between mother and child, and, finally, environments being sources of IDs in speed of L1 development. However, the most relevant finding for this dissertation is that noteworthy variation was found among children regarding their rate of L1 development. The Bristol study demonstrated that L1 speakers' progress at different rates, opening the door to IDs and to possible language aptitude effects on L1 acquisition in childhood.

Longitudinal research carried out by using the same subjects 10 to 12 years later yielded intriguing results. Researchers contacted 100 subjects and administered them a range of language aptitude tests. Although 10 years had elapsed, a number of significant correlations were found between the first language measures taken in the first study and the aptitude tests taken 10 years later (Skehan & Ducroquet, 1988). The most striking correlation was a composite measure of first language skills, which yielded a correlation index of .40 with an aptitude sub-test measuring specifically inductive language learning ability.

Children have been found to exhibit variation when learning second languages too. Nelson (1973), Vihman (1982), and Wong-Fillmore (1979) showed that children differ in the styles they use to learn both first and second languages, and vary greatly in the degree in which they master them. Wong-Fillmore (1979) in particular reported massive differences in the rate of natural second language acquisition of five Mexican children newly arrived in the

States. She chose five Spanish-speaking children who had undergone a successful L1 acquisition process; then she followed their exposure and strategies during the first year in which they were acquiring English. By using transcriptions of real-life interactions and thick narratives, she concluded that the IDs these five children were displaying were related to 'the interaction between the nature of the task of learning a new language, the strategies that needed to be applied to the task, and the personal characteristics of the individuals involved.' (Wong-Fillmore, 1979:227). After all, the most successful child in her study was Nora, whose success was put down to an exceptional motivation to be integrated with the English-speaking children in her classroom, an integrative motivation which is frequently found in exceptional adult second language learners too: Moyer (1999) gave the same explanation for the exceptional adult learner of German who did not show any maturational effects. His success was attributed to a strong desire to acculturate into the German culture and to his personal fascination with the German language.

Humes-Bartlo (1989) explored variation in the rate of second language learning in a group of 71 third to fifth grade children attending bilingual classes of Spanish as a second language in New York. Her hypothesis was that students showing low ability in second language learning would also exhibit language deficits in their L1, as well as above average abilities in mathematical reasoning and visuo-spatial construction. This idea that certain talents and phenomena related to brain lateralisation, like left-handedness and dyslexia, cluster in certain individuals was observed by Geschwind and Galaburda (1985a, 1985b, 1985c). This cluster of abilities (also known as Geschwind's cluster) was present, for instance, in Ioup's et al. (1994) talented learner Julie, a successful case of adult second language acquisition in a naturalistic environment. Ioup reports that Julie was left-handed, not good at maths, and had skin allergies.

Interestingly enough, and despite the cluster being present, the explanation for Julie's success was an ability to perceive linguistically significant contrasts in L2 input and being able to organise the information obtained into a nativelike L2 grammar by paying conscious attention to grammatical form. Similarly, Humes-Bartlo identified a group of slow learners and another group of fast learners, and rather than attributing the success of the fast learners to Geschwind's theory of unusual lateralization patterns, she concluded that it was verbal analogical reasoning the only ability exhibiting significant differences between the two groups. Humes-Bartlo's suggested that strengthening first language skills and verbal memory in children might be beneficial to prepare them to learn a second language.

The idea that variation and IDs are present both in children and adult language learning is critical for the line of the argumentation of the present dissertation, and, like Humes-Bartlo's findings in the paragraph above, it will be further discussed in chapter 3.

1.4 Measuring IDs

Measuring IDs has been and still is a controversial issue. Nobody disputes that, just like in any other area of research, it is very difficult to validate hypotheses without proper measurement of variables, as comparison of findings across different empirical studies is otherwise virtually impossible and hypotheses cannot be falsified. This has been the case for ID research during the second half of the XXth century.

The first level of difficulty concerns how variables have been measured individually. This is not going to be discussed in detail in this chapter, as the methodology chapter will describe in detail how each one of the IDs used in

this dissertation have been measured. It should suffice to say that the main claim regarding this issue is that it is difficult to find reliable and valid measures of learner traits and second language learning outcomes which have been used consistently across studies and which are driven by theory, rather than empirically derived (i.e. the MLAT in the case of language aptitude).

The second level of difficulty is related to the dependent variables used in previous research. While a number of studies have measured L2 learning outcomes by focussing on a particular language dimension (i.e. morphosyntax by using a grammaticality judgement test), recent aptitude studies stress the importance of having multiple L2 measures to understand how aptitude relates to variation in L2 proficiency in more than one specific domain (Hinton, 2012; Grañena, 2013a).

Finally, the third level of difficulty concerns how the interactions among variables have been analysed to provide a global understanding of IDs which goes beyond the treatment of individual IDs as discrete variables.

Traditionally, ID research has measured learner behaviour using questionnaires, scales or tests, and has investigated the relationships between the measures by using what Skehan (1989) calls the correlation coefficient technique. In this technique, +1 represents a perfect relationship; 0 indicates no relationship between variables, and -1 indicates a perfect negative relationship. ID studies typically yield correlations within the range of .20 to .60 between ID variables and second language achievement measures. Some empirical studies on IDs using the correlation coefficient technique are: Bylund et al., 2009 (language aptitude and first language attrition), Abrahamsson and Hyltenstam, 2008 (language aptitude and SL attainment), Harley and Hart, 2002 (age, aptitude and SL learning), Harley and Hart, 1997 (language aptitude and SL

proficiency), and Ehrman and Oxford, 1995 (a variety of IDs and FL proficiency). A limitation of correlations is that although relationships can be explored, causality cannot be determined. In addition, by analysing relationships in such an isolated manner we are neglecting the fact that the way in which a variable behaves may depend on the full set of learner abilities and of their interaction with the learning context.

One of Skehan's main concerns and objectives was to identify learner types which could be matched to instructional treatments. In order to do so, what was needed was to identify sub-groups of learners who would be maximally similar to each other, and different from other sub-groups of learners (Skehan, 1989): for that specific purpose, he recommended using cluster analysis. The outcome of the analysis would then not be a reduced number of variables, but a reduced number of learner types or profiles. Some examples of this line of research are Skehan, 1989; Rysiewicz, 2008; and Sparks, Patton, and Ganschow, 2012. Skehan (1989) was able to classify successful learners into two groups, one of which based their success on memory, while the other based success in verbal aptitude. Rysiewicz (2008), in turn, found a three-cluster solution of ability/aptitude profiles for 13-year old foreign language learners, and, finally, Sparks, Patton, and Ganschow (2012) reported three distinct cognitive and achievement profiles: participants in the high-achieving cluster scored average range on most L1 and L2 measures; participants in the average-achieving cluster scored average on all measures, and, finally, students in the low-achieving cluster scored low to average on most measures except IQ.

Research on the trait-complexes paradigm used the correlation coefficient technique too, sharing with previous research the limitation of not

being able to infer causality. Snow (1978) promoted moving on to multivariate statistics because 'multivariate continuous parametric measurement has so far proven to be the most efficient and versatile approach to the problem of studying IDs of all kinds' (p. 228-229). In his 2003 paper on aptitude complexes and trait complexes involving three different studies, Ackerman uses correlations in two of them to investigate the relationships between abilities, personality and interests and domain knowledge. In the third study, factor analysis is used to separate the different components loading on a trait. Hummel also used factor analysis in 2009 to investigate the different loadings of aptitude and phonological memory on second language proficiency.

Robinson's work is not methodologically different from Snow or Ackerman. In his 2001 paper on the aptitude complex/ability differentiation framework, his recommendations for further research include the identification of clusters of abilities (thus, cluster analysis), and then the investigation of cognitive correlates with components of implicit, incidental and explicit SLA processes.

Recent studies have used factor analysis to investigate the core dimensions of aptitude constructs: Sparks, Javorsky, Patton, and Ganschow (1998) already used factor analysis to identify components from a battery of L1 skill and FL aptitude measures used to predict FL proficiency. Also, Sparks, Patton, Ganschow, and Humbach (2011) used factor analysis again to draw components from a set of L1 and L2 aptitude skills. Of late, Grañena (2012, 2013b) also used principal components analysis (PCA) to explore the aptitude dimensions underlying the LLAMA aptitude test.

Lastly, the most complex interpretation of IDs is also the one which is more defiant to measurement: Dörnyei's systemic approach to language as a

multifaceted adaptive system. Although in his 2009 article Dörnyei is far from proposing a specific methodology to capture the complexity of adaptive systems, he proposes some methodological guidelines to conduct language-specific dynamic system studies:

- a) Researchers should investigate cause-effect relationships as processes of self-organization connected to the entire system.
- b) Qualitative rather than quantitative research methods should be followed, with a strong preference for mixed-methods research.
- c) The focus should be placed on change rather than on variables, and therefore prioritize longitudinal rather than cross-sectional research.
- d) System modelling techniques should be explored for ease-of-fit with adaptive systems.

Such techniques of analysis should facilitate investigating suspected non-linear relationships between constructs: for instance, an intriguing contention by Sparks, Patton, Ganschow, and Humbach (2011), and also Sparks (2012), by which self-report measures of L2 motivation and L2 anxiety may not be tapping into the learners' affective characteristics; on the contrary, they speculate that these measures may be an indication of students' perceptions on how strong or weak their language learning skills are. This idea had already been put forward in Sparks and associates' early studies (Sparks & Ganschow, 1991, 1993, 1995). What this is saying is that 'low motivation or high levels of anxiety for L2 learning are likely to be consequences rather than causes of good and poor L2 learning' (Sparks, Patton, Ganschow, and Humbach 2011:268). Statistical techniques which can be used to answer questions of directionality would be of great use for the research community.

All in all, the objective of these methods needs to be the identification of higher level constellations of cognition, affect, and motivation which act as 'whole elements'. Dörnyei (2009) provides two examples of constellations of factors: Robinson's concept of aptitude complexes (Robinson, 2002a, 2007) and Dörnyei's notion of ideal and ought-to selves (Dörnyei, 2005, 2009). Of late, DeKeyser (2012) has highlighted the lack of research on second or third-order variable interactions in second language acquisition, i.e. interactions between IDs and treatments and structures, on the grounds that investigating beyond first-order interactions involving only two variables would provide information not on the variables being studied but also on the process that links the two variables. An additional suggestion by DeKeyser (2012) is that studying interactions over time can help identify patterns of change in second language learning processes as a function of the interaction of the intervening variables. This is undoubtedly an attractive research agenda for the coming years.

1.5 Motivation

A model example of a variable which has explained variation in language proficiency in numerous studies is motivation: no study on IDs would be complete without including motivation, the second of the 'big twos' in IDs research (the first one being language aptitude). Motivation is an affective factor. Lambert and Gardner pioneered motivation research in the nineteen eighties, working on the social psychology of language learning in the bilingual context of Canada. They made a key distinction between 'orientation', which refers to the long-term learning objectives of language learners, and 'motivation', which they define in terms of intensity, namely, the effort that learners are willing to do to learn a language persistently. In their model, learners' goals could be classified in two broad categories: an integrative

orientation, by which the learner shows a positive disposition towards the L2 community and a desire to identify with it, and an instrumental orientation, whereby language learning is associated with the potential benefits of learning the language: i.e. a better job. Although Lambert and Gardner's work is still influential, current research trends now accept that there may be more orientations than the original 'integrative' and 'instrumental' categories. Besides, it is also acknowledged that orientations are not stable and may vary over time. Ellis (2004) highlights that motivation as perseverance is more important than orientations for language learning success. In general, Dörnyei and Skehan (2003) define motivation as

the direction and magnitude of human behaviour, or, more specifically, (i) the choice of a particular action, (ii) the persistence with it, and (iii) the effort expended on it. In broad terms, motivation is responsible for *why* people decide to do something, *how long* they are willing to sustain the activity, and *how hard* they are going to pursue it. (p. 614)

Noels et al. (2000) developed a model for the distinction between intrinsic and extrinsic motivation, as well as amotivation: the absence of a motivation to learn. In this model, extrinsically motivated learners pursue an instrumental end in their learning, while intrinsically motivated learners engage in language learning for personal satisfaction.

More recently, Dörnyei (2010) proposed a theory which acknowledges the dynamic and multidimensional nature of motivation. This is a turning point in motivation theory as he moves away from traditional static theories of motivation to try to explain how motivation changes over time. In his model, he distinguishes three stages: pre-actional, which concerns choice motivation, very much related to orientations; actional, related to executive motivation, which is

concerned with how much the learner is prepared to invest in learning the language, and, finally, a post-actional stage: in this final phase motivation is retrospective and the learner develops attributions out of the learning experience which, in turn, influence motivation in subsequent phases of learning. A new definition for motivation is proposed by Dörnyei and Ottó (1998, cited in Dörnyei & Skehan, 2003) under this dynamic approach:

A dynamically changing cumulative arousal in a person that initiates, directs, coordinates, amplifies, terminates, and evaluates the cognitive and motor processes whereby initial wishes and desires are selected, prioritized, operationalised, and (successfully or unsuccessfully) acted out. (p. 617)

In the foreign language learning context, Tragant (2006:238) reported that attitudes toward learning a foreign language seem dependant on the language which is being learnt, and more importantly, to students recognising that learning that language is an important life skill. A review of the results of the BAF larger project from the point of view of motivation, age of onset and hours of instruction, the study reports how motivation changes as a function of the age of learners. Tragant's (2006) study shows the dynamism that Dörnyei's and other models describe. There were four groups in the study: groups A and B were mainly primary school students; group C included teenagers, and group D comprised college students and non-college students aged 18 or older. Of the four groups, adults reported being more motivated than students with earlier onset ages. This should not come as a surprise since learning English in the Spanish educational system is compulsory at earlier ages, while adults study on their own initiative. An important finding in the adult age group for the present dissertation is that adults with negative attitudes attributed their English

learning dislike to the difficulty of the task, 'either because they feel they are not good at languages or because they find this particular language too complex to learn or difficult to understand orally' (Tragant, 2006:263). Finally, this study follows current trends on the dynamic nature of motivation as it explores a finding in Artieda (2010), by which the role of motivation on learning outcomes varied as a function of foreign language proficiency: as stated above, while it correlated positively for both proficiency groups, the strength of the correlation and the tests on which it loaded were different: after 200 hours of instruction, motivation correlated weakly to moderately with results on a cloze, $r = .28$, $n = 51$, $p < .05$, and on a multiple choice test, $r = .32$, $n = 51$, $p < .05$. Conversely, for the group with 416 hours of instruction, correlations yielded a strong, positive correlation coefficient with dictation $r = .54$, $n = 14$, $p < .05$, and with listening test scores $r = .57$, $n = 14$, $p < .05$. Despite the low number of participants in the higher proficiency group, results were suggestive of a differential impact of motivation at two different stages of the proficiency scale which is worth further investigation.

1.6 Age

The role of age of onset in second language acquisition has been extensively researched in naturalistic contexts, mostly following the critical period hypothesis framework (CPH), which in its most succinct form states that there is a limited developmental period during which acquiring a language is possible to nativelike levels. After this window of opportunity, the age variable does not have any predictive value any longer and a high degree of variability amongst individuals is to be expected. Penfield and Roberts (1959) and then Lenneberg (1967) situated the end of the critical period around puberty. They claimed that the critical period closed when brain lateralization was complete,

thus driving to an end a state of organisational plasticity in the brain. However, empirical studies researching this hypothesis have posited dissimilar shapes of the age function after puberty: Johnson and Newport (1989) observed that the ability to learn a language plateaued at very low levels after puberty, and interpreted these results as proof of the CPH and of a sharp end to learning after puberty. In contrast, Bialystok and Hakuta (1999) reported a linear decline in proficiency across all ages in their analysis of the NY census population, and Birdsong and Molis (2001) did a reanalysis of the data in Johnson and Newport (1989) setting a cut-off point at age 17, and found a strong age effect for the late arrivals group. The latter findings are clearly indicative of a qualitative change in the L2 learning abilities at a point in maturation, after which starting age has predictive value again.

Findings in instructional learning settings draw attention to the fact that age of onset seems to be mediated by the learning context. Several studies conducted in instructed learning settings with learners of different age groups (Muñoz, 2001, 2003, 2006, 2011, Al-Thubaiti, 2011) suggest that, contrary to findings in naturalistic contexts, in the long term and after similar amounts of input, starting age is not a strong predictor of language outcomes. Along the same lines, Marinova-Todd et al. (2000), propose that age influences language learning, but mainly because it is associated with other factors of a social, psychological and educational nature affecting L2 proficiency, and not because of any biological limitations as suggested by the CPH. Moyer (1999) supported this concept too in her study on the role of age, motivation and instruction in adult learners of German, and predicted that the role of age would be observed as 'inextricably connected to other variables, to the extent that its predictable value alone would be questionable' (Moyer, 1999:85).

A related topic in the age literature is the influence of the aging process on second language learning across adulthood, understood as a steady and progressive decline in second language learning abilities as a result of aging, which begins shortly after maturation (Birdsong, 2006). The purported aging of the brain would cause cognitive declines in second language learning abilities, as suggested by Hakuta et al. (2003) as an explanation for the older learner's declines in learning paired associates in their study including learners of all ages (5 to 60 years old). What abilities would then be affected by cognitive aging? Birdsong (2006) reports declines in performance for tasks involving working memory and episodic memory. The same seems to be true for associative memory and incremental learning. There are three central characteristics of declines according to Birdsong, as follows: declines in the abilities mentioned above affect both L2 and L1 processing; the onset of declines begins as early as in the twenties; and finally, the function shows a linear and continuous shape across adulthood (Birdsong, 2006). Salthouse (2004) summarizes his findings on cognitive aging by reporting negative linear age trends in measures of processing speed, reasoning, and memory which are observable in early adulthood (around the twenties).

Adding to declines in adult age, Singleton and Ryan (2004) suggest that the L2 learning capacity may also be affected by a decreasing sharpness of the senses, predominantly to hearing loss. Hearing decrements are typically slight in early adults, but can be quite significant from the 50s onwards. Singleton and Ryan (2004) posit that these declines may explain findings in which older adults tend to obtain lower scores than younger adults in tests involving aural comprehension skills (Thorndike, 1928; Halladay, 1970). More recent studies have reported differences in aural comprehension skills in much narrower age ranges, particularly between the 20s and the 30s (Seright, 1985; Artieda &

Muñoz, 2013). Of late, Ribeiro (2013) found significant differences in performance in listening skills between a younger group of adults (ages 19 to 29) and an older group of adults (over 45).

Some researchers investigating adult L2 learning advocate the need to conduct studies with disaggregated learner samples in smaller age groups to be able to draw specific regression lines for each age range, as diverse variables may interact with age for different age groups (DeKeyser, Alfi-Shabtay & Ravid, 2010; DeKeyser, 2013). An attractive line of research in this area concerns the particular learning characteristics of what Singleton and Ryan (2004) named the 'young-old' group, consisting of learners in the age range between 55 and 75 years old. Their work suggests that this age group does not face insuperable difficulties for learning an L2 if given 'clear speech input, plenty of opportunities and encouragement to rehearse such input, appropriate guidance in respect of memory strategies, a watchful eye over task complexity, and an absence of time pressure' (Singleton and Ryan, 2004:215). In a recent study, Mackey and Sachs (2013) pushed the age even further to include older learners between 65 and 89 years old to motivate research on working memory in older age groups. Results suggested that L2 development progressed only in those adults obtaining high scores on a first-language working memory span test.

Not all is bad news for the older learner, though. 'With advancing age can come increased tolerance for ambiguity, greater willingness to consider multiple perspectives, and stable crystallized intelligence' (Mackey and Sachs, 2013:707). There is clearly a need to further investigate the trade-offs between expected declines in cognitive and sensory abilities and increased motivation, personality characteristics conducive to learning, and accumulated knowledge and experience (Salthouse, 2004), if we are to better understand the second

language learning processes of adults. The current study looks at what is the role played by age at testing in two groups of adult learners of English as a foreign language.

The two forthcoming chapters provide a detailed account of the main IDs investigated in this study: language aptitude and L1 literacy.

CHAPTER 2

Language Aptitude

2.1 What is Language Aptitude and why is it Relevant for Foreign Language Learning?

In the broader area of individual differences, language aptitude is the first of the big 'twos' in explaining inter-learner variation, the second factor being motivation. Correlations between language aptitude and foreign language attainment are often as high as .50: these results have made language aptitude the most important cognitive variable affecting second language acquisition. Despite its strong explanatory power, language aptitude research has experienced a very irregular research route during the XXth century and the first decade of the XXIst century.

Several definitions have been put forward for foreign language aptitude during the past 60 years. Language aptitude has been defined as:

'Basic abilities that are essential to facilitate foreign language learning' (Carroll and Sapon, 1959: 14).

'A range of different cognitive factors making up a composite measure that can, in turn, be referred to as the learner's overall capacity to master a foreign language' (Dörnyei, 2005: 249).

‘Second language learning aptitude is characterized as strengths individuals have –relative to their population– in the cognitive abilities information processing draws on during L2 learning and performance in various contexts and at different stages’ (Robinson, 2005: 46).

‘Aptitude is a [...] theoretical construct [...], operationalised in the form of a test, which aims to predict phenomena that characterise SLA (such as incidental learning, metalinguistic awareness, fossilisation, and others), and the extent to which successful SLA occurs as a result’ (Robinson, 2013:1).

Robinson (2013) supplemented this definition stating that

‘higher aptitude [...] predicts more successful adaptation to instructed, or naturalistic exposure to the L2, as measurable by demonstrable faster progress in learning, and in higher levels of ultimate attainment in proficiency at the end of a course of instruction, or following a period of naturalistic exposure to the L2’ (p. 1).

The latter definition is the most encompassing of all, as it includes learning contexts, as well as acknowledging language aptitude’s relevance both in learning rate and in ultimate attainment.

While there is much debate about some of the intrinsic characteristics of foreign language aptitude, scholars mostly agree on the following core features:

1. Language aptitude is not a unitary construct; rather, it is an umbrella term which encompasses a collection of human abilities or skills which facilitate foreign language learning.
2. The abilities or skills which contribute to language aptitude are of cognitive nature; that is to say, they are related to mental processes

involved in information processing and in the acquisition of new knowledge.

3. Language aptitude does not determine whether an individual is able to learn a foreign language or not; it only predicts rate of learning in foreign language acquisition. It predicts the rate of progress that an individual is likely to make in second language learning 'under optimal conditions of motivation, opportunity to learn, and quality of instruction' (Carroll, 1973, cited in Dörnyei, 2005).

2.2 Language Aptitude: From a Psychometric Approach towards Theory Building

Unlike other second language acquisition areas which have been driven by theory, the study of foreign language aptitude has been closely tied to the development of foreign language tests since its inception. As early as in the 1920s and 1930s, language specialists in the US started to develop prognosis tests. The objective of these tests was not to understand the processes underlying foreign language learning, but rather to be able to predict who would benefit from foreign language instruction. Tests did not have much predictive power, and in fact there were other variables which were found to be more predictive of language learning success, like IQ scores or English grades (Sparks and Ganschow, 2001).

Language aptitude research flourished in the 1960s, when J.B. Carroll and his associates were commissioned to develop language aptitude tests by the US government. Their research peaked with the publication of the most popular and influential of all language aptitude batteries of the 20th century: the Modern Language Aptitude Test (MLAT). World War II had just ended by then, and the army was very interested in being able to identify people who

could attain mastery of foreign languages –which was the original motive for the funding of Carroll’s research (Stansfield and Reed, 2004). In those times prediction always went ahead of theory building, and indeed, Carroll proposed his four-factor structure of language aptitude basing it on the results of the factor analyses of a large number of individual learner characteristics expected to contribute to foreign language learning. Hence, his factors were empirically-derived.

Carroll’s purported four factors of language aptitude were as follows:

1. Phonemic Coding Ability: This is the ability to discriminate and code unfamiliar sounds in such a way that they can be recalled later.
2. Associative Memory: In accordance with what was known about memory in psychology at that time, Carroll explained this memory ability as the ability to make connections between native language words and their foreign language equivalents. Later, Carroll (1990) himself admitted that he had never been confident about its validity, suggesting that it should be regarded only as measuring a special kind of rote-learning ability that seems to function in foreign language learning situations.
3. Grammatical Sensitivity: This is the ability to identify the functions of words in sentences. In 1990 Carroll would admit that this test loaded highly on results of the Verbal sections of the Scholastic Aptitude Test, which led him to suggest that the MLAT-IV was a fairly good test of general intelligence.
4. Inductive Language Analytic Ability: This is seen as a receptive and a productive ability test, as it is expected that in addition to identifying patterns between form and meaning, the participant is able to

extrapolate and produce new forms of the language by using the new patterns that have been inferred. In 1981 Carroll already suggested that the validity of this test was limited in that the purported inductive language analytic ability was represented only weakly due to difficulties in administration; the test was too long and tedious for participants. Carroll suggested that the PLAB-4, Linguistic Analysis, was a much better test of inductive language analytic ability (Carroll, 1990).

Carroll defined then foreign language aptitude as measured by the MLAT as 'some special cognitive talent or group of talents that is largely independent of intelligence, and operates independently of the motivations and attitudes of the learner' (Carroll, 1981).

The MLAT was not exempt from criticism, but it was the upcoming of communicative learning approaches which represented the end of the bright times of the psychometric tradition. According to Skehan (2002), there were three main reasons for this decline: language aptitude was perceived as undemocratic for learners, out-of-date conceptually, and of little practical explanatory value. In addition, some researchers at that time made the point that language aptitude was relevant only to formal learning as opposed to naturalistic acquisition processes, which were considered more relevant and successful (Krashen, 1982; Gardner, 1985). Following his Monitor Model², Krashen (1982) described the good language learner as an acquirer who was able to obtain sufficient intake in the second language and, additionally, who had a low affective filter to make an efficient use of this input for language

²The Monitor Model posits that adults have two ways for internalising linguistic rules of a second language: 'acquisition', which is implicit and subconscious, similar to the way children learnt their first language, and 'learning', which is explicit and results in the conscious representation of linguistic generalisations (Krashen, 1982).

acquisition. According to this view, attitude was superior and far more relevant for successful L2 acquisition than language aptitude.

Another foreign language aptitude test which was developed at that time was the Language Aptitude Battery (PLAB) (Pimsleur et al., 1966), for teenagers aged 16 to 19. The PLAB consisted of a verbal aptitude score subsuming scores from two tests of vocabulary and language analysis, and an auditory ability score composed of two separate scores of sound discrimination and sound-symbol association. This test emphasized the role of auditory ability and inductive language learning abilities, because Pimsleur had done research suggesting that 20 to 30 per cent of children underachieved in foreign language learning because they had poor auditory ability (Pimsleur et al., 1966). Other tests which were developed at that time but which shall not be described in detail here are VORD, developed by Child in the early 70s (Parry & Child, 1990) with the objective of identifying adults with a talent for learning languages which were very different syntactically from Western Indo-European languages; and DLAB (Defense Language Aptitude Battery), developed by Petersen and Al-Haik in 1976 (cited in Sparks & Ganshow, 2001), a very similar test to the MLAT.

Subsequent researchers in the 1990s and the first decade of the XXIst century shifted the approach towards language aptitude from skill measurement to construct development and theory building. Since then language aptitude research has blossomed again due to two main reasons (Dörnyei, 2005): on the one hand, advances in cognitive psychology have permitted a better representation of the mental skills and processes of the learner. On the other, scholars have started to link language aptitude to other important issues in second language acquisition research.

While other language aptitude tests have recently been developed (i.e. Canal-FT, Swansea LLAMA), researchers have advocated the need to update the current tests 'to accommodate findings from second language acquisition and cognitive psychology research' (Robinson, 2013:58). Robinson (2012b) proposes that either Skehan's processing-stage model of aptitude (Skehan, 2002, 2012) or his own Aptitude Complex/Ability Differentiation model of aptitude (Robinson, 2001, 2005) are valid frameworks on which to develop a theory-driven language aptitude test battery.

2.3 Recent Constructs of Foreign Language Aptitude

The first decade of the XXIst century witnessed a renewed interest in language aptitude research. In the following sections, the latest key conceptualizations of language aptitude proposed by scholars in the second language acquisition discipline are introduced. All constructs share the common objective of contributing to build theory and then offer it to the research community so that it can be tested. To begin with, in 2000, Grigorenko, Sternberg and Ehrman developed the Cognitive Ability for Novelty in Acquisition of Language (Foreign), also known as the CANAL-F. Similarly, in 2001 Robinson presented the Aptitude Complex/Ability Differentiation framework with the objective of explaining the vast variability in outcomes in second language learning. Skehan had widely researched language aptitude in depth in the 80s, in which he formulated his modular view of language acquisition. Then in 2002 he revisited the topic and further elaborated the links he suggested purportedly existed between aptitude components and second language acquisition stages.

The descriptions below are intended to provide a brief account of the key points and ideas underlying each construct, and therefore they are by no means extensive.

2.3.1 ABILITY TO COPE WITH NOVELTY: CANAL-F

Proposed by researchers Grigorenko, Ehrman and Sternberg, the Canal-F is both a theory of foreign language learning ability and a test. Central to this theory is the notion that the core ability required for foreign language acquisition is 'the ability to cope with novelty and ambiguity' (Grigorenko, Sternberg and Ehrman, 2000). Unlike previous attempts at broadening the language aptitude construct by including affective factors, Grigorenko and associates propose that the 'coping with novelty factor' is a cognitive factor which has its roots in Sternberg's theory of triarchic intelligence, and thus it does not challenge the base definition of foreign language aptitude as a set of cognitive abilities. However, before providing the rationale for this framework, a brief account of Sternberg's theory of successful intelligence is given. The CANAL-F test is based on this theory.

With the objective of providing a general definition of intelligence, Sternberg argued that a construct of successful intelligence should capture the fundamental nature of human abilities. The point he made is not that previous theories of intelligence were wrong; but rather, that they were incomplete. Conventional tests of intelligence (*g* factor) only account for 25% of the individual differences variation in school performance after all (Anastasi & Urbina, 1997, cited in Sternberg, 2002). Sternberg posited that 'the intelligence one needs to attain success in life and success in learning a foreign language as well comprises analytical, creative and practical aspects' (2001). Analytic intelligence would involve applying skills to analyze, evaluate, judge, compare

and contrast, and it would be the academic intelligence that conventional intelligence tests measure. Creative intelligence, which skips conventional intelligence tests, would consist of an individual's ability to cope with relative novelty. There would be still one area of intelligence that would remain unexplored if we limited the concept of intelligence to analysis and creativity: practical intelligence. Practical intelligence would involve applying intelligence to experience so as to adapt to the environment successfully. The central argument of Sternberg's theory is that creative and practical abilities are not captured by conventional intelligence tests because they do not draw on a general factor: academic or analytical abilities are the only ones which can be measured by a general factor. Creative and practical abilities cannot be measured with these general tests because they are typically domain-specific.

Sternberg himself applied this broader three-component view of intelligence to the topic of foreign language learning, and suggested several ways in which this could be done in order to better capture the abilities at play in foreign language learning. His first suggestion was to test for creative and practical language-acquisition abilities and not limit the foreign language aptitude batteries to tests of analytical and memory abilities. Secondly, he proposed using a dynamic test, in which the learner would be involved in acquiring a new language while being tested simultaneously. Finally, Sternberg recommended that the score in the aptitude test was not given as a global measure, but as results per component so that individuals could be proposed forms of instruction which suit the strengths of the learner (Sternberg, 2002).

Going back to the Canal-F theory, the link with the triarchic theory of intelligence as described above is that the ability to cope with novelty is a part of the experiential/practical aspect of intelligence –and thus, amenable to training and modifiable by experience. The idea was not totally new, though,

and something along the same lines had been suggested by Skehan (1989) when he said that one of the reasons by which language aptitude tests worked was because they mainly tapped into 'the capacity to function as a measure of the ability to cope with decontextualised material' (1989:34).

As regards second language acquisition processes, the triarchic theory of intelligence distinguishes five processes:

1. Selective encoding is used to distinguish between information with different importance.
2. Accidental encoding is used to encode background information and use it as context for the main information stream.
3. Selective comparison is used to decide how relevant a piece of old information for a current task is.
4. Selective transfer is useful to apply inferred rules to new tasks.
5. Selective combination is useful to synthesize different bits of information gathered through any kind of encoding.

These five knowledge acquisition processes have four levels of operation: lexical, morphological, semantic and syntactic. Finally, there are two ways in which input can be processed: visually, for reading and writing; and orally, for listening and speaking.

The Canal-FT test is a dynamic test in which participants are tested while learning a new artificial language, Ursulu. By the end of the test participants have learnt enough Ursulu to be able to cope with a small story written in Ursulu. The test has nine sections: five of them consist of immediate recall tasks, and the other four are identical to the first five but are presented later, involving delayed recall tasks. The different aspects of the theory being tested are:

1. Learning meanings of neologisms from context.
2. Understanding the meaning of passages.
3. Continuous paired-associate learning.
4. Sentential inference.
5. Learning language rules (this is the only section which does not have a delayed recall task).

For a detailed account of which knowledge acquisition processes and modes of operation are involved in each of one of the sections, see Grigorenko, Sternberg and Ehrman, 2000, pages 394-395.

Grigorenko and her associates conducted two studies in order to explore construct and content validity of the Canal-FT. The first study set out to explore whether the test measured FL learning ability rather than a general cognitive ability. To do so, participants took two other tests of crystallized and fluid intelligence, as well as the MLAT. Results proved that the Canal-FT subtests loaded on both a general intelligence factor and a language-specific factor. All the subcomponents of the Canal-FT test contributed to the language-specific factor, while only two of the MLAT sections contributed to it (Paired Associates and Spelling Clues). This finding suggests a degree of overlap between these two factors which deserves further investigation. As far as external construct validity is concerned, the Canal-FT scores were validated against the MLAT, which was used as the benchmark, and two tests of intelligence, crystallised and fluid. The convergent validity of the Canal-FT was assessed by running correlations with the MLAT: the results of the correlations between the two tests were either significantly higher or not significantly lower than correlations between the Canal-FT scores and the indicators of crystallised or fluid abilities, demonstrating convergent-discriminant validity of the Canal-FT measurements.

Construct validity assessments suggest that 'the Canal-FT is a valid measure of FL aptitude, which, as expected, is related but not equivalent to both crystallised and fluid abilities' (Grigorenko et al., 2000:397). Another aim of the study was to investigate the role of previous experience with foreign languages. The result of this question was very interesting in that it yielded significant correlations between the number of spoken and written languages of participants and the total score in the Canal-FT test. However, there was no correlation whatsoever with the results in the MLAT, which suggests that the two tests are not measuring the same constructs, and so the Canal-FT seems to be measuring the kind of abilities which people having language learning experience exhibit.

2.3.2 ROBINSON AND THE APTITUDE COMPLEX / ABILITY DIFFERENTIATION

FRAMEWORK

Adopting Snow's (1978, 1979) interactionist approach, Robinson (2001) proposed the Aptitude Complex/Ability Differentiation framework in order to explain the variability in outcomes in second language learning and to build a theory-motivated measure of foreign language aptitude.

The assumptions upon which the Aptitude Complex / Ability Differentiation framework is based are as follows:

1. There are child-adult differences in foreign language learning: adults rely on general problem-solving abilities and have greater variation in attainment (see the Fundamental Difference Hypothesis, Bley-Vroman, 1990).

2. Cognitive abilities (or aptitude complexes) are impacted by the information processing demands of different tasks (the aptitude complex hypothesis (Snow, 1978).
3. Adult learning in any condition of exposure is fundamentally similar, since it is the result of the interaction between cognitive abilities and the processing demands of the task (the fundamental similarity hypothesis, Robinson, 1997).
4. Points 2 and 3 explain variation in adult foreign language learning attainment, as:
 - a. Cognitive abilities need to be matched to learning tasks and conditions of exposure, and typically this is often not the case.
 - b. Some adults have better differentiated abilities (adults and high-IQ groups), consisting of multiple abilities and a weaker *g* factor, than others (children and low-IQ adult groups). This is the Ability Differentiation Hypothesis (Deary et al., 1996).

Hence, the expectation is that those groups of learners with more differentiated abilities will experience more variation in learning even if conditions of exposure and tasks are kept constant compared to learners with less differentiated abilities.

Robinson's proposal provides a top-down comprehensive theoretical framework to conduct, for instance, aptitude-treatment interaction studies which can shed light on the correlates between cognitive abilities and second language acquisition processes (i.e. implicit, incidental and explicit); and, as Skehan had proposed earlier, to match learner profiles to instructional tasks and treatments (1998).

2.3.3 SKEHAN AND THE 'INFORMATION PROCESSING' MODULAR APTITUDE THEORY

In 1989 and 1998 Skehan set out to update the construct of aptitude by posing that aptitude consisted of three components: auditory ability, linguistic ability, and memory ability, and then he went further and linked these three components to stages within a flow of information processing. Table 2.01 shows the proposed relationship between aptitude factors and second language acquisition processes.

Table 2.01 *Aptitude and Second Language Acquisition Processing Stages*

| Aptitude and Processing Stages | | |
|--------------------------------|--------------------|---|
| Aptitude Factor | Stage | Operations |
| Phonemic coding ability | Input | Noticing |
| Language analytic ability | Central processing | Pattern identification Generalization Restructuring Dual-coding organization |
| Memory | Output | Retrieval - 'computed' performance - exemplar-based performance |

From *Research into Language Aptitude*. Skehan. (1998). A Cognitive Approach to Language Learning. Oxford: Oxford University Press.

Skehan defined these three factors and compared them to Carroll's four-factor system in the following manner:

1. Phonemic Coding Ability: this is the same factor which Carroll named exactly the same. Skehan emphasized that, as Carroll pointed out too, this is not only about making sound

discriminations, but about the fact that learners need to code the auditory input in such a way that it can later be recalled and then recognised as processable input; and, as such, this ability is critical for the related noticing stage in foreign language acquisition. Skehan claimed that sound discrimination alone did not correlate with foreign language learning success, while the ability to analyse the discriminated sounds in such a way in which they can be recalled and properly used later did.

2. Language Analytic Ability: In this factor Skehan subsumed two factors which Carroll treated separately: grammatical sensitivity and inductive language analytic ability, and so his explanation of this factor is that this ability is not only concerned with recognising patterns in language, but rather that the learner will also be able to extrapolate from the internalized rules and produce correct chunks of new language. In SLA, this ability impacts on such processes as pattern identification, generalization, restructuring, and dual-coding organization.
3. Memory: In line with what was known about memory at his time, Carroll only included a component of associative memory. By the time Skehan published his work significant progress has been made in memory research, and researchers knew that associative memory was only one component of memory, possibly not the most important component. In light of this, Skehan's idea of memory highlighted the ability to 'retrieve it efficiently in real time to handle natural conversational demands' (Skehan, 1998: 204). This understanding of memory would be closer to what nowadays is considered as 'working memory'. Skehan links this

third factor to the output phase of second language acquisition, and thus memory would facilitate all retrieval processes which are essential for successful real time output performance.

In 2002, Skehan updated his modular language aptitude theory and developed a more granular linkage between aptitude components and processing stages in second language acquisition (see table 2.02.).

Table 2.02 *SLA Processing Stages and Potential Aptitude Components*

| SLA Processing Stages and Potential Aptitude Components | | |
|---|--|--|
| SLA Processing Stage | Description | Aptitude Component(s) |
| Noticing | Phonemic coding ability supplemented by attentional management and working memory operation. | Auditory segmentation Attention management Working memory Phonemic coding |
| Patterning | Capacity to detect and manipulate pattern in the target language. | Grammatical sensitivity Working memory Inductive language learning ability Restructuring capacity |
| Controlling | Proceduralisation of rule-based generalisations which were initially handled with difficulty. | Automatisation Proceduralisation Retrieval process Automatising |
| Lexicalising | Building of a lexical system which can be used to underlie real-time performance, which does not need excessive computation. | Memory Chunking Retrieval Processes |

Adapted from *SLA processing stages and potential aptitude components*, Skehan. (1998). *Theorising and Updating Aptitude*. In P. Robinson (Ed.) (2002) Individual Differences and Instructed Language Learning. Amsterdam, John Benjamins Publishing Co.

Skehan proposed that by exploring the relationships between existing language aptitude subtests and the possible aptitude components a research agenda emerged which indicated where new tests for aptitude sub-components could be developed.

Drawing from the evidence gathered from successful and unsuccessful learners, Skehan (1998) proposed a diagram to represent the relationships between language aptitude components and L2 proficiency (see figure 2.1).

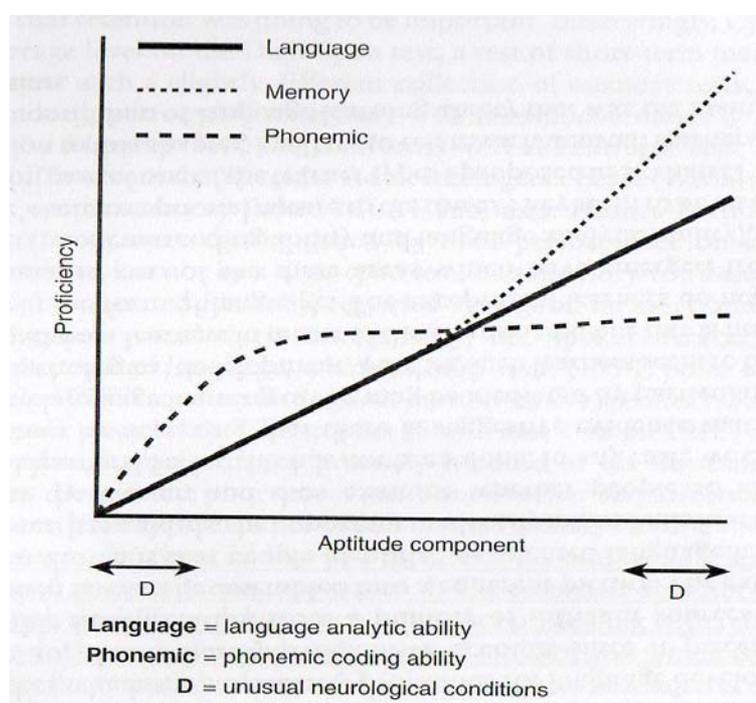


Figure 2.01 *Purported relationships between language aptitude components and L2 proficiency. From Skehan (1998).*

These relationships can be explained as follows:

- Language analytic ability has a linear relationship with success at all stages of the proficiency ladder, and is therefore equally important at all levels.
- Phonemic coding ability is of greatest importance at the early stages of L2 proficiency, and it plateaus after that. After a threshold has been

reached, the contribution the contribution of phonemic coding ability to L2 proficiency decreases substantially.

- Memory is another fundamental component which is equally important at all levels of L2 development until an advanced level of proficiency is reached. At that point its importance increases and it becomes the determining factor for learners to achieve native-like command of the language.

Later on, Robinson (2005) proposed clusters of abilities which may be important at beginning, intermediate and advanced levels of L2 development. Ten basic cognitive abilities would contribute to input processability in early stages of L2 learning, while pragmatic / interactional abilities / traits would be necessary in advanced levels of L2 development, such as interactional intelligence, openness to experience, pragmatic ability, etc, all of these traits contributing to information processes and mediated by the demands of the tasks.

However, Robinson (2005, 2013) has argued that to date no aptitude test takes a developmental approach to language aptitude by aiming at tapping at the different aptitude components which may play a role at different stages of L2 development.

Of late, Sparks, Patton, Ganschow, and Humbach (2011) set out to test Skehan's contention that language aptitude is multi-componential (Skehan, 1989) by carrying out a factor analysis of a test battery which included measures of language skills in the student's L1 and L2 in a sample consisting of 54 high-school students. Two of the four factors identified in the factor analysis included similar L1 and L2 skills, which provides support for the componential nature of language aptitude across languages (Skehan, 1989; Robinson, 2005,

2013), as well as emphasizing the long-term relationships between L1 and L2 learning, and providing support for the linguistic coding differences hypothesis' tenet that a phonemic coding deficit or poor language analysis in the L1 will be reflected on a student's L2 learning skill (Sparks & Ganschow, 1991, 1993, 1995; Sparks, Javorsky, Patton, and Ganschow, 1998). The two linguistic factors identified across languages were language analysis, which included measures of vocabulary, language comprehension, grammar, and inductive language learning; and phonology/orthography, which included measures of phonetic coding and phonological processing (word decoding, spelling, and sound-symbol correspondence). The purported long-term relationships between the L1 and any subsequent languages learnt later in life, as well as their relationships with language aptitude are further reviewed in chapter 3.

2.4 Language Aptitude and L1 Acquisition

As explained in chapter 1, underlying Bley-Vroman's Fundamental Difference Hypothesis is the main assumption that child first language acquisition and adult foreign language acquisition processes are fundamentally different. One of the consequences of that assumption is that since all children acquire their L1 successfully, there is no variation in outcomes and therefore language aptitude does not play any role in L1 acquisition.

Cases of failure in the acquisition of the L1 are rare and belong into the field of language disorders; or of wolf or feral children, the latter being children who have suffered severe deprivation from human contact in their infancy and childhood. The group with language disorders includes children who are 'early talkers', 'late talkers', children with Specific Language Impairment (SLI), children with cognitive deficits (Williams and Down Syndromes) and children

with focal brain injury.’ (Suárez, 2010:22). As for wolf or feral children, landmark examples are Genie (Curtiss, 1988), and Victor of Aveyron (1797), portrayed in the 1969 movie by François Truffaut *The Wild Child* (*L’Enfant Sauvage*). Genie spent the first 12 years of her life locked in her bedroom, deprived from any contact with other human beings, when not entirely forgotten. By age 13, when she was found, she was almost mute and commanded a vocabulary of 20 words and some short phrases. Although doctors expected they could nurture her back into normality, as far as language is concerned and after having worked with her for eight years, Curtiss (1988) concluded that the acquisition of grammar is most sensitive to age at acquisition. At that time Genie was still showing impairments in the psychosocial functions of language and in the acquisition of grammar, with her sentences being still largely ungrammatical and lacking syntactic devices to mark relationships. Victor of Aveyron was a feral child who lived his childhood naked in the woods, until he was spotted and caught near Sant-Sernin-Sur-Rance, in France, when he was about 12 years old. Jean-Marc Gaspard Itard, a medical student, adopted him and tried to teach him to speak and communicate with other human beings. Victor made fast progress in understanding, but never went beyond a very rudimentary use of the language. In the end, Itard concluded that Victor was the mental and psychological equivalent of somebody who has been born deaf and mute (Shattuck, R., 1980).

Within the boundaries of normality, children differ in the rate and attainment of their L1s. However, it is the case that, as far as oral skills are concerned, all children are successful and become ‘indistinguishable from other native speakers of their language’ (Doughty, 2003:258). The picture is not so clear cut regarding reading and writing, in which individual children display different levels of both learning rate and attainment. In chapter 3 more

arguments are presented in favour of the argument that the non-existence of variation in L1 acquisition is controversial. Following, the assumption that language aptitude does not play any role in L1 acquisition is questioned. When reviewing the results of the Bristol Language Project (Wells, 1981, 1985), Skehan concluded that the study demonstrated that not all children acquire their L1 at the same rate. Skehan interpreted findings to suggest that language aptitude may explain differences in the rate of learning of the L1 to some extent. Other researchers have been able to find language aptitude effects in L1-related processes, such as attrition: it is claimed that if L1 contact is reduced prior to puberty, the L1 system may suffer severe loss (Bylund et al., 2009). On the contrary, if L1 contact is reduced after puberty, negative effects on the L1 are only minor (Yeni-Komshian et al., 2000). Bylund et al. (2009) reported having identified positive effects of language aptitude in helping avoid or minimize L1 attrition, suggesting that 'language aptitude has a compensatory function in language attrition, helping the attriter to retain a high level of L1 proficiency despite reduced L1 contact' (Bylund et al., 2009:443).

Despite the limited evidence available, there are enough reasons to question the assumption that language aptitude does not play a role in children L1 acquisition, and further research will undoubtedly help casting light on this area.

2.5 Language Aptitude and L2 Acquisition by Children and Adults

The issue of language aptitude playing a role for adult second language learning and not for children's is related to DeKeyser's seminal 2000 study to test the Fundamental Difference Hypothesis. In his study with 57 adult Hungarian-speaking immigrants into the US, he speculated that only adults

with a high level of verbal analytic ability would be able to reach nativelike competence in their L2, but that this verbal ability would not play any role for children. His interpretation of findings was in line with the prediction of the Fundamental Difference Hypothesis: only 6 out of 42 adult acquirers scored within the child acquirer's range, supporting the idea that only adult learners with above-average analytical abilities can reach a nativelike command of the second language, because the implicit learning mechanisms of the child are no longer accessible for the adult. From that evidence, DeKeyser inferred that 'aptitude plays a role independent of schooling, and it only plays that role for adult learners' (p.515). However, this interpretation of the results has been severely criticized as DeKeyser did not provide a satisfactory explanation for that one participant who scored in the native range but did not have above average language aptitude. Long (2007) argued that the test used to measure analytic abilities, the grammaticality judgement test (GJT) was administered without time pressure, which may have allowed participants to rely on explicit L2 knowledge. In addition, Long (2007) claimed that the lack of correlation between aptitude and GJT scores in the early arrival group may have been an effect of the non-language independence of the language aptitude test, the HUNLAT (Hungarian version of the MLAT, Ottó, 1996), to conclude that the fact that all high aptitude participants were in the group of late acquirers 'seems to be an artifact of the aptitude instrument used' (Grañena, 2012:10).

Empirical evidence exists in favour of the opposite position, which holds that language aptitude plays a role in L2 acquisition by children and pre-pubertal adolescents (before the closure of the purported Critical Period). One of the first examples is provided by Humes-Bartlo in her 1989 paper, in which she studied variation in children's ability to learn languages. Seventy-one 3rd to 5th-Grade students in bilingual education in New York were tested on a set of

aptitude, cognitive and vocabulary variables to understand what distinguished fast and slow learners of English. Verbal analytical reasoning, auditory discrimination, verbal associative memory, and English vocabulary identified the fast learning group clearly.

Researchers Harley and Hart also found aptitude effects in children and adolescents in their two studies investigating the roles of age and language aptitude on L2 proficiency. In the 1997 study, participants were 65 11th-grade students in early and late French immersion programs. Findings supported the hypothesis that different components of language aptitude would be associated with L2 proficiency for early and late immersion students. Successful early immersion students obtained higher scores on a memory measure, whereas successful late immersion students scored higher on a measure of analytical language ability. The 2002 study, in contrast, took place in a naturalistic setting: 31 English-speaking Ontario students in grades 10 and 11 took place in a bilingual exchange program for three months. The findings of this study seemed to suggest that language analysis was the best predictor of French proficiency, followed by intensity of use. However, in this naturalistic context the influence of analytical language ability skill was not as consistent as it was in the French immersion students in the previous study: analytic skills correlated only with a sentence-repetition task, and results of post-tests failed to confirm the relationship with aptitude. In addition, the fact that participants had learnt French in a classroom context for seven years before the naturalistic experience made the aptitude effects difficult to be attributable to the very limited period of naturalistic exposure.

More recent evidence was provided by Abrahamsson and Hyltenstam in 2008 when researching the prevailing presence of aptitude effects in near-native second language acquisition. Abrahamsson and Hyltenstam investigated the

role played by aptitude in near-native adult speakers of Swedish with different ages of arrival (AO). Contrary to the findings of DeKeyser (2000), results revealed small but significant effects of language aptitude for early L2 learners. The authors suggest that DeKeyser's claim that language aptitude only plays a role for adult learners should be modified to state that language aptitude 'plays not only a crucial role for adult learners, but also a certain role for child learners.' (Abrahamsson & Hyltenstam, 2008:499).

One of the main problems with the empirical evidence supporting language aptitude effects in children's second language learning is the fact that language aptitude has been operationalised using different variables and measured using diverse instruments in the research literature. The articles reported upon above are not an exception to this variety of variable operationalisations and instruments. Humes-Bartlo (1989), rather than using an off-the-shelf aptitude test like the MLAT, used a variety of language-related measures of cognitive skills such as vocabulary knowledge, phonemic discrimination, and associative memory. Hartley and Hart (1997) operationalised language aptitude as associative memory, memory for text and analytical ability, but in their 2002 study, they only measured memory and language analytical ability. Finally, Abrahamsson and Hyltenstam (2008) measured phonetic memory, lexical-morphological analytical skills, grammatical inference, aural memory for unfamiliar sound sequences and the ability to form sound-symbol associations. The four studies used different tests to measure the purported skills considered to be part of the overarching language aptitude construct. These different conceptualizations do not contribute to providing evidence for a language aptitude effect, since each study is considering language aptitude as an umbrella term comprising a different cognitive skill set and using different instruments to measure it. Table

2.03 shows the different skills measured and the instruments used in each study.

Table 2.03 *Skills Contributing to Language Aptitude and Tests Used to Measure them in Experimental Studies*

| Language Aptitude Skills and Tests Used to Measure Them | | |
|---|---|---|
| Study | Skill | Test |
| Humes-Bartlo, 1989 | Vocabulary Knowledge | The Peabody Picture Vocabulary Test Revisited |
| | Phonemic Discrimination | A 10-word list constructed by the author |
| | Associative Memory | A Spanish translation of the paired associates test from the Wechsler Memory Scale (Wechsler and Stone, 1945) |
| Hartley & Hart, 1989 | Associative Memory | MLAT-IV Word Pairs Subtest |
| | Memory for Text | An adaptation of the Wechsler Memory Scale (Wechsler and Stone, 1945), for texts. |
| | Analytical Ability | PLAB-IV Language Analysis Subtest. |
| Hartley & Hart, 2002 | Memory for Text | An adaptation of the Wechsler Memory Scale (Wechsler and Stone, 1945), for texts. |
| | Analytical Ability | PLAB-IV Language Analysis Subtest. |
| Abrahamsson & Hyltenstam, 2008 | Phonetic Memory | LAT A (Swansea Lat 2003) |
| | Lexical-morphological Analytical Skills | LAT B (Swansea Lat 2003) |
| | Grammatical Inference | LAT C (Swansea Lat 2003) |
| | Aural Memory for Unfamiliar Sound Sequences | LAT D (Swansea Lat 2003) |
| | Ability to Form Sound- | LAT E (Swansea Lat 2003) |

| | | |
|--|---------------------|--|
| | Symbol Associations | |
|--|---------------------|--|

Nowadays the issue is still far from being settled, although the empirical evidence gathered in the past 20 years seems to point in the direction that language aptitude plays a role in children's second language acquisition too.

2.6 Language Aptitude: Trainable or Fixed-at-Birth?

As mentioned in chapter 1, in psychology individual differences are considered as rather stable traits of individuals. In second language acquisition, the earliest case for language aptitude stability was a study by Politzer and Weiss (1969). Politzer and Weiss wanted to investigate whether it was possible to increase foreign language aptitude as measured by the Carroll-Sapon aptitude tests through specific training. To do that, an experimental-control group research design was used. The experimental groups received aptitude training; the control group did not. Five classes in the US Defence Language Institute Experiment (students of Arabic, Chinese, Russian, Spanish and Vietnamese) took part in the experiment, and were divided into experimental and control groups matched by initial aptitude scores. Findings showed that the specific language aptitude training received had no effect in the experimental cohort, and that it was the intensive language training provided by the Defence Language Institute which had an effect in aptitude scores, registered by both experimental and control groups. Almost 20 years later, Skehan and Ducroquet's 1988 research on the Bristol Project (Wells 1981, 1985) also suggested that foreign language aptitude remains remarkably stable during long periods of time: although 10 years had elapsed between the early first language measures and the aptitude indices, there were still a number of significant correlations. The Bristol Language Scale, which included a selection

of first language measures, yielded correlations above .40 with aptitude, above all with a measure of inductive language learning ability.

Carroll (1971, 1981) had supported this stability idea and admitted that, while he had no evidence that language aptitude was not critically dependent on prior language learning experience, the evidence that he had suggested that 'foreign language aptitude is relatively fixed over long periods of an individual's life span, and relatively hard to modify in any significant way' (Carroll, 1981:86). Carroll believed language aptitude to be strongly linked to native endowments in language acquisition ability, and thus he did not see any way in which a native endowment could be modified. Also in this fixed-at-birth paradigm, Larsen-Freeman and Long (1991) reported on a comforting idea by Carroll, who thought that high-quality instruction might help nullify language aptitude differences (Carroll, 1956, cited in Larsen-Freeman and Long, 1991). According to this speculation it is when instruction is not good enough that students need to compensate the lack of quality instruction with their own language aptitude endowment.

Other researchers have reported contradictory research findings. In 1980, Eiseinstein found that childhood bilingualism, and specifically formal education in more than one language before age 10, was associated with enhanced language aptitude in adulthood. In the study mentioned above, Harley and Hart (1997) investigated the hypothesis that language aptitude may be influenced by prior language experience, particularly in childhood. In their study, they posited that intensive L2 exposure in an early immersion classroom (kindergarten or grade 1) would be associated with higher eventual language aptitude scores than a later start at the grade 7 level. Their hypothesis was not supported by findings. In contrast to the students in Eiseinstein's (1980) research, intensive L2 exposure in childhood did not make a difference in their

language aptitude. Eiseinstein and Harley and Hart, however, were not applying the same intervention: while the former was advocating for formal education in more than one language in childhood, Harley and Hart were providing intensive L2 exposure. It may be the case that it was precisely the formal approach of Eiseinstein's intervention what made the difference. In any case, one study does not rule out the findings of the other since their interventions are different. All we can say is that in Eiseinstein's study formal education seemed to enhance language aptitude, and that in Harley and Hart's, intensive L2 exposure did not.

McLaughlin (1994) strongly supported the idea that language aptitude was modifiable by previous learning and experience, to the point of stating that 'novices can become experts with experience' (McLaughlin, 1994:114). This strong statement is based on a series of experiments conducted with Nation in 1986 in which they compared the performance of multilingual subjects to that of monolinguals, and findings suggested that the several languages known by multilinguals provide them with strategies and metacognitive skills which transfer to other languages. In his approach to foreign language aptitude from an information perspective, McLaughlin suggested that differences in language aptitude were due to the combination of two factors: availability of knowledge about the target language and the speed and efficiency of working memory³. Poor language learners could then be taught strategies from good language learners to increase the efficiency of working memory.

More recently, Grigorenko et al. (2000) conducted a study to validate their construct of their new theory of foreign language aptitude, CANAL-F (see section 2.3.1). They collected data on the participants' previous exposure to

³ Working memory is defined by McLaughlin as the degree to which individuals can more flexibly and consistently restructure linguistic representations (McLaughlin, 1994).

foreign language learning, and an association was found between the number of languages a person can speak, read, and write, and higher levels of language aptitude. Indeed, one of the conclusions of their study is that language aptitude is partially based on the individual's expertise in certain kinds of information processing which can be developed (Grigorenko et al., 2000:401). Note the mention in this study to the number of languages a person can not only speak, but *speak, read and write* (my italics). The fact that the authors include two academic skills as well as speaking entails that the learner needs to have attained a noteworthy level of proficiency in any previously learnt languages in order for this factor to have an impact on language aptitude. This is connected to the linguistic coding differences hypothesis posited by Sparks and Ganschow (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995), by which native language skills serve as the foundation for learning a foreign language, and that difficulties in one component of language are likely to have a negative effect on both native and foreign language learning.

Of late, Sáfar and Kormos (2008) also provided further evidence that language learning exerts an important influence on certain components of language aptitude (phonological sensitivity above all) as measured by the HUNLAT, the Hungarian version of the MLAT. Sáfar and Kormos had one group of learners participate in a highly intensive language learning programme. The results in the HUNLAT for both groups were favourable to the treatment group, especially in the Words in Sentences component of the HUNLAT. The researchers' interpretation of the findings is that the alleged abilities measured by language aptitude tests are not abilities but skills that can be trained.

Finally, Robinson (2012b) has suggested that the issue of language aptitude trainability is in clear need of more research, and that the sets of

cognitive abilities which he proposes seem to suggest that some of them may be more amenable to training than others. More research is needed before we are able to say which abilities are these.

2.7 Language Aptitude and Learning Contexts

In section 2.2 we saw how one of the reasons why language aptitude research declined in the 1970s and the 1980s was related to the upcoming of communicative learning methodologies. Language aptitude had come to be related to the learning context in which it appeared, namely, audiolingual methodologies, which were considered to be outmoded in the 70s and the 80s. Scholars agreed that language aptitude was less relevant in communicative language learning, and so that aptitude effects were negligible when learning (or, rather, acquisition) took place outside of the classroom environment, resembling naturalistic acquisition processes. The main supporter of this criticism was Krashen (1982), who draw attention to the fact that, in his times, almost all aptitude research was carried out in formal learning settings. His conclusions followed his own proposals on the acquisition-learning distinction and the operation of the Monitor Model: he proposed that aptitude only had a relevant role when conscious learning was concerned, and concluded from this that aptitude was only relevant for formal learning contexts. Skehan (1989) argued a few years later that in informal learning contexts there is less preliminary language organisation, and so the learner has a greater problem as he needs to impose structure on the new data he is facing. It is arguable then that, in that situation, language analytic capacities are even more important than in a classroom setting, as the learner needs to make sense of the new material he is being exposed to rather than being told the new language rules explicitly as in classroom environments.

Since these initial criticisms by Krashen the situation has changed, as empirical evidence showing that language aptitude is relevant in all learning contexts has become available. The first noteworthy experiment was carried out by Reves (1983). She investigated the role of several potential predictors of language learning success, such as aptitude, motivation, cognitive style, and learning strategies, in two learning contexts: one formal and one informal. In the informal setting, L1 Arabic speakers were acquiring Hebrew, while the control group involved the same group of learners but learning English in a formal setting. Findings were consistent with the explanation offered by Skehan in the previous paragraph: in the informal situation, language aptitude was the most effective predictor of language learning success, as it seemed to be more necessary for learners in a situation in which new language was less standardised. Harley and Hart (1997) provided evidence of language aptitude being relevant for L2 outcomes from the French immersion context. In their study, the L2 is learnt through content-based teaching methodologies, in which there is a much greater quantity of input than in formal classrooms, and in which the emphasis is placed on learning content rather than language. Similarly, Ehrman and Oxford (1995) provided more evidence when researching the variables with the highest correlation indexes for language learning success in a communicative learning context. In their discussion of findings, they were supporting the use of the MLAT (which had been criticized for applying only to audiolingual learning methodologies) in communicative learning environments as the MLAT seemed to be capturing learning abilities that are independent of the intervention. The correlations with the MLAT were .51. In a literature review, Sawyer and Ranta (2001) examined the language aptitude research available and concluded that

the predictive value of the aptitude measures has been maintained even when L2 learning takes place in a variety of settings which do not involve a metalinguistic analysis of language rules. Moreover, in controlled laboratory studies, aptitude was relevant to L2 learning in both implicit and explicit conditions. (p. 339).

Only one year later, Ranta (2002) continued exploring how learning happened in classes which were truly communicative in nature. Participants were francophone children studying in a five-month intensive ESL program offered at the grade 6 level. The aims of the program focused on the development of interpersonal communication skills through mainly oral activities. A cluster analysis revealed that language analytic ability was associated with strong performance on the L2 measures for the successful learners and with weak performance for the least successful students. This suggests that language analytic ability is still underlying communicative learning situations and so its influence is not limited to audiolingual methodologies or formal learning settings, which would explain why the MLAT continues to be a good predictor of success in communicative language learning.

Currently there are two main lines of argumentation regarding the possible relevance of language aptitude across learning contexts. While both approaches advocate that language aptitude has an influence in all learning contexts, Dörnyei (2005) argues that language aptitude has a robust effect which is not restricted to specific teaching methodologies, whereas other researchers (Robinson, 2001; Sternberg, 2002) believe that language aptitude has a strong situational and teaching methodological dependency. Drawing on the similarity hypothesis (Robinson, 1996:1997), by which adult L2 learning is fundamentally similar under any conditions of exposure, and measures of IDs in cognitive

abilities affect the extent of learning according to the processing demands of the specific learning tasks, Robinson (2002b) proposes that:

Cognitive maturity, critical period effects and existing L1 knowledge conspire to prevent adult access back to ontogenetically earlier evolved implicit L1 acquisition mechanisms. Dual systems (acquisition/learning, implicit/explicit, UG/central processing) are not dissociated in the domain of adult SLA, and consequently IDs in cognitive abilities have ubiquitous effects on the effectiveness of the general problem solving procedures, and explicit modes of information processing that adults adopt in learning an L2, accounting in part for the wide variation in levels of attainment, and rate of adult L2 learning process. (p. 214)

In a replication of an earlier study by Reber, Walkenfield and Herstadt (1991), Robinson (2002b) set out to study the apparent insensitivity of incidental L2 learning to IDs in cognitive abilities which Reber et al. had found, and, moreover, to further investigate Reber's claim that IDs in IQ do not affect and unconscious implicit⁴ and in many cases incidental⁵ learning, whereas explicit learning is affected by intelligence and IDs. A second objective was to examine whether this claim was generalisable to adult incidental L2 learning. To do so, Robinson examined what cognitive abilities and resources characterise the aptitude complex contributing to successful incidental learning. Fifty-five experienced L2 learners completed three Samoan learning tasks: an explicit learning task, an implicit learning task, and an additional incidental learning

⁴ Implicit learning conditions encourage memory based learning, without awareness of the underlying rule and without intention to discover it (Robinson, 2002).

⁵ In incidental learning conditions learners process input for meaning, and unintentionally learn the underlying language rule. Often learners become aware of this rule discovery (Robinson, 2002).

task. The results of the experiment demonstrate that the claims about implicit learning and IDs by Reber et al. were not generalisable to incidental SLA. Out of the three learning conditions, incidental learning was the most sensitive to ID measures that most closely matched the abilities hypothesized to be at play during the incidental learning task, i.e., aptitude and learning memory. A key claim in this study was that aptitude tests such as the LABJ (Sasaki's (1996) Language Aptitude Battery for the Japanese) and the MLAT need to be revised if they are to capture the cognitive abilities drawn upon in learning under incidental learning conditions. New tests should be developed that capture functioning cognitive abilities across a variety of instructional conditions (communicative, incidental, task-based, focus-on-forms, etc), which were not used when the formerly mentioned tests (LABJ and MLAT) were developed. Recently, Robinson (2013) has emphasized this point and claimed that current aptitude tests are situationally insensitive, and do not reflect the processing conditions or learning contexts in which learners are exposed to L2 input.

Sternberg (2002) argues for the situated nature of language aptitude and its strong dependency from the learning context too. As previously explained in his theory of triarchic intelligence (see section 2.3.1), there would be multiple intelligences which would draw on different constellations of domain-appropriate cognitive abilities, each of them influencing success in different adaptive domains. In L2 learning then, different aptitude complexes may need to be proposed and matched to different learning conditions and task types.

This dissertation is situated in a formal foreign language learning context, in which the methodological teaching approach is typically communicative, with focus-on-form and very limited exposure to the target language outside of the classroom environment. Although learners are expected

to read graded books in English as part of their course, exposure is considered to be too scarce to enhance the learning process in a significant manner.

2.8 Measuring Language Aptitude

Developed in the 1950s by Carroll and Sapon, the Modern Language Aptitude Test (MLAT) meant the start of what is considered the 'modern' view of language aptitude: the standard four component view of language aptitude. According to this view, there are four factors which have an impact on foreign language learning proficiency: phonemic coding ability, grammatical sensitivity, inductive language learning ability, and rote learning activity for foreign language materials. Based on this factor list, Carroll and Sapon created five tests which would measure them, and which became the five sub-tests of the MLAT:

Part One: Number Learning: A test of associative memory.

Part Two: Phonetic Script: This test measures phonemic coding ability.

Part Three: Spelling Clues: This test measures first language vocabulary and phonemic coding ability.

Part Four: Words in Sentences: A test of grammatical sensitivity.

Part Five: Paired Associates: Another test of associative memory.

While the MLAT was developed for people of 14 years old and above, another version was created to be used with children between the ages of eight and eleven (MLAT-Elementary). The original MLAT was developed having native speakers of English in mind, and it was devised to be taken in the first language of the participant. Its use has been so widespread that it has been adapted to a number of different languages: Italian (Ferencich, 1964), French (Wells et al., 1982), Japanese (Murakami, 1974), Japanese (Sasaki, 1996),

Hungarian (Ottó, 1996), Spanish (SLTF, 2005), etc. Just recently, the MLAT-Elementary form has been adapted to Catalan (Suárez, 2010).

But the MLAT has also been criticised for a number reasons, including several design flaws which Carroll himself admitted to (for a full account see Suárez, 2010). Possibly, the most outstanding critique is that language learning methodologies, populations and the conceptualisation of aptitude have changed a lot over the past fifty years, while the test is still the same (Suárez, 2010:122). In addition, the MLAT lacked a measure of inductive language learning ability from the very beginning, as well as having been accused of detecting reading and writing abilities alone, and not oral ability.

The main reason for the extraordinary popularity of the test was that, contrary to the very low correlation levels with achievement scores obtained by former tests developed in the first half of the century, the MLAT yielded multiple correlations with proficiency of between 0.40 to 0.60, which have yet to be beaten by another language aptitude test. Researchers have used the MLAT in its full or abbreviated form widely since the 1960s until the present day (i.e. Ehrman and Oxford 1995, Harley and Hart, 1997, 2002; Ehrman, 1998; Sparks, Javorsky, Patton, Ganschow, 1998; Sparks, Artzer, Ganschow, Siebenhar, Plageman, Patton, 1998; DeKeyser, 2000; Robinson, 2002b; Ross, Yoshinaga and Sasaki, 2002; Ranta, 2002; Erlam, 2005; Sparks et al., 2006; Hummel, 2009; Sáfár and Kormos, 2008; Sparks, Humbach, Javorsky, 2008; Sparks, Patton, Ganschow, Humbach, 2009a, 2009b).

The onset of the present century witnessed the creation of two foreign language learning ability tests: The Canal-FT (Cognitive Ability for Novelty in Acquisition of Foreign Languages), and the Swansea LLAMA.

Developed by psychologists Grigorenko and Sternberg and by linguist Madeline Ehrman, the Canal-FT is grounded on a cognitive theory of knowledge acquisition, naturalistic and dynamic, in that test takers learn an artificial language while they take the test. The concept underlying the Canal-F theory is that one of the central abilities required for the acquisition of a foreign language is the ability to cope with novelty and ambiguity. The test comprises five sections:

- a) Learning meanings of neologisms from context.
- b) Understanding the meaning of passages.
- c) Continuous paired-associate learning.
- d) Sentential inference.
- e) Learning language rules.

To the best of the researcher's knowledge, no study has used yet the Canal-FT test as an instrument.

The current Swansea Language Aptitude Test (LLAMA) used is a second version released in 2005, based on prior work published in 2002 by Paul Meara and his associates at Swansea University. It is vaguely based on Carroll and Sapon's work, and it measures different aspects of language learning through four sub-tests:

- a) LLAMA B: Vocabulary learning.
- b) LLAMA D: Recognition of patterns in spoken language.
- c) LLAMA E: Sound-symbol correspondence.
- d) LLAMA F: Grammatical inference.

Recently, researchers have begun to use the Swansea Llama Tests in their studies: in their 2008 study on the robustness of aptitude effect in near native second language acquisition, Abrahamsson and Hyltenstam detected 'small yet significant aptitude effects in child second language acquisition' (2008:481), something which previous language aptitude tests had failed to identify. Bylund et al. (2009) used the LLAMA again one year later in their research on the role of language aptitude in first language attrition: in this case they found that the scores in the LLAMA tests correlated with performance on a grammaticality judgement test. Bialystok, Luk and Kwan found the same correlation in their 2005 study on bilingualism, biliteracy and learning to read when using the LAT test. Of late, LLAMA tests have also been used in research with adults on ultimate attainment: Grañena and Long (2012) reported no relationship between aptitude and performance on a GJT task, while Grañena (2012) found cognitive aptitudes having effects in both early and late L2 learners as well as different types of cognitive aptitudes (posited to be implicit and explicit aptitudes) having differential effects on L2 outcomes.

Two features which this test and the Canal-FT have in common are that they are language independent, based on invented languages with which the test taker cannot be familiar, and that they are dynamic: participants are expected to learn an artificial language while sitting the tests.

The LLAMA battery of tests began as a series of exploratory projects carried out by students of English and linguistics at the University of Swansea, Wales. The instruments aimed at measuring aptitude for foreign language learning. The first version of the test was published as Meara, Milton and Lorenzo-Dus (2001), and it consisted of five sub-tests:

Lat A: A phonetic memory test.

Lat B: A test assessing lexical-morphological analytical skills.

Lat C: A grammatical inferencing task.

Lat D: This task tested aural memory for unfamiliar sound sequences.

Lat E: A test on the ability to form sound-symbol associations.

This initial version of the test was based on Carroll's MLAT up to a certain extent. However, tests began to be used by the research community and feedback started to be received, and the tests were modified accordingly. Thus subsequent tests started to diverge from Carroll's original work. The Lat A and Lat D tests were the less successful tests of the initial battery, while tests B, C, and E yielded very good results but had to be adjusted to respond to requests that were being received to adapt the programs to languages that did not use languages based on the Roman alphabet. As shown in detail in the full account offered below, the main changes that were made to the tests for this research concern two main areas. First, the elimination of tests which were not useful (Lat A) and, secondly, the substitution of English as the source first language by the use of visual stimuli for material to be read on the screen, as well as the substitution of very distant and computer-synthesised languages for spoken language strings, with the objective to make the tests usable to a wider audience. Other advantages of using this test suite for the current research were related to its ease of administration: the fact that it could be taken individually by using a computer with headphones provided test-takers with a more relaxed atmosphere than other pen-and-paper tests which need continuous assistance of the researcher to play taped recordings and read texts aloud. Also, the use of visual stimuli reinforced the fun part of test taking, making it less strenuous than other language-based tests which need lots of reading on the part of the participant. Finally, the four sub-tests could be taken in 20' to 30', so its short

duration made it perfect for its administration with the rest of the tests in the study, as all the tests had to be taken in a limited timeframe.

The version of the battery which is used nowadays is an updated version of the initial one, and Meara (2005) cautions researchers that it should not be used in high-stakes situations because it has not been standardised or validated. Recently, Grañena (2013b) conducted an exploratory validation study using a 186 participant sample from three different language backgrounds (English, Spanish, and Chinese). Results yielded acceptable levels of reliability, approaching an internal consistency coefficient of .80, as well as showing stability on a test-retest reliability procedure. LLAMA consists of the following tests:

LLAMA B: A vocabulary learning task aimed at measuring the ability to learn large amounts of vocabulary in a short space of time. Similar to Carroll and Sapon's vocabulary learning task, this version is not language-dependent as it uses visual stimuli rather than text. The words to be learnt are taken from a Central American language and are assigned to the images randomly.

LLAMA D: A task to measure how effectively the participant can recognise short segments of oral language to which they have been exposed previously. Unlike Llama B, Llama D is not based on Carroll and Sapon's work. It was inspired by the research by Service (1992) and Speciale (Speciale, Ellis and Bywater, 2004), who claim that the ability to recognise patterns in oral language is a key skill for language learning. The sound sequences are computer generated, and are based on the words of flowers and animals in a dialect of an Indian language spoken in British Columbia (Canada). Besides, the spoken language has been

synthesised using the AT&T Natural Voices for French, to make the sounds even more difficult to recognise by test takers.

LLAMA E: This sound-symbol correspondence task consists of a set of 22 recorded syllables which the participant needs to match to a transliteration of the syllable sounds in an unfamiliar language. This test is basically the same as the original Lat E. The original task yielded very satisfactory results, so only minimal changes to the scoring system to align it to the other tests in the battery were made.

LLAMA F: A grammatical inferencing task. This is an improved version of the Lat C test. In the Lat C test, the participant was presented with a sentence in an unknown language and with its translation into English, and then they had to infer the grammatical rules of the unknown language. Although the test worked extremely well, it had to be adjusted so that it could be used by participants with first languages other than English. In the current Llama F test, English has been substituted by visual stimuli, thus making the test language-independent and usable by participants with any first language. The original Lat C test dealt with word order effects, and it was extremely good at picking linguists and participants with outstanding language analytical skills. Due to the limitations of using visual stimuli, LLAMA F relies more on agreement features, although word order effects also play a role. The current test is more challenging than the previous version.

Motivated by the voices in the literature who claim that language aptitude is a multifaceted construct resulting in L2 aptitude profiles (Skehan, 1998; 2002; 2012) or L2 aptitude complexes (Robinson, 2002a), Grañaena (2011, 2012) investigated whether the LLAMA subtests measured a unitary trait,

conceived as language aptitude, or multiple aptitude subcomponents. An unrotated PCA resulted in a two-factor solution: LLAMA B, E, and F subtests (vocabulary learning, sound-symbol association, and grammatical inferencing respectively) on one factor, while LLAMA D (sound recognition) loaded on a second factor. Grañena (2012) suggested that the two factors underlying the Llama aptitude tests could be interpreted as a posited language analytic ability for factor one, and phonological sequence learning ability for factor two. Additional empirical evidence was provided by Grañena (2013b) in a follow-up study in which she conducted a series of exploratory PCAs which converged on solutions showing the same structure outlined above. Table 2.04 describes the purported aptitude abilities measured by LLAMA tests according to Grañena, 2011).

Table 2.04 *Purported Aptitude Abilities Captured by the Llama Test Suite*

| Aptitude Abilities Captured by the Llama Test Suite | |
|---|---|
| Llama Test | Underlying Cognitive Ability |
| Llama B <i>Vocabulary Learning</i> Llama E <i>Sound-symbol Correspondence</i> Llama F <i>Grammatical Inferencing</i> | <i>Analytic Learning Ability:</i> <ul style="list-style-type: none"> - gained by linguistic experience in one's L1 - it allows for strategy use and problem-solving techniques - learning happens by analysis - equated to explicit learning aptitude |
| Llama D <i>Sound Recognition</i> | <i>Sequence Learning Ability:</i> <ul style="list-style-type: none"> - discovery of language structure by detecting statistical properties in input - learning is unintentional and uncontrolled, and happens by analogy - equated to implicit learning aptitude |

Adapted from Grañena (2012)

In Grañena (2012)'s study on age and language aptitude in adult learners of English, results confirmed the hypothesized distribution of cognitive abilities in two different types of aptitudes; implicit and explicit. Early and late L2 learners with high aptitude for explicit learning outperformed individuals with low aptitude on tasks allowing controlled use of language knowledge. Implicit learning had an effect on those tasks, too, but only among early L2 learners.

2.9 Recent Additions to the Language Aptitude Construct

As the idea that language aptitude is a composite construct rather than a monolithic concept permeates the research community, new components start being treated as part of the concept of language aptitude. This section reviews an element which some researchers have considered may be part of language aptitude: tolerance of ambiguity. In this dissertation, this additional element is treated as part of language aptitude, but is analysed both as a component of language aptitude and also separately. The objective is that its contribution can be assessed independently of the traditional construct of language aptitude, operationalised in this study as the four cognitive components as measured by the LLAMA test: vocabulary learning, recognition of patterns in oral language, sound-symbol correspondence, and grammatical inference.

2.9.1 TOLERANCE OF AMBIGUITY

The concept of tolerance of ambiguity is related to the idea of creativity in educational psychology. Although still not widely adopted in the ID tradition, some researchers have included this construct in their studies. Dörnyei (2005), in his review of language aptitude research, includes Grigorenko, Sternberg, and Ehrman's work on the ability to cope with novelty and ambiguity as a new research direction for language aptitude.

For Ehrman and Oxford (1995), a learner with tolerance of ambiguity is a learner who accepts confusing situations and takes risks in language learning. These learners are not affected by criticism from peers or self-criticism, and are more likely to persist in language learning despite difficulties faced in the learning process. Ehrman and Oxford (1995) found that students

were advantaged by the following personality characteristics: a conceptual and random approach (intuition), questioning what one hears or reads (thinking), and flexibility (thin ego boundaries, especially external ones). (p. 82)

Ehrman (1998) reported findings on a research in progress at the Foreign Service Institute, a US government language training institution. The research examined biographical, motivational, attitudinal, personality, and cognitive aptitude variables among 1,000 adult students who were being prepared for overseas assignments at the FSA. While the MLAT remained the best predictor of second language proficiency out of the variables examined, strong performance on the MLAT appeared to be related to personality variables indicating high tolerance for ambiguity and chaos, and hence the capacity to reconceptualise input. Ehrman highlighted the importance of this personality trait for communicative classrooms specifically, and listed the following features as the exponents of this construct which appear to be especially favourable for learning:

- Non-linear, discovery learning attitude.
- Orientation to meaning rather than to form.
- Ability to cope with linguistic and educational surprises, with the unexpected.
- Openness to input and tolerance of ambiguity.
- Ability to select input, analyse and organise into mental structures.

Students who are not able to cope with the above situations 'appear to be overwhelmed by the chaos they encounter' (Ehrman, 1998:61). These students

are less successful than students who tolerate unexpected linguistic situations and embrace ambiguity.

Sternberg emphasized the importance of creative intelligence too in his 2002 paper on the theory of successful intelligence, as well as its implications for language aptitude testing. He proposed that the best way to measure creative intelligence was to assess 'how well an individual can cope with relative novelty' (Sternberg, 2002:27). In his paper, Sternberg proposed moving to non-conventional manners of testing language aptitude, so that not only memory and analytical abilities were measured, but also creative and practical language-acquisition abilities. In fact, the Canal-FT (Grigorenko et al., 2000) is proposed as a new instrument to measure language aptitude based on the CANAL-F theory, which holds that 'one of the central abilities required for FL acquisition is the ability to cope with novelty and ambiguity' (Grigorenko et al, 2000).

Recently, Doughty et al. (2010) have been investigating the factor structure of a new aptitude battery which is currently in the process of being developed. This battery is expected to identify individuals who have the aptitude to reach high levels of foreign language proficiency (Doughty et al, 2010). Tolerance of ambiguity was one of the components included in the original definition of language aptitude's underlying constructs, and it was defined as 'the ability to keep contradictory or incomplete input in memory' (Doughty et al, 2010:18). This definition was a bit different from the previous ones as it added a memory component to the capacity to deal with apparently contradictory information. However, the construct did not pass the reliability tests-retests as some participants performed on the lie scale. This fact caused the authors of the battery to drop the tolerance of ambiguity construct from the

aptitude battery until a more reliable measure can be found which ideally does not rely on self-reported data.

Previous studies have used a wide variety of tests to measure the tolerance of ambiguity factor. Table 2.05 lists some of the instruments used in previous research.

Table 2.05 *Tests Used to Measure Tolerance of Ambiguity*

| Tests Used to Measure Tolerance of Ambiguity | | |
|--|--|---|
| Paper/Study | Test | Description |
| Ehrman & Oxford, 1995 | Hartmann Boundary Questionnaire (HBQ) | HBQ explores 'thick' and 'thin' ego boundaries. It provides information on 12 scales relating to internal experience and external experience. |
| Ehrman, 1998 | Hartmann Boundary Questionnaire (HBQ) | HBQ explores 'thick' and 'thin' ego boundaries. It provides information on 12 scales relating to internal experience and external experience. |
| Grigorenko, Sternberg, Ehrman, 2000 | Canal-FT | Coping with novelty and ambiguity integrated in the language aptitude test. This ability is seen as part of the experiential aspect of intelligence as described by the triarchic theory of human intelligence. |
| Dewaele, 2010 | Tolerance of Ambiguity Scale. Budner, 1962 | A series of statements to which participants have to indicate their level of agreement or disagreement on a 7-point Likert scale, from Strongly Disagree to Strongly Agree. |
| Doughty et al., 2010 | Tolerance of Ambiguity Scale. Budner, 1962 The MAT-50 Alternative Ambiguity Tolerance Scale. Norton, 1975 | A series of statements to which participants have to indicate their level of agreement or disagreement on a 7-point Likert scale, from Strongly Disagree to Strongly Agree. |

| | | |
|--|---|--|
| | The Need for Cognitive Closure ToA Subscale Webster et al., 1994 | |
|--|---|--|

Borrowed from the international management research community, Budner's (1962) tolerance of ambiguity scale is used to assess degree of performance and adjustment of expatriate staff and global leaders in cross-cultural settings. Budner's concept of tolerance for ambiguity is very close to Ehrman's and Sternberg's: 'The tendency to perceive ambiguous situations as desirable' (Budner, 1962:29). In SLA, Dewaele used this scale in 2010 to measure tolerance of ambiguity in a personality survey for his students. Scores turned out not to be correlated with self-perceived proficiency scores, but participants knowing more languages scored higher on the scale, as well as those who had spent some time abroad (Dewaele, 2011, personal communication).

CHAPTER 3

L1 Literacy

3.1 What is L1 literacy and why is it Relevant for Foreign Language Learning?

First language literacy (henceforth, L1 literacy) is a construct which has scarcely been used in research with adults. However, it has been widely used in research with children because of its obvious connections with the development of the native language, which inextricably happens during childhood except in rare cases of failure in the acquisition of the L1 (see section 2.5). Researchers have used a number of closely-related terms to refer to it during the past 30 years: Skehan and Ducroquet (1988) and McLaughlin (1990) called it first language proficiency or first language development; Cummins (1979b, 1999) named it cognitive/academic language proficiency or CALP; Sparks, Artzer, Ganschow, Siebenhar, Plageman, Patton (1998) and Sparks, Patton, Ganschow, Humbarch, Javorsky (2006) opted for native language skills; and Dufva and Voeten (1999) used native language literacy.

When researching children and teenagers (which is the case for all the studies mentioned above), the terms mentioned usually encompass the four skills (speaking, listening, reading and writing), and become equated with L1

proficiency. The reason is that the development of the four L1 skills is not complete for children and adolescents and therefore it makes sense to measure them all when talking about L1 literacy. However, in this dissertation participants are adults, and the term L1 literacy is used to refer to scores in reading and writing skills, which are the two skills in which adults may differ since listening and speaking are expected to be fully developed by the time we become adults.

In previous examples, first language and native language have been used interchangeably, as both 'first' and 'native' refer to the first language the individual learns in a sequence of possible languages that can be learnt in the course of a person's life. This is totally acceptable in a monolingual context in which foreign languages are not introduced until later in school, often several years after the mother tongue has been developed. However, the context of the participants in this study is bilingualism (for a detailed description of the research context, see section 5.2). Participants in this study are Catalan/Spanish bilinguals with differing degrees of language dominance. For these participants English may be their L3 in the case that English was the language they were taught at school; or their L4 or even further in the case that they were exposed to a different language than English at school, or because of any other circumstances in their life, such as having foreign parent(s), international mobility, etc. What this means is that when we talk about L1 literacy, we may be referring to either Catalan or Spanish, as in this study L1 refers to the language in which the participant considered s/he was stronger in literacy skills operationalised as reading and writing. In either case, when we discuss their L1 literacy we will be referring to their most developed L1, whatever that is. The term 'literacy' is preferred to 'proficiency', as it does not imply a sense of end-state, completion. Finally, and because of the bilingual setting in which these

participants are immersed, caution needs to be made with generalisability of any findings to other research contexts. Different competences including an enhanced metalinguistic awareness may result from the cognitive processes at play when learning other several previous languages earlier in life (Herdina & Jessner, 2000).

The following paragraphs provide a review of the research on what we refer to as L1 literacy in this dissertation. However, the names originally used in each study for the same construct are maintained in order to be faithful to the terminology used by previous researchers.

Underlying all the terms discussed lays the assumption that there is not uniform success in children's acquisition of the L1 (see sections 1.4 and 2.5) and that the L1 end state needs to be measured. Despite Bley-Vroman's (1990) initial claim that L1 acquisition is uniformly successful except for incidental variation, several researchers have provided empirical evidence that in fact this seems not to be the case. In section 1.4, the Bristol project (Wells, 1981, 1985) has been presented as evidence that IDs may affect L1 acquisition as they do affect L2 learning, thus originating different end states to L1 acquisition. In a 1985 follow-up study to the original Bristol project, Skehan reported what he considered 'an astonishing amount of variation and [...] that there are very wide individual differences in the speed at which language is acquired' (1985:96). Results yielded statistically significant correlations (>.40) between native language literacy measures for reading comprehension and vocabulary and foreign language achievement. In addition, and more relevant for L1 literacy, Skehan pointed out that 'the existence of such wide differences in rate of first language development raises the possibility that there may be a connection between them and the differences in patterns of subsequent language ability' (Skehan, 1985:96); in fact, he explicitly suggests a connection between first language

development and foreign language achievement later in life. His specific research question on this relationship is whether fast first language acquirers will be successful foreign language learners, and whether the capacities involved in first language acquisition are long-lasting into adulthood and relevant for later foreign language learning.

Carroll (1989) agreed with Skehan in that children differ in the rate of acquisition of their native language, and in the mastery which they show in language skills such as reading and writing. McLaughlin (1990) supported this view too when he stated that 'two children can differ in their acquisition of bilingual proficiency because of their native [language] ability' (McLaughlin, 1990:172). Dörnyei (2005) also conceded that differences in language comprehension and production begin to appear in childhood while the L1 is being acquired, and then speculated that these individual differences will affect children's performance in reading understood as language aptitude in adulthood (like in Skehan, 1989).

But what is literacy in the first place? To what dimensions of language are we referring to when we talk about literacy? Essentially, definitions of literacy relate in one way or other, to 'a person's ability to understand, communicate and use printed text.' (Wagner, 2005:25). In a paper prepared for the Education for All Global Monitoring Report 2006, Wagner proposed two well-known and frequently used definitions of literacy:

A person is literate who can with understanding both read and write a short simple statement on his everyday life... A person is functionally literate who can engage in all those activities in which literacy is required for effective functioning of his group and community... (UNESCO, 1978, in Wagner, 2005, p. 25).

The ability to understand and employ printed information in daily activities, at home, at work and in the community –to achieve one’s goals, and to develop one’s knowledge and potential. (OECD/Statistics Canada, 2000, in Wagner, 2005, p. 25).

The National Institute of Adult Continuing Education (NIACE) agreed the following working definition of adult literacy:

Literacy is the ability to read and write, to express ideas and opinions, to make decisions and solve problems, to use information and digital technologies, as individual family members, workers and citizens. (NIACE, 2011:4)

As we can see, the definition of literacy on an institutional level involves reading and writing skills, as well as the relationship between them. However, from the definitions above it can be seen that literacy has taken a broader sense than its mere etymological meaning, namely, basic reading and writing skills: from literacy it is also expected that individuals are able to manipulate knowledge via written text, structure oral and written discourse, and further develop their cognitive processes and linguistic capacities. In a position paper, Ravid and Tolchinsky (2002) make a case for what they call ‘later language development’, that is, linguistic acquisition beyond the pre-school years and the basic acquisition of literacy. Of chief importance in their paper is their definition of linguistic literacy: to be linguistically literate entails possessing a wide range of registers and genres. If and when literacy has become part of a person’s cognitive system,

it interacts with other components of linguistic knowledge to shape the emergence of its key property, which we call rhetorical flexibility or adaptability. [This...] involves being able to produce

interesting and varied linguistic output which is attuned to different addressees and communicative contexts. Rhetorical flexibility develops along with core language abilities and with an increasing ability to think about and analyse domains of language. (Ravid & Tolchinsky, 2002, p. 420)

A literate person is expected to show mastery of the two major linguistic modalities: speech and writing, and to be able to reflect on the language in the form of metalinguistic awareness. Writing is essentially metalinguistic, as the model of language provided by a script shapes the way we think about language (Olson, 1996). Ravid and Tolchinsky's view of language literacy 'consists of one defining feature: control over linguistic variation; of one concomitant process: metalanguage; and of one condition: familiarity with writing and written language.' (Ravid & Tolchinsky, 2002:420). It is the combination of these three features what enables the individual to use literacy as a means for development in our society of knowledge. Literacy is understood as part of an individual's linguistic knowledge, and these two concepts interface and influence each other from birth to maturity. In childhood, children learn the language as well as the conventions of the notational system. Acquiring literacy is more than transcribing sounds into letters, though: for the child, the writing system provides a model in the form of categories of speech sounds. It is a matter of sorting sounds according to the categories provided by the writing system: the alphabet 'creates' reality as well as representing it (Olson, 1996). Adolescents learn new functions for existing constructs, alternative linguistic expressions, and use advanced or domain-specific lexical items, until they become proficient speakers and are capable of making the most of the three features mentioned previously: control over linguistic variation (flexibility), metalanguage development and mastery of the written

language as a discourse style. These are the characteristics of a 'proficient speaker' of a language according to Berman and Slobin (1994). Further contributions to this linguistic literacy construct are by Verhoeven (2002), who underscores the importance of situating linguistic literacy in the sociocultural context in which it occurs, adding to the definition the characteristic of being context-bound, and by Biber, Reppen and Conrad (2002), who describe with detail the fundamentally different features of spoken and written language which must be mastered to be linguistically proficient based on evidence gathered in corpus linguistics: adult written language is dramatically different from oral language, and it is by no means homogeneous, thus requiring the learner to control the patterns of register variation. In contrast, spoken language is quite homogeneous as far as register is concerned, possibly because it is constrained by real-time production. Developmental changes that take place between upper elementary school and adulthood (Reppen, 2001) provide evidence that, as suggested by Ravid and Tolchinsky (2002), language literacy is not fully developed until early adulthood. One of the main characteristics displayed in these late phases of literacy is a much higher density of information packaging in writing, as reported by Conrad (1996, 2001).

A close construct to L1 literacy is cognitive/academic language proficiency (CALP). This term was coined by educator Jim Cummins (1979b, 1999) in the US immersion-submersion education context to explain the poor achievement of minority language children when placed in mainstream L1 language programs. In immersion programs, all children started the school year with little or no command of the school language. Conversely, children in submersion programs were mixed with other students whose L1 is the school language, and their lack of command of the language, which frequently causes communication problems between the minority child and the teacher, was

treated as a sign of limited intellectual ability. When exploring the reasons for minority children's school failure, Cummins suggested that little attention had been paid to the interrelationships between language and thought in the bilingual child, expressed as the level of L1 and L2 competence which the bilingual child has to achieve in order to be able to progress academically in a mainstream classroom. The relationship between these two competences was Cummins' starting point to provide a theoretical framework for research. The first hypothesis formulated in this respect was the threshold hypothesis (Cummins, 1979a), which poses that

there may be threshold levels of linguistic competence which bilingual children must attain both in order to avoid cognitive deficits and to allow the potentially beneficial aspects of becoming bilingual to influence their cognitive growth. (p. 71)

The main assumption in this hypothesis is that the aspects of bilingualism which may influence cognitive development positively are unlikely to operate until the child attains a minimum level of competence in a second language. Cummins proposed two thresholds: a lower threshold level which would avoid any negative cognitive effects, and a higher level of bilingual competence, which would be necessary to experience cognitive growth. The consequence of this hypothesis for students speaking minority languages but placed in mainstream programs is that the maintenance of L1 skills is a prerequisite for attaining a high level of bilingual competence (Cummins, 1979a).

A recent review of the threshold hypothesis was proposed by Ardasheva et al. (2012), who explored the predictive strength of English proficiency levels on academic achievement. Results provided support for Cummins's lower level

threshold hypothesis, predicting that upon reaching adequate proficiency English language learners would no longer experience academic disadvantages. However, researchers also proposed a refinement of the bilingual threshold hypothesis as, in their view, 'higher achievement [of participants] may be attributed, in part, to cognitive processing benefits associated with bilingualism' (Ardasheva et al., 2012:29). Ardasheva et al. (2012) suggested that oral proficiency in two languages may be a sufficient condition for cognitive benefits to become available to students, and not necessarily biliteracy skills as originally proposed by Cummins.

In another recent investigation on the threshold hypothesis, Lasagabaster (2012) tested whether the lower threshold and the higher threshold would be applicable to a three-language-in-contact-school situation, or whether a medium threshold would be necessary, as measured by a metalinguistic awareness task. Thresholds were set and tested as follows:

a) Three thresholds:

(1) Subjects highly competent in three languages

_____ *Higher threshold*

(2) Subjects highly competent in two languages

_____ *Medium threshold*

(3) Subjects highly competent in one language

_____ *Lower threshold*

(4) Subjects not highly competent in any of the three languages

b) Two thresholds:

(1) Subjects highly competent in three languages

Higher threshold

(2) Subjects highly competent in one or two languages

Lower threshold

(3) Subjects not highly competent in any of the three languages

Results did not provide evidence for the three thresholds, as there was no significant difference between participants highly competent in two languages and those highly competent in one. When the two original thresholds were maintained according to Cummins's original formulation of the hypothesis, differences were significant. These findings confirm the original threshold hypothesis in a trilingual context.

The second hypothesis in Cummins' framework and the one which is more important for this study is the developmental interdependence hypothesis (Cummins, 1979a, 1983). This hypothesis proposes that

the level of L2 competence which a bilingual child attains is partially a function of the type of competence the child has developed in the L1 at the time when intensive exposure to L2 begins. (Cummins, 1979a, p.75)

This hypothesis proposes that there is an interaction between the language of instruction (L2) and the proficiency level that the child has reached in his L1 before entering school. If the child L1' skills are not well developed, intensive exposure to an unknown language will hinder further development of the L1. On the other hand, if the L1 has been strongly developed outside school,

intensive exposure to the L2 will result in high levels of proficiency in the L2 at no expense of the L1.

But what are we referring to when we talk about CALP? Cummins (1980, 1982) defined cognitive/academic language proficiency as ‘the dimension of language proficiency that is related to literacy skills’ (Cummins, 1980:112). This definition is proposed in contrast to another term which subsumes the remaining ‘natural’ dimensions of language proficiency: basic interpersonal communicative skills or BICS. These two dimensions of language are conceptually different in as far as the language skills necessary to function in everyday contexts are universal: in this case, it is true that *everybody* (my italics) achieves mastery of BICS in their native language or L1, while not everybody reaches the same end state in CALP. Individual differences exist in the manner in which different speakers use BICS-related skills, but, unlike for CALP, these differences are not related to academic performance. BICS is limited to cognitively undemanding situations. Main differences between the two concepts can be observed in their developmental patterns: typically, BICS (the development of native-like phonology and fluency) develops until age five or six, and then it plateaus and its rate of further development is largely reduced. On the contrary, CALP follows the curve of overall cognitive development which flattens out around mid-adolescence, but which continues ‘to develop at least throughout our schooling and usually throughout our lifetimes’ (Cummins, 1999:3). This idea of lifelong development of the literacy-related aspects of language is key as it implies that the literacy can be developed at any age, which is one of the claims made in this dissertation.

Cummins is careful to point out that the BICS/CALP distinction is not a dichotomy, but rather the two ends of a continuum of linguistic performance in academic contexts. The essential distinction is illustrated by two intersecting

continua which underlie the range of cognitive demands and contextual support involved in a language act (see figure 3.1) (Cummins, 2000:57). Consequently, CALP is not limited to a person's performance on reading and writing skills. CALP can also be expressed orally in a debate about politics or in the defence of a dissertation, since these activities are cognitively demanding and context-independent too. In a nutshell,

the essential aspect of academic language proficiency is the ability to make complex meanings explicit in either oral or written modalities by means of language itself rather than by means of contextual or paralinguistic cues such as gestures or intonation. (Cummins, 2000:59)

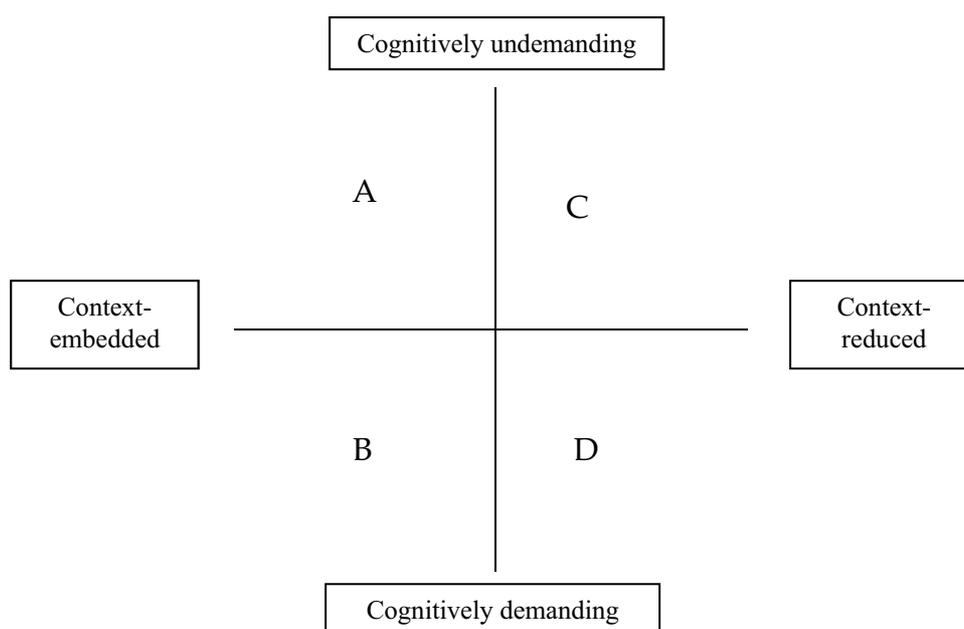


Figure 3.01 *The BICS-CALP distinction*

Another consequence of this BICS-CALP distinction and of the interdependence hypothesis is that L1 and L2 CALP are manifestations of a common underlying language proficiency, and so CALP in the two languages is

expected to be highly correlated. Cummins (1979b) supported this idea by presenting evidence from nine studies in which the correlations between L1 and L2 CALP were mostly in the .6 - .7 range. Cummins suggested that, if properly developed, the ability to extract meaning from texts, for instance, can be easily transferred from one language to another. When learning an L2, there is empirical evidence that the acquisition of L2 BICS follows a totally different route than the acquisition of L2 CALP, just as it happens with L1 BICS and L1 CALP. For L2 BICS to be acquired, the learner must have ample opportunities for interpersonal contact in the L2, as well as a strong motivation to learn. However, the acquisition of L2 BICS is not a requirement which should precede the acquisition of L2 CALP. The latter could happen successfully if the learner exhibits high levels of L2 reading proficiency, which can be developed at home without contact with native speakers of the language.

Concerning age, and connected to the idea of literacy language development throughout one's lifetime, the interdependence hypothesis predicts that older L2 learners who show a high development of L1 CALP will acquire L2 CALP faster than younger learners. This seems to be in fact the case and empirical evidence has been provided in several studies (Cummins, 1980; Krashen, Long & Scarcella, 1979; Muñoz, 2003, 2006). This fact strongly suggests that the level of L1 CALP is a major determinant of success in the acquisition of L_n CALP. Conversely, the hypothesis predicts no advantage for older learners regarding the acquisition of BICS; older learners acquire foreign languages equipped with L1 reading and writing skills and a complete lexical and grammatical knowledge (Lapkin et al., 1980), that is, all the literacy-related skill set. This finding seems to be due to the greater cognitive maturity of the learner; older learners did not show any advantages in pronunciation and oral fluency (BICS) as these seem to be the less cognitively demanding aspects of L1 and L2

proficiency. 'Measures of basic interpersonal communicative skills may be less sensitive to individual cognitive differences and to academic development' (Muñoz, 2006:8). Findings in Muñoz's (2003, 2006) studies on the effects of age of onset on English learning in a foreign language learning context are consistent with Cummins's CALP/BICS distinction: older starters progressed faster in all dimensions of the language except in two measures of aural comprehension. In aural perception measures (reception skills on an interview task, a phonetic discrimination test, a phonetic imitation test, and fluency measures on a written composition task) younger learners did not differ much from older learners, as the tasks used to measure them are less cognitively-demanding. In this study listening comprehension skills were less affected by age than morphosyntactic skills, the former improving more as a function of amount of exposure than as a function of the learner's age. Conversely, results on cognitively-demanding tasks such as the cloze, the dictation and the textual cohesion measure in a picture-elicited narrative, all having a strong morphosyntactic component, were more favourable to the older age group. These results were reinforced by previous findings in an earlier study with BAF project participants, in which a multiple regression analysis was conducted only with listening comprehension, dictation, cloze and grammar test results: findings showed that L1 proficiency, associated with children's cognitive development, was the stronger loading factor on all tests except for the listening comprehension test (Muñoz, 2006).

Despite Cummins's enormous contribution to policy-making in favour of language minorities in the last quarter of the 20th century, his arguments are not exempt from criticism: his threshold hypothesis has been accused of being tautological and void of any empirical content on the grounds that it places the locus of the deficiency in the L1 in literacy and school knowledge (defined as

skill learning), and thus outside of the linguistic domain (Eldersky, 1990; MacSwann, 2000). Broader definitions of L1 literacy such as the later conceptualisation by Ravid and Tolchinsky (2002) presented above, or Gibbons and Lascar's (1998) including linguistic register as a way of developing and measuring CALP bring the threshold hypothesis back to the linguistic domain. Wiley (1996) criticized the BICS and CALP constructs as he interpreted these constructs as operating autonomously in the learner without any relationship with their sociocultural and sociopolitical context. Cummins (2000) himself responded to such critiques by providing evidence of the BICS and CALP distinction following Biber's (1986) corpus studies from a range of oral and written communications, and Corson's (1995) documentation of lexical differences between conversational English and textual language. Cummins also clarifies that he never discussed CALP in an isolated manner, but rather as part of a causal chain in a number of individual learner attributes determined by societal influences. In this respect, it is worth mentioning that although Lasagabaster's (2012) study yielded significant differences in linguistic factors, other independent variables like sociocultural and socioeconomic status yielded differences but failed to reach significance. The non-explanatory power of SES variables (as socioeconomic variables are known in the literature) was a finding which had already been reported in Proctor et al., 2010, to the research question of how SES influence Spanish literacy development in Latino bilingual learners.

The relationship between L1 skills and L2 learning later in life has been thoroughly investigated by Sparks and his associates, who conducted their research in the context of special education in the US with high school and college students exhibiting difficulties with L2 learning. Their populations were mostly high school and college populations because that is the time at which foreign language learning is introduced in the US. In their studies they

observed that students whose L1 was the same at home and in mainstream education usually succeeded in learning foreign languages, as long as students had developed strong L1 literacy skills. However, students exhibiting low proficiency in their L1 were likely to show deficits in L2 acquisition. Building on the cross-language relationships outlined by Cummins, Sparks and Ganschow speculated that one's ability to learn a foreign language relates to one's skills in his/her native language. Initially they formulated this speculation as the linguistic coding deficit hypothesis (Sparks & Ganschow, 1991, 1993), which originally posited 'native language difficulties as a possible cause of foreign language difficulties' (Sparks & Ganschow, 1993). This conclusion was based on evidence from secondary school students; when students who were struggling in their FL learning were evaluated, most of them exhibited difficulties with oral or written aspects of their native language. These students also got low scores in the MLAT. Later the title of the hypothesis was modified to linguistic coding differences hypothesis (LCDH) (Sparks, 1995; Sparks & Ganschow, 1995), to move away from the deficit connotation and to better express the connections between the L1 and foreign language learning. Sparks, Javorsky, Patton, and Ganschow (1998) hypothesized that

an individual's skill in the native-language components (i.e. phonology/ orthography, grammar and semantics) serves as the foundation for successful foreign-language learning. [...] both native-and foreign language learning depend on basic language-learning mechanisms and that problems with one language skill, e.g. semantics, are likely to have a negative effect on both the native and the FL systems. (p. 74.)

Subsequently, the LCDH predicts that a student who has difficulties in his/her native language may lack the ability to reflect on the

phonological/orthographic and grammatical structures of a foreign language, namely, the ability to reflect on language in a decontextualised manner, and is likely to show the same difficulties in the same skill in the foreign language.

Sparks and his associates have conducted a number of cross-sectional and longitudinal empirical studies to test the LCDH. In Sparks, Artzer, Ganschow, Siebenhar, Plageman, and Patton (1998), two studies were conducted to investigate to what an extent there would be differences in native language skills, foreign-language aptitude, and final foreign-language grades among high-school students completing a second year of a foreign-language course identified as high-, average-, and low-proficiency learners. Results yielded differences among the three groups on native-language and foreign-language aptitude measures: performance on native-language phonological/orthographic measures distinguished high-proficiency and low-proficiency foreign language learners, while the English literacy test for grade 8 and the MLAT F (grammatical inferencing subtest) distinguished high-, average-, and low-proficiency learners. This study supported the hypothesis that students who achieved higher levels of oral and written proficiency in a foreign language had significantly stronger native-language skills and foreign-language aptitude.

Studies conducted by this research group in the early years tested student's L1 skills shortly before or at the time they started their L2 courses. This had a limitation: researchers did not know whether differences in L1 skills could have been observed several years earlier in elementary school or not (Sparks, 2012). To address this limitation the group conducted retrospective studies, in which students were tested in L1 skills while at elementary school, and then tested again when they started their L2 learning. Another method used was to obtain the student's scores in L1 skills on elementary courses from

the school records. The latter was the system used in 2008 by Sparks, Humbach and Javorsky to explore individual and longitudinal differences between high- and low-achieving, learning disabled, and attention deficit hyperactivity disorder (ADHD) high school students. Findings revealed that differences in L1 literacy skills are important for L2 learning and can be observed in elementary school, and that students classified as ADHD who have better L1 skills do better in L2 courses. In 2012, another retrospective study was conducted by Sparks, Patton, and Ganschow involving 208 high school students. Again, findings suggested that the level of achievement in L1 skills several years before L2 learning started was related to their L2 aptitude and L2 proficiency years later.

Longitudinal studies were also conducted to examine long-term relationships between L1 skills and L2 aptitude and L2 proficiency, following Skehan and Ducroquet's (1988) conclusions from the Bristol Project by which early L1 skills continued to influence L2 learning over 10 years later. In 2006, Sparks, Patton, Ganschow, Humbach, Javorsky examined which were the native language predictors of foreign language proficiency and aptitude. Fifty-four students were tested at time intervals during 10 years to determine which were the best native language predictors of oral and written foreign language proficiency in the five prediction models developed. Native language literacy measures were the best predictors of foreign language proficiency, with the bulk of the variance being explained by L1 spelling and L1 word decoding skills. Findings provided support for long-term connections between L1 and L2 skills. An interesting finding in this study is that native language predictors of students' oral and written foreign language proficiency changed over time. After grade one, the best predictor of foreign language proficiency was a measure of reading readiness composed of rhyming, letter-sound relationships

and word-decoding tasks, while by the end of grade five the best predictor was a test of reading including measures of word decoding, pseudo-word decoding, reading vocabulary and reading comprehension. In another longitudinal study, Sparks, Patton, Ganschow, Humbach, and Javorsky (2008) investigated the long-term relationships among early first-language skills, second language aptitude, second language affect and later second language proficiency. Fifty-four students were followed for over 10 years beginning in first grade to determine which were the best predictors of oral and written L2 proficiency. Although the strongest predictor of L2 proficiency was the MLAT, findings revealed strong correlations between early L1 skills and later L2 proficiency, specially word decoding, spelling and reading comprehension skills. On the following year Sparks, Patton, Ganschow and Humbach (2009a) explored once again the relationship between L1 skills in elementary school and L2 proficiency in high school. Again, L1-related measures were robust predictors of L2 proficiency, yielding strong correlation indexes (from .49 to .68) between early L1 skills in elementary school and L2 proficiency in high-school.

Kahn-Horwitz, Shimron, and Sparks (2005) provided evidence for the LCDH too when they reported that phonological, orthographic, morphological, and speed variables measured in 145 Hebrew first graders were accountable for EFL reading acquisition.

Another landmark study in the effects of L1 literacy on second language proficiency is the research carried out by Dufva and Voeten (1999), in which they examined the effects of phonological memory and native language acquisition on English as an L2 in 160 Finnish 7-year-old school children. Native language literacy skills (word recognition and comprehension skills), together with phonological memory explained 58% of the variance in the beginning

stages of English proficiency, with the higher coefficient being the one for word recognition.

Finally, Muñoz (2001, 2003, 2006), in the context of foreign language learning in Spain, also reported that 'L1 proficiency, associated with children's cognitive development, was the factor with the strongest weight on the English scores of all the tests with the exception of the listening comprehension test' as stated above (Muñoz, 2006:32). In a previous study involving three languages (Spanish, Catalan, and English), Muñoz (2000) had already provided empirical evidence for the linguistic interdependence hypothesis and the LCDH when she found that results in cloze tests and dictations were highly correlated among the three languages.

All the studies reviewed so far concern children, teenagers, and, to a lesser extent, young adults at college. Artieda (2010) tested the connections between age and other variables affecting rate of learning in adult foreign language learners in Spain, using a segment of the data of the Barcelona age factor project including adult subjects only. Results showed that for Group A, after 200 hours of instruction in English, L1 literacy was the variable which explained most of the variance in the regression model for foreign language proficiency tests (cloze, dictation, multiple choice, listening), all in the range of $r = .30$ to $r = .47$, $n = 51$, $p < .05$. This finding suggested that there are different L1 literacy end states for different individuals. Further, these individual differences seem to persist into adulthood and to have an influence on foreign language acquisition at any age. If the findings of the current dissertation supported this hypothesis, this would be further evidence for a parallelism with what Cummins called the 'entry fallacy' in immersion education, by which it was assumed that students who were limited in English would be proficient in their mother tongue. The same situation happens in language schools which do

not have any education entry requirement: it is assumed that students share the same L1 literacy end state, and then any L2 learning difficulties are attributed to the L2 being specially difficult, disregarding any potential impact from an incomplete development of the literacy language of the learner. The present study continues this line of research with the addition of two larger population samples and two different levels of foreign language proficiency: beginner and advanced⁶. To the author's knowledge, no other researchers have investigated the role of L1 literacy in adult foreign language acquisition at two different levels of proficiency so far.

In sum, the articles reviewed in this section suggest that some variation in L2 outcomes may be due to differences in L1 literacy at the time the student begins to acquire or is first exposed to the second language (or n language). Since the population studied in the research papers reviewed includes mostly children, teenagers and young adults, the present dissertation aims at extending that population to a much wider range of adults.

3.2 Acquiring Literacy in the L1 and in the L2: Similarities and Differences

The previous section described the L1 literacy construct. But how similar or different is the acquisition of literacy in a person's first language to the acquisition of literacy in any subsequent languages? The following paragraphs review the process of acquiring literacy in the L1, by looking closely at the reading and writing skills, followed by an account of similarities and differences between the acquisition of literacy in an L1 and an L2.

⁶The high-proficiency group in this study is referred to as advanced group as this is the name used by the school. However, note that according to the CEFR these students are somewhere between B1 and B2, so upper-intermediate would be more appropriate according to CEFR standards. See chapter 5, section 5.1 for a detailed description of the participant sample.

Concerning the acquisition of reading in the L1, there are two basic models used to describe the reading process: the bottom-up approach and the top-down model. In the bottom-up approach, raw input is processed and undergoes increasingly refined analyses until the reader grasps the meaning of the text. The critical component to infer meaning is called decoding; in this sub-process, written symbols are transferred into units (i.e. words, morphemes, phonemes, etc.). Continued exposure to reading facilitates the acquisition of orthography. In the top-down approach the main decisions take place at higher levels of processing: to arrive at meaning, the reader activates his knowledge of language structures and of the world. Top-down influences can occur at any stage of processing, and then reading becomes an anticipatory process in which orthographic, syntactic and semantic cues are added to the perceptual image from the text until the reader can make a choice on the identity of the word. None of these two approaches provides a fully satisfactory account of reading processes, with interactive models recognising the contribution of raw input and of the reader's expectations and previous knowledge at the same time. (Verhoeven, 1987).

A critical component in the acquisition of reading is word recognition and how word length, orthography, and prior knowledge impact verbal efficiency. A second component of paramount importance in the successful acquisition of reading is reading comprehension. Studies of eye movements (Just & Carpenter, 1980; Carpenter & Just, 1981; cited in Verhoeven, 1987) revealed that lexical access is the central issue in reading, that interpretation immediately follows recognition and that fixations are longer at the end of sentences. A developmental sequence of reading strategies was uncovered by a series of studies (Weber, 1970; Biemiller, 1970; 1978; Cohen, 1975; and Francis, 1977; cited in Verhoeven, 1987) by which the reader 'moves from the

predominant use of context, to graphic-contextual conflict (no response), through the predominant use of graphic cues (nonsense error), to the integrated use of graphic and contextual cues' (Verhoeven, 1987:35). On a macro-propositional level, readers also build on the text models that they know, make inferences and use anaphoric references.

Lower-level processing skills refer to the processes involved in extracting information from print, namely, word decoding. In contrast, higher level processing skills include those processes necessary for the correct interpretation of texts and integration of new information with the reader's prior knowledge (Koda, 1992). Recent research has examined the contribution of higher-level skills to reading comprehension (Landi & Perfetti, 2007; Nation & Snowling, 1998)⁷. Landi (2010) claims that, although lower-level skills play a crucial role in reading comprehension in children, the picture is not so clear-cut for adults. Lower-level skills play a role in adult L2 reading comprehension in non-skilled readers or when word reading is difficult due to language distance. However, Perfetti and Hard (2001) report data suggesting that for more skilled readers, lexical-level factors and phonological factors are linked, whereas for poor readers these are separate. Findings from these studies suggest that the relationship between lower-level reading skills and comprehension depends on the age and the skill level of participants. Skilled adult readers seem to show a partial dissociation between reading comprehension (higher-level) and decoding (lower-level) skills. Using a large adult reading database including 920 participants, Landi (2010) found evidence that adults' higher-level reading

⁷ Note that in the reading models and research articles discussed in the section on L1 reading, vocabulary knowledge is considered as a higher-level skill. In contrast, in the models and research articles discussed in the section on L2 reading, vocabulary knowledge is considered a lower-level skill. This distinction will not be discussed as it is not the focus of this dissertation; what should be conveyed is that vocabulary knowledge is of paramount importance in reading comprehension, irrespective of whether it is considered a lower-level or a higher-level skill.

skills (comprehension and vocabulary) are partially dissociated from lower-level skills (spelling and decoding), a finding consistent with Jackson (2005). In her sample, decoding accounts for a very small amount of variance in reading comprehension (1%), while vocabulary is the single best predictor (40% of variance in a hierarchical regression).

Moving on to learning to write in an L1, it is hard not to overstate the enormous contribution of process writing researchers in the US. Written reactively to previous traditional product-focused composition approaches, Flower and Hayes (1981) based their cognitive theory of writing in four key points: (1) the process of writing consists of a set of distinctive thinking processes orchestrated by writers; (2) processes have a hierarchical and highly embedded organization; (3) the act of composing is a goal-directed thinking process guided by the writer's growing network of sub-goals; and (4) writers generate their own goals by creating higher-level goals and sub-goals according to purpose and, additionally, by changing or developing new goals according to what they have learnt in the act of writing. Their model consists of three major elements: the task environment (the rhetorical problem: topic, audience, exigency and its interaction with the current text), the writer's long-term memory (a writer's knowledge of the topic, audience and his/her initial writing plan), and the writing processes. The writing processes are three: planning, translating, and reviewing. When planning, writers set goals and plan the content of the text. Translating consists of expressing the goals and content in a written code. Finally, reviewing is an iterative process in which the results of planning and translating are tested and refined. Finally, these processes operate under the supervision of a monitor –the writer-, who is able to think strategically and to decide when to move from one process to the other or when to come back and apply some of the previous processes again in the light of the

progress made in the writing piece. Zamel (1982), subscribed to this cognitive approach to writing. When acquired in childhood, there are other abilities which children need to learn when acquiring the writing skill in their L1, such as word spelling and discourse writing (the acquisition of the structural and stylistic characteristics of written language). Ravid and Tolchinsky's (2002) model of linguistic literacy is consistent with this view, and describes L1 writing development as follows: children acquire control over morphological and syntactic structures early in their language development, but vocabulary grows through the life span, as it is likely to do the control and flexibility in the use of linguistic resources to meet the rhetorical demands of a writing situation.

What knowledge is then necessary in learning to write? Hyland (2011) lists the following types of knowledge as involved in learning to write: content knowledge (the ideas and concepts that the text will address), system knowledge (formal conventions needed, such as syntax, vocabulary, etc.), process knowledge (stages involved in writing), genre knowledge (purpose and choice of genre to be used), and context knowledge (audience's expectations and cultural preferences).

Additionally, writers at different levels of proficiency have different perceptions of the requirements that are necessary to fulfil writing tasks successfully: in Schoonen et al. (2011), less proficient L1 writers were more engaged with lower order features of texts, such as layout and mechanics, whereas more proficient writers were more concerned about text structure, a differential behaviour which had already been observed by Victori (1999).

What are then the specific differences between composing in an L1 and in an L2? Schoonen et al (2003) suggested that the main differences are the linguistic knowledge of the L2 (L2 proficiency as measured by vocabulary,

orthography and grammar tests), and L2 fluency, defined as the ease with which they can access words and grammatical structures during writing.

Summarizing, reading and writing research findings suggest that L1 literacy builds out of:

- a) Oral competence with the literary forms of language: learners must have mastered discourse in their L1.
- b) Conceptual development including notational systems of print: concepts of sound, word and the function of print must be well established before learning to read.
- c) Metalinguistic insights to facilitate awareness of the phonological forms of language; a critical strategy for learning to read successfully (Bialystok, 2007).

The process of acquiring literacy in an L1 and in an L2 has similarities and differences. A similarity is that in both situations the learner needs to understand the functional and structural characteristics of written texts. They need to understand texts without the writer being present, and also to write texts explicitly so that readers can successfully understand content and intention. Another similarity is the asymmetrical relationship between reading and writing skills: reading always precedes writing. Writing is a conceptual model for speech (Olson, 1996). The third similarity is the importance of previous learning experiences in the acquisition of literacy; Wells (1981) demonstrated that understanding of literacy concepts before the onset of literacy instruction strongly predicts literacy results. Moreover, he found a direct relationship between learner understanding of literacy conventions and parents' interest in the development of their children's literacy. This finding is consistent with Dunsmuir and Blatchford (2004), who found that preschool

variables predicting writing competence in 4- to 7-year old children were mother's educational level, family size, parental assessment and a measure of home writing. Taylor (2011) reported a relationship between parental oral and written language skills and their children's emergent oral and written language skills. Along the same lines, Lindgren and Muñoz (2012) found that children's L1 reading skills were predicted by their parent's literacy habits, and suggested that the latter 'may be transferred to the children's L2 reading skills' (p. 17).

The main difference between L1 and L2 literacy acquisition is probably that individual variation in achievement or rate of learning is much larger in L2 literacy acquisition than in L1 literacy acquisition. This variation can largely be put down to one or several of the following possibilities:

- a) Differences in linguistic (L1) and socio-cultural background: unlike in the acquisition of literacy in the L1, in L2 literacy acquisition the learner is not a blank slate and brings his/her knowledge of literacy processes in his/her first language. Different levels of development of L1 literacy in different learners will cause differences in the development of L2 literacy.
- b) Transfer: L2 literacy is fundamentally cross-linguistic (Koda, 2007), and there will be interactions between the L1 and the L2: developed skills in the learner's mother tongue may cause transfer and interact with L2 reading and writing.
- c) Limited oral proficiency in the target language: learners may not be competent enough in the oral dimensions of the target language. This may cause difficulties in grasping the linguistic patterns of the language and in using linguistic cues in reading and writing. This

limited oral proficiency may impact word recognition and reading comprehension negatively, both in reading and in writing.

3.3 Cognitive Processes of L2 Literacy

The previous section provided a brief description of how reading and writing skills are developed in the L1, and the fundamental differences in the acquisition of reading and writing in an L1 and in an L2. The components underlying L2 reading and writing are reviewed in the following sections.

3.3.1 COGNITIVE COMPONENTS OF L2 READING

The goal of reading can be stated as the construction of text meaning 'based on visually encoded information. Essentially, reading entails converting print into language and then to the message intended by the author.' (Koda, 2007:1). But the acquisition of L2 reading is fundamentally different from the development of L1 reading skills, because it involves two languages. Therefore, reading is naturally crosslinguistic. Koda (2007) argues that any L2 reading research must accept three basic tenets about L2 reading development:

- a) Reading is multi-faceted and complex, and involves a number of subskills.
- b) Distinct linguistic knowledge is necessary for the development of each subskill.
- c) The two languages are needed and, indeed, used, to develop the subskills in the second language.

The componential approach proposed by Carr and Levy (1990) proposes that there are different cognitive skills contributing to reading performance. The assumption underlying the model is that successful comprehension is achieved

'through the integrative interaction of the extracted text information and a reader's prior knowledge' (Koda, 2007:4). Hence, reading is composed of three main components:

- a) Decoding/word recognition: the extraction of meaning from print.
- b) Text-information building: integrating the information extracted from print into sentences and paragraphs.
- c) Reader-model construction: integrating the information extracted from the text with the reader's previous knowledge. (Koda, 2007).

What is then needed is to understand how diverse kinds of linguistic knowledge contribute to the development of each of the reading subskills. Table 3.01 summarizes the types of linguistic knowledge used in each reading subskill.

Table 3.01 *Components of Reading and Types of Linguistic Knowledge Used*

| Components of Reading and Types of Linguistic Knowledge Used | | |
|--|------------------------|---|
| Component | Linguistic Knowledge | Function |
| <i>Lower Level Verbal Processing Skills</i> Decoding ⁸ | Orthographic Knowledge | Seamless word recognition is attributable to internalised knowledge of one's writing system. It is a powerful mnemonic device for deep orthographies in which relationships between sounds and symbols are not regular. |
| | Phonological Knowledge | Access, storage and manipulation of phonological information. Enables the learner to access the linguistic knowledge learnt through oral communication before literacy is acquired. It requires |

⁸ Decoding is used here as a synonym of the subprocess of word recognition.

| | | |
|--|--------------------------------|---|
| <i>Higher Level Verbal Processing Skills</i> | Vocabulary Knowledge | segmenting spoken words into phonological constituents. Vocabulary knowledge enables reading comprehension. The notion of a vocabulary threshold is critical (98% of the words in a text must be known (Hu & Nation, 2000)). |
| | Morphological Knowledge | The meaning of new words can be deduced by analysing their morphological constituents. Morphological knowledge bolsters word recognition. |
| Text-Information Building | Syntactic Knowledge | Syntactic parsing consists of integrating lexical information into chunks so that these reflect the meaning of phrases and sentences. Decisions on phrase attachments have major consequences for meaning. |
| | Knowledge of Discourse Markers | The integration of assembled information across sentences by using cohesive devices. |
| Reader-Model Building | Text-structure Knowledge | Knowledge of the clues signalling text coherence and relationships. |
| | Schemata | Previous schemata predispose the reader to interpret input in certain ways. Background knowledge affects interpretation. |

Adapted from Koda, K. (2007). Reading and Language Learning: Crosslinguistic Constraints on Second Language Reading Development. *Language Learning*, 57, 1-44.

3.3.1.1 Decoding or Word Recognition

As defined by Koda (2005), word recognition refers to the processes of extracting lexical information from graphic displays of words. The objective of

research in this area is to investigate how information in a word is 'perceived, extracted, sorted, and retrieved.' (Koda, 2005:29). Word recognition efficiency promotes comprehension. L1 developmental studies have demonstrated that poor readers have problems retrieving information from print, and suffer from reading comprehension deficiencies. Prevailing views on reading research consider the efficient visual information processing as the key competency for successful reading comprehension: visual information is necessary at the word level to recognise the word, and also at the context level for building meaning accordingly. These two processes are mutually enhancing and interactive, and one cannot be successful without the other. An additional challenge for successful and effortless reading comprehension is the limited capacity of working memory: as the number of mental processes that can be activated simultaneously is limited, several components must be automated for the overall process of reading comprehension to be efficient. Since word recognition involves extracting information rather than building it, in successful readers this function is greatly automated, thus reducing the processing load in working memory.

As described in the previous paragraph, word recognition is composed of two different components: phonological decoding and semantic access. And, because both are activated through visual input, orthographic knowledge mediates phonological processing (Taft & Hambly, 1985). Efficient word processing is due to a person's accumulated knowledge of a language's writing system and sound and symbol correspondences. Orthographic knowledge is then used as a mnemonic device that ties the form of a word to how it is pronounced in memory. As the learner becomes frequently exposed to letter clusters and how these are pronounced, connections are strengthened in the learner and fluent word recognition emerges. Skilled readers, then, have

successfully internalised inter-letter associations, and efficiency is related to input frequency and practice. Before extracting meaning, learners must yet achieve phonological decoding, that is, the ability to pronounce printed words. The main function of phonological codes is to enhance the storage of information in working memory –which is pivotal in new word learning and in unfamiliar word recognition. Phonological codes also permit access to oral vocabulary in lexical memory, which is stored in phonological forms. Finally, semantic processing refers to the skill of retrieving context-appropriate word meanings: the ability to integrate lexical and contextual information. The orthographic representation of a word activates all of its meanings known by the reader, and then the reader makes the appropriate choice of meaning. Poor readers have been proven to over-rely on context for meaning selection.

Vocabulary knowledge correlates more strongly with reading comprehension than any other variable (Koda, 2005). However, the relationship between reading and vocabulary is complex: not all types of vocabulary instruction generate gains in comprehension. Current trends suggest that vocabulary and reading comprehension are related but mediated through third constructs, like background knowledge, reasoning skill, and inference ability. In sum, a substantial knowledge of words is necessary for word decoding, but the relationship between vocabulary size and reading comprehension is not causal.

Finally, morphological knowledge facilitates reading as morphological analysis 'bolsters the capacity for identifying familiar components in an unfamiliar word, thereby allowing learners to extract partial information from familiar parts' (Koda, 2007). Nagy and Anderson (1984) suggested that 60% of the new words children encounter in school are morphologically transparent words, or the meaning of which can be easily inferred by analyzing its morphological constituents, like 'fire-fight-er'. Without morphological

knowledge, lexical inferencing would be extremely challenging for students and extracting information from print could be seriously hampered.

3.3.1.2 *Text-information Building*

Information is organized in different ways in distinct text types. Knowledge on the structures of different text types plays a major role in comprehension. Since the acquisition of this knowledge is derived from extensive reading experiences, the causal impact of this variable is not as clear-cut as that of other lower-level processes (Koda, 2005).

Sentence comprehension involves integrating lexical information in such a way that a new 'chunk' reflects the meaning of larger linguistic units. This process is known as syntactic parsing, and it consists of two operations: phrase building through the integration of lexical information, and assigning cases to the newly constructed phrases. Decisions regarding phrase attachment have major semantic knowledge, and a sound grasp of syntactic knowledge is necessary to ensure the appropriate meaning is retrieved. According to research, syntactic knowledge, although essential for sentence comprehension, only explains a minor variance in L1 reading. This is not so for L2 reading, because syntactic parsing varies from language to language (Koda, 2007).

Discourse markers and other cohesive devices, such as co-reference are essential to build text coherence. Numerous studies suggest that there are significant differences in children and adults' knowledge of coherence devices, that this knowledge is developmental in nature and that it facilitates reading comprehension by providing the structural salience of a text. Finally, this type of knowledge benefits greatly from understanding genre-specific structural properties, largely obtained from exposure to a variety of text types (Koda, 2007).

3.3.1.3 *Reader-model Building*

Schemata are abstract knowledge structures consisting of generalized information abstracted from a variety of instances, and it denotes the relationships among their component elements. A schema is abstract as it summarizes what is known about a variety of cases which are different in many particulars (Alderson & Pearson, 1984). This structured understanding provides 'conceptual scaffolding for organizing and interpreting newly encountered experiences' (Koda, 2007:9). This reading component explains variations in text interpretation for readers with different real-life experiences and resulting differential knowledge of the world. A reader's previous knowledge determines what s/he is going to understand from the text to a large extent, thus being responsible for individual differences in reading comprehension. In this case the difficulty lies in determining causal directions: gains in knowledge acquisition in the academic context improve reading, and reading enhances knowledge acquisition. It is therefore difficult to determine 'whether those who know more read better, or whether those who read better know more' (Koda, 2005).

3.3.2 COGNITIVE COMPONENTS OF L2 WRITING

Many of the processes of writing in a second language are comparable to those of writing in a first language (Zamel, 1982; Raimes, 1994; Cumming, 1994). Research in process L2 writing refers to the classical tripartite model of composition (Flower & Hayes, 1981), by which the composing process consists of three major processes that interact recursively: planning, formulating and reviewing. First and second language writers plan content, use thinking strategies, use personal writing styles, and integrate knowledge into writing (see section 3.3 for a full account of L1 writing cognitive processes). Likewise,

both for L1 and for L2 writers' performance errors are due to constraints in processing capacities, inadequacies in writing strategies, constraints on hypotheses about language, or knowledge in general (Cumming, 1994). From a process writing perspective, Raimes (1994) examined the composing strategies of L1 and L2 writers and her findings confirmed that strategies were the same for L1 and L2 writers: low-proficiency writers in any language hardly spent any time prewriting, planned very little and in a rigid way, and used formulaic prescriptions, as well as rescanning a great deal. What varies is the time and purpose allocated to the different stages of writing as a function of L2 proficiency: in two small-scale studies, Roca de Larios, Murphy and Manchón (1999) investigated the use of restructuring as a formulation strategy by Spanish learners of English at different stages of proficiency. Results indicated that intermediate learners use restructuring for compensatory purposes to address a lack of linguistic resources in the L2, while advanced learners used restructuring more for ideational and textual purposes. In a later study, Roca de Larios et al. (2008) compared the differential distribution of time allocated by differing proficiency groups to different writing processes. Findings highlighted how formulation took up the largest percentage of composition time across proficiency groups, and how L2 proficiency was found to be related to a more balanced allocation of processing time to different composing activities. As proficiency increased, writers seem to be able to make more strategic decisions as to what attentional resources should be allocated to which writing activities at which stages of the writing process (Sasaki, 2000).

A critical component of learning to write in an L2 is the enormous potential that writing in an L2 has to learn that language, what Manchón (2011) has called the 'writing-to-learn' dimension of L2 writing, and which considers writing as a tool for language learning. This function of writing is based on

Cumming's (1994) argument that composition functions as a psycholinguistic output condition which helps learners analyse and consolidate the L2 that they are in the process of developing. Therefore, writing, specially collaborative writing, 'fosters a type of linguistic processing with potential learning effects [...and...] such linguistic processing is more likely to take place in written than in spoken collaborative tasks, and is mediated by task- and writer-related factors' (Manchón, 2011:70). The key element to guarantee learning while writing is the depth of processing that takes place while composing; it is the iterative process of output generated which triggers deeper and more elaborate processing of the form, leading to the consolidation of the new language learnt in long-term memory (Izumi, 2003).

3.4 Relationships Between L1 Literacy Components and Second/Foreign Language Skills: Cross-linguistic Transfer

The working definition of transfer used in this paper is that transfer is 'the ability to learn new skills by drawing on previously acquired resources' (Genesee, Geva, Dressler, & Kamil, 2006). This is a recent and broad definition which shifts from previous characterizations of transfer as influences from the L1, whether positive, negative, or neutral. In this recent view, prior learning experience is considered as 'a reservoir of knowledge, skills and abilities that is available when learning a new language as well as literacy skills in that language' (Riches & Genesee cited in Koda, 2007). Some characteristics of transfer are that it is automatically activated by triggers in the L2 input; that it is non-volitional, and that it cannot be easily controlled. Non-volitional L1 activation implies that L1 competencies are involved in L2 information processing irrespective of the learners' intent, age, L2 proficiency, and L1 background.

From as early as the 1970s researchers have speculated that there is a relationship between learners' L1 and L2 skills. Cummins's (1979a, 1984) linguistic interdependence hypothesis contended that success in the L2 literacy depended on success in L1 literacy. In Cummins' early studies, though, reading was treated as a single unitary construct, which left unanswered critical questions as which subskills are transferred and how do they contribute to L2 reading. The LCDH (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995) suggested that L1 skills were the foundation for L2 learning and that problems with one component of the language would be very likely to have effects on L1 and L2 learning.

As far as reading is concerned, one way of looking at transfer is to explore the two hypotheses which may shed light on the relationship between L1 and L2 reading abilities: the linguistic interdependence hypothesis, which in its simplest form posits that transfer happens automatically if the learner has certain level of L1 ability, and the threshold hypothesis, which proposes that a certain level of L2 ability must have been reached for reading skill transfer to occur. A limited control of L2 proficiency would 'short-circuit' transfer of reading abilities acquired in the native language (the short-circuit hypothesis, Clark, 1988). These hypotheses were synthesized by Alderson (1984) when he posed the celebrated question of whether reading in a foreign language was a reading problem or a language problem. Alderson (1984) shared Cummins's caution recommendations with the interpretation of the hypothesis, as the threshold is difficult to define in absolute terms and is likely to vary as a function of two learner variables: first, the demands of the task; the more demanding the task, the higher the threshold is likely to be. Second, the conceptual level: the higher the conceptual knowledge of the individual, the lower the threshold will need to be. After reviewing a number of studies,

Alderson suggested that L2 reading was possibly more of a language problem at low levels of L2 proficiency, and more of a reading problem at higher levels of L2 proficiency. Later studies further explored this topic, and evidence supported the conclusion that L2 proficiency explained more variance than L1 reading. Studies suggested that, consistent with Alderson, the relationship between L1 and L2 reading ability became stronger as L2 proficiency increased (Brisbois, 1995; Taillefer, 1996; Yamashita, 1999). It is important to note that L2 language proficiency continues to explain some level of variance even at higher levels and that the contribution of the different language dimensions varies as a function of the L2 proficiency level. Building on these findings, Yamashita (2001) elaborated on Cummins's threshold hypothesis and proposed three levels to explain the differential contribution of L1 reading ability to L2 language proficiency: the fundamental level, at which L2 language proficiency does not explain L2 reading comprehension (low-level readers in Taillefer, 1996, in Schoonen et al., 1998, and in Yamashita, 1999); the minimum level, at which L2 proficiency begins to explain part of the variation but at which L1 reading ability cannot be transferred yet, and the maximum level. When readers' L2 language proficiency is larger than L1 reading ability, then the contribution of L2 language proficiency is larger than that of L1 reading ability. At some point between the minimum and the maximum levels, the contribution of L1 reading ability becomes larger than that of L2 ability. This is a gradual process as shown in Brisbois (1995). At the maximum level, L2 language ability does not present any problems for readers any longer, and variation is explained solely by L1 reading ability (see top readers in Bossers, 1991, and more recently, a contribution of .85 of L1 reading comprehension in Van Gelderen et al. 2004, and of .84 in Van Gelderen et al. 2007). Yamashita (2002) recommends using process rather than product-oriented approaches to further investigate the

impact of L1 reading on L2 reading, as process-oriented approaches provide information on how reading strategies vary as a function of L1 reading ability rather than focussing on the strength of the relationship only.

Other researchers have taken a more componential approach and have investigated which L1 literacy subcomponents are transferable and therefore promote successful L2 learning. The components that are more easily transferable are those which reflect language-independent, metacognitive/metalinguistic processes of literacy. In a review, Durgunoglu (2002) identified the following domains of cross-linguistic transfer in reading development: phonological awareness, syntactic awareness, functional awareness, word decoding, use of decontextualised language, knowledge of writing conventions, and successful meaning-making strategies in reading comprehension.

Phonological awareness is a component with a strong contribution to L2 learning. In fact, its contribution is so significant that Koda (2007) proposes that the question should not be how it transfers to other languages (if it were a language-specific construct) but whether it is a general competence shared across languages. She makes the point that a portion of phonological awareness arises as a product of oral language development, prior to learning to read. Further, she argues that the concept of word segmentation is not specific to any language, and therefore that, once developed; it should be easily available for learning to read in any other language. This concept would then explain that phonological awareness in bilingual children has found to be highly correlated in their two languages, and L2 decoding has been found to be closely related to phonological awareness in a bilingual's two languages. Several studies have proven that L1 and L2 phonological awareness are closely related and that poor readers show weak phonological skills in their two languages (Abu-Rabia, 1995; Gholamain & Geva, 1999; Verhoeven, 2000; Wade-Wooley & Geva, 2000). While

further empirical validation of phonological awareness as a language-independent competence is still needed, there is proof that it largely facilitates learning to read in another language, even across two different alphabetic orthographies that differ in visual forms such as English and Korean Hangul (Wang, Park and Lee, 2006). A number of studies have provided empirical evidence of phonological awareness transfer by showing strong relationships in phonological awareness across languages: Durgunoglu, Nagy, Hancin-Bhatt, 1993 (Spanish & English); Verhoeven, 1994 (Turkish & Dutch); Meschyan and Hernández, 2002 (English & Spanish); Hamada and Koda, 2010 (English & Korean, Turkish, Chinese and Japanese). Holm and Dodd (1996) (Chinese & English) also reported phonological awareness transfer from Chinese to English, but only for those subjects who had learned pinyin⁹: pinyin users had developed phonological awareness at the lower levels and so they were able to transfer these skills to English. In contrast, Chinese non-pinyin users or Hong Kong Chinese (who do not use pinyin) had no phonological awareness to transfer, as shown in their inability to process non words. Phonological awareness transfer seems to be limited to alphabetic systems. Besides phonological awareness, Sparks, Patton, Ganschow, Humbach, and Javorsky (2008) proved cross-linguistic skill transfer for word decoding, spelling, and reading comprehension even several years after students learn to read and spell their L1.

Syntactic awareness refers to the person's ability to notice the internal grammatical structure of sentences (Durgunoglu, 2002:194). Children may be aware of systematicities in a language although they are still unable to

⁹ In 1958 China introduced an alphabetic system using Latin symbols, called pinyin, which is a phonemic representation of the Chinese language in Roman letters. Children are first exposed to pinyin for facilitating literacy of the Chinese logographic system and to promote the standard dialect.

articulate a grammatical rule. Syntactic awareness facilitates reading comprehension (although to a much lesser extent than other lower-level processes; see section 3.3.1.1) and helps understanding spoken language. The cross-linguistic nature of syntactic awareness was put to the test in Durgunoglu, Mir, and Ariño-Martí (2002), in which 4th grade Spanish-English students had to perform a grammatical judgement task: English and Spanish syntactic measures were correlated (.44).

Functional awareness includes the notions developed about the functions and conventions of written language, as well as the understanding of why print is used (see section 3.6 for an account of the value of print conventions). Verhoeven and Aarts (1998) analysed whether print conventions were interrelated in the two languages of Turkish children in Dutch schools. Measures were significantly correlated across the two languages, providing evidence for cross-linguistic transfer.

Concerning word recognition, structural linguistic distance is directly related to differences in processing efficiency among L2 readers with diverse L1 backgrounds. In the preceding section it was stated that orthographic knowledge mediated phonological decoding and semantic access. Researchers have studied what happens when the two languages (the L1 and the L2) have different orthographic depths. In shallow or transparent orthographies the sounds of a language are consistently mapped to specific symbols, whereas in deep or opaque orthographies the correspondences between sounds and symbols are more variable, and a sound can be mapped with more than one symbol. Katz and Frost (1992) proposed the orthographic depth hypothesis, by which the orthographic depth of a language (that is, shallow versus deep orthographies), affects word decoding skill. Recent studies show that word decoding is affected by the orthographic depth of the L2, by the orthographic

distance between the L1 and the L2, and by the L1 experience and knowledge (Sparks, Patton, Ganschow, Humbach, and Javorsky, 2008). Crosslinguistic studies have found that learners acquire faster and more efficient L2 word recognition skills if the L2 orthography is closely related to their L1's orthography (Akamatsu, 1999; Koda, 1997; Bialystok, Luk & Kwan, 2005; Hamada & Koda, 2010); that learners use L1 processing skills for L2 word decoding (Ryan & Meara, 1991; Tan et al., 2003), and that L2 learners with different orthographic backgrounds use different processing skills to read words (Koda, 2005; Hamada & Koda, 2010). Abu-Rabia (2001) tested the interdependence hypothesis among native adult bilingual Russian-English students. His study provided evidence for the interdependence hypothesis for phonological processing, spelling (as word identification) and working memory, but not for orthographies: test results were significantly correlated within each specific language but not across languages. Wang, Park, and Lee (2006) did not find evidence of orthographic cross-linguistic transfer between Korean Hangeul (a shallow orthography) and English (a deep orthography). The same findings were reported by Luk and Bialystok (2008) when exploring the relationship between phonological awareness and early reading for Cantonese-English bilingual children. The implication from these studies is that the orthographic distance effect is language-specific, but also that L1-induced facilitation can be predicted through finely tuned crosslinguistic analysis.

Building on the initial orthographic depth hypothesis, there is a recent extended version which suggests that reading in a shallow orthography may rely primarily on a single phonological process, while reading in a deep orthography involves visual processing as well, with the learner having to cope with a dual process system (Seymour, Aro & Erskine, 2003; Share, 2004). This contrast in processing explains differences in the rate of acquisition of word

decoding in shallow versus deep orthographies: the rate of foundation literacy acquisition is slower by a ratio of 2.5 to 1 in English than is in other shallow European languages (Seymour, Aro, & Erskine, 2003). This extended version of the orthographic depth hypothesis helps explain the findings in Wang, Park and Lee (2006), who speculated that the unique visual form of the Hangul system may have been responsible for the difference in role of the orthographic skill between reading Korean Hangul and reading other Roman alphabet-based systems. Akamatsu (1999) investigated the processing effects on word recognition that distorted words would have in university students in Toronto with orthographically distant L1s, such as Persian, Chinese, and Japanese. Results revealed that participants with non-alphabetic L1s (Chinese and Japanese) were more severely impacted by case manipulation than those with alphabetic L1s (Persians), who, in turn, were more affected than the control group. Akamatsu suggested that it is quite possible that once the cognitive processing mechanisms have been fixed for a particular orthography, their foundational structure cannot be modified. Tan et al. (2003) used MRI to visualise Chinese-English bilinguals' brain activity and showed that phonological processing of Chinese characters (logographic) activated cortical regions that are known to contribute to spatial information representation and spatial working memory. While Chinese bilinguals showed activity in the same cortex area related to spatial information despite reading in English, these areas were only weakly activated when monolingual English subjects read English. These findings were supportive of Akamatsu's suggestion that language experiences may turn the cortex.

An interesting finding in the crosslinguistic skill transfer research literature regarding vocabulary was reported by Proctor et al. (2006), who found that Spanish vocabulary knowledge (L1), enhanced English reading

outcomes when L2 decoding and oral language proficiency were controlled. This effect was greater for students who had developed average-to-faster reading rates, and so the fact that decoding skills had already been automatized for learners enabled them to devote their time to creating meaning for text, and thus learners referred back to their L1 to facilitate comprehension.

Higher-order reading processes have not been as extensively researched, although Durgunoglu et al, 2002, explored how writing conventions transfer across languages. Skilled writers know how information is organized in different genres, and so results showed a significant correlation between a storytelling task in English and Spanish. Similarly, reading comprehension strategies seem to transfer across languages, although more research is needed in this area.

Further research on L2 reading development (Koda, 2007) should expand the reading skills being investigated beyond phonological awareness and word decoding to other subskills, adopt crosslinguistic perspectives that can help understanding the impacts of prior literacy experience on L2 reading development, and it should involve a wider variety of learners beyond children, adolescents and college-level students. All other things being equal, adult learners have more transfer-ready competencies; therefore, their L2 reading development is more affected by prior literacy experience. Documenting how they capitalize differently on their prior literacy experiences is critical to help them succeed in L2 acquisition. The present dissertation includes these research recommendations in its research design, under the assumption that prior literacy experience facilitates L2 acquisition when shaped to the specific characteristics of the L2.

Concerning writing, Cumming (1994) identified writing expertise as an ability that is transferred from the L1 to any other languages learnt in life, and called it a central cognitive ability. Cross-linguistic transfer was assumed in Cumming's definition of writing expertise as 'a specially developed intelligence [...] with unique cognitive characteristics that can be applied across languages' (Cumming, 1994:206). He characterised writing expertise by describing expert writers' performance: successful writers use problem-solving strategies while writing; transform their knowledge as they write; use complex mental representations to guide their decision making; produce more effective content and discourse organisation; interrelate planning and production processes, and pay close attention to word choices (Cumming, 1994). Other studies have provided evidence of the transferability of the writing ability across languages (Valdez et al, 1992; Raimes, 1994; Schoonen et al., 2003, 2011). Specifically, Leki (2011) provided evidence for how prior genre knowledge is transferred to new demands: participants' previous genre knowledge served as the foundation for their new literacy tasks, being used as 'a collection of options from which to then select and recombine in approaching new writing contexts' (Leki, 2011:9). Similar findings were reported by Canagarajah (2011) on a study on an advanced scholar from Sri Lanka switching discourse according to the writing context and the audience rather than according to any of the two languages which the writer uses (English and Tamil), showing that the main variable in multilingual writing is not language or culture, but rhetorical context/objective.

So what can we do to promote writing expertise transfer? An interesting line of research is that of James (2008), who investigated the influence of students' perceptions of task similarity/difference on the transfer of writing skills. Results highlighted the importance of understanding how students interpret writing assignments. Perceived task similarity had a positive impact

on scores on the writing task; conversely, perceived task difference had a negative impact on the frequency of reported learning transfer: therefore, 'it is learners' *perceptions* of similarity/difference rather than externally determined similarity/difference that appear to be key'. (James, 2008:94). In a follow-up study, learning outcomes in a writing assignment transferred but in a constrained manner, which led James to suggest that while transfer may be inhibited by task differences, it can be stimulated by explicit instruction. Again, this study provided evidence that perceived task similarity/difference is relevant to the transfer of writing expertise and would highlight the importance of metacognitive knowledge as an important variable for cross-linguistic skill transfer. Victori (1999) defined metacognitive knowledge as the knowledge that a person develops about his or her cognitive processes and about the requirements necessary in undertaking a cognitive task. Findings of her 1999 study point to metacognitive knowledge about writing tasks and writing strategies differentiating between high-proficiency and low-proficiency writers.

Consistent with the threshold hypothesis, the issue of the interrelations between a posited language-universal writing expertise and L2 language ability is very similar to the debate in the reading literature. What would the threshold to be surpassed be so that writing expertise can be transferred from the L1 to the L2? Researchers have typically tried to inform that question by investigating the relationships and dynamic interactions between the two variables (Sasaki & Hirose, 1996; Schoonen et al., 2003). Findings are still inconclusive, though. Sasaki and Hirose (1996) investigated first-year university students in Japan and found out that L2 proficiency explained the largest portion of variance (52%), while L1 writing ability explained 18%, and metaknowledge the smallest portion (only 11%). In contrast, in Schoonen et al. (2003) L1 writing proficiency explained the largest part of the variance (49%). Schoonen et al. speculated that

this difference may be due to the participants in their study having surpassed the threshold that inhibits L1 writing expertise transfer, whereas Sasaki and Hirose's students may not have hit that threshold yet. Another interpretation is that the threshold hypothesis needs to be refined in the case of writing to allow for the different cognitive processes involved: while readers have hardly any control over the difficulty of the texts they read, writers may avoid 'writing texts of linguistic and cognitive complexity beyond their knowledge and skills' (Schoonen et al., 2003). In a later study involving 400 secondary-school students, Schoonen et al. (2011) provided evidence of the dynamic relationship between L1 writing proficiency and L2 language proficiency: by gathering data at three different points in the L2 proficiency scale, the contribution of L1 writing expertise varied from 73% to 95%. Schoonen et al argued that the reason for different results having been reported previously may be due to the way writing was operationalised: their participants having completed multiple writing assignments may have provided more accurate results than previous studies which have used single writing assignments.

Further research on L2 writing should look at identifiable clusters of practices, experiences or personal preferences that ESL students show towards L2 writing. There appear to be complex configurations of background and process variables that interrelate students' previous educational experiences and present practices learning to write in an L2 (Cumming & Riazi, 2000). Research findings point to mediating roles being played by learner-related variables such as language proficiency and the whole range of affective variables contributing to individual differences; as well as task-related variables, including time on task, writing process stage, etc, in fostering language development through writing (Manchón, 2011). Schoonen et al. (2011) call for further research on the constructs of L1 proficiency, linguistic fluency,

language-general metacognition, and their interactions. Further research on the crosslinguistic aspects of writing should definitely help understanding under what circumstances can learners draw on their L1 writing expertise more successfully.

An imperative question when talking about L1 literacy influencing L2 learning is for how long it is expected to hold such an influence on second (or *n*) language learning. Most studies have followed learners for short periods of time, and while being able to provide evidence for the connections between L1 literacy and L2 learning, longitudinal research designs are needed to investigate whether this type of transfer can still occur long after an individual has developed literacy in their L1 in compulsory education. Sparks and associates have recently started to focus on this key question of long-term crosslinguistic skill transfer. In a 2007 study, they investigated 156 students attending a public high school and learning an L2 for the first time. A new finding to this study was that students exhibiting stronger L1 literacy (reading and writing) achieved significantly stronger scores on measures of L2 proficiency several years later. This finding pointed to the long-term crosslinguistic transfer of L1 skills to the L2. In 2009, they replicated a 1998 study by administering L1 measures to 54 students when they began their 1st grade, and then followed them over 10 years until they had completed two years of L2 learning in high school. Again, results suggested that early L1 skills (reading, spelling, vocabulary, phonological awareness, listening comprehension) appear to play a role in individual differences in L2 learning even several years after students have mastered their L1, and that a large part of the differences in L2 proficiency measures is likely to be explained by L1 skills.

Finally, cross-linguistic literacy skill transfer is encouraging as it can be used to enhance literacy development in the L2 in the case that those skills have

not been fully developed in the L1 of the learner. L2 literacy can develop by building on learner's existing L1 strengths as their L2 language proficiency improves, and so Durgunoglu (2002) recommends tailoring the L2 instruction to foster the development of literacy skills. Of late, a remarkable teaching model based on the cross-linguistic nature of literacy skills was developed and tested by Hauptman et al. (2012): in their pedagogical intervention, identical strategies of reading comprehension and writing skills were taught simultaneously by the Arabic, Hebrew and English teachers to 10th-grade Bedouin students in Southern Israel. Results showed that the programme contributed to improve the overall level of achievement significantly in the three languages, as well as pointing to an improvement in the specific skills tested in the areas of reading comprehension and composition writing in the three languages. Hauptman et al (2012) underscored the multidirectional and dynamic interactions allowed by a trilingual teaching model which was notably successful despite its short duration (four months).

3.5 Measuring L1 Literacy

3.5.1 L1 LITERACY TESTS

Most studies on literacy have been conducted with children and adolescents (Sénéchal, 2006; Dufva & Voeten, 1999; Sparks, Patton, Ganschow, Humbach, and Javorsky, 2006; Sparks, Patton, Ganschow, and Humbach, 2009a, 2009b). The research group which has devoted more time and energy to this topic has been led by Richard Sparks (University of Cincinnati, Ohio) and his associates in the context of foreign language learning in the US, who for over fifteen years have produced an impressive amount of studies and research designs in the area mostly with children and high school populations. The instruments they used to measure L1 literacy are fairly consistent (see table

3.02): in their 1998 study involving high-school students they used the IOWA tests of basic skills, consisting of texts with comprehension questions in a multiple-choice format, as well as a spelling task in which participants had to write dictated single words, and in their 2008 study, also with high-school students, they used the Metropolitan Achievement Test for Reading. Other than those, in their more recent studies (Sparks, Patton, Ganschow, Humbach, and Javorsky, 2006; Sparks, Patton, Ganschow, and Humbach, 2009a, 2009b), this research group has used the Woodcock Reading Mastery Tests, Formal Reading Inventory forms A+B. These tests are standardized and graded for the different school levels of the American school system, with the forms used to assess literacy including the following tasks:

- a) Word Identification: to measure the ability to read isolated words.
- b) Word Attack: to measure the ability to read nonsense words.
- c) Word Comprehension: to measure the ability to reads words, provide synonyms and antonyms and to read and complete an analogy.
- d) Passage Comprehension: to measure the ability to read a short passage and identify a key missing word.

Since their studies involved participants who had not completed their cognitive development, their instruments often include a measure of cognitive development: McGraw-Hill test of Cognitive Skills in their 2009b) study, the Otis-Lennon School Ability Test in their 2008 study, and a Test of Cognitive Skills in their 2006 study. Often Spark's and associates have included measures of spelling in the measurement of L1 literacy. Table 3.02 lists and describes instruments used by researchers in the field.

Table 3.02 *L1 Literacy Skills and Tests Used to Measure Them in Previous Studies*

| L1 literacy Skills and Tests Used to Measure Them in Previous Studies | | |
|---|----------------------------|---|
| Study | Skill | Test |
| Cummins, 1983 | Reading & writing | IRAS-E and Informal Writing Inventory (IWI) |
| Sparks, Javorsky, Patton, Ganschow, 1998 | Phonology/orthography | Wide Range Achievement Test: Spelling Subtest; Woodcock Reading Mastery Test-Revised Basic Skills Cluster (Word Identification, Word Attack and Phoneme Deletion). |
| | Semantics | Peabody Picture Vocabulary Test Revised: measures receptive vocabulary. Nelson-Denny Reading Test: measures the ability to read and answer questions. |
| | Reading Comprehension | Nelson-Denny at private school, ITBS reading subtest at public school. |
| Sparks, Patton, Ganschow, Humbach, Javorsky, 2006 | High School Placement Test | IOWA Test of Basic Skills Test, form J, level 14: a standardized measure of comprehensive growth in fundamental academic skills (language, reading, vocabulary and maths) |
| | Phonological | Lindamood Auditory Conceptualization Test (phonemic awareness test). |
| | Phonological/orthographic | Test of Reading Readiness Test of Written Spelling -2 |
| Sparks, Patton, Ganschow, Humbach, Javorsky, 2008 | Word decoding | Woodcock Reading Mastery Test-Revised |
| | Spelling | Test of Written Spelling -2 |
| | Reading comprehension | Formal Reading Inventory, A-B |
| | Phonological Awareness | Lindamood Auditory Conceptualization Test, A-B |
| | Reading Readiness | Test of Reading Readiness: Level K |
| | Vocabulary | Peabody Picture Vocabulary Test, L-M. |

| | | |
|--|---|--|
| Sparks, Patton, Ganschow, Humbach, 2009a | Listening Comprehension | The Woodcock Reading Mastery Test, G-H. |
| | Word Decoding | Woodcock Reading Master Test –Revised Basic Skills Cluster Forms G&H (Word identification and word attack) |
| | Spelling | Test of Written Spelling -2 |
| | Reading Comprehension | Formal Reading Inventory Forms A&B |
| | Phonological Awareness | Lindamood Auditory Conceptualization Test Forms A&B |
| | Vocabulary | Peabody Picture Vocabulary Test-Revised, Forms L&M |
| Sparks, Patton, Ganschow, Humbach, 2009b | Listening Comprehension | Woodcock Reading Mastery Test – Revised, Forms G and H |
| | Word Decoding | Woodcock Reading Mastery Test – Revised, Basic Skills Cluster (Word Identification and Word Attack). |
| | Spelling | Test of Written Spelling -2 |
| | Reading Comprehension | Formal Reading Inventory, Forms A&B |
| | Phonological Awareness | Lindamood Auditory Conceptualization Test, Forms A&B |
| | Vocabulary | Peabody Picture Vocabulary Test-Revised, Forms L&M |
| Dufva & Voeten, 1999 | Listening Comprehension | Woodcock Reading Mastery Test-Revised Passage Comprehension Subtest. |
| | Word Recognition | A lexical decision task: decide if a word is a word or a pseudo-word A word-naming task: Read the word aloud as quickly and accurately as possible. |
| | Listening Comprehension and Reading Comprehension | A 95-word text on which students were presented questions afterwards. Recall task: students were asked to retell the story. |

| | | |
|--------------------------------|-----------------------|-----------------------------|
| Muñoz, 2001 (adults) | Reading Comprehension | Cloze Test, Multiple Choice |
| | Listening | Listening Test |
| | Spelling/Orthography | Dictation Test |
| Artieda, 2010 (adults only) | Reading Comprehension | Cloze Test, Multiple Choice |
| | Listening | Listening Test |
| | Spelling/Orthography | Dictation Test |

Summarizing, tests commonly used in the assessment of L1 literacy for children and adolescents include:

- a) A measurement of phonology/orthography: how well can the participant identify the sounds of the language and represent them by letters.
- b) A measurement of reading comprehension: ability to identify the meaning of words on their own and in context.
- c) A measurement of vocabulary knowledge.
- d) A measurement of spelling.

However, Sparks and associates do not present a global L1 measure aggregating the scores of the phonology, reading comprehension, vocabulary and spelling tests. This is also the manner in which scores for these tests are treated in this dissertation too.

3.5.2 L1 SPELLING TESTS

The most commonly used spelling tests in second language acquisition research are of three main types: discriminative tests, in which the student

needs to choose the correct spelling of a word among a series of alternative and incorrect spellings of the same word; meaning-related tests, in which students need to relate the word they are given to its closest meaning from several meaning alternatives; and, finally, dictation tests, which are based on a list of words read aloud which students need to spell correctly.

These three types of tests have been widely used in research. Discriminative tests, for example, were used by Abu-Rabia in 2001 to test the interdependence hypothesis with adults (see chapter 3). Abu-Rabia used two discriminative tests:

- a) Visual Condition, Russian/English (English version developed by Olson, Kliegel, Davidson, & Folz, 1985). In this test participants are presented 26 pairs of words and pseudowords, and only one word in each pair is spelled correctly. Example: 'rain' – 'rane'.
- b) Spelling, Russian/English (English version Was Subtest of the Woodcock Reading Mastery Test, Woodcock, 1973). Participants are presented with a list of 100 words which they need to spell correctly.

Landi (2010) measured her participants spelling ability by using a discriminative test too: the Baroff spelling test. This is a test in which participants are presented with one word spelled correctly once and incorrectly four times. Participants need to select the correct spelling of the word. However, discriminative tests may be a valid way to test spelling skills in opaque orthographies, like Russian or English, but the level of difficulty of a discriminative task is going to be greatly reduced in systems with shallow orthographies such as Catalan or Spanish.

Meaning-related tests and dictation tests have been used frequently by Sparks and his associates to assess spelling. Examples of these tests are as follows:

- a) MLAT section III: Spelling Clues: In this meaning-related MLAT subtest, the student has to read words in English presented as abbreviated spelling (i.e. luv). In the instructions, students are told that words are not spelled in the usual way but rather they are spelled closely to the way they are spoken. Then, students have to choose one word out of five which matches the meaning of the word more closely. For example, for the word 'luv' the five options presented are 'carry, exist, affection, wash, and spy'. After having using this test extensively, Sparks and his associates have also criticized it severely as a valid measure of the spelling skill on the grounds that it relies too heavily on the vocabulary knowledge of the learner.
- b) Wide Range Achievement Test-Revised (WRAT-R Spell), a dictation Spelling Subtest: In this test students have to write single words from dictation.

3.6 The Lifelong Development of L1 Literacy

As discussed in section 3.2, several researchers agree that there is not a uniform end state to the development of L1 literacy which everybody attains at the end of secondary education. If this is so, then it is likely that there are activities which promote its development, and these activities are likely to vary depending on the individual's age. This section reviews studies which include models for enhancing literacy in different age groups outside of the formal

education curriculum, or which include measures of extensive reading, the latter being an activity which fosters learning throughout a person's lifetime.

Cunningham and Stanovich (1991) embarked on a research program with the objective of isolating the unique cognitive effects of exposure to print in samples of fourth-, fifth, and sixth-grade children. Data analyses indicated that print exposure was a significant unique predictor of spelling, several measures of word and vocabulary knowledge, and general world knowledge. Stanovich and Cunningham (1993) studied the effects of exposure to print in a population of 268 college students, and, again, results indicated that differences in exposure to written sources of information contributed to differences in knowledge significantly.

Working with francophone Grade 1 and Grade 4 children in Canada, Sénéchal (2006) presented different ways in which the development of literacy can be fostered at home in her Home Literacy Model, extending on the model with the same name already presented by Sénéchal and LeFevre (2002). Developed for francophone pre-school children, the first aspect of the original 2002 model is that parents differ in the types of literacy activities which they carry out at home. Findings suggested that storybook exposure and parent teaching literacy are totally different activities which may or may not be found happening simultaneously in all homes. The second aspect of the model describes the relationships among literacy activities and language, early literacy, and phoneme awareness. The Home Literacy Model posits that storybook exposure promotes the development of language skills; whereas parents teaching about literacy promote the development of early literacy skills. Storybook exposure and teaching about literacy were found not to be directly related to phoneme awareness, which was mediated by children's language and literacy skills. Taylor (2011) also found that parental teaching of literacy skills

was not related to their children's phonological awareness. The third aspect of the model describes the longitudinal relationships between the home literacy activities prior to Grade 1 and the final reading outcomes. The model does not indicate any links between informal literacy and reading in Grade 1. Until more advanced literacy skills are acquired, informal literacy experiences do not become associated to reading. The model indicates that the path seems to be that parent teaching about literacy fosters early literacy, which, then, is associated to Grade 1 reading outcomes, and Grade 1 successful reading predicts advanced reading skills.

In the 2006 longitudinal study, ninety French-speaking children and their parents were followed until the end of Grade 4. Children were tracked on storybook exposure and parent teaching about literacy, and the possible contributions of these home activities were compared to grades 1 and 4 learning outcomes. Results confirmed a finding which had already been observed in the 2002 study, that is, that parent book reading and teaching about literacy belong to distinct domains of home literacy experiences. Book reading was related to language skills such as vocabulary, but it was not related to early literacy skills or phoneme awareness. Parent teaching about literacy was related to early literacy skills and indirectly related to phoneme awareness, and it was not related to children's vocabulary. Storybook exposure, on the contrary, was indirectly related to advanced reading comprehension in Grade 4. A finding of interest in this respect is that the measure of frequency of reading for pleasure proved to be a good predictor of Grade 4 reading comprehension, while it was not related to spelling: mere exposure to print may not be enough to develop an accurate orthographic representation of words.

Sénéchal and Lefevre's finding that the relationship between storybook exposure and phoneme awareness is mediated by language and literacy skills is

consistent with what Tarone (2009) observed in a sample of 35 low-literate Somali adolescents learning English as an L2 in the US: alphabetic print literacy had a significant impact on oral L2 processing. The findings of the study suggested that

alphabetic literacy appears to improve one's short-term memory for language. Alphabetic literacy can help L2 learners to notice language forms present in oral L2 input that differ from forms they themselves produce, and particularly to notice formal differences that do not affect meaning. (p. 80)

Sparks and his associates further researched the contributions of L1 reading achievement and L1 print exposure by extending the period covered in their longitudinal design in a recent study (2012): they examined whether individual differences in the L1 variables just mentioned would account for unique variance in L2 written and oral proficiency after adjusting for the impact of early L1 literacy and verbal skills, cognitive ability in the L1, and L2 aptitude in a population of 54 high school students who were 6 years old at the beginning of the study and 16 at the second testing time. Results showed that L1 reading achievement made significant and unique contributions to L2 proficiency (8%), as well as to the components of L2 word decoding, L2 reading comprehension, and L2 listening/speaking. This finding suggests that continued growth in reading after the acquisition of elemental literacy may play a role in L2 learning. As far as the print exposure measures, in this study these added significant and unique variance not only to the composite L2 proficiency measure (4-6%), but also to L2 reading comprehension, L2 writing, L2 listening/speaking, and L2 word decoding. Stanovich (2000) described several mechanisms by which print exposure can be a significant predictor of variance in language. Print language tends to be syntactically more complex than oral

language, and it contributes to vocabulary growth because the bulk of a person's vocabulary is likely to be acquired outside of the formal classroom. Spark et al.'s interpretation of these findings is that 'strong L1 reading achievement and frequent L1 print exposure (reading volume) may serve to increase student's metalinguistic awareness' (Sparks, Patton, Ganschow, Humbach, 2012:498).

The main question investigated in Sparks, Patton, Ganschow, and Humbach's (2012) study, whether individual differences in L1 literacy exposure may affect L2 proficiency and aptitude measures, is based on Stanovich and his colleagues' work in the L1 literacy literature. These researchers investigated whether differences in educational outcomes as measured by vocabulary size, language skills, etc, are related to differences in exposure to print or reading volume. They investigated whether these differences could be due to one of the following two hypotheses:

- a) The cognitive efficiency hypothesis, or the idea that these differences are caused by individual variation in the efficiency in the cognitive processes for obtaining meaning from text; or,
- b) The environmental opportunity hypothesis, by which differences in vocabulary and language skills are due to differential opportunities for word learning (print exposure).

Sparks, Patton, Ganschow, and Humbach's (2012) findings provided support for the environmental opportunity hypothesis, as the print exposure measures added unique variation to the regression model.

Sénéchal (2006) and Sparks, Patton, Ganschow, and Humbach's (2012) studies used pre-school children, school children, and adolescents, and all studies yielded significant relationships between print exposure and L2

outcomes. Concerning print exposure, Sénéchal's (2006) study measured reading frequency in two different manners: in Grade 1, by asking parents how frequently they read storybooks to their children in a week, and by asking parents the number of children's books available in their home on a 6-point Likert scale, from 0 to 5 (0=none, 1=1 to 20, 2=21 to 40, 3=41 to 60, 4=61 to 80), and 5 (more than 80). In Grade 4, children were asked about their reading frequency directly. For the first measure, children reported reading four times a week at bedtime and five times a week at other times. Reading frequency explained a significant 6% of unique variance in reading comprehension in Grade 4. For the second one, named storybook exposure, an important finding was that in Grade 1 it explained 11% of the variance in the frequency with which children reported reading for pleasure in Grade 4. In Sparks, Patton, Ganschow, and Humbach's study, the L1 print exposure measures were the ART (author recognition), the MRT (magazine recognition), and the CLT (general knowledge), and added a significant and unique variance not only to the prediction of the composite measure, total L2 proficiency (4-6%), but also to L2 reading comprehension (4-5%), and to L2 word decoding, L2 listening/speaking, and L2 writing by 3 to 10%.

Table 3.03 below lists the instruments used in previous research to measure L1 literacy habits.

Table 3.03 *Activities Contributing to L1 literacy and Tests Used to Measure it*

| Activities Contributing to the Development of L1 literacy and Tests Used in Previous Research | | |
|---|----------------|---|
| Study | Activity | Instrument |
| Cunningham & Stanovich, 1991 | Print Exposure | Author Recognition Test (ART) Magazine Recognition Test (MRT) Newspaper Recognition Checklist (NRT) |

| | | |
|------------------------------|--|--|
| Stanovich & Cunningham, 1993 | Print Exposure | Title Recognition Test (TRT) |
| Sénéchal, 2005 | <i>For Kindergarten</i> Storybook Exposure | Reading Frequency (at home) |
| | Letter Knowledge | Letter Teaching Frequency by parents |
| | Letter-name Knowledge | Letter Identification Task |
| | Reading/letter-sound Knowledge | Reading 5 target words. |
| | Phoneme Awareness | A phoneme-deletion task |
| | Vocabulary | Échelle de vocabulaire en images Peabody (Canadian version). |
| | <i>For Grade 1 Students</i> Word Recognition | Form B of the Reading Subtest of the Batterie d'Évaluation du Language Écrit (BELEC) |
| | Decoding | Pseudoword Reading Subtest of BELEC |
| | Spelling | Print 10 words. |
| | Phoneme Awareness | A phoneme-deletion task. |
| | <i>For Grade 4 Students</i> Reading Comprehension | Level A Comprehension Subtest of the Test de Rendement pour Francophones |
| | Reading Fluency | The Test Alouette (Lefavrais, 1967). |
| | Spelling | Spelling Subtest of the Test de Rendement pour Francophones. |
| Tarone, 2009 | Reading for Pleasure | Reading Frequency. |
| | Literacy in General | Native Language Literacy Screening |

| | | |
|---|---|---|
| Sparks, Patton, Ganschow, Humbach, 2012 | L1 Reading Achievement L1 Print Exposure | <p>Device in Somali and English, tasks:</p> <ul style="list-style-type: none"> - English question formation - Elicited imitation tasks with English questions - Use of interlanguage forms in oral narrative tasks. <p>Indiana Statewide Testing for Educational Progress (ISTEP, 2002) reading subtest.</p> <p>Author Recognition Test (ART) Version 4 (Stanovich & West, 1989).</p> <p>Magazine Recognition Test (MRT) Version 2 (Stanovich & West 1989; Cunningham & Stanovich, 1997)</p> <p>Cultural Literacy Test (CLT), a composite general knowledge score.</p> |
|---|---|---|

This dissertation explores whether such a relationship stands for adult learners of English as a foreign language by investigating the effect that L1 reading habits may have in adult foreign language acquisition.

CHAPTER 4

The Study

4.1 Statement of the Problem

It is becoming increasingly common that adults need to develop new skills at any age, and learning a new language is very frequently one of these skills. Be it as a requirement for a new career orientation in our globalised world, or for the enjoyment of learning something new, learning foreign languages is not exclusive to children and adolescents any more. With what tools does the ordinary adult¹⁰ face such task? This dissertation explores the role played by language aptitude, L1 literacy, motivation and orientations, and age in the adult foreign language learning process, as well as the interactions thereof.

Despite the rising number of adult language learners, only recently have these been an object of study regarding language aptitude (Abrahamson & Hyltenstam, 2008; Bialystok, Luk and Kwan, 2005; Ehrman & Oxford, 1995; Ehrman, 1998; Erlam, 2005; Robinson, 2002b; Ross, Yoshinaga, and Sasaki, 2002;

¹⁰ In this piece of research, by ordinary adult the author refers to a Catalan-Spanish bilingual person with different degrees of language dominance, who has typically been exposed to a foreign language as a child in the context of classroom instruction and who may or may not have continued learning the foreign language after leaving or finishing primary education or high school.

Hummel, 2009; Mercer & Ryal, 2009; Koda, 2005; Landi, 2010) or literacy (Abu-Rabia, 2001; Tarone, 2009). Researchers have typically focused their attention in younger age groups both for language aptitude (The Bristol Project, Skehan, 1989; Harley and Hart, 1997; Harley and Hart, 2002; Geva and Verhoeven, 2000; Luk & Bialystok, 2008; Koda, 1992, 1996; Humes-Bartlo, 1989; Ranta, 2002; Safar & Kormos, 2008; Suárez, 2010) and literacy (Dufva & Voeten, 1999; Sénéchal, 2006; Sparks & Ganschow, 1993; Sparks, Javorsky, and Ganschow, 1998; Sparks, Patton, Ganschow, Humbach, and Javorsky, 2006; Sparks, Humbach, and Javorsky, 2008; Sparks, Patton, Ganschow, and Humbach, 2009; Sparks, Patton, Ganschow, Humbach and Javorsky, 2008) alike.

The result is a growing yet still insufficient number of empirical studies aiming at explaining what influence language aptitude exerts in adult language learning, and even fewer studies considering L1 literacy as an ID impacting the adult second language learning process at any stage. Finally, and to the author's knowledge, no previous study has focused on the role played by these two IDs in an exclusively adult population of learners simultaneously, on the interaction between the two constructs, or in their combination with the additional IDs of motivation and age.

4.2 The Study: Research Goals

This study belongs in the individual differences research tradition. The research design follows a research recommendation by Skehan (1998) and Robinson (2005), who suggested that language aptitude may impact L2 acquisition differently at different stages of the proficiency scale, following the notion that 'aptitudes are dynamic, and that abilities contributing to them reconfigure as learners reach higher levels' (Robinson, 2005: 60). In order to test this hypothesis, data have been collected at two stages of proficiency: beginner

and advanced. L2 development is measured by testing students on five language dimensions: listening, reading comprehension, writing, and grammar in use. This allows for an in-depth analysis of data on a macro- and a micro-level: as well as comparing IDs with a global L2 development score, the granularity of the data permit a fine-grained picture of the relationships among the IDs studied and the five language dimensions.

A second aim of the study is to focus on the role played by two individual variables specifically: language aptitude and L1 literacy. For a detailed analysis, language aptitude scores can also be read as a global score (macro-analysis) or disaggregated into the different components (micro-analysis). As far as language aptitude is concerned, this dissertation aims at shedding light on the role played by language aptitude components on the five language dimensions at two different stages of proficiency (elementary and advanced). Concerning L1 literacy, the goal is to test whether there is a relationship between L1 and L2 development, and what is the nature of such relationship. If results are positive, then the study will further investigate under what conditions crosslinguistic skill transfer is likely to occur in this adult population sample.

Last but not least, the study aims at shedding light on the interactions amongst the main four IDs under scrutiny (language aptitude, L1 literacy, motivation and orientations, and age), and on how these interactions evolve along a continuum of L2 development. If language is a dynamic system (Dörnyei, 2010), then the focus should shift from an assumption of stability to ongoing change, and research should aim at identifying the components, the relationship among components, and finally on describing system dynamics, 'that is, how the components and the relations change over time' (Dörnyei, 2010).

4.3 Research Questions and Hypotheses

Based on the theoretical background reviewed in the preceding sections, this study tried to answer the following research questions:

4.3.1 RESEARCH QUESTION 1

Main Question:

Will language aptitude as a global score in the LLAMA test battery impact two groups of participants at two levels of L2 proficiency differently?

Sub-questions:

1.a. Out of the set of aptitude components explored in this study (vocabulary learning, recognition of patterns in oral language, sound-symbol correspondence, grammatical inference) which of them will contribute the most to the participants' rate of learning at two levels of L2 proficiency (beginner and advanced)?

1.b. To which language dimensions does each component contribute?

1.c. Does the additional 'tolerance of ambiguity' component add explanatory power to the global language aptitude score?

1.d. Does L1 literacy as measured by an L1 reading comprehension test play a mediating role?

4.3.2 HYPOTHESIS 1

The hypothesis for research question 1 is that language aptitude as a global score will impact L2 learners at two level of proficiency differently.

The hypotheses for subquestion 1.a are as follows:

According to Skehan's prediction (Skehan, 1998), for low-proficiency students, the faster learning students will be those exhibiting higher levels of auditory ability, expressed in this study as scores in a sound-symbol correspondence task (LLAMA D). For these students auditory ability is critical as it acts as a threshold for learners to transform acoustic input into processable language chunks (Skehan, 2002). Following Grañena (2011, 2012), language analytic ability as measured by LLAMA tests B (vocabulary learning), E (recognition of patterns in oral language), and F (grammatical inference) is expected to contribute to language learning rate in the same proportion at both levels of proficiency (Skehan, 1998).

No hypothesis is proposed for subquestion 1.b.

For subquestion 1.c, concerning the 'tolerance of ambiguity' factor, Ehrman (1998) found that strong performance on the MLAT appears to be related to personality variables that indicate high tolerance of ambiguity. It is then expected that a measure specific to tolerance of ambiguity may add explanatory power to the language aptitude construct.

Finally, for subquestion 1.d the hypothesis is that L1 literacy will play a mediating role for participants in the beginner group following the contention by Skehan (1985), Carroll (1989), and McLaughlin (1990) that children differ in rate of acquisition and mastery attained in their L1, and so that these differences may impact adult foreign language learning. Advanced learners are not expected to experience this mediating effect of L1 literacy since, as predicted by Cummins' interdependence hypothesis (Cummins, 1979a, 1983), and by the LCDH (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995), cross-linguistic transfer is expected to have occurred and the L1 literacy differences would have been bridged.

4.3.3 RESEARCH QUESTION 2

What variance is explained by L1 literacy at beginner and advanced levels of proficiency? Do results provide evidence for the threshold hypothesis (Cummins, 1979a)?

Sub-questions:

2.a What is the contribution of each L1 literacy variable?

2.b Do skills in the L1 (reading comprehension, spelling) correlate with skills in the L2? Are results consistent with the interdependence hypothesis (Cummins 1979a, 1983) and with the LCDH (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995)?

2.c The questionnaire includes measures of L1 reading habits. Do these habits play any role in foreign language acquisition for the learners in the study, and how do findings compare to other studies in the area (Cunningham and Stanovich, 1991; Stanovich and Cunningham, 1993; Sénéchal, 2006; Sparks et al, 2012)?

4.3.4 HYPOTHESIS 2

The hypothesis for the main research question 2 is that L1 literacy will play a prominent role for beginner students, while showing a much lower impact in advanced students. This finding would be consistent with the threshold hypothesis for adults (Cummins, 1979a) as it would suggest that an insufficient level of development of learners' L1 skills might be hindering L2 learning in beginners, while advanced learners would be enjoying the benefits of cross-language skill transfer because they would have surpassed the L1 literacy threshold necessary to facilitate transfer.

No hypothesis is proposed for subquestion 2.a.

Hypothesis for subquestion 2.b is that the level of development in the different language skills in participants' L1 will correlate with L2 skills' outcomes. This finding would support the interdependence hypothesis (Cummins 1979a, 1983) and for the LCDH (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995), as well as providing evidence for cross-language skill transfer in adulthood. Other studies have provided evidence of connections between literacies (Cummins, 1980c; Krashen, Long & Scarcella, 1979; Muñoz 2001, 2003, 2006; Dufva & Voeten, 1999; Ganschow & Sparks, 2001; Sparks, Humbach, & Javorsky, 2008; Sparks, Patton, Ganschow, & Humbach, 2009a, 2009b; Artieda & Muñoz, 2013).

No hypothesis is proposed for subquestion 2.c.

4.3.5 RESEARCH QUESTION 3

A result of Artieda (2010) on individual differences in adult foreign language acquisition was the different weight that motivation played for learners after 200 and after 416 hours of study. Will motivation and orientations show the same differential impact at two levels of proficiency in this study?

4.3.6 HYPOTHESIS 3

Consistent with Artieda's 2010 study, motivation is expected to play a minor role for beginners, whereas this role is expected to be much more important for advanced learners.

4.3.7 RESEARCH QUESTION 4

4.a What will be the role of age for the two proficiency groups?

4.b Will age have a moderating role for L2 development and the rest of independent variables?

No hypothesis is proposed for research subquestions 4.a and 4.b.

4.3.8 RESEARCH QUESTION 5

What are the interactions amongst the constructs investigated in this study? Will there be different patterns of interaction at two levels of proficiency, and, if so, which will be the main differences between the patterns?

No hypothesis is proposed for research question 5.

CHAPTER 5

Methodology

5.1 Research Context and Participants

The school where data were collected is the Escola Oficial d'Idiomes in the town of Santa Coloma. Santa Coloma is a densely populated town adjacent to Barcelona with a population of 124,365 inhabitants as at 1st of January, 2011 (Anuari Estadístic de l'Ajuntament de Santa Coloma de Gramenet 2010, Edició 2011). A massive destination for immigration for the building industry coming from other Spanish regions in the 1960s and 1970s, the current population of the city has changed over the past ten years due to immigration flows from other countries. At present, 25% of the population is of foreign origin, while 75% is Spanish. The distribution of the population regarding country and Spanish region of origin is as follows:

Table 5.01 *Distribution of the Population by Origin*

| Population of Non-Spanish Origin – 25% | |
|--|----------|
| 21% | Chinese |
| 16% | Moroccan |

| | |
|---|------------------------|
| 9% | Ecuadorian |
| 54% | Other Nationalities |
| Population of Spanish Origin – 75% | |
| 62% | Catalonia |
| 20% | Andalusia |
| 18% | Other regions in Spain |

Regarding age, Santa Coloma's population is still relatively young. 67% of Santa Coloma's inhabitants are in working age, between 16 and 64 years old, as shown in table 5.02.

Table 5.02 *Distribution of the Population by Age*

| Age Range | | |
|-----------|-------|-------------|
| 0-15 | 16-64 | 64 or older |
| 16% | 67% | 17% |

Another relevant piece of demographic information for this research is the level of literacy of the population. As shown in table 5.03, most of the population have completed some level of secondary education. The column secondary education includes people who have finished education at 16 years old (lower baccalaureate or middle school) and people who have completed their baccalaureate or other kinds of pre-university professional studies (18 years old). The second most numerous group includes people with primary education (until 14 years old), followed by a very insignificant percentage of people who are illiterate or have not completed their primary studies. It is worth mentioning the low percentage of people who have some kind of university studies: this group represents only 3% of the population.

Table 5.03 *Santa Coloma de Gramenet: Distribution of the Population by Academic Level*

| Age group | Unknown | Illiterate or No Primary Ed. | Primary | Secondary | University |
|--------------|-----------|------------------------------|------------|------------|------------|
| 20-29 | 6% | 5% | 28% | 59% | 2% |
| 30-39 | 7% | 3% | 10% | 75% | 4% |
| 49-49 | 6% | 4% | 9% | 77% | 4% |
| 50-59 | 3% | 2% | 13% | 80% | 2% |
| 60-69 | 1% | 4% | 29% | 66% | 1% |
| 70-79 | 1% | 9% | 44% | 46% | 0% |
| 80-89 | 1% | 16% | 49% | 34% | 0% |
| Total | 4% | 5% | 21% | 68% | 3% |

In the Spanish region of Catalonia, an Escola Oficial d'Idiomes (EOI) is a government-owned foreign language learning centre, open to all adult population starting from age 16 and without any academic entry requirements. These schools also offer foreign language academic certificates for the languages they teach. The certifications have official validity throughout the Spanish territory and can be obtained by attending courses and sitting the exams or by passing the level examinations only.

The objective of the schools is that students acquire communicative competence in the languages learnt after passing all the levels offered. For English, the schools offer five courses, with the following level structure:

- Elementary level: 1st and 2nd year.
- Intermediate level: 3rd year.
- Advanced level: 4th and 5th year.¹¹

¹¹ EOIs provide the following level equivalences with the Common European Framework of Reference for Languages (CEFR): at the end of the intermediate level, students are B1 level in the CEFR. At the end of the advanced level (5th year), students are B2 in the CEFR. Therefore,

In order to help students attain communicative competence, schools aim at students to:

- Develop basic receptive and productive skills, for both oral and written language.
- Develop communicative strategies for different communicative needs.
- Develop strategies for autonomous language learning so that students can enhance their language knowledge by participating in professional seminars and other activities offered in the language learnt.
- Develop positive attitudes towards language and culture diversity in our present world.

EOIs offer extensive and intensive courses. Extensive courses have a minimum duration of 130 hours spread out in nine months, October through June. Classes are two hours long and take place twice a week. Intensive courses focus on communicative aspects of the language, and are offered in the summer, typically in July. The schools have additional facilities for enhancing language learning, such as language laboratories, libraries, reading rooms, cinemas, self-learning centres, and cable TV.

All the students who participated in this research were attending classes in the second term of an extensive course: first year students and fourth year students of English. The sample consisted of 140 subjects. The mean age of the participants was 34.03 years old. Participants were grouped according to the level of English they were studying. The beginner group had 52 subjects, with a mean age of 39.65 years old. The advanced group included 88 subjects, with a mean age of 30.99 years old.

participants in this study who were in their 4th year were somewhere between B1 and B2 levels in the CEFR (independent users). The study refers to this group as the advanced group as this is the name they are given by the school.

5.2 Research Design and Variables

In line with previous research on IDs, this study uses a correlational research design (see section 1.4 for previous ID studies using the correlation coefficient technique). Then, multiple regression analyses are used where appropriate to confirm linear relationships amongst variables and to quantify the percentage of variance explained. Finally, the study aims at designing exploratory path models using PLS path modelling to explore more complex variable relationships which have been previously outlined by correlations and multiple regression procedures.

In the current study, the dependent variable was development in the foreign language (English). There were two groups of participants: a lower proficiency group, with 140 hours of study, and an advanced proficiency group, with 560 hours of study.

The main constructs under investigation and the variables with which they were operationalised were as follows: language aptitude, as the score obtained from the Llama Tests B, C, D, and F (Meara, 2005). For L1 literacy several variables were used: L1 reading comprehension, expressed as scores in an L1 reading comprehension test; and L1 spelling, as scores obtained in an L1 spelling test. Then two additional literacy-related variables were included to capture reading habits: a measure of amount of reading expressed in number of books read per year in increments of five years, and a measure of reading for pleasure in a 1-10 Likert scale. Motivation and orientations was the third construct explored by means of three variables: motivation, communicative orientations and professional orientations, measured by answers to an adaptation of the Flags questionnaire (Cid, Grañena and Tragant, 2009) in a 6-

step Likert scale. Finally, the last ID investigated was biological age at testing as reported by participants in a questionnaire.

There were other factors which could have an impact on foreign language learning in adults, and these were included as control variables. Linguistic background factors had already been controlled in Artieda (2010), and the measures which worked well were used again for the current dissertation. First, several measures of bilingualism were used, as degree of bilingualism could play a role. Previous research findings suggest that bilingualism seems to enhance cognitive control in adults: Bialystok, Craik, Klein and Viswanathan (2004) and Bialystok, Craig and Ryan (2006) report advantages in attentional control in lifelong bilinguals using two languages in their daily lives. Three measures were included: self-reported bilingualism, in which participants had to classify themselves as 'balanced bilinguals', 'Catalan-dominant bilinguals', 'Spanish-dominant bilinguals', 'bilinguals with low proficiency in Catalan', or 'bilinguals with low proficiency in Spanish'. The second measure of bilingualism was language preference, a categorical measure which records the language chosen by participants to take the questionnaire. Finally, there was a third measure, literacy language, which consisted of the language in which participants consider they are stronger in reading and writing, the skills with the highest contribution to the development of literacy. Another linguistic factor which impacted results in Artieda (2010) was previous foreign language experience. Therefore, it was included as a control variable in this study too: participants had to list the number of foreign languages they had studied in their lives and, and they were classified as follows: 'none', '1 foreign language', '2 foreign languages', or 'more than 2 foreign languages'. Another control variable which was already used in Artieda (2010) and which was used in this study too was stays in English-speaking countries to learn or practise

English. Participants were asked to report whether they had been abroad for the purpose of enhancing English learning using the following scale: 'never', 'once, for 15 days', 'once, 1 month', 'once, over a month', 'twice and/or over a month', or 'more than 2'.

There were other factors which had not been controlled in Artieda (2010) because they were not relevant for the study. For instance, there was no mention or investigation of the academic level of participants and of its relationship with foreign language achievement. Since L1 literacy was one of the main points of interest of this dissertation, participants were asked to report their level of education accurately. A control variable was used which situated learners in discrete points on the educational scale in the Spanish academic system.

5.3 Test Design

The following sections provide an account of the instruments used in this research, as follows: the language aptitude test, the L1 reading comprehension test, the L1 spelling test, the questionnaire, and the foreign language proficiency exams.

5.3.1 THE LANGUAGE APTITUDE TEST

Three criteria were taken into consideration in order to choose the most suitable foreign language aptitude test for this dissertation: the language in which the test was presented, whether it was dynamic or static, and its ease of administration. The MLAT was discarded as it did not fulfil any of the three criteria: first, it is taken in the first language of the participant. Secondly, it is a static test which checks a language which the participant already knows very well; and, finally, in its complete form it takes 60 to 70 minutes to complete in a

pen-and-paper format, which is well beyond the time available in this study. The CANAL-FT test met two out of three criteria: it is taken in an invented language (Ursulu); and it is dynamic in that the test taker learns this artificial language while taking the test; however, it didn't meet the duration requirement, as it takes a long time to complete and more than one session, since it includes delayed recall tasks. Therefore, the test chosen for this study was the Swansea LLAMA test battery as it fulfils the three necessary criteria: it uses an artificial language; it is dynamic; and it only takes between 30 and 40 minutes to complete, something to which the fact that it is computer-administered contributes.

5.3.2 THE L1 READING COMPREHENSION TESTS

L1 reading comprehension tests used by Sparks and his associates have proved to discriminate between high- achieving and low- achieving students in different studies, so finding equivalent measures that could be used with an adult population was a critical objective when designing the tests. The population in this study were adults who wanted to learn English but who did not necessarily share the same educational background: since having a university degree or even being a university student is not a language school entry requirement in the institutions where data were collected, there was a mixture of adults with very different educational backgrounds. The objective when designing this test was, therefore, to find a measure which permitted discriminating between the different levels of literacy an adult person may have achieved, and to avoid any ceiling or bottom effects which could be found in the case that the measure was not discriminative enough and our population sample clustered in the upper or lower ends of the literacy scale.

Another challenge was that, unlike in the compulsory education context, in which the researcher can attend a class and test the students at different times trusting that students will still be there when s/he comes back to test them a second time, in the adult context the researcher is often limited to one sitting. Attendance to class is not compulsory, which means that if the test takes more than one session there is a high risk that students do not show up for the second session, or that they are simply not interested in the research and therefore not willing to take the test that day.

With these goals and limitations in mind, the first tests that were considered for this literacy measure were the standard tests of Catalan and Spanish as Foreign Languages developed by the Institut d'Estudis Catalans (the Catalan Language Institute) and the Instituto Cervantes (the Spanish Language Institute) respectively. After close examination, the tests were discarded for several reasons: they were extremely long, taking from an hour to ninety minutes to complete each; they required very explicit grammatical knowledge of the language, and they included listening and oral tests addressed at non-native speakers of the language, which were not suitable for this research since the population sample consisted of native speakers of the language.

The second tests under consideration, which were the ones that were eventually used for this research, were the standard governmental tests of admission to Spanish universities for over twenty-five year olds. These tests fulfilled the requirements for this study for the following reasons:

- a) They were short, not requiring more than 30' to complete.
- b) They were designed having adults in mind, so the cognitive development of the participants was assumed to be complete in all cases and so no further tests of cognitive development were required.

- c) They measured reading comprehension, vocabulary knowledge and writing, which are the skills of which literacy is composed according to Sparks and his associates, and the ones they measure with their tests (refer to section 3.2 for a discussion on the components of literacy).

Despite the advantages listed above, a number of tweaks had to be done to the tests so that they would fit our population and the goals of the research as tightly as possible, as explained below.

The original tests consisted of a text, between 20 to 30 lines in length, extracted from a book, essay, or newspaper. The texts chosen for these tests were usually state-of-the-art texts, featuring fiction extracts by well-known writers or topics of current interest in recent newspapers. Then a number of questions on the text followed, and finally the student was asked to write a short composition developing an idea contained in the text. In its original format, the tests measured comprehension just by asking the participant to suggest antonyms and synonyms for words in context. While this is a valid way to assess comprehension, it can be argued that it is also a measure of vocabulary knowledge; the student who knows the meaning of the words does not need to refer back to the text in order to infer the meaning of the word. Since one of the aims of this study was to measure L1 reading comprehension, three multiple-choice comprehension questions were added at the beginning of each test. Then, the antonym-synonym questions were kept right afterwards, as they are a valid measure of vocabulary knowledge and vocabulary knowledge contributes to literacy, too. There were a few questions asking about explicit grammar knowledge: a few of those were removed, and only two of them were kept in each test, with a very specific objective in mind: to identify very high-achieving participants. For these grammar questions the assumption was that the average

adult foreign language learner would have forgotten explicit grammar rules and would find it difficult to answer them correctly. Then, a question asking to put a fragment of the text into the present tense was kept, as a controlled writing exercise needing some basic knowledge of grammar and composition. Finally, the originally 50- to 80- word composition with a given structure was substituted by a summary of the main text in a maximum of five lines. Being able to summarize a text in a few words is cognitively demanding enough to provide a quick assessment of the writing skills of participants.

The way the test was scored gave more importance to the understanding of the meaning of the text than to grammatical knowledge. There were a total of 10 questions. Three of them were pure comprehension questions: 1 point for each correct answer. Then, there were three questions for synonyms-antonyms: 1 point for each correct answer. The final summary composition needed that the participant had understood the meaning of the text correctly: 2 points for an accurate and well-written summary. Finally, the grammar questions were given .5 points each only, and the verb-transformation exercise was given a global score of 1 point (for 4 common correct verb tenses in Spanish and in Catalan). In this manner, participants with a high level of intuitively-developed literacy could obtain a high score, while those who had a high level of academic literacy could be easily screened too because they would score even higher.

A full copy of the final version of the L1 reading comprehension tests and related answer keys can be found in Appendix A.

5.3.3 THE L1 SPELLING TESTS

The next tests described are the L1 spelling tests. One of the main factors to be taken into consideration when designing a spelling test is that, according to some researchers, spelling is language-specific and that, unlike other

language skills, it does not transfer across languages (Abu-Rabia, 2001). This is even more so when the two languages compared have two different writing systems (Abu-Rabia was using students who spoke Russian and English). In the languages studied in this dissertation, Catalan/English and Spanish/English, while the writing systems are not different, orthographies are: Catalan and Spanish are considered languages with transparent or shallow orthographies, while English is a language with an opaque or deep orthography. Since the population used for the study consists of Catalan-Spanish bilinguals, two spelling tests had to be developed: one in Catalan for the Catalan-dominant bilinguals and another one in Spanish for the Spanish-dominant bilinguals.

Given the existing criticisms on discriminative spelling tests, which are not considered difficult enough to be used for shallow orthographies, and on meaning-related tests, which rely too heavily on the vocabulary knowledge of participants (see section 3.5.4), the format chosen for the spelling tests was the dictation. This is also the spelling test format most commonly used in Spanish public and private schools, just like in the American school system.

Knowing that the orthographic systems Catalan and Spanish are substantially different, there was a need to customize the test type chosen to the areas of spelling difficulty of each language specifically. Participants were dictated 20 words carefully selected from areas of well-known orthographic difficulty in Catalan and Spanish, which subjects had to spell correctly.

The following sections provide a brief account of the features of these two languages concerning orthography, an identification of their main areas of difficulty, and, based on that identification, the words that were used in each spelling test.

5.3.3.1 *The Test of Catalan Spelling*

Catalan is a language with a shallow orthography. However, influence from other languages and an irregular historical development have contributed to Catalan having a more complex orthography than Spanish.

To begin with, Catalan has eight vowels, and only five graphemes to represent them. This is a source of orthographic mistakes. Then, just like in Spanish, there are many instances of one phoneme corresponding to two or more graphemes. Another area of difficulty concerns the grapheme 'h', for which the phoneme has disappeared completely. Finally, we have the area of accentuation, which is a great source of complexity as the Catalan language has two graphic accents instead of one.

In order to create the list of words two books on the topic were used: *Llengua Catalana, Material Didàctic per a Cursos de Nivell B*, by Maria Sitjà i Brunat, and *Ortografia Catalana*, by Joan Badia and Jordi Grifoll.

The main areas of difficulty around which the test has been developed and the words chosen to test participants on are as follows:

Category a): The same phoneme, i.e./b/ can be represented by more than one grapheme, b, or v: 'bevia', 'beneita', 'mòbil'. Also, phoneme /ʒ/ can be represented by graphemes g or j: 'estranger', 'juny'.

Category b): The sound matching the grapheme has disappeared altogether (i.e. / /, (h), 'ombrívol', but 'home'.

Category c): Accentuation and use of hyphens: 'fóu', 'llúdriga', 'entonació', 'ambigüitat', 'vint-i-sis', 'maleir', 'miscel.lània'.

Category d): Neutralization and vowels in unstressed syllables: 'rondinaire', 'confús', 'berenàveu', 'ombrívol'.

5.3.3.2 *The Test of Spanish Spelling*

Spanish is a language with an exceptionally shallow orthography. In most cases letters are pronounced the way they are written and do not present any spelling challenges. This is 100% true for the vowel system: there are five vocalic sounds in Spanish, and five graphemes are used to represent them. This is not so in the case of the consonants. Although the main trend is to pronounce them the way they are written, there are areas of difficulty whenever one or several of the following situations occur:

- a) The same sound, i.e. /b/, can be represented by more than one grapheme, b, or v: 'bovino', 'absorber', 'herbívoro'. Also, phoneme /x/ can be represented by either g or j: 'enjundia', 'jirafa', 'extranjero' but 'genoma'.
- b) The sound matching the grapheme has disappeared altogether (i.e. / /, (h), in 'herbívoro').

Other areas of difficulty in Spanish include the much broader topic of accentuation, and the spelling of borrowings from other languages.

Two manuals on Spanish orthography have been used to determine the most common difficulty areas and to choose the words for the test: *Ortografía de la Lengua Española*, by Larousse, and *Manual de Ortografía Española*, by Fernando Carratalá.

For the purposes of this test, the words selected belong to the first categories and to accentuation. There were no borrowings from other languages in these tests as these are incorporated into the language corpus in an ongoing basis and we might have found participants who were not aware of incorporations or modifications in spelling rules of recently-accepted borrowings.

The choice of words according to the categories above was as follows (note that one word may present more than one source of difficulty and therefore be listed in two categories at the same time).

Category a): A sound can be represented by more than one grapheme:

- 'bovino', 'conveniencia', 'absorber', 'herbívoro', 'verborrea', 'subrayar'

Category b): The sound has disappeared altogether but grapheme has not:

- 'herbívoro' (also accent), 'alopecia'

Category c): Different graphemes are used for the same sound:

- 'envidia', 'jirafa', 'dislexia', 'extranjero'

Accentuation:

- 'lágrima', 'ágape', 'diácono', 'farináceo', 'quíntuple', 'fue', 'superflua', 'vio', 'veintiséis'

5.3.4 THE QUESTIONNAIRE

5.3.4.1 *Constructing the Questionnaire: Initial Considerations*

This questionnaire was developed according to the recommendations made by Dörnyei in his book *Questionnaires in Second Language Research* (2003). Dörnyei gives specific recommendations to write questionnaires with two purposes in mind: to ensure questions elicit the desired information from the respondents as accurately as possible, and to do so in such a way that data can be easily processed afterwards.

The following recommendations were used in this questionnaire:

1. Length: the questionnaire did not exceed the maximum length recommended, which is 4 pages, and it did not take more than 30 minutes to complete. When piloted, none of the respondents took longer than 15 minutes to answer all the questions.
2. Layout: the questionnaire needed to be and look short. To that effect, the amount of writing to be done by the participant was reduced as much as possible. In addition, all questions were marked and numbered to give a sense of structure and flow.
3. Anonymity, sensitive topics and thankfulness: participants needed to feel well and as at ease as possible if we wanted that they expressed their thoughts with transparency. To that aim, the opening paragraph was a clear statement of anonymity and respect towards any personal and biographical details contained in the questionnaire. Some of the questions in the questionnaire might have been threatening for the participant as they inquired about their educational background or about having positive or negative attitudes towards language learning. Some learners might feel bad about giving a negative answer to such questions. To avoid that, an introductory paragraph explicitly stated the non-judgemental nature of the questionnaire and tried to encourage participants to express their views on the items questioned freely. The natural and friendly register in which the instructions, questions, and answers were written intended to convey closeness and understanding, exactly for the same purpose. Finally, participation in the research was acknowledged several times, and at the end and as a proof of gratitude the researcher offered to share the results of the tests with the participants once these had been analysed.

5.3.4.2 *Main Topics and Approach*

The questionnaire had to provide meaningful information on the two constructs investigated in greater depth in this research: language aptitude and L1 literacy, as well as providing background biographical information on the participants which was used to identify any potential confounding effects.

In order to ensure that the questions elicited the information needed, multi-item scales were used. The use of these scales is recommended by Dörnyei (2003, p. 34 this book) and Skehan (1989, p. 11), as they avoid that one item carries an excessive weight in the topic being researched.

Since this research is quantitative, almost all items in this questionnaire are closed-ended, which according to Dörnyei (2003) are most suitable for quantitative research 'because the response options can easily be numerically coded and entered into a computer database (p. 35).'

The questionnaire was divided into four main sections: motivation and orientations, L1 literacy, tolerance of ambiguity, and biographical profile. Following Ellard and Rogers' (1993:17) Ten Commandments of Question Writing (cited in Dörnyei, 2003), the type of questions and scales used was varied in order to maintain the participant's interest during questionnaire completion, but only one type of questions was used within each section to avoid confusion –with the exception of the bio data section, in which different formats were used to elicit factual information.

Section 1 explored the motivation and orientations of participants by presenting two grids with six statements each. For the first group, a six-step Likert scale in which the two end-points were 'totally agree' and 'totally disagree' was used. For the second group, a six-step Likert scale was used too, but the two end-points were 'very important' and 'not important at all.' An

even number of steps was used to avoid neutral answers. With these two tables three scores were obtained: one for motivation, one for professional orientations and a third one for communicative orientations.

Section 2 inquired about participants' perceptions on the role of talent for languages. This information was not used in this dissertation.

Section 3 included questions on learning strategies, which were not used in this study either.

Section 4 presented a grid in which the participant needed to make a choice on a Likert scale from 'totally disagree' to 'totally agree' to 12 items on the tolerance of ambiguity construct.

Finally, the formats of questions in section 5 were varied, which was not a problem in this section as all the questions in it were factual and did not need a lot of thinking. Section 5 included several factual questions on the participant's age, educational level, type and degree of bilingualism, and English learning background. These questions were included close to the end of the questionnaire so that, by the time the participant was presented with them, they had already experienced the friendly tone of the questionnaire and hopefully would not feel threatened to answer them.

5.3.4.3 Section 1: Motivation / Orientations

The items on the motivation and orientations section were taken from a motivation questionnaire which was first developed for secondary school EFL students in Catalonia by Cid, Grañena and Tragant (2009), and which was put to Exploratory and Confirmatory Factor Analyses (EFA and CFA respectively) with a population of 3,570 secondary and post-secondary school learners in 63 schools throughout Catalonia by Tragant and Thompson (in progress). This

questionnaire was considered suitable for this study, because, despite the obvious difference in the age of the learners, its primary objective is to capture the specific characteristics of motivation in the scarce input and exposure situations which are typical of foreign language learning contexts. Most items were considered appropriate for this sample as the main characteristics of the two populations being studied were the same:

- overall low levels of proficiency
- few opportunities to speak the target language
- poor exposure to the foreign language outside of the classroom

(Tragant and Thompson, in progress).

Out of the three factors that were extracted in this study (motivation to learn English, linguistic self-efficacy, and attitudes towards FL instruction), only the first and the third ones were used for the motivation section of the present study. In Tragant and Thompson (in progress), factor 1 accounted for 35% of the variance and had an estimated reliability of .89, including 8 items drawing on 'student's degree of interest and determination to learn the foreign language and to reach a high level of proficiency in the future' (p. 10).

The items and factor loadings were as follows:

Table 5.04 *Factor 1 Items and Factor Loadings*

| Item | Description | Factor Loading |
|------|---|----------------|
| 1 | I really want to learn English | .91 |
| 2 | I would like to be able to speak English as well as I speak Spanish/Catalan | .77 |
| 3 | When I grow up I would like to know English | .77 |
| 4 | I am not interested in learning English [reverse coded] | .71 |

| | | |
|---|--|-----|
| 5 | When I finish high school I would not like to continue studying English | .65 |
| 6 | I am attracted to the English language | .57 |
| 7 | When I see something written in English I try to see if I understand | .53 |
| 8 | I like learning English | .52 |

Two of the items, number 3 and 5, were not suitable for a non-high school population, and therefore these items were excluded from the scale. Six strongly loading items were considered sufficient to measure motivation in the current study.

These were the items finally included in the questionnaire:

Table 5.05 *Final Motivation Items Included in the Questionnaire*

| Item | Description | Factor Loading |
|------|---|----------------|
| 1 | I really want to learn English | .91 |
| 2 | I would like to be able to speak English as well as I speak Spanish/Catalan | .77 |
| 3 | I am not interested in learning English [reverse coded] | .71 |
| 4 | I am attracted to the English language | .57 |
| 5 | When I see something written in English I try to see if I understand | .53 |
| 6 | I like learning English | .52 |

Section II in the original Cid, Grañena and Tragant's (2009) questionnaire concerned orientations. Three main factors were identified after conducting an exploratory factor analysis (EFA) (Tragant and Thompson, in progress), in which the 10 items included accounted for 55.1% of the variability in the measures. The three factors were: interpersonal communication goal

orientation, a professional/academic goal orientation, and the third one referred to an interest in popular culture. In this case, only seven of the original ten items were retained: those included in factor 1 and factor 2. Item 3 was removed because it was considered not relevant for adults, and items 6 and 7 were reworded in order to make them more meaningful for an adult audience. The index of reliability of the final items for factor 1 was .77, and the index of reliability of factor 2 was .79. Together, these two factors accounted for 47.05% of the total 55.1% variation. These were the items of the original questionnaire (Factors 1 and 2):

Table 5.06 *Factor 2 Items in the Original FLAGS Questionnaire*

| Item | Description | Orientation | Factor Loading |
|------|---|-------------|----------------|
| 1 | To meet people from other countries | IC | .85 |
| 2 | Because I would like to be able to communicate with people from other countries | IC | .75 |
| 3 | To be able to answer if a tourist addresses to me in English | IC | .56 |
| 4 | To travel abroad and go on vacation | IC | .51 |
| 5 | To have more possibilities to find a job | P/A | .79 |
| 6 | Because I will need it in the job that I would like to have | P/A | .78 |
| 7 | Because I will need it to continue studying | P/A | .69 |

Note: IC: Interpersonal Communication Goal; P/A: Professional / Academic Goal

And these were the items as finally used in the current study:

Table 5.07 *Factor 2 Items Included in the Final Questionnaire*

| Item | Description | Orientation | Factor Loading |
|------|---|-------------|----------------|
| 1 | To meet people from other countries | IC | .85 |
| 2 | Because I would like to be able to communicate with people from other countries | IC | .75 |
| 4 | To travel abroad and go on vacation | IC | .51 |
| 5 | To have more possibilities to find a job | P/A | .79 |
| 6 | Because I will needed to improve in my current job | P/A | n/a |
| 7 | Because it will help me find a better job | P/A | n/a |

Note: IC: *Interpersonal Communication Goal*; P/A: *Professional / Academic Goal*

5.3.4.4. Section 4: *Tolerance of Ambiguity*

The version of the scale used in this dissertation was a refined version of the original Budner (1962) scale, developed by Herman et al in 2010, which increased internal consistency from an original .57 alpha value to .73 and reduced the items in the scale from 16 to 12. Construct dimensions included valuing diverse others, coping with change, dealing with unfamiliar situations, and managing conflicting perspectives and ambiguity. The scale consisted of 12 statements on the dimensions listed above, which the participant had to grade in a five-step Likert scale from 'strongly disagree' to 'strongly agree'. Some statements were reverse-coded to ensure participants answered the items carefully (see full scale used in Appendix A).

5.3.4.5 Section 5: *Biographical Profile*

This section contained biographical and linguistic background information on the participants as follows:

- a) Personal information: name, date of birth, current English course at EOI, and last level of education completed.

Name: _____

Date of birth: _____ EOI course _____

What is your educational level? Underline your higher **finished**

level: Old EGB Old BUP/COU Old FP

Primary Ed. ESO Baccalaureate

University No formal education Professional
education

- b) Linguistic information: degree of bilingualism (balanced/unbalanced bilingual and which is the dominant language), number of years of previous study of English and in which educational stage (school, secondary school, private institutions), final grade in the latest course (proficiency). Other foreign languages learnt: language, number of years of study, final grade in the latest course (proficiency). Finally, stays abroad in English-speaking countries longer than 15 days and with the purpose to improve the level of English: country, duration of stay, and age of the participant when the stay took place.

- 2) Knowledge of Catalan/Spanish. Which option defines you better?

1. I am a Spanish speaker. I understand Catalan but I hardly speak it and I don't write it well.
2. I am a Catalan speaker. I understand Spanish but I hardly speak it and I don't write it well.
3. I am a bilingual person: I understand, speak and write both languages.
4. I am a bilingual person, but I am much better at Spanish than at Catalan.
5. I am a bilingual person, but I am much better at Catalan than at Spanish.

3) For how long have you studied English?

At school: _____ years

In high school _____ years

In language institutes outside of school or high school _____ years

Final grade (d'Insuficient a Excel.lent): _____

4) If you have studied a foreign language other than English, say which one, for how long and what your final grade was (en una escala d'Insuficient a Excel.lent):

Language: _____ Years: _____ Final Grade: _____

Language: _____ Years: _____ Final Grade: _____

Language: _____ Years: _____ Final Grade: _____

5) Have you been abroad to English speaking countries for longer than 15 days with the objective of improving your English? Say to which country, for how long and how old were you when you went there.

Country: _____ Duration _____ Age: _____

Country: _____ Duration _____ Age: _____

Country: _____ Duration _____ Age: _____

Some of the data obtained from these questions were used as control variables. For descriptives of control variables, see section 6.2.1.

5.3.5 THE FOREIGN LANGUAGE PROFICIENCY EXAMS

The English proficiency tests used for this research were the official tests that students take at the end of their current English course. In this case, the results obtained in these tests were made available to the researcher by the school at the beginning of July. Exams assessed the following language dimensions: use of language, reading, listening, writing, and speaking, each of which accounts for 20% of the exam.

The first year exam was as follows:

Use of Language (45'): An open cloze with ten answers (5 points); an exercise of question-formation: students were given ten answers and needed to write 10 questions (5 points). Finally, a multiple-choice exercise with four possible answers to each question (10 points). The multiple-choice exercise had 20 items. Total score: 20 points.

Reading Comprehension (30'): Students had to read a text and then answer four multiple-choice comprehension questions (10 points). Then they were presented with a number of advertisements, which they had to match to sentences which had the same meaning (10 points). Total score: 20 points.

Listening (20'): Four audio files were played. In the first one, there was one speaker and two situations. Learners needed to understand the speaker and answer five multiple choice questions on each situation (5 points). In the second file students listened to five speakers, and they needed to identify the speaker who provided the answer to each question in a matching exercise (5 points). In the third exercise students listened to a conversation in which two speakers needed a travel ticket. Then they had to extract the necessary information to fill in a form (5 points). Finally, in the fourth file, students listened to an answering machine, which provided information for a gap-filling exercise (5 points). Total score: 20 points.

Writing (50'): Students had to write a 125-word composition. The topic was writing an email to a friend describing somebody: provide a physical description, likes and dislikes hobbies, what they did last summer and what they were planning to do next summer. The assessment criteria for the writing exercise were: linguistic range (8 points), text organization (4 points), and linguistic accuracy (8 points). Total: 20 points.

Speaking (20'): The speaking test was taken in pairs and consisted of three exercises. Clear instructions were given, and students could prepare a dialogue in class (mock exam). In the first exercise, students were given situations, such as being on a plane, in a clothes shop, etc. Cards told students what they needed to ask for in the different situations. In the second exercise students were given pictures, which they needed to describe following the guidelines. Finally, for the third exercise students prepared different topics, such as personal information, abilities, house, etc. With the prompts given, one student had to ask questions to the other student. The assessment criteria for the oral test were as follows: pronunciation (5 points), vocabulary (5 points), accuracy (5 points), and fluency/interaction (5 points). Total: 20 points.

The fourth-year exam consisted of the following tests:

Use of language (50'): a multiple choice section with four possible answers to each question (10 points). A multiple-choice text: 8 gaps to fill in with the correct answer out of four choices (10 points). An open cloze with 8 gaps (8 points). A word-formation exercise (a text with 6 gaps) in which students were given a root word which then needed to be inflected (6 points). Finally, a rephrasing exercise: students had to rephrase eight sentences with a given word (8 points). Students could score a total of 40 points, which were then divided into two to obtain a maximum score of 20 points.

Reading Comprehension (50'): There were three exercises. In the first one, students were given six paragraphs from a newspaper article, and they needed to choose the most suitable headline for each paragraph out of a choice of seven (6 points). In the second one, they were given a text with seven multiple-choice reading comprehension questions (7 points). Thirdly, students

were presented with a text in which eight chunks had been removed and needed to be inserted back (7 points). Total: 20 points.

Listening (40'): In the listening test students listened to four audio tracks. In the first exercise, students listened to different conversations in eight situations, and then responded multiple-choice comprehension questions (5 points). In the second exercise, learners listened to a radio program, and then completed ten gap-filling sentences (5 points). Thirdly, students listened to five speakers discussing the same topic, and had to find out what each speaker said (5 points). Finally, in the fourth exercise there was only one speaker and students had to answer seven multiple-choice questions on what the speaker was saying (5 points). Total score: 20 points.

Writing (45'): In this test students had to write a 180-word article of opinion on one of the two quotes provided. The options in the present test were a) celebrities and privacy and b) mobile phones: could you live without them and why. The assessment criteria for the writing exercise were: linguistic range (8 points), text organization (4 points), and linguistic accuracy (8 points). Total score: 20 points.

Speaking (20'): The speaking test was taken in pairs. Each pair of students was given two texts on the same topic. Each student was given three prompts, and then they had to discuss. Students were given 20 minutes: four to prepare, three for writing a script and eight for the discussion. The assessment criteria for the oral test were as follows: pronunciation (4 points), vocabulary (5 points), accuracy (6 points), and fluency/interaction (5 points). Total: 20 points.

The overall passmark for all exams was 65, but, as an additional requirement, students need a minimum score of 10 out of 20 on the speaking and writing papers to pass. A global foreign language proficiency measure was

obtained, but the scores for the different skills tested were kept separate in order to be able to investigate whether different language skills behaved differently when correlated with the independent variables.

5.4 Pilot of the Tests

In the following sections the results of the pilot procedure are presented. First, a description of the pilot participant sample is provided, as well as an account of the objectives of the pilot. An account of the results of pilot follows, and then the changes made as a result of the feedback and results obtained are explained.

5.4.1 PILOT SAMPLE

For the pilot a convenience sample was used. Friends and colleagues of the researcher who were unfamiliar with the instruments were asked to take the tests. The participants met the conditions of the research: none of them had a degree in languages, and all of them were adults and were studying or had studied English at some point during adulthood. For those of them who were not studying English at the time of taking the tests, the researcher asked them to answer the questions as if they were studying English at that moment.

The objectives of the pilot were as follows:

- 1) For groups of variables contributing to the development of constructs, to perform scale reliability tests.
- 2) To ensure that scales were discriminative, and that there were no ceiling or bottom effects.
- 3) To ensure that the questions were correctly worded and that they could be answered without difficulty or misinterpretation.

- 4) To check that the duration of the tests was within the expected timeframe and that it was appropriate for the time available at the school.

5.4.2 TESTS PILOTED

The English language proficiency tests by the Escola d'Idiomes Moderns of Barcelona are standard across official language schools and are used with all the students of the schools every year, so no further testing was warranted. The rest of the tests had either created for the purposes of this piece of research specifically or partially adapted from other research studies with different purposes. For such reasons the latter had to undergo pilot testing.

The piloted tests were:

- The reading comprehension test in Catalan (except for the summary exercise)
- The reading comprehension test in Spanish (except for the summary exercise)
- The spelling test in Catalan
- The spelling test in Spanish
- The questionnaire

5.4.3 THE READING COMPREHENSION TEST IN CATALAN: RESULTS OF PILOT

The number of test takers of the reading comprehension test in Catalan was nine. The descriptive statistics for this test were as follows:

Table 5.08 *Descriptive Statistics for the Reading Comprehension Test in Catalan*

| Reading Comprehension Test in Catalan: Descriptive Statistics | | | | | | | | |
|---|-------|---------|--------------|-----------------|--------|-----|------|---------------|
| Variable | Cases | | Descriptives | | | | | |
| Literacycat | N | Percent | Mean | 5% Trimmed Mean | Median | Max | Min | Std Deviation |
| | 9 | 100% | 7,11 | 7,19 | 7,5 | 8 | 4,75 | 1,19 |

In this test, some participants scored very high on the scale, while some scored very low. As a result, scores in this test were not normally distributed. The significance of the K-S test was .003, so the assumption of normality was not met. However, the 5% trimmed mean was very close to the mean and to the median; this means that the abnormal distribution of data might have been due to the selection of the participants: the researcher tried to find participants who had either average to high level of education as well as a few participants who had a very low level of education and poor to non-existent reading habits throughout their lives. These participants were clearly displayed in the distribution of data as outliers. In the larger sample collected in the final test, the low-to-average portion of the population was filled by participants scoring in the middle, and so lower scorers were expected to be shown as such and not as outliers.

The analysis of the answers to the different questions revealed that these posed no major challenges. Participants did not seem to have major problems with most questions regarding reading comprehension or the explicit knowledge of grammar. There were, however, some problems in the question in which participants had to put all the verbs in a paragraph in the present tense: one of the sentences in the paragraph had time references to the past, thus misleading participants to think that the verb tense required in that gap

had to be in the past: ‘quines estructures de poder s’ _____ en els últims trenta anys’. Subsequently, the ambiguous sentence was removed and the exercise was left with four blanks instead of five. The final paragraph can be found in Appendix A.

As for the duration of the test, the maximum time taken to complete the test was 13’, so it met the time requirement of having to be taken in only one sitting. Participants did not take the summary question, which might have added 5’ to 10’ to the pilot. However, this time addition still made it valid for the time available in the data collection sessions.

5.4.4 THE READING COMPREHENSION TEST IN SPANISH: RESULTS OF PILOT

The number of test takers of the reading comprehension test in Spanish was twelve. The descriptive statistics for this test were as follows:

Table 5.09 *Descriptive Statistics for the Reading Comprehension Test in Spanish*

| Reading Comprehension Test in Spanish: Descriptive Statistics | | | | | | | | |
|---|-------|---------|--------------|-----------|--------|------|------|---------|
| Variable | Cases | | Descriptives | | | | | |
| | N | Percent | Mean | 5% Trim M | Median | Max | Min | Std Dev |
| Literacycas | 12 | 100% | 5,70 | 5,73 | 5,87 | 7,50 | 3,50 | 1,00 |

Results for this test were normally distributed, with the 5% trimmed mean very close to the mean and to the median. In this test none of the participants scored at ceiling. The significance value of the K-S test was .20, so in this case the assumption of normality was met.

Overall, the results on this test were lower than the results of the reading comprehension test in Catalan, so it was necessary to explore the reasons which made the literacy test in Spanish more difficult than the literacy test in Catalan.

Initially, the analysis of the answers to the different questions posed no difficulty for participants as respondents did not fail the same questions. This was true for all the questions except for one: question number 5, 'Señale el sujeto gramatical del verbo tejían en la expresión: 'que tejían un perpétuo crepúsculo de escarlata y negro sobre Barcelona'' proved to be impossible for a 100% of the test takers. Therefore, the decision was taken to substitute this question by another one which would still test the participants' explicit grammar knowledge but which would be easier. An alternative was chosen from the same original test. The new question can be found in Appendix A.

Another source of error was the order in which questions 7, 8, and 9 were presented. Questions 7 and 9 elicited synonyms, while question 8 needed an antonym. Because of the order in which these questions were presented, there were a few participants who thought that the three questions needed synonyms. The confusing questions were as follows:

7. Señale cuál de estas palabras es **sinónimo** de proclive en la frase:
8. Sustituya la palabra frondoso por un **antónimo** en la expresión:
9. Según el contexto, el **sinónimo** más adecuado [...]

Therefore, question number 8 changed its position to after question 3, becoming then the first grammar-related question. The two questions prompting for synonyms were then consecutive. This removed any errors incurred due to the misleading order in which questions were presented.

Regarding the timing of the test, none of the participants took longer than 20' to complete it, so it met the time requirements to be taken in only one sitting. Participants did not take the summary question, which might have added 5' to 10' to the pilot.

5.4.5 THE SPELLING TEST IN CATALAN: RESULTS OF THE PILOT

The number of test takers of the spelling test in Catalan was nine. The descriptive statistics for this test results were as follows:

Table 5.10 *Descriptive Statistics for the Spelling Test in Catalan*

| Spelling Test in Catalan: Descriptive Statistics | | | | | | | | |
|--|-------|---------|--------------|-----------------|--------|-----|-----|---------------|
| Variable | Cases | | Descriptives | | | | | |
| Spellingcat | N | Percent | Mean | 5% Trimmed Mean | Median | Max | Min | Std Deviation |
| | 9 | 100% | 13,77 | 13,91 | 15 | 18 | 7 | 3,66 |

Results for this test were normally distributed, with the 5% trimmed mean very close to the mean and to the median. The significance level of the K-S test of normality was .20.

Only one word posed problems in this test: item number 3, 'beneita'. It is not a very common word and participants often asked whether they had to spell 'beneita', meaning 'fool' or 'beneïda', meaning 'blessed'. To eliminate an area of doubt, the decision was taken to substitute this word by another word which was easier to identify. The chosen word was 'histèria'.

The rest of the words were adequate for the test and tapped into a variety of areas of spelling difficulty of the Catalan language. However, four more words were changed in order to balance the importance given to each area of difficulty. The final list of words according to the different categories of difficulty as set in section 5.3.2.1 was as follows:

Category a) The same phoneme, i.e./b/ can be represented by more than one grapheme (b, v): 'mòbil', 'bevia'. Phoneme /3/ can be represented by

g or j: 'estranger', 'girafa'. Phoneme /s/ can be represented by s, ç, or ss: 'lloança', 'assassí', 'esguinç', 'dansa'.

Category b) The sound matching the grapheme has disappeared altogether (i.e. / /, (h)): 'histèria', 'cacauet'.

Category c) Accentuation, dieresis, and use of hyphens: 'fóu', 'vint-i-sis', 'ambigüitat', 'maleir', 'delinqüent', 'miscel.lània'.

Category d) Neutralization: 'confús', 'meravella', 'berenàveu', 'ombrívol', 'assassí'.

The following table lists the piloted word choice. The words which were removed from the list have been crossed out. Then the list of words which was used in the final test is provided. The words that were added to the list have been highlighted in bold.

Table 5.11 *The Catalan Spelling Test*

| Item Number | Pilot Test | Final Test |
|-------------|----------------------|-----------------|
| 1 | estranger | estranger |
| 2 | fóu | fóu |
| 3 | beneita | histèria |
| 4 | llúdriga | lloança |
| 5 | entonació | assassí |
| 6 | miscel.lània | miscel.lània |
| 7 | mòbil | mòbil |
| 8 | ambigüitat | ambigüitat |
| 9 | lloança | cacauet |

| | | |
|----|-----------------------|-------------------|
| 10 | vint-i-sis | vint-i-sis |
| 11 | ron inaire | meravella |
| 12 | confús | confús |
| 13 | bevia | bevia |
| 14 | girafa | girafa |
| 15 | esguinç | esguinç |
| 16 | esquitxar | delinqüent |
| 17 | dansa | dansa |
| 18 | berenàveu | berenàveu |
| 19 | maleir | maleir |
| 20 | ombrívol | ombrívol |

5.4.6 THE SPELLING TEST IN SPANISH: RESULTS OF PILOT

The number of test takers of the spelling test in Spanish was twelve. The descriptive statistics for this test were as follows:

Table 5.12 *Descriptive Statistics for the Spanish Spelling Test*

| Spelling Test in Spanish: Descriptive Statistics | | | | | | | | |
|--|-------|---------|--------------|-----------------|--------|-----|-----|---------------|
| Variable | Cases | | Descriptives | | | | | |
| | N | Percent | Mean | 5% Trimmed Mean | Median | Max | Min | Std Deviation |
| Spellingcas | 12 | 100% | 13,5 | 13,5 | 13,5 | 18 | 9 | 2,46 |

Results for this test were normally distributed, with the 5% trimmed mean being exactly the same than the mean and the median. In this spelling test

none of the participants scored at ceiling. The significance level of the K-S test was .20, so the assumption of normality was met.

A problem was spotted in a word in this test: word number two, 'bovino' is an homophone heterograph: 'bovino' with the meaning 'related to bulls and cows' is spelled with a 'v', while 'bobino' with the meaning 'related to a cable reel' is spelled with a 'b', so both spellings are correct. The word had to be replaced by a different one: the choice was 'abubilla' (hoopoe), with only one spelling possible.

While the rest of the words were valid test items at first sight, it was decided to change a few ones to balance the complexity of the test among the different areas of difficulty of the Spanish language. This test might have loaded too heavily on accents or included words which did not present any difficulty, so some of the items testing accents were substituted by words testing other areas, like the use of letter 'h', which has no sound in Spanish, and the use of graphemes which have the same sound but can be spelled differently depending on the vowels preceding or following them.

The classification of the final words according to the areas of difficulty of the Spanish language defined in section 5.3.2.2 was as follows:

Category a): The sound can be represented by more than one grapheme, i.e. phoneme /b/ can be represented by b or v: 'abubilla', 'absorber', 'verborrea'. Phoneme /3/ can be represented by g or j: 'litigio', 'envidia', 'jirafa', 'extranjero'.

Category b): The sound has disappeared altogether but grapheme has not: / / may or may not be represented by h: 'hierático', 'adherencia', 'hervíboro', 'inhóspito'.

Category c): Different graphemes for the same sound are possible depending on the vowel before or after the consonant: ‘eczema’, ‘adecuado’, ‘quíntuple’.

Accentuation: ‘hierático’, ‘ágape’, ‘diácono’, ‘quíntuple’, ‘fue’, ‘superflua’, ‘veintiséis’.

Finally, below are the two lists used for the pilot and for the final tests. Any words removed after the pilot have been crossed out, and new additions have been highlighted in bold.

Table 5.13 *The Spanish Spelling Test*

| Item Number | Pilot Test | Final Test |
|-------------|-------------------------|-------------------|
| 1 | lágrima | inhópito |
| 2 | bovino | abubilla |
| 3 | conveniencia | litigio |
| 4 | ágape | ágape |
| 5 | diácono | diácono |
| 6 | enjundia | enjundia |
| 7 | jirafa | jirafa |
| 8 | alopecia | hierático |
| 9 | farináceo | eczema |
| 10 | quíntuple | adherencia |
| 11 | dislexia | absorber |
| 12 | absorber | extranjero |
| 13 | extranjero | quíntuple |

| | | |
|----|------------|------------|
| 14 | fue | fue |
| 15 | herbívoro | herbívoro |
| 16 | superflua | superflua |
| 17 | vio | adecuado |
| 18 | veintiséis | veintiséis |
| 19 | verborrea | verborrea |
| 20 | subrayar | subrayar |

5.4.7 THE QUESTIONNAIRE: FEEDBACK AND RESULTS FROM PILOT

5.4.7.1 *Feedback from Participants*

The number of participants who answered the questionnaire was 21. A number of questions were posed by participants as they were taking the questionnaire, which were indicative of ambiguity or difficulty. In the following sections an account is provided of the suggestions made by participants and of the changes made to the final questionnaire as a result.

5.4.7.2 *Section 1: Motivation and Orientations: Assessing Reliability*

The two grids exploring motivation and orientations presented no difficulties for participants, who answered all the questions smoothly.

Since some of the items in the grids had to be rephrased to make them suitable to an adult population, the reliability of the two factors needed to be tested again. As explained in section 5.4.3.3, in Tragant and Thompson's study motivation accounted for 35% of the variance and had an estimated reliability of .89. Before applying the reliability check to the answers in the present test,

the answers to statement 'I am not interested in learning English' had to be recoded as the question was reverse coded. Cronbach's alpha index for the modified scale was of .87. As far as orientations were concerned, the 10 items included in Tragant and Thompson's study accounted for 55.1% of the variability in the measures. The reliability index for the original items was of .77 for items belonging to factor 1 in Tragant and Thompson (interpersonal communication goal), and of .79 for items belonging to factor 2 in the same study (professional/academic goal orientation). The six items which were rephrased or kept for this research were then tested and yielded a Cronbach's alpha coefficient of .86. Therefore, for both motivation and orientations the items in the scale were reliable.

5.4.7.3 Section 3: Reading Habits

Two measures of reading were developed, following findings in Sénéchal's home literacy model (2006): a reading frequency measure and another one to explore how much participants enjoyed reading, as follows:

- Please indicate approximately how many books of any kind do you read per year for any reason:

None Between 1-5 Between 6-10 Between 11-15
Between 16-20 21 or more

- Now please grade how much you enjoy reading (anything; any type of books, newspapers, etc.) in a scale of 1-10 in which 1 is 'I don't like reading at all' and 10 represents 'I love reading'.

Something which had to be taken into account specifically for this population sample is that the language school encourages students to read books in English during their courses. In every course, students must read 3

books in English, and they have to take a reading comprehension test afterwards. Therefore, at the time of data collection 1st year students have read 2 books in English, and most 4th year students have probably read 11. For this quantitative measure of reading, students were asked explicitly not to count the school's compulsory readings.

5.4.7.4 Section 4: Tolerance of Ambiguity Scale

The enhanced tolerance of ambiguity scale used in this study was reported to have an internal consistency of .73 (Herman et al. 2010). This value was a remarkable improvement on Budner's original 16-item scale, which had an internal consistency coefficient of .57.

In this pilot exercise the Cronbach alpha coefficient was also low: .55. However, there were several methodological explanations for that result: on the one hand, subjects expressed being confused by the layout of the grid: they found the format of the table misleading and expressed difficulty in situating themselves in the correct answer line. The format was modified accordingly to eliminate this possible source of mistakes in the answers. On the other hand, there was a major flaw in the way in which Likert scales were presented: for the items that were reverse-coded, the researcher turned the scales around. This fact added an unwanted degree of complexity for respondents, who on top of having to be careful with the negative wording of the reverse-coded sentences had to choose from misplaced boxes to tick their answers. Therefore, it was very likely that participants were distracted by these instrument design flaws and made mistakes when ticking their preferences. A more careful layout was expected to increase the reliability of the scale to the levels reported by Herman et al. (2010). To that effect, the titles in the scale were highlighted in bold and the boxes had a light grey shadow so that participants were not confused and

saw that the different grades across the scale were in the same place for all the questions. The second objective was to facilitate horizontal identification of questions and answers along the lines. This revised version was piloted again: a larger convenience sample was recruited, consisting of 52 subjects. This time, participants reported not having had issues responding to the items in the scale, and reliability was greatly improved: the alpha coefficient increased to .71, very close to the .73 coefficient reported in Herman et al. (2010). The scale was ready to be used in the real data collection sessions.

5.4.7.5 Section 5: Biographical Data

There were a number of difficulties in section 5, biographical profile.

Question 1, on the participant's educational level, was not clear for people over forty years old, as formal studies were called different names at the time they were in compulsory education. In order to make the answers clearer for all age segments of the population, different options were provided so that participants could choose from the different educational plans in Spain since the 1950s. New question and answers can be found in Appendix A.

In question 3, participants were asked to recall what their final grade was in their last year of studying English in the past, whenever that happened. Some participants complained that they did not remember. The question was reworded to elicit a more positive response from participants. The new question can be found in Appendix A.

Finally, questions 4 and 5 needed an option for participants to be able to answer 'no'. In the way that those questions were worded, if participants did not answer it was not clear at all if they didn't answer because they did not take part in the learning activities referred to in the questions or because they missed

the question. Therefore, questions were rephrased so that the answer 'no' was possible (see Appendix A).

5.5 Test Administration

The tests for this research were administered in different sittings and by different people depending on the test. The full battery of tests included: the Llama tests B, D, E, and F, the L1 literacy tests, the spelling tests and the questionnaire, and the English proficiency exams. All tests by the English proficiency exams were administered right after the February exams at the beginning of March, and data collection took two weeks. The second battery of tests was the English proficiency tests, which were administered by the school at the end of the course in June and then made available to the researcher in July. In the next sections the reader can find a full account of the first battery of tests' administration process.

5.5.1 THE FIRST TEST BATTERY: THE LANGUAGE APTITUDE TEST, THE L1 LITERACY TESTS, AND THE QUESTIONNAIRE

This battery was administered by the researcher, with the help of three experienced research assistants. It was a requirement of the school that data collection would not take more than one class per teacher and group, so as not to disrupt students' learning excessively.

The tests had to be taken in two different locations: the pen-and-paper tests were taken in the class in which students usually had their English lessons. The LLAMA tests, which were computer-administered, had to be taken in the school's computer room. The school had a modern computer room with 13 workstations for students and one workstation for the teacher. The researcher went to the school for a preparation session one week before the data collection

took place. The LLAMA test suite folder had to be copied in every computer before the day of the test, so that when students came, they would be able to access the tests with ease. An additional copy was installed in the teacher's computer so that the person administering the tests could describe the user interfaces to participants. At the end of each session, the results stored in the computers were copied to a pen drive to ensure that no data were lost from one day to another.

The battery of tests had been timed in the pilot as taking 75 minutes. In the end, it took 75 minutes for the 4th grade students to take the tests, and nearly two hours (105 minutes) for the 1st year students. The most time-consuming factor was that for test administration the class had to be divided into two groups: half of the group stayed in class with one researcher to answer the questionnaire and take the L1 literacy tests, while the other half of the group had to walk downstairs one floor in order to take the LLAMA tests in the computer room. Then, the students swapped and took the remaining tests. This fact undoubtedly added some minutes of class management time to the total test taking time. Eventually, it took substantially longer for 1st year students to take the tests than it took 4th year students. This was due to the fact that 1st year groups were substantially larger than 4th year groups: while the average number of participants in 1st year groups was of 22 students, the average number of participants in 4th year groups was of 13 students. More participants per group added complexity and time to classroom management.

Data collection elapsed six days in two weeks. The final schedule was as shown in the table below:

Table 5.14 *Data Collection Schedule*

| February | | | | |
|------------------|-------------------------------------|-------------------------------------|------------------------------------|----------------------------------|
| | Monday 20 | Tuesday 21 | Wednesday 22 | Thursday 23 |
| Morning | | | | |
| 10-12h | | | | Install Llama in computers |
| Afternoon | | | | |
| 18:19h | | Prep work with research assistants | | |
| | | | | |
| March | | | | |
| | Monday 5 | Tuesday 6 | Wednesday 7 | Thursday 8 |
| Afternoon | | | | |
| 17:00-19:00h | | | 1st Year: 1AM17S Aula 1.3 T: MM | |
| 19:00-21:00h | 4th Year: 1DL19S Aula 1.1 T: DR | 4th Year: 1DL19P Aula 1.1 T: DR | 1st Year: 1AM19S Aula 1.3 T: MM | 4th Year: 1DL19S Aula 1.4: EP |
| | | | | |
| March | | | | |
| | Monday 12 | Tuesday 13 | Wednesday 14 | Thursday 15 |
| Morning | | | | |
| 09:30-11:30h | | 4th Year: 1DO09P Aula 1.0 T: MSJ | | |
| 11:30-13:30h | | 1st Year: 1AM11P Aula 1.3 T: MM | | |
| Afternoon | | | | |
| 17:00-19:00h | 4th Year: 1DO17S Aula 1.0 T: MSJ | | | |
| 19:00-21:00h | 4th Year: 1DO19S Aula 1.0: MSJ | | | |

Concerning which tests were taken first and which were taken later, students in classes were assigned to the paper-and-pencil tests or the computer-administered tests randomly as they were arriving to the classroom: therefore,

50% of the total participant population took the pen-and-paper test first, and the other 50% took the computer-administered tests first.

Research assistants had been given specific guidelines regarding test sequencing and instructions for participants, as follows:

For the group staying in the classroom:

- Questionnaire had to be taken first. Once finished, assistants had to check that the questions had been answered, and, above all, that participants had signed the consent at the end.
- Secondly, researchers had to hand out the L1 reading comprehension tests: participants could choose to take them in Spanish or in Catalan. As guidance, research assistants were told to ask participants to choose the language in which they would have stronger writing skills rather than their mother tongue in the case that the two would not coincide.
- Dictation in language 1: Assistants were instructed to dictate the first 20 words to the first group. Once finished, participants could start the L1 reading comprehension test.
- Dictation in language 2: Assistants were instructed to dictate the second 20 words to the second group. Once finished, participants could start the L1 reading comprehension test.

The group in the computer room was asked to open the program interface. Research assistants were asked to provide clear instructions to test takers before completing each one of the aptitude tests, and were available during the entire session in case students had questions on the tests. Brief instructions for each one of the tests were translated by the researcher into Spanish. Instructions were taken from the Llama Manual, by Paul Meara

(Meara, 2005). All participants had to wait for other participants to finish one test before moving on to the next test, so that the class would progress at the same pace. Students were told not to click on the right-left x at the top to prevent any loss of data, as by doing that participant's results were not saved. Tests were taken in the following order: B, D, and E. After test E, research assistants handed out notes paper, which participants could use as help to take test F. Students were asked to write their names at the top of the sheet, and the researcher collected the notes papers at the end of the session.

In general the data collection sessions were very successful, with very few cases lost due to non-recorded data in computers or to students leaving the class before finishing the tests. Teachers and staff at the school were friendly and helpful, and most students were happy to participate in the study, especially because of the language aptitude test battery. After the research, 90% of the students requested to be emailed their scores in the LLAMA test.

CHAPTER 6

Results

This dissertation set out to investigate the contention that individual differences may impact second language acquisition differently at two levels of the proficiency scale. A second aim of the study was to focus on two individual differences specifically: language aptitude and L1 literacy. In the case of language aptitude, the objective was to assess the contribution of language aptitude components separately and their impact on five L2 language dimensions. Concerning L1 literacy, the goal was to test whether this construct acts as a threshold for second language learning as it does with children and adolescents in the context of bilingual education in the US (the threshold hypothesis, Cummins, 1979a). Finally, the third goal of the study was to shed light on the interactions amongst the four IDs being investigated: language aptitude, L1 literacy, motivation and orientations, and age.

This chapter presents the results of the study. First, descriptive statistics and normality tests are provided for dependent and independent variables. Descriptive statistics and analyses for the control variables then follow. Finally, the chapter reports results for the five research questions in the study.

6.1 Dependent and Independent Variables

6.1.1 MISSING DATA

The first observation on the data set was that there were some missing data. As recommended by Larson-Hall (2010), since missing data did not follow any pattern and constituted less than 5% of the dataset, it was decided to choose a formal method to deal with missing data rather than removing the cases altogether. Contemporary statistics for the social sciences strongly oppose using pairwise, listwise deletion, or mean substitution, given that other methods currently exist which provide better solutions. Our missing data fulfilled the requirement of being classifiable as MCAR (missing completely at random), mostly being due to participants missing one of the questions in the questionnaire, or to not having saved results on one of the aptitude tests by having clicked on the wrong icon. In total 12 data points were generated through the multiple imputation method¹² by using Norm software¹³. All values were kept except for one in which the generated data point exceeded the range of values; for this specific case, the generated value was substituted by the closest value in limit of the data range.

6.1.2 DEPENDENT VARIABLES: L2 DEVELOPMENT

This section provides descriptive information on the results of L2 development measures. First, descriptive statistics by language dimension are

¹²In the multiple imputation method values are predicted on the basis of the variables that are available for each case and error components are added to counteract the tendency of the Expectation-Maximization algorithm to underestimate standard errors. This is done via a computerised iterative process, imputing values and deriving revised parameter estimates until the process stabilizes. The final set of estimates is derived by averaging all the estimates following a set of rules by Rubin.

¹³ NORM is a free software for the multiple imputation of incomplete multivariate data under a normal model. Version 2.03, November 2000, by J. L. Schafer. It is available from www.stat.psu.edu/~jls/misoftwa.html.

presented in table 6.01, and then a composite global L2 development variable is computed.

Table 6.01 L2 Development by Language Dimension

Beginner Group

| | Max ¹⁴ | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|-------------------------------|-------------------|------|-------|-----------|------|----------|----------|
| L2 Grammar <i>n</i> = 52 | 20 | 5.25 | 15.10 | 15.31 | 3.63 | -.77 | -.17 |
| L2 Reading <i>n</i> = 52 | 18.50 | 3 | 11.73 | 11.84 | 3.67 | -.46 | -.30 |
| L2 Writing <i>n</i> = 52 | 20 | 3 | 13.09 | 13.13 | 4.42 | -.05 | -.95 |
| L2 Listening <i>n</i> = 52 | 20 | 10 | 16.86 | 17.07 | 3.02 | -.92 | .06 |
| L2 Speaking <i>n</i> = 52 | 20 | 9 | 14.61 | 14.61 | 3.43 | .05 | -1.3 |

Advanced Group

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|-------------------------------|-------|------|-------|-----------|------|----------|----------|
| L2 Grammar <i>n</i> = 88 | 19.50 | 6.50 | 12.48 | 12.46 | 2.68 | .17 | -.60 |
| L2 Reading <i>n</i> = 88 | 20 | 8 | 14.90 | 15.01 | 3.06 | -.47 | -.90 |
| L2 Writing <i>n</i> = 88 | 20 | 10 | 14.34 | 14.31 | 2.62 | .11 | -1.03 |
| L2 Listening <i>n</i> = 88 | 20 | 6 | 14.04 | 14.12 | 3.25 | -.41 | -.45 |
| L2 Speaking <i>n</i> = 88 | 20 | 8 | 14.56 | 14.60 | 2.60 | -.04 | -.44 |

In the beginner group, only two out of five language test scores were normally distributed according to one-sample K-S tests: L2 reading ($p = .200$)

¹⁴ Max and min information provided refer to the maximum and minimum scores obtained by participants.

and L2 writing ($p = .200$). An inspection of the boxplots revealed outliers only in the L2 listening scores:

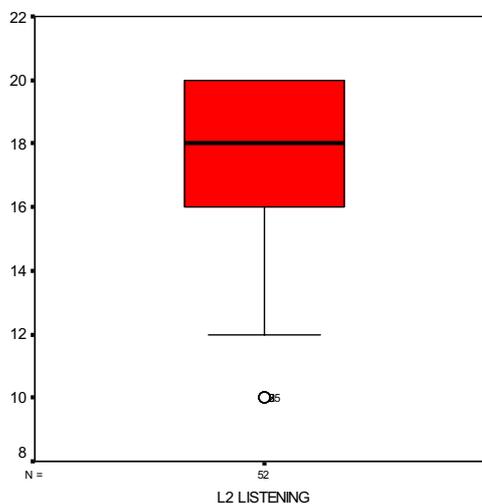


Figure 6.01 *L2 listening boxplot*

Three outlying cases were recoded¹⁵. The new descriptive statistics for L2 listening scores after recoding outliers are shown in table 6.02.

Table 6.02 *L2 Listening after Recoding Outliers*

Beginner Group

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|------------------------|-----|-----|-------|--------------|------|----------|----------|
| L2 Grammar $n = 52$ | 20 | 12 | 17.09 | 17.21 | 2.56 | -.51 | -.82 |

The skewness and kurtosis levels of all language skill variables were under the 1 value (except for two values which exceeded it slightly by .30 and .03 respectively), which according to Porte (2002) does not violate the assumption of normality. Histograms can be checked in Appendix B.1.1.

¹⁵ The procedure followed to recode outliers consisted of assigning a raw score close to the next most extreme score, to reduce the impact of outliers on the dataset (Tabachnick & Fidell, 2001).

In the advanced group, only one language test score was normally distributed according to the K-S test: L2 listening ($p = .096$). An inspection of the boxplots for all language dimensions did not highlight any outliers (see figure 6.02).

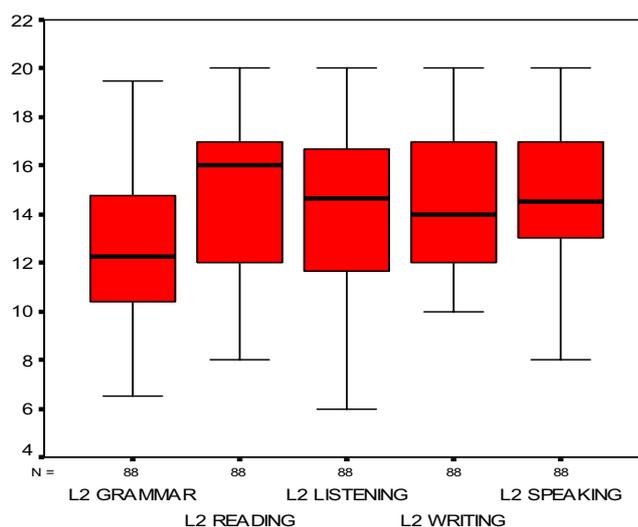


Figure 6.02 L2 proficiency boxplot, advanced group.

A look at the histograms of the language dimensions which failed the K-S test did not reveal any severely skewed or kurtotic shapes, as well as all the levels being under 1, like in the beginner group. The normality assumption was thus not violated. See Figure B.1.2 in Appendix B for histograms with normality curve.

For the beginner group, results showed that the highest mean score obtained was for listening (16.86), followed by grammar (15.10), speaking (14.61), writing (13.09), and, finally, reading (11.73). Conversely, the advanced group scored the highest in reading (14.90), followed by very similar scores in three skills, namely, speaking, writing, and listening (14.56, 14.34, and 14.04, respectively), and scored at their lowest in grammar (12.48).

Finally, a global L2 development variable was computed by adding up all test scores from the five language dimensions. Descriptive statistics for this global L2 development score are provided in table 6.03.

Table 6.03 *L2 Global Development*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-------|-------|-------|--------------|-------|----------|----------|
| Beginners <i>n</i> = 52 | 96.50 | 34.25 | 71.64 | 72.00 | 14.94 | -.35 | -.58 |
| Advanced <i>n</i> = 88 | 91.83 | 51.08 | 70.35 | 70.36 | 9.71 | -.04 | -.70 |

In both groups global L2 development scores were normally distributed according to one-sample K-S tests: beginners ($p = .200$) and advanced ($p = .200$). Despite beginners outperforming advanced learners slightly in this global measure, the minimum score for advanced learners was much higher than for beginners. Histograms with normality curve can be checked in appendix B, section B.1.3.

6.1.3 INDEPENDENT VARIABLES

This section describes the results obtained for the independent variables. Independent variables are language aptitude, by component and global, L1 reading comprehension, L1 spelling, reading quantity, enjoy reading, motivation, communicative orientations, professional orientations, and age at testing (AT).

6.1.3.1 Language Aptitude

This section provides descriptive statistics for language aptitude, first by LLAMA subtest, and then a global language aptitude score. Table 6.04 presents the results of the tests by component.

Table 6.04 *Language Aptitude by Component*

Beginners

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|--------------------------|-----|-----|-------|--------------|-------|----------|----------|
| LLAMA B <i>n</i> = 52 | 80 | 10 | 40.27 | 40.02 | 16.84 | .11 | -.63 |
| LLAMA D <i>n</i> = 52 | 60 | 0 | 24.10 | 23.78 | 15.68 | .09 | -.82 |
| LLAMA E <i>n</i> = 52 | 100 | 0 | 59.62 | 60.68 | 30.54 | -.49 | -.71 |
| LLAMA F <i>n</i> = 52 | 90 | 0 | 37.31 | 36.79 | 25.05 | .07 | -.97 |

Advanced

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|--------------------------|-----|-----|-------|--------------|-------|----------|----------|
| LLAMA B <i>n</i> = 88 | 80 | 10 | 45.34 | 45.38 | 16.00 | .05 | -.21 |
| LLAMA D <i>n</i> = 88 | 65 | 0 | 28.20 | 28.06 | 15.10 | .05 | -.34 |
| LLAMA E <i>n</i> = 88 | 100 | 0 | 74.20 | 76.54 | 23.37 | -1.36 | 1.83 |
| LLAMA F <i>n</i> = 88 | 90 | 0 | 45.34 | 45.38 | 24.49 | -.02 | -.67 |

For the beginner group, only LLAMA D scores were normally distributed according to the K-S normality test ($p = .18$). An inspection of the boxplots of the other three LLAMA tests did not reveal any outliers (see figure 6.3).

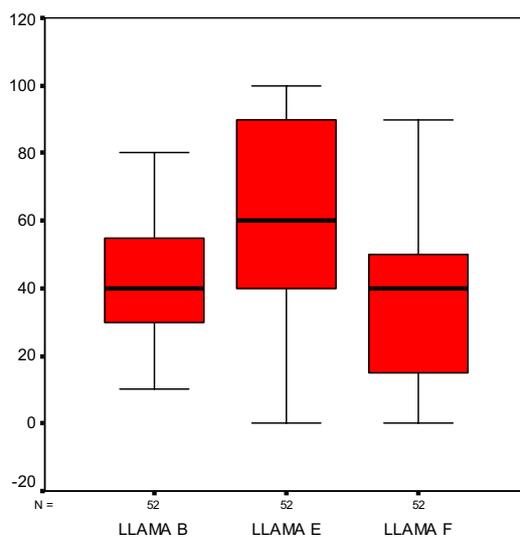


Figure 6.03 LLAMA B, E, and F boxplot, beginner group

A look at histograms with normality curve revealed positive skewness in LLAMA B, E, and F scores. However, none of the skewness or kurtosis levels was above 1, so the assumption of normality was not violated for the remaining three tests. For the advanced group, LLAMA B and LLAMA D yielded non-significant coefficients in the K-S normality tests, ($p = .08$) and ($p = .08$) respectively, so the assumption of normality was not violated. LLAMA E and LLAMA F scores obtained statistically significant results in the K-S test. Boxplots for the latter two tests showed outliers in LLAMA E scores.

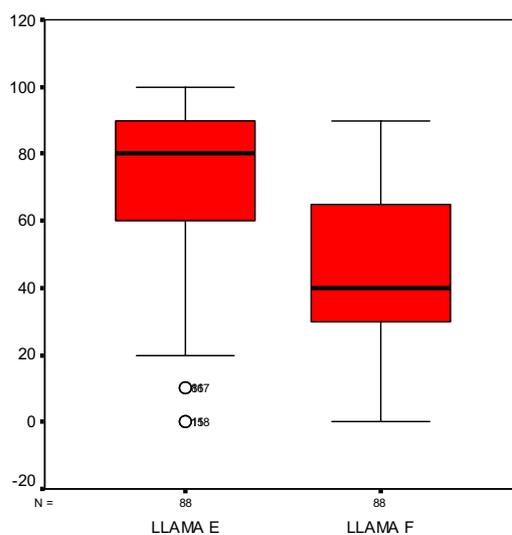


Figure 6.04 LLAMA E, F boxplot, advanced group

Four scores which were very close to 3.29 (3.17) were recoded. New boxplots did not highlight any more outliers. The new descriptives for the LLAMA E scores with attenuated effect of outliers are reported in table 6.05.

Table 6.05 New LLAMA E Descriptives, Advanced Group

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|-------------------|-----|-----|-------|-----------|-------|----------|----------|
| LLAMA E n = 88 | 100 | 20 | 74.89 | 76.54 | 21.44 | -1.02 | .50 |

A close look at the histograms did not reveal any strong effect of skewness or kurtosis for LLAMA F, while LLAMA E displayed a moderate negative skewness (1.02), negligible for the assumption of normality. Normality was therefore assumed for LLAMA tests F and E. Histograms with normality curves for all language aptitude variables can be found in appendix B, section B.1.4.

Learners in the advanced group consistently outperformed beginners in the four language aptitude tests. According to the LLAMA Manual (Meara,

2005), for LLAMA B (vocabulary learning) an average score range is 25 to 45 points. Both groups scored in this range, with a slight advantage for the advanced group, scoring 45.34. Beginners scored 40.27. For LLAMA D, sound recognition, the same result was obtained: while both groups scored within the average range (15 to 35), beginners scored 24.10, whereas advanced learners scored a bit higher: 28.20. The largest difference between the two groups was found in LLAMA E, sound-symbol correspondence: Meara (2005) considers that an average score is between 20 and 45. Beginners scored in the good score range (50-65), 59.62, but were remarkably outperformed by advanced learners, who scored 74.20, when 75 is the threshold for outstandingly good scores. An independent-samples t-test was conducted to compare the LLAMA E scores for the two groups. There was a significant difference in the scores between beginners ($M = 59.62$, $SD = 30.54$) and advanced learners ($M = 74.20$, $SD = 21.44$; 95% CI = -24.84, -5.69, $t(80) = -3.1$, $p = .00$). Similarly, there was a large difference in LLAMA F, the grammatical inferencing test: beginners scored 37.31, clearly belonging in the average scoring range (between 20 and 45), while advanced learners scored outstandingly higher, 45.34, on the threshold of the good score range (from 50 to 65)¹⁶. A t-test was conducted for LLAMA F too, but this time the difference was not statistically significant.

Finally, a global language aptitude score was calculated by adding up the z-scores of the individual LLAMA test components. Results of the K-S normality tests were non-significant for the two groups, $p = .09$ for beginners, and $p = .200$ for the advanced group, so the assumption of normality was met. Descriptives for the composite language aptitude measure are provided in table

¹⁶ In the LLAMA manual and for the LLAMA F test, there is a 5 point difference between a score range and the next, i.e. average scores go from 20 to 45, while good scores begin at 50. For the purposes of this dissertation, it is considered that exceeding the previous range is meaningful and that, at the very least, the learner can be considered to be on the threshold to the next category.

6.06, and histograms with normality curves for individual components and the global measure can be found in appendix B, section B.1.4.

Table 6.06 *Total Language Aptitude*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|------|-------|-----|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 3.31 | -4.91 | .00 | .07 | 2.26 | -.63 | -.56 |
| Advanced <i>n</i> = 88 | 4.79 | -5.59 | .00 | .02 | 2.55 | -.11 | -.95 |

Finally, descriptive statistics were explored for the tolerance of ambiguity addition to the language aptitude variable. Results are presented in table 6.07.

Table 6.07 *Tolerance of Ambiguity*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 48 | 27 | 36.73 | 36.61 | 4.12 | .45 | .45 |
| Advanced <i>n</i> = 88 | 46 | 26 | 37 | 37.02 | .90 | -.18 | .49 |

Results of the K-S test of normality were significant for both groups. An inspection of boxplots highlighted outliers in both groups, as shown in figure 6.05.

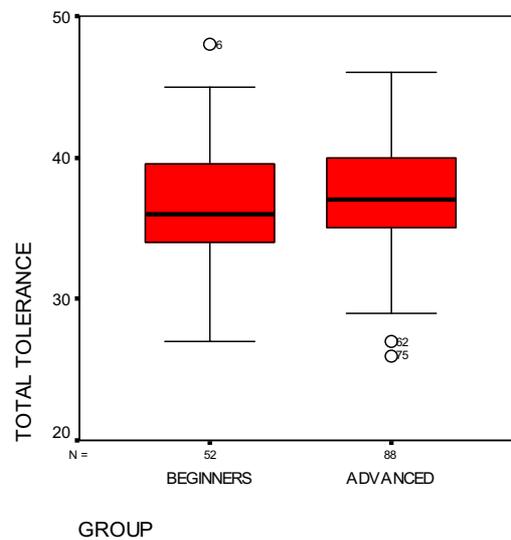


Figure 6.05 *Tolerance of ambiguity boxplot*

Outliers were recoded. Descriptive statistics after recoding outliers are presented in table 6.08.

Table 6.08 *Tolerance of Ambiguity with Outliers Recoded*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 45 | 27 | 36.65 | 36.60 | 3.94 | .23 | -.03 |
| Advanced <i>n</i> = 88 | 46 | 30 | 37.12 | 37.03 | 3.63 | .20 | -.09 |

After recoding, the K-S normality test was non-significant for the advanced group ($p = .05$), and the Shapiro-Wilk test of normality was non-significant for both beginners ($p = .15$) and advanced ($p = .08$) groups.

For this measure there was hardly any difference in behaviour between the two groups, with advanced learners scoring inconsequentially higher than beginners.

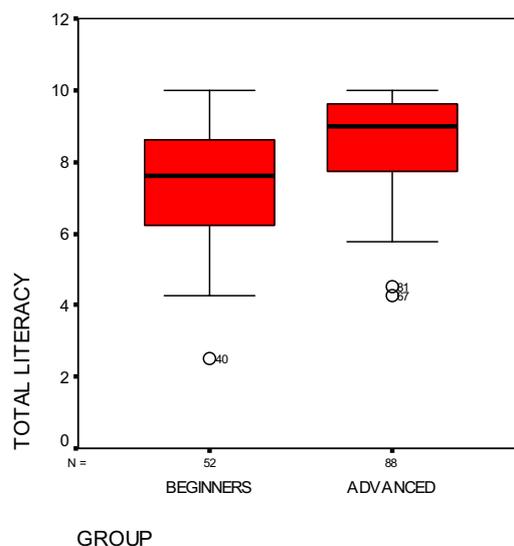
6.1.3.2 L1 Reading Comprehension

This section presents descriptive statistics for L1 reading comprehension. Table 6.09 shows descriptive statistics for this variable for both groups of learners.

Table 6.09 *Total L1 Reading Comprehension*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|------|------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 10 | 2.50 | 7.37 | 7.43 | 1.67 | -.63 | .00 |
| Advanced <i>n</i> = 88 | 10 | 4.25 | 8.61 | 8.72 | 1.32 | -1.23 | 1.16 |

The beginner group was normally distributed according to the K-S normality test ($p = .18$), but the advanced group was not. An inspection of the boxplots revealed outliers in the two groups, as well as moderate skewness and kurtosis (above the 1 level) for the advanced group, as shown in figure 6.06.

Figure 6.06 *L1 reading comprehension boxplot*

Outliers were recoded. Descriptive statistics after recoding outliers are presented in table 6.10.

Table 6.10 *L1 Reading Comprehension*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|------|------|-----------|------|----------|----------|
| Beginners <i>n</i> = 52 | 10 | 4.25 | 7.42 | 7.44 | 1.55 | -.31 | -.91 |
| Advanced <i>n</i> = 88 | 10 | 6 | 8.69 | 8.75 | 1.14 | -.76 | -.48 |

The K-S normality test did not reach significance for the beginners group ($p = .200$), while it did for advanced group, thus violating the assumption of normality for the latter. Histograms were then inspected (see figures in section B.1.5, appendix B), and a moderate negative skewness was observed in the advanced group. However, the 5% trimmed mean was very close to the mean, and the skewness ratio was less than 1 and hence the assumption of normality was not violated.

In the L1 reading comprehension test advanced learners outperformed beginners. A t-test was conducted to assess the magnitude of the difference. There was a significant difference in scores between beginners ($M = 7.42$, $SD = 1.55$) and advanced learners ($M = 8.69$, $SD = 1.14$; 95% CI = -1.76, -.77; $t(83) = -5.10$, $p = .00$), favourable to the advanced learners.

6.1.3.3 L1 Spelling

This section presents the scores for the L1 spelling test. Table 6.11 shows the descriptive statistics for L1 spelling for the two proficiency groups.

Table 6.11 L1 Spelling

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|-----------------------|-----|-----|-------|-----------|------|----------|----------|
| Beginners $n = 52$ | 19 | 7 | 13.08 | 13.03 | 2.57 | -.36 | .51 |
| Advanced $n = 88$ | 20 | 8 | 14.50 | 14.52 | 2.96 | -.01 | -.58 |

The K-S test of normality was not significant for the beginner group ($p = .05$), but it was significant for the advanced group. For the latter, Shapiro-Wilk test was not significant ($p = .10$). Boxplots did not display any outliers in the groups, and the skewness and kurtosis values were below 1, as well as the 5% trimmed mean being very close to mean, so the normality assumption was not violated for either group. Histograms with normality curves were plotted: see figure B.1.6 in appendix B.

In the L1 spelling test advanced learners outperformed beginners too. A t-test was conducted to assess the magnitude of the difference. A significant difference in scores was found between beginners ($M = 13.08$, $SD = 2.57$) and

advanced learners ($M = 14.50$, $SD = 2.96$; 95% CI = -2.44, -.44; $t(138) = -2.87$, $p = .00$), favourable to the advanced learners.

6.1.3.4 Reading Quantity

This section presents results for the reading quantity measure. Table 6.12 presents the descriptive statistics for the two proficiency groups.

Table 6.12 Reading Quantity

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|-----------------------|-----|-----|------|-----------|------|----------|----------|
| Beginners $n = 52$ | 5 | 0 | 1.75 | 1.65 | 1.23 | 1.34 | 1.10 |
| Advanced $n = 88$ | 5 | 0 | 1.82 | 1.74 | 1.22 | .96 | .68 |

The K-S normality test was significant for both groups, so boxplots were inspected for outliers. Outliers were found in both groups, as shown in figure 6.07.

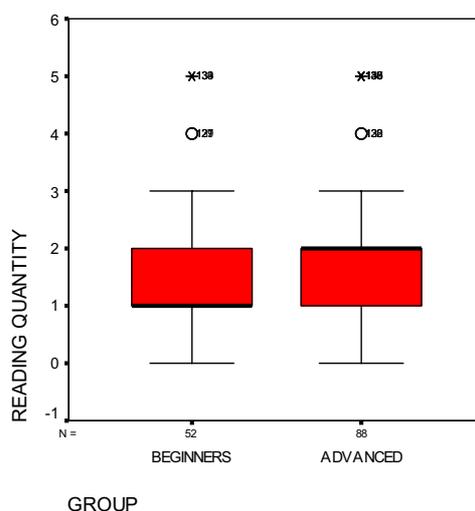


Figure 6.07 Reading quantity boxplot

Outliers were recoded. Descriptive statistics with the recoded values were as presented in table 6.13.

Table 6.13 *Reading Quantity after Recoding*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|------|--------------|-----|----------|----------|
| Beginners <i>n</i> = 52 | 3 | 0 | 1.51 | 1.50 | .78 | .50 | -.70 |
| Advanced <i>n</i> = 88 | 3 | 0 | 1.62 | 1.63 | .87 | .02 | -.88 |

Normality tests were significant after recoding outlying values too, so histograms with normality curve were generated (see figure B.1.7 in appendix B). Skewness and kurtosis values were below 1, and the differences between 5% trimmed mean and mean negligible, so the assumption of normality was not violated.

6.1.3.5 *Enjoy Reading*

This section shows the results of the instrument developed to measure how much participants enjoyed reading. Table 6.14 shows the descriptive statistics for the two proficiency groups.

Table 6.14 *Enjoy Reading*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 10 | 3 | 7.71 | 7.77 | 1.91 | -.28 | -.93 |
| Advanced <i>n</i> = 88 | 10 | 2 | 7.72 | 7.85 | 1.77 | -.87 | .77 |

The K-S normality test reached significance for the two measures, so boxplots were inspected for outliers. Outliers were found only in the advanced group, as shown in figure 6.8.

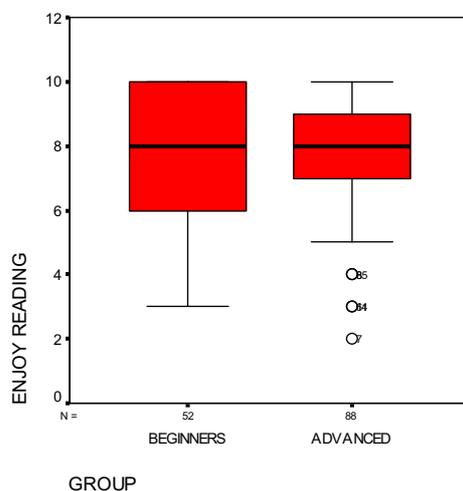


Figure 6.08 *Enjoy reading boxplot*

Outliers were recoded. The descriptive statistics for the variable after recoding are presented in table 6.15.

Table 6.15 *Enjoy Reading after Recoding*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|------|-----------|------|----------|----------|
| Beginners <i>n</i> = 52 | 10 | 3 | 7.71 | 7.77 | 1.91 | -.28 | -.93 |
| Advanced <i>n</i> = 88 | 10 | 5 | 7.88 | 7.91 | 1.44 | -.12 | -1.06 |

Normality tests were still significant after recoding outlying values, so histograms with normality curve were generated (see figure B.1.7 in appendix B). Skewness and kurtosis values were below 1 (except for an insignificant .06 departure in kurtosis for advanced learners), and the 5% trimmed mean was very close to mean, so the assumption of normality was not violated.

The two proficiency groups behaved in an extraordinarily similar manner for the two measures related to reading activities (see 6.1.3.4 Reading Quantity, and 6.1.3.5 Enjoy Reading), with differences between group means being totally negligible. As far as reading quantity is concerned, both groups reported reading approximately between 1 and 5 books per year. When asked about how much they enjoyed reading, both scores were close to 8 out of 10, in a 0 to 10 Likert-scale, under the category flagged as 'I enjoy reading a lot'.

6.1.3.6 Motivation

The results obtained in the motivation and orientations section of the questionnaire are presented in this section. Table 6.16 shows the descriptive statistics for motivation for the two proficiency groups.

Table 6.16 *Motivation*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 36 | 22 | 32.57 | 32.80 | 3.08 | -1.05 | 1.3 |
| Advanced <i>n</i> = 88 | 36 | 20 | 32.76 | 33.11 | 3.22 | -1.60 | 3.2 |

The assumption of normality was not met according to the K-S test results. Inspection of boxplots revealed outliers in both groups.

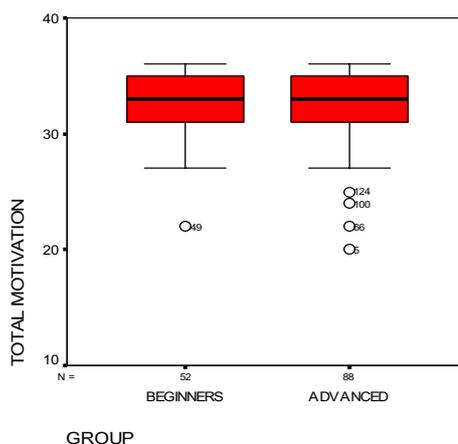


Figure 6.09 Motivation boxplot

Five outliers were recoded. The new descriptive statistics are shown in table 6.17.

Table 6.17 Motivation After Outliers Recoded

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|-----------|------|----------|----------|
| Beginners <i>n</i> = 52 | 36 | 26 | 32.65 | 32.80 | 2.86 | -.62 | -.5 |
| Advanced <i>n</i> = 88 | 36 | 26 | 32.90 | 33.11 | 2.77 | -.90 | .23 |

The next step was having a look at histograms with normality curve (see figure B.1.8 in appendix B). Both groups presented negative skewness, but since values did not exceed 1 in any direction and, in addition, 5% trimmed mean was very close to mean, the normality assumption was not violated.

Both groups reported having very high levels of motivation to learn English, with scores being remarkably close to each other: beginners scored 32.65 and advanced learners 32.90 out of a 0-to-36 Likert scale.

6.1.3.7 *Communicative Orientations*

This section presents the results of the questions related to communicative orientations. Table 6.18 shows the descriptive statistics for both levels of proficiency.

Table 6.18 *Communicative Orientations*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|-----------|------|----------|----------|
| Beginners <i>n</i> = 52 | 18 | 10 | 15.76 | 15.94 | 1.94 | -.97 | 1.22 |
| Advanced <i>n</i> = 88 | 18 | 10 | 15.85 | 16.01 | 1.94 | -1.08 | .83 |

None of the two groups met the assumption of normality, according to the K-S test. Boxplots were scanned for outliers, which were present in both beginner and advanced groups. See figure 6.10.

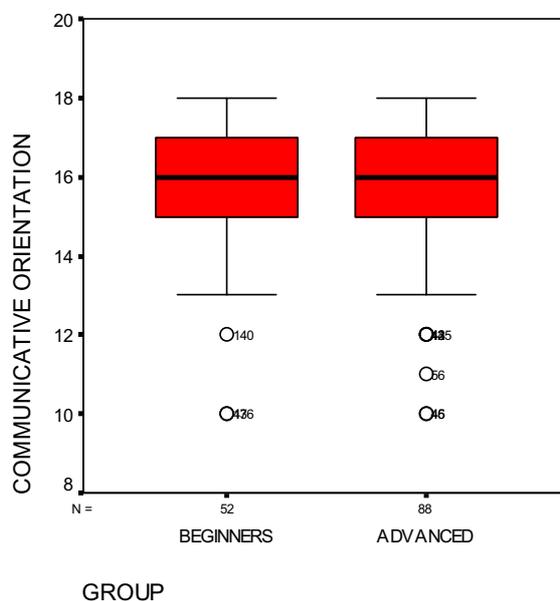


Figure 6.10 *Communicative orientations boxplot*

Outliers were recoded following the same rule for outliers as for previous variables. Descriptives for the variable with outlying scores recoded are presented in table 6.19.

Table 6.19 *Communicative Orientations with Outliers Recoded*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 18 | 13 | 15.96 | 15.97 | 1.53 | -.00 | -1.37 |
| Advanced <i>n</i> = 88 | 18 | 13 | 16.06 | 16.12 | 1.50 | -.36 | -.91 |

The K-S test was significant for both groups, so histograms with normality curves were generated (see figures in section B.1.8, appendix B). Both groups presented negative kurtosis, but since only one of the values exceeded 1 slightly and the 5% trimmed mean was very close to the mean the normality assumption was not violated.

Participants reported being very interested in learning English for communicative purposes, as shown by the results, which were high and again very similar for both groups of learners: 15.96 for beginners and 16.06 for the advanced learners' group, in a 0-to-18 Likert scale.

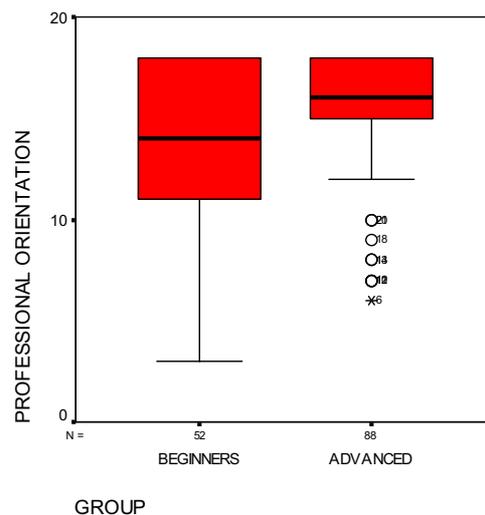
6.1.3.8 Professional Orientations

This section provides descriptive statistics for professional orientations. Table 6.20 presents statistics for the two proficiency groups.

Table 6.20 *Professional Orientations*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 18 | 3 | 13.36 | 13.68 | 4.50 | -.88 | -.01 |
| Advanced <i>n</i> = 88 | 18 | 3 | 15.56 | 15.91 | 3.00 | -1.67 | 2.37 |

None of the two groups met the assumption of normality according to the K-S test. Boxplots were scanned, revealing a strong presence of outliers in the advanced group as shown in figure 6.11.

Figure 6.11 *Professional orientation boxplot*

Descriptive statistics after recoding outliers in the advanced group are shown in table 6.21.

Table 6.21 *Professional Orientations after Recoding*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 18 | 3 | 13.36 | 13.68 | 4.50 | -.88 | -.01 |
| Advanced <i>n</i> = 88 | 18 | 11 | 15.87 | 16.02 | 2.23 | -.92 | -.05 |

Results of the normality test (K-S) were significant for the two groups, so histograms with normality curves were generated. These did not display any significant departures from normality shapes. See figures in section B.1.8, appendix B. Besides, the 5% trimmed mean was very close to the mean, and the skewness and kurtosis levels were below 1, so the normality assumption was met.

Participants reported high levels of interest in learning English for professional purposes, although in this case there were noteworthy differences between the two groups: for beginners, scores in this orientation type were remarkably lower (13.36) than for advanced learners (15.87), who obviously had a much stronger professional drive.

6.1.3.9 Age at Testing (AT)

The results obtained in the biographical section of the questionnaire are presented in this section. Table 6.22 shows the descriptive statistics for AT.

Table 6.22 Age at Testing (AT)

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-------|-----------|-------|----------|----------|
| Beginners <i>n</i> = 52 | 62 | 16 | 39.65 | 39.60 | 10.65 | .19 | -.32 |
| Advanced <i>n</i> = 88 | 59 | 16 | 30.99 | 30.35 | 10.67 | .71 | -.01 |

In this case, the assumption of normality was met by the beginner group according to the K-S results ($p = .200$). The K-S test was significant for the advanced group; however, the levels of skewness and kurtosis were below 1, 5% trimmed mean was very close to mean, and boxplots (see figure 6.12) did not reveal the presence of any outliers, so the assumption of normality was considered as met. Histograms with normality curves are provided in appendix B, section B.1.9.

As presented in section 5.1, beginners were 9 years older than advanced learners. Results of an independent-samples t-test yielded a significant difference in age between beginners ($M = 39.65$, $SD = 10.65$) and advanced learners ($M = 30.99$, $SD = 10.67$; 95% CI = 4.97, 12.35; $t(138) = 4.64$, $p = .00$).

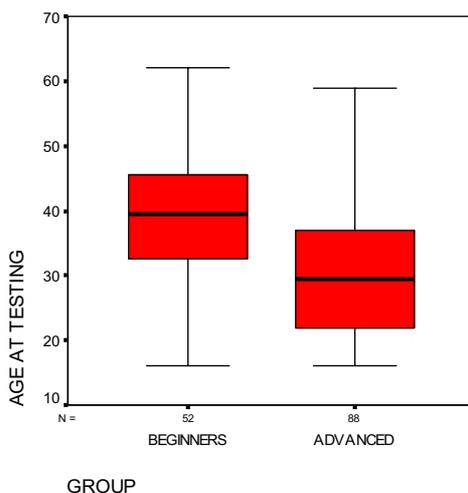


Figure 6.12 Age of testing boxplot

6.2 Control Variables

This section presents the control variables included in this dissertation, classified in three main categories: linguistic context-related variables (language dominance, language preference, literacy language, and other foreign languages known), exposure variables (stays abroad), and learner background variables (academic level). First, descriptive statistics are provided for each variable, and then results of inferential statistics are presented.

6.2.1 DESCRIPTIVE STATISTICS

6.2.1.1 *Linguistic Context-Related Variables*

In a bilingual context such as Catalonia's, it is important to control any effects on learning which bilingualism or language dominance may have on foreign language development. The questionnaire included three measures: language dominance, language preference, and literacy language.

Participants were classified according to the following variables: self-reported language dominance (fully bilingual, bilingual with Catalan dominance, bilingual with Spanish dominance, bilingual with a low level of proficiency in Catalan, bilingual with a low level of proficiency in Spanish). Then subjects were asked to take the questionnaire according to their language preference, Spanish or Catalan. Finally, and to take the L1 literacy tests, participants were asked to choose the language in which they had stronger reading and writing skills, which are the skills known to contribute to the development of literacy to a greater extent.

Table 6.23 shows self-reported bilingualism and language dominance for the two groups. There was a noteworthy difference between them: while 44% of the participants in the advanced group considered themselves balanced

bilinguals, only 17% of the beginners thought they qualify as such. The second category in importance in the two groups included those participants who considered themselves bilinguals but who were Spanish dominant: percentages are 67% for the beginner group and 45% for the advanced group. Another way of looking at this information is considering balanced bilinguals and bilinguals with a very high level of proficiency in both languages in one group, and bilinguals who do not have a high level of proficiency in one of the two languages in another group: in this case, the percentage of high-proficiency bilinguals in the beginner group was 88%, and it was even higher in the advanced group, 96%. This classification highlights how the majority of participants in this study were high proficiency bilinguals.

Table 6.23 *Self-Reported Bilingualism and Language Dominance*

| | Beginner Group | | Advanced Group | | Total | |
|-----------------------|----------------|------|----------------|------|----------|------|
| | Subjects | % | Subjects | % | Subjects | % |
| Balanced Bilingual | 9 | 17% | 39 | 44% | 48 | 34% |
| Bil. Catalan Dominant | 2 | 4% | 6 | 7% | 8 | 6% |
| Bil. Spanish Dominant | 35 | 67% | 40 | 45% | 75 | 54% |
| Bilingual Low Catalan | 0 | 0% | 1 | 1% | 1 | 1% |
| Bilingual Low Spanish | 6 | 12% | 2 | 2% | 8 | 6% |
| Total | 52 | 100% | 88 | 100% | 142 | 100% |

Language choice varied considerably when participants were asked about language preference for the purposes of answering a questionnaire, or for more cognitively-demanding situations such as taking a reading and writing exam. Table 6.24 shows how participants changed choices in the two groups. In the beginner group, 83% of subjects chose to take the questionnaire in Spanish,

while this percentage increased to 96% when the same subjects had to take the reading and writing exam. In contrast, in the advanced group, the situation was more balanced: only 53% of the participants chose to take the questionnaire in Spanish, and when they had to take the reading and writing test that segment of the group increased until 68%. There might be a political explanation for that: under the Franco dictatorship in Spain (1939-1975), it was forbidden to teach Catalan in schools, and so all the population became literate in Spanish. However, the latest education laws under the Franco regime indicated some degree of tolerance towards languages other than Spanish in Spain. The 1970 law tolerated the oral use of first languages other than Spanish, and the act of 1975 allowed the teaching of regional languages at school, although always as optional subjects and limited to a few hours per week. It wasn't until the autonomous government of Catalonia was restored in 1977 that the Catalan language was granted an official status in Catalonia, together with Spanish. This institutional framework permitted the passing of laws for the recuperation of the Catalan language. The objectives of the first law of linguistic standardization, passed in 1983, were the recuperation of the Catalan language for institutional uses and its integration in the school system, the media, and society. Only after this law the Catalan language became the language of education and of communication in schools, while still providing a level of exposure and teaching of the Spanish language which would guarantee a successful mastery of the two official languages by the end of compulsory education (www.gencat.cat/Àrees de coneixement/Llengua/Llengua i història). That cut-off point between the development of literacy in Spanish or in Catalan may be what is observed in this population sample: the mean age in the beginners group (39.65 years old) means that that segment of population was between 9 and 14 years old when the first laws in favour of the Catalan

language were passed, and so their development of literacy took place mainly in Spanish. On the contrary, subjects in the advanced group were ten years younger, which means that participants in that group are very likely to have developed their literacy in Catalan.

Table 6.24 *Language Preference and Literacy Language*

Beginner Group

| | Catalan | | Spanish | | Total |
|---------------------|----------|-----|----------|-----|----------|
| | Subjects | % | Subjects | % | Subjects |
| Language Preference | 9 | 17% | 43 | 83% | 52 |
| Literacy Language | 2 | 4% | 50 | 96% | 52 |

Advanced Group

| | Catalan | | Spanish | | Total |
|---------------------|----------|-----|----------|-----|----------|
| | Subjects | % | Subjects | % | Subjects |
| Language Preference | 41 | 47% | 47 | 53% | 88 |
| Literacy Language | 28 | 32% | 60 | 68% | 88 |

Other linguistic characteristics of the participants included, for instance, other foreign languages which participants might have learnt in the past. This information can be seen in table 6.25, and it provided important information to assess the effect of previous foreign language learning in the sample. In this case the differences between the two groups were not major: for both groups around 50% of the participants had learnt at least another foreign language, so, given that subjects were bilinguals to a greater or lesser degree, for half of the sample English was their L3, and for the other half it was their L4.

Table 6.25 *Other Foreign Languages, Participant Distribution*

| Foreign Languages | Beginner Group | | Advanced Group | |
|---------------------|----------------|---------|----------------|---------|
| | Subjects | Percent | Subjects | Percent |
| None | 27 | 52% | 31 | 35% |
| 1 Foreign Language | 23 | 44% | 46 | 52% |
| 2 Foreign Languages | 2 | 4% | 10 | 11% |
| More than 2 | 0 | 0% | 1 | 1% |
| Total | 52 | | 88 | |

As seen in the table above, four groups were created: none, one foreign language, two foreign languages, and more than two foreign languages, although there were not enough cases in the latter to be included in the statistical analysis. Table 6.26 shows the descriptive statistics for other foreign languages previously learnt by participants.

Table 6.26 *Other Foreign Languages, Descriptive Statistics*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-----|-----------|-----|----------|----------|
| Beginners <i>n</i> = 52 | 2 | 0 | .52 | .48 | .57 | .55 | -.63 |
| Advanced <i>n</i> = 88 | 3 | 0 | .78 | .75 | .68 | .52 | .11 |

The K-S normality test reached significance for the two groups, so boxplots were inspected for outliers. There was only one outlier in the advanced group, as shown in figure 6.13.

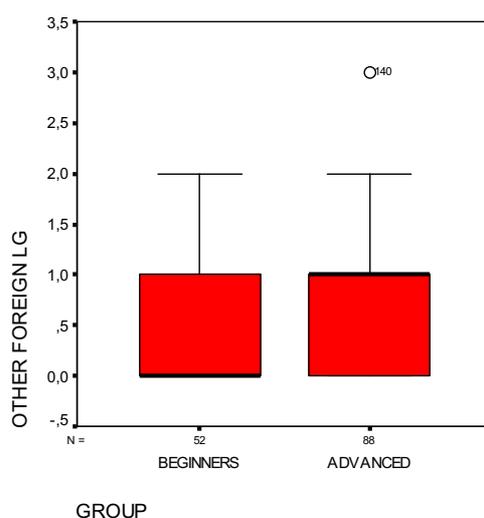


Figure 6.13 *Other foreign languages, boxplot*

As with previous variables, the outlier was recoded. Descriptive statistics for the variable after recoding are listed in table 6.27.

Table 6.27 *Other Foreign Languages after Recoding*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|-----|-----------|-----|----------|----------|
| Beginners <i>n</i> = 52 | 2 | 0 | .52 | .48 | .57 | .55 | -.63 |
| Advanced <i>n</i> = 88 | 2 | 0 | .77 | .74 | .64 | .24 | -.70 |

Normality tests were still significant after recoding the outlying value, so histograms with normality curve were generated (see figure B.1.10 in appendix B). Skewness and kurtosis levels were well below the 1 value, and the 5% trimmed mean was very close to the mean, so the assumption of normality was not violated.

In both groups there was a high percentage of subjects who had not learnt any languages other than English (52% in the beginner group and 35% in the advanced group), and the next highest percentage was for learners who had

studied another foreign language before English: 44% in the beginner group and 52% in the advanced group.

6.2.1.2 Exposure Variable: Stays Abroad

Another variable which may impact L2 development is stays in English-speaking countries. In this dissertation, this variable has been categorised in a very granular manner, with five different levels of stays abroad which students needed to report upon.

This exposure factor might have had an effect on the successful learning of English. Stays abroad are stays in English-speaking countries in which subjects have spent time for the purpose of learning English at any point in their lives. Table 6.28 shows the distribution of subjects for the two groups according to their stays in English-speaking countries. Although there were differences between the two groups, these were not really noteworthy; perhaps the most striking characteristic in the data is that most participants in the two groups had never been to an English-speaking country for language learning purposes. In the beginner group 98% of the subjects had never been in an English-speaking country to learn English, and in the advanced group this was the case too for 77% of the participants.

Table 6.28 *Stays in English-speaking Countries for Learning English*

| Stays Abroad | Beginner Group | | Advanced Group | |
|---------------------------|----------------|---------|----------------|---------|
| | Subjects | Percent | Subjects | Percent |
| Never | 50 | 98% | 68 | 77% |
| Once, 15 days | 0 | 0% | 3 | 3% |
| Once, 1 month | 0 | 0% | 8 | 9% |
| Once, over a month | 0 | 0% | 4 | 5% |
| Twice and/or over a month | 1 | 2% | 5 | 6% |
| More than 2 | 0 | 0% | 0 | 0% |
| Total | 51 | | 88 | |

6.2.1.3 Learner Background Variable: Academic Level

Escoles Oficials d'Idiomes in Catalonia do not have any admission requirement regarding level of education, so it was likely that this factor was a source of differences amongst participants. The first category created concerns the education level of the participants, which resulted to be very different to the level of education of the population in Santa Coloma in general. Table 6.29 shows the level of education for adult sample, divided into the two groups. While for Santa Coloma only 3% of the population had tertiary education and most people clustered around secondary education (68%), in the research sample the percentages of subjects with university studies were much higher: 50% for the beginner group and 70% for the advanced group. There was a clear tendency to higher education levels as the level of English increased: the higher the level of English, the higher the education background of the learner. In addition, age probably had an influence in the level of education: the lower the mean age of the participants (30.99 for the advanced group compared to 39.65 for the beginner group), the higher the education level.

Table 6.29 *Levels of Education*

| Level of Education | Beginner Group | | Advanced Group | |
|---------------------|----------------|---------|----------------|---------|
| | Subjects | Percent | Subjects | Percent |
| Primary Education | 3 | 6% | 0 | 0% |
| Secondary Education | 23 | 44% | 26 | 30% |
| Tertiary Education | 26 | 50% | 61 | 70% |
| Total Valid Cases | 52 | | 87 | |

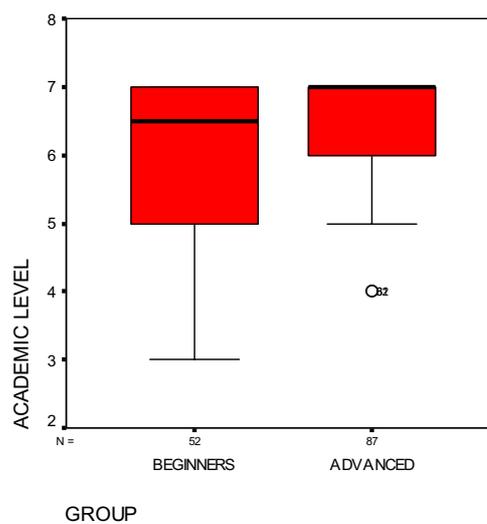
Table 6.30 shows the descriptive statistics for academic level.

Table 6.30 *Academic Level*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|------|-----------|------|----------|----------|
| Beginners <i>n</i> = 52 | 7 | 3 | 5.87 | 5.96 | 1.29 | -.69 | -.75 |
| Advanced <i>n</i> = 88 | 7 | 4 | 6.57 | 6.66 | .74 | -1.75 | 2.45 |

An inspection of the boxplots revealed outliers in the advanced group.

See figure 6.14.

Figure 6.14 *Academic level, boxplot*

Outliers in the advanced group were recoded. Descriptive statistics after dealing with outliers are shown in table 6.31.

Table 6.31 *Academic Level after Recoding Outliers*

| | Max | Min | M | 5% Trim M | SD | Skewness | Kurtosis |
|----------------------------|-----|-----|------|--------------|------|----------|----------|
| Beginners <i>n</i> = 52 | 7 | 3 | 5.87 | 5.96 | 1.29 | -.69 | -.75 |
| Advanced <i>n</i> = 87 | 7 | 5 | 6.60 | 6.66 | .67 | -1.42 | .69 |

Results of the normality tests (K-S, Shapiro-Wilk) were significant for the two groups, so histograms with normality curves were generated and can be found in appendix B, section B.1.12. Five percent of the trimmed means was very close to the mean, which is an indicator of normality. There was only a mild departure from normality in skewness for the advanced group, in which the value was higher than 1.

6.2.2 INFERENCE STATISTICS

Possible differences in control variables were explored by analysing them with the main dependent and independent variables in the study. As main dependent variable, L2 development was used. The list of independent variables analysed is as follows: for language aptitude, a global language aptitude score. For L1 literacy, results on the L1 reading comprehension test. Finally, for motivation and orientations, a motivation score is used.

6.2.2.1 Language Context-Related Variables

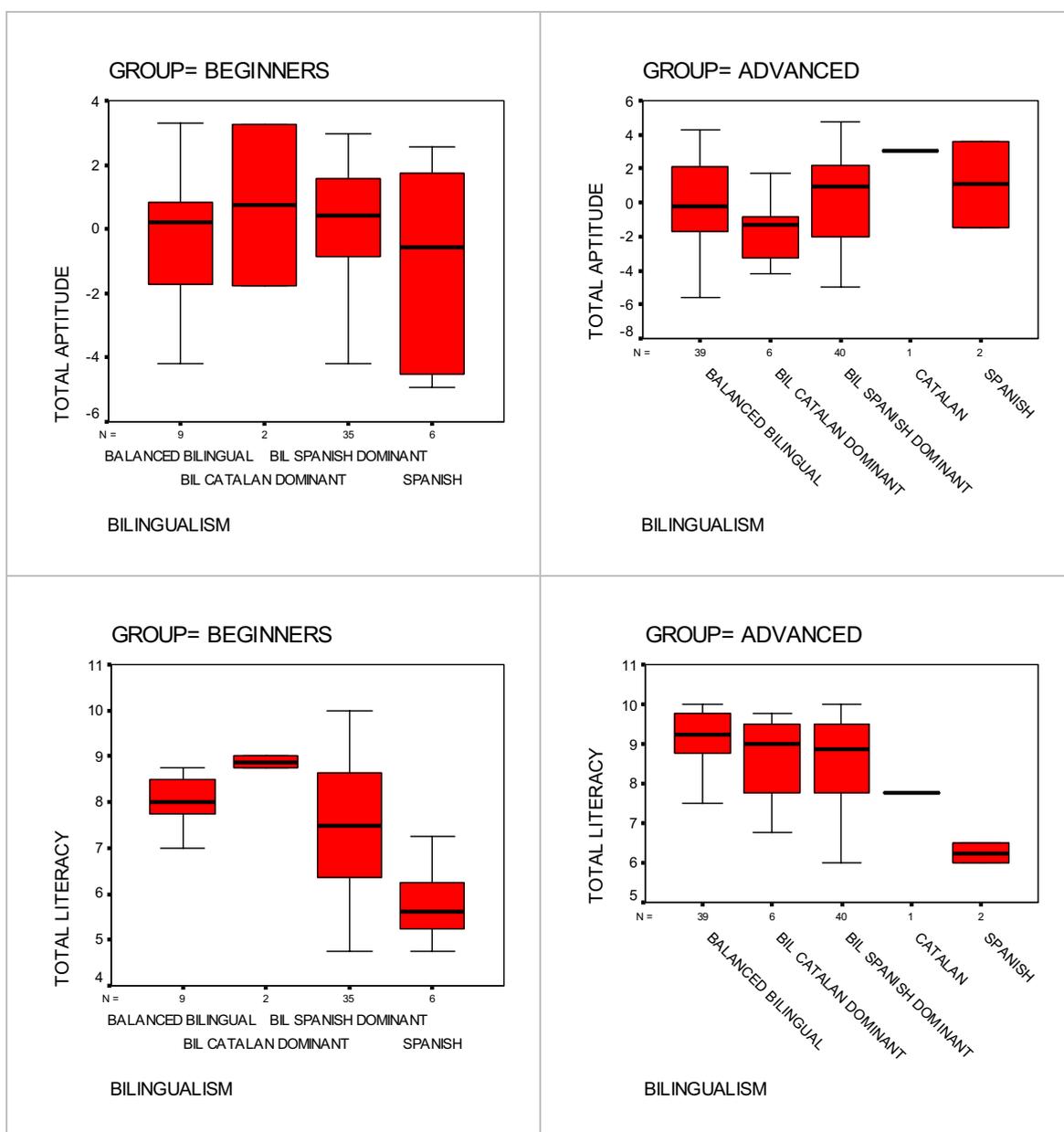
T-tests were conducted for the three linguistic context-related variables with L2 development, and also with language aptitude, L1 literacy, and motivation.

First, independent-samples t-tests were run for the main dependent variable, L2 development, and dichotomous control variables: language preference (Catalan or Spanish) and literacy language (again Catalan or Spanish). Equality of variances could be assumed for both groups according to Levene's test¹⁷. Concerning language preference in the beginner group, there was no significant difference in scores for participants choosing Catalan ($M = 74.22$, $SD = 13.86$), and participants choosing Spanish ($M = 71.10$, $SD = 15.26$; 95% CI = -7.96, 14.19, $t(50) = .565$, $p = .57$). As far as the advanced learners are concerned, there was no significant difference in scores for participants choosing Catalan ($M = 86.82$, $SD = 9.69$), and participants choosing Spanish ($M = 71.69$, $SD = 10.43$; 95% CI = -6.97, 1.23, $t(86) = -1.39$, $p = .16$) either. Another independent-samples t-test was conducted for the variable literacy language, which offered the same categorical options: Catalan or Spanish. Equality of variances could be assumed according to Levene's test. In this case, and for the beginner group, there was no significant difference in scores for participants choosing Catalan ($M = 76.12$, $SD = 16.44$), and participants choosing Spanish ($M = 71.46$, $SD = 15.03$; 95% CI = -17.16, 26.48, $t(50) = .42$, $p = .67$). As far as the advanced learners are concerned, there was no significant difference in scores for participants choosing Catalan ($M = 69.24$, $SD = 8.36$), and participants choosing Spanish ($M = 70.87$, $SD = 10.31$; 95% CI = -6.05, 2.81, $t(86) = -.72$, $p = .46$) either.

Secondly, a one-way between-groups ANOVA test was needed for the language dominance variable, which had five options: balanced bilingual, bilingual with Catalan dominance, bilingual with Spanish dominance, bilingual with low proficiency in Catalan, or bilingual with low proficiency in Spanish,

¹⁷ For this and other t-tests or ANOVA analyses presented in this chapter, Levene's equal variances or homogeneity of variances tests and boxplots are supplied in Appendix B.

and the dependent variable, L2 development. Data were normally distributed according to the K-S test of normality, and homogeneity of variances could be assumed following Levene’s test results. In the beginner group, the Catalan-dominant bilingual subgroup was not normally distributed because the *n* was too small (*n* = 2); for the three remaining groups, there were no significant differences in means ($F(3, 48) = 1.3, p = .27$). In the advanced group, there were not enough participants in the Spanish subgroup (*n* = 2), and the homogeneity of variances assumption was not met, so no further analyses were conducted.



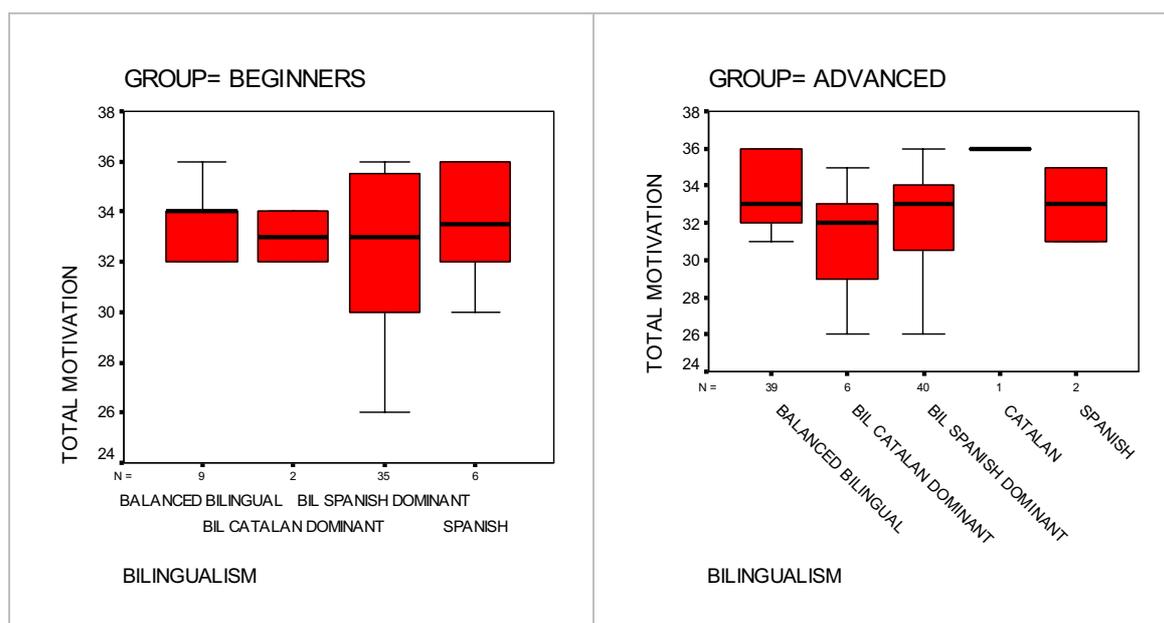


Figure 6.15 Language Dominance and IVs After Recoding Outliers

A series of one-way between-groups analyses (ANOVA) was then conducted with three independent variables and the main control linguistic variable, language dominance. Homogeneity of variances could be assumed according to Levene's test for language aptitude and according to Welch's robust test for motivation. Regarding language aptitude, no differences were found in the groups either for beginners, ($F(3, 48) = .62, p = .60$) or advanced learners ($F(4, 83) = 1.03, p = .39$). Secondly, groups were compared to explore the possible impact of bilingualism on motivation. As with language aptitude, no statistically significant differences were found for beginners ($F(3, 48) = .69, p = .55$). Conversely, there was a significant difference in the omnibus test for the advanced learners group ($F(4, 83) = 2.7, p = .03$). Unfortunately post-hoc tests could not be conducted as there were not enough participants in the groups.

Since homogeneity of variances could not be assumed for L1 literacy, Kruskal-Wallis tests were performed with the five bilingualism types as independent variables. Results of the Kruskal-Wallis test revealed significant

differences in the beginner group ($\chi^2 10.85$, $df 3$, $p = .01$) and in the advanced group ($\chi^2 11.13$, $df 4$, $p = .02$). Then, Mann-Whitney U tests were conducted between pairs of groups to identify where the significant differences were (Larson-Hall, 2010). A significant difference was found in the beginner group between balanced bilinguals and Catalan dominant bilinguals ($U .50$, $Z -2.01$, $p = .03$, $r = .06$), favourable to the Catalan-dominant bilinguals, although with a small effect size. There were also significant differences in the beginners group between Spanish speakers and balanced bilinguals with a very large effect size ($U 1$, $Z -3.07$, $p = .00$, $r = .79$), and between Spanish speakers and Spanish-dominant bilinguals with a large effect size ($U 37$, $Z -2.5$, $p = .01$, $r = .39$), always favourable to bilingual groups. In the advanced group, there were differences between Spanish speakers and balanced bilinguals ($U 00$, $Z -2.38$, $p = .00$, $r = .37$), and Spanish speakers and Spanish-dominant bilinguals ($U 1.5$, $Z -2.2$, $p = .00$, $r = .35$), also favourable to bilingual groups and with large effect sizes. While these findings seem to point at the differential L1 literacy outcomes of monolinguals (in this case, low-Spanish bilinguals, as there were no low-Catalan bilinguals present in the data in order to generalise to both groups) compared to bilinguals, they need to be treated with extreme caution given that the homogeneity of variances assumption could not be fulfilled and to the extremely low number of participants in the low-Spanish bilingual groups (6 in the beginner group and 2 in the advanced group).

The last linguistic context-related variable to be analysed was other foreign languages. As far as L2 development is concerned, a series of one-way between-groups ANOVA tests were conducted. There were no statistically significant differences in the beginner group ($F(2, 49) = 1.15$, $p = .32$), or the advanced group ($F(3, 84) = .77$, $p = .51$). Findings for language aptitude were similar, with no statistically significant differences for either beginners ($F(2, 49)$

= 1.33, $p = .27$) or advanced learners ($F(3, 84) = 1.46, p = .23$). The same was found for L1 reading comprehension in both groups; beginners ($F(2, 49) = 1.17, p = .31$), advanced ($F(3, 84) = 1.09, p = .35$), and for motivation: beginners ($F(2, 49) = 1.51, p = .23$), advanced ($F(3, 84) = .20, p = .89$).

6.2.2.2 Exposure Variable: Stays Abroad

For the beginner group, no tests were conducted as 98% of the student population reported not having spent any time in an English-speaking country ever. For the advanced group, a one-way between-groups ANOVA was conducted although the group was highly homogeneous too: 77% of students reported not having been in English-speaking countries at all. There were no statistically significant differences amongst the subgroups regarding L2 development ($F(4, 83) = 1.00, p = .41$), language aptitude ($F(4, 83) = .88, p = .47$), L1 literacy ($F(4, 83) = .12, p = .97$), or motivation ($F(4, 83) = .49, p = .73$).

6.2.2.3 Learner Background Variable: Academic Level

A one-way between-groups analysis (ANOVA) test was conducted to identify potential differences in the global L2 development measure due to differences in academic levels. For the beginner group, homogeneity of variances could be assumed according to Levene's test. There was a significant difference in the omnibus test ($F(4, 47) = 4.8, p = .00$). The effect size, calculated using eta-squared, was .29, which can be considered a small to medium effect size according to Cohen. Post-hoc comparisons using the Tukey test revealed that there were statistically significant differences between participants with tertiary studies ($M = 77.54, SD = 13.22$) and participants who studied until they were 14 years old ($M = 50.16, SD = 14.46$), and between participants with tertiary studies ($M = 77.54, SD = 13.22$) and participants who studied until they

were 18 years old ($M = 55.75$, $SD = 17.39$), favourable to the group with tertiary studies. For the advanced group, the test did not reach significance so there were no between-group differences.

A series of one-way between-group analyses (ANOVA) tests were then conducted between academic level and language aptitude, L1 literacy, and motivation. In the beginner group, homogeneity of variances could be assumed according to Levene's test for language aptitude and L1 literacy and according to Welsch's test for motivation. There were no statistically significant differences amongst the subgroups regarding language aptitude ($F(2, 86) = 1.2$, $p = .28$) and motivation ($F(2, 86) = .28$, $p = .75$). The omnibus test revealed a statistically significant difference in L1 literacy ($F(2, 86) = 3.2$, $p = .04$). The effect size, calculated using eta-squared, was .07, which can be considered a medium effect size according to Cohen. Post-hoc comparisons using the Tukey test revealed that there were statistically significant differences between participants who had finished studying when they were 17 years old ($M = 7.77$, $SD = 1.3$) and participants with tertiary studies ($M = 8.7$, $SD = 1.0$).

6.3 Research Question 1: Language Aptitude

The main research question 1 enquired whether language aptitude as a global score would impact L2 development differently at two levels of proficiency, beginner and advanced, and subquestion 1.a investigated which aptitude components of the set measured in this study contributed to it. To answer these research questions correlational analyses were run between the global L2 development score and the four language aptitude components, and between the global L2 development score and the global language aptitude score. In order to do that, scatterplots were examined to rule out any non-linear relationships. Table 6.32 shows correlations for the two groups.

Table 6.32 *Pearson r Coefficients for L2 Development and Language Aptitude*

| Pearson r | LLAMA B | LLAMA D | LLAMA E | LLAMA F | TOTAL APTITUDE |
|-------------------------------|-------------------|----------------------------------|-------------------|--------------------|-----------------------|
| Beginners $n = 52$ | .14 | .40** pwr = .64 ¹⁸ | .05 | .29* pwr = .55 | .39* pwr = .82 |
| Advanced $n = 88$ | .21* pwr = .50 | .11 | .26* pwr = .68 | .39** pwr = .88 | .39* pwr = .96 |

* $p < .05$, ** $p < .01$

Hypothesis 1 for the total language aptitude score was not confirmed: correlations between global language aptitude and global L2 development were the same for the two L2 development groups, beginner and advanced. A positive correlation was found in the beginner group, where $r = .39$, $n = 52$, $p < .05$, and in the advanced learners' group, $r = .39$, $n = 88$, $p < .05$. The effect size for both groups was medium according to Cohen, $R^2 = .15$ (15%).

As far as subquestion 1.a, the hypothesis for the beginner group was that the faster learner students would be those exhibiting higher levels of auditory ability. This was confirmed by the correlations reported in table 6.34, where $r = .40$, $n = 52$, $p < .01$. As shown in figure 6.16, the effect size for LLAMA D is $R^2 = .16$ (16%), which can be considered a medium effect size according to Cohen (1992). LLAMA F also correlated with L2 Development, $r = .29$, $n = 52$, $p < .05$. The effect size for LLAMA F is $R^2 = .08$ (8%), nearly a medium effect size according to Cohen (1992).

¹⁸pwr = Acronym for power. As recommended by Larson-Hall (2010), all significant correlations report the level of power and the effect size. For level of power, Murphy and Myers' (2004) recommendations are followed, by which it is considered that the level of power should be above .50 to be considered adequate, and ideally above .80. Power level was calculated using R, downloaded from <http://cran.r-project.org/>, library(pwr). As far as effect sizes are concerned, Cohen's guidelines are followed, for r ($r = .10$, small; $r = .30$, medium; $r = .50$, large), and squared r ($R^2 = .01$, small; $R^2 = .09$, medium; $R^2 = .25$, large).

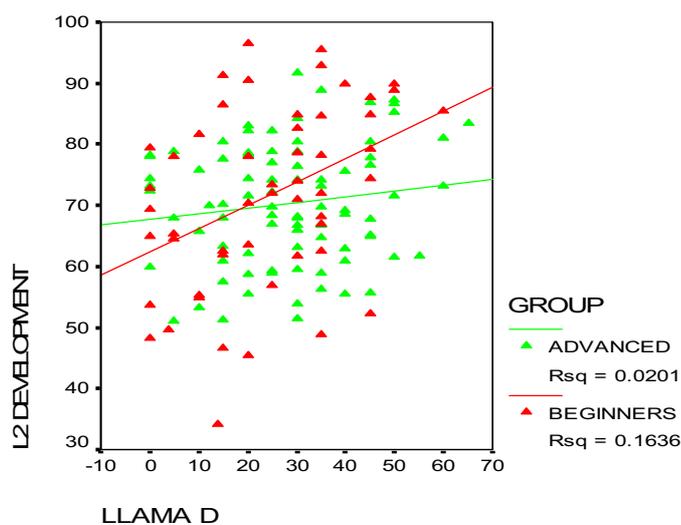


Figure 6.16 Correlation effect size for LLAMA D, beginner group

There were three language aptitude components showing a significant correlation with L2 development for the advanced group. Students exhibiting higher levels of language analytic ability presented a faster development, as suggested by the correlations reported in table 6.33. Two explanatory variables yielded weak to moderate correlation indexes, LLAMA B, $r = .21$, $n = 88$, $p < .05$, and LLAMA E, $r = .26$, $n = 88$, $p < .05$, while the correlation index for LLAMA F was much stronger, $r = .39$, $n = 88$, $p < .01$. A standard multiple regression analysis was conducted for this group entering LLAMA B, LLAMA E, and LLAMA F as independent variables, with the objective of finding out which was the unique contribution of LLAMA F. Assumptions for multiple regression were previously checked and are presented in appendix B, section B.3.

Table 6.33 *Standard Multiple Regression Results for Language Aptitude Components*

| | R ² | LLAMA B | | | LLAMA E | | | LLAMA F | | |
|-------------------------|----------------|---------|------------|-----------------|---------|-------------|-----------------|---------|--------------|-----------------|
| | | B | t-t | sr ² | B | t-t | sr ² | B | t-t | sr ² |
| L2 Dev <i>n</i> = 88 | .17 | .05 | .54 .58 | - | .12 | 1.19 .23 | - | .32 | 2.9** .00 | .08 |

Standardized B coefficients are reported for variable comparability.

** significant at the 0.01 level (2-tailed)

* significant at the 0.05 level (2-tailed)

Previous research had pointed out that LLAMA F (grammatical inferencing) would be the LLAMA test showing the largest contribution to L2 development. The correlation indexes reported for LLAMA B and E were small, and so these components did not reach significance in the regression and were excluded from the model. Only LLAMA F remained significant, explaining an overall variance of 8%. Although the variance explained was small to medium according to Cohen's standards, this result was consistent with previous research as LLAMA F being the only test explaining variance for advanced learners.

Subquestion 1.b. investigated to which language dimensions each language aptitude component would contribute. To answer this question, exploratory correlations were conducted for all LLAMA tests and all language dimensions. Results are displayed in table 6.34.

Table 6.34 *Pearson's r Coefficients for LLAMA Tests and Language Dimensions*

| Beginners | LLAMA B | LLAMA D | LLAMA E | LLAMA F |
|----------------------------|---------|--------------------|---------|-------------------|
| Grammar <i>n</i> = 52 | .05 | .36** pwr = .51 | .07 | .25 |
| Reading <i>n</i> = 52 | .19 | .31* pwr = .61 | .09 | .27* pwr = .49 |
| Listening <i>n</i> = 52 | .06 | .37** pwr = .55 | .02 | .30* pwr = .58 |

| | | | | |
|---------------------------|-----|--------------------|-----|-----|
| Writing <i>n</i> = 52 | .10 | .31* pwr = .61 | .09 | .26 |
| Speaking <i>n</i> = 52 | .10 | .35** pwr = .48 | .00 | .14 |

* $p < .05$, ** $p < .01$

| Advanced | LLAMA B | LLAMA D | LLAMA E | LLAMA F |
|----------------------------|--------------------|---------|-------------------|--------------------|
| Grammar <i>n</i> = 88 | .04 | .12 | .22* pwr = .54 | .26* pwr = .68 |
| Reading <i>n</i> = 88 | .27* pwr = .72 | .11 | .30* pwr = .81 | .36* pwr = .93 |
| Listening <i>n</i> = 88 | .34** pwr = .75 | .20 | .07 | .29** pwr = .56 |
| Writing <i>n</i> = 88 | .06 | .07 | .06 | .20 |
| Speaking <i>n</i> = 88 | -.05 | -.06 | .22* pwr = .54 | .17 |

* $p < .05$, ** $p < .01$

In the beginner group, LLAMA D test yielded moderate correlations with all language dimensions: grammar, $r = .36$, $n = 52$, $p < .01$; reading, $r = .31$, $n = 52$, $p < .05$; listening, $r = .37$, $n = 52$, $p < .01$; writing, $r = .31$, $n = 52$, $p < .05$; and speaking, $r = .35$, $n = 52$, $p < .01$. Correlations for LLAMA B and LLAMA E tests did not reach significance for any of the language skills. Finally, LLAMA F correlated mildly with only two language measures: reading $r = .27$, $n = 52$, $p < .05$; and listening $r = .30$, $n = 52$, $p < .05$.

The advanced learners' group behaved differently. LLAMA D test did not correlate with any L2 development measures, while the other three aptitude tests correlated weakly to moderately with several language dimensions. Correlations with LLAMA B test reached significance for reading, $r = .27$, $n = 88$, $p < .05$; and listening, $r = .34$, $n = 88$, $p < .01$. LLAMA E showed weak to moderate correlations with grammar, $r = .22$, $n = 88$, $p < .05$; reading, $r = .30$, $n =$

88, $p < .05$; and speaking, $r = .22$, $n = 88$, $p < .05$. Finally, LLAMA F yielded the same size correlations with grammar, $r = .26$, $n = 88$, $p < .05$; reading, $r = .36$, $n = 88$, $p < .05$; and listening, $r = .29$, $n = 88$, $p < .01$.

No further multiple regression analyses were conducted, since correlations need to show correlation indexes higher than .30 to be suitable for multiple regression and this was not the case.

Subquestion 1.c. explored the possible contribution to the language aptitude construct by a new factor, tolerance of ambiguity, as proposed by previous research (Ehrman & Oxford, 1995; Ehrman, 1988; Grigorenko et al., 2000). Based on findings from previous studies (see chapter 2, section 2.9.1), it was hypothesized that an instrument specifically devised to measure tolerance of ambiguity would add explanatory power to the language aptitude construct.

Correlations were run for tolerance of ambiguity and global L2 development. Results are shown in table 6.35.

Table 6.35 *Pearson r Coefficients for L2 Development and Tolerance of Ambiguity*

| L2 Development | Tolerance of Ambiguity |
|-----------------------|------------------------|
| Beginners $n = 52$ | -.18 |
| Advanced $n = 88$ | .10 |

* $p < .05$, ** $p < .01$

The tolerance of ambiguity variable did not correlate with global development for either group, so no further analyses were conducted.

Finally, the last subquestion in research question 1 asked whether L1 reading comprehension would play a mediating role between global

development and global language aptitude. A partial correlation was conducted with the three variables at play for the two proficiency groups and compared with the correlations indexes between L2 development and total language aptitude. Results are shown in table 6.36.

Table 6.36 *Pearson r Coefficients for L2 Development and Language Aptitude Mediated by L1 Reading Comprehension*

| L2 Development | Global Language Aptitude | Global Language Aptitude controlling for L1 reading comprehension |
|-----------------------|--------------------------|---|
| Beginners $n = 49$ | .39** pwr = .61 | .36** pwr = .51 |
| Advanced $n = 88$ | .39** pwr = .88 | .38*** pwr = .64 |

* $p < .05$, ** $p < .01$, *** $p < .001$

A partial correlation controlling for L1 reading comprehension continued to find a moderate correlation between global development and global language aptitude for beginners, $r = .36$, $n = 49$, $p < .01$. L1 reading comprehension played a minor moderating role for this group, as the correlation coefficient between the two main variables was slightly higher than without controlling for L1 reading comprehension, $r = .39$, $n = 52$, $p < .05$. For the advanced group, L1 reading comprehension's mediating role was insignificant. Controlling for L1 reading comprehension, a moderate correlation between global development and global language aptitude for advanced learners was still held, $r = .38$, $n = 85$, $p < .001$. In this case the drop in r was irrelevant, from $r = .39$, $n = 88$, $p < .01$ to $r = .38$, $n = 85$, $p < .01$, so it can be concluded that L1 reading comprehension did not play any mediating role for advanced learners.

6.4 Research Question 2: L1 Literacy

Research question 2 investigated the role played by L1 literacy for adult learners of English. This section presents the results of the analyses conducted to answer research question 2 and its subquestions.

The main research question in this section explores the role played by L1 literacy at beginner and advanced levels of proficiency for adult learners of English as a foreign language. It was hypothesized that L1 literacy would play a prominent role for beginners, while having a much lower influence for advanced students. This finding would be consistent with the threshold hypothesis (Cummins, 1979a), by which threshold levels of linguistic competence should be attained by children before they can enjoy the cognitive benefits of bilingualism. Exploratory correlational analyses were conducted between the variables under scrutiny for the two proficiency groups. Results are shown in table 6.37.

Table 6.37 *Pearson r Coefficients for L2 Development, L1 Reading Comprehension, and L1 Spelling*

| L2 Development | L1 Reading Comprehension | L1 Spelling |
|-----------------------|--------------------------|-------------------|
| Beginners $n = 52$ | .29* pwr = .55 | .42* pwr = .88 |
| Advanced $n = 88$ | .14 | .23* pwr = .57 |

* $p < .05$, ** $p < .01$

Subquestion 2.a explored the contribution of each L1 literacy variable. Regarding L1 reading comprehension, a nearly medium correlation was found for the beginner group, $r = .29$, $n = 52$, $p < .05$, with the following size effect, $R^2 =$

8%. For the advanced group correlation did not reach significance. This finding would be consistent with the threshold hypothesis (Cummins, 1979a).

As far as L1 spelling is concerned, a medium to large correlation was found for the beginner group, $r = .42$, $n = 52$, $p < .05$, with a medium to large size effect, $R^2 = 17\%$. The power level for the beginner group was of .61 for L1 reading comprehension and .69 for spelling. For the advanced group, a small correlation was found, $r = .23$, $n = 88$, $p < .05$. This finding would be consistent with the threshold hypothesis too.

Hypothesis for subquestion 2.b predicted that the level of proficiency in the different language skills in participant's L1 would correlate with L2 skills' outcomes. Since subjects were all adults, it was assumed that L1 speakers would score at ceiling in oral skills (listening and speaking). The remaining three language dimensions were correlated to L1 reading comprehension and L1 spelling. Results of correlations are shown in table 6.38.

Table 6.38 *Pearson r Coefficients for L2 language dimensions, L1 Reading Comprehension, and L1 Spelling*

| Beginners | L1 Reading Comprehension | L1 Spelling |
|------------------------|---------------------------------|--------------------|
| L2 Grammar $n = 52$ | .23* pwr = .37 | .45** pwr = .79 |
| L2 Reading $n = 52$ | .20 | .22 |
| L2 Writing $n = 52$ | .32* pwr = .64 | .47** pwr = .83 |

* $p < .05$, ** $p < .01$

| Advanced | L1 Reading Comprehension | L1 Spelling |
|-----------------------------|--------------------------|--------------------|
| L2 Grammar <i>n</i> = 88 | .09 | .31** pwr = .64 |
| L2 Reading <i>n</i> = 88 | .13 | .03 |
| L2 Writing <i>n</i> = 88 | .08 | .40** pwr = .90 |

* $p < .05$, ** $p < .01$

In the beginner group, L1 reading comprehension yielded a moderate correlation only for writing, $r = .34$, $n = 52$, $p < .05$. Correlations for L1 spelling showed higher indexes with two L2 language dimensions: grammar, $r = .45$, $n = 52$, $p < .01$; and writing, $r = .47$, $n = 52$, $p < .01$. In the advanced group L1 reading comprehension did not impact any of the L2 language dimensions; no significance was reached. However, the effects of L1 spelling were slightly lower than for the beginner group but still moderately significant for the same dimensions: grammar, $r = .31$, $n = 88$, $p < .01$; and writing, $r = .40$, $n = 88$, $p < .01$.

Finally, subquestion 2.c inquired whether reading habits in adulthood would play any role in foreign language acquisition for the two groups of learners. Exploratory correlations were conducted between L2 development and the two reading habits measures. Results can be found in table 6.39.

Table 6.39 *Pearson r Coefficients for L2 Development and Reading Habits*

| | Beginners <i>n</i> = 52 | Advanced <i>n</i> = 88 |
|------------------|----------------------------|---------------------------|
| Reading Quantity | .18 | .29** pwr = .56 |
| Enjoy Reading | .06 | .28** pwr = .52 |

* $p < .05$, ** $p < .01$

In the beginner group none of the reading habits variables correlated with L2 development. Conversely, in the advanced group, reading quantity yielded a moderate correlation, $r = .29$, $n = 88$, $p < .01$, with a small size effect, $R^2 = .08$, and so did enjoy reading, $r = .28$, $n = 88$, $p < .01$, with a slightly smaller size effect, $R^2 = .07$. A more fine-grained correlational analysis was then conducted to investigate which were the language dimensions which were influenced by literacy activities. The result of the second correlational analysis is shown in table 6.40.

Table 6.40 *Pearson's r Coefficients L2 Language Dimensions and Literacy Development*

| Advanced Group | L2 Grammar | L2 Reading | L2 Listening | L2 Writing | L2 Speaking |
|------------------------------|--------------------|------------|--------------------|-------------------|-------------|
| Reading Quantity $n = 88$ | .17 | .18 | .40** pwr = .90 | .18 | .00 |
| Enjoy Reading $n = 88$ | .30** pwr = .60 | .14 | .30** pwr = .60 | .23* pwr = .57 | -.02 |

* $p < .05$, ** $p < .01$

L2 grammar showed a moderate correlation with enjoy reading, $r = .30$, $n = 88$, $p < .01$ for advanced learners, but the most influenced dimension was L2 listening, which correlated moderately with the two literacy development measures in the two L2 development groups: reading quantity, $r = .40$, $n = 88$, $p < .01$; enjoy reading, $r = .30$, $n = 88$, $p < .01$. Finally, L2 writing was only mildly impacted by enjoy reading, $r = .23$, $n = 88$, $p < .05$.

6.5 Research Question 3: Motivation and Orientations

Research question 3 investigated the role played by motivation and orientations on L2 development. The questionnaire included three measures:

one for motivation, one for communicative orientations, and a third one for professional orientations.

Exploratory correlations were conducted for both proficiency groups. Results are presented in table 6.41.

Table 6.41 *Pearson r Coefficients for L2 Development and Motivation*

| L2 Development | Beginners $n = 52$ | Advanced $n = 88$ |
|----------------------------|-----------------------|----------------------|
| Motivation | -.02 | .33* pwr = .88 |
| Communicative Orientations | .00 | .08 |
| Professional Orientations | .33** pwr = .42 | -.10 |

* $p < .05$, ** $p < .01$

The three measures behaved in a totally different manner for the two proficiency groups. While professional orientation was the only variable to be significant for the beginner group, $r = .33$, $n = 52$, $p < .01$, with a medium effect size, $R^2 = .10$, for the advanced learners' group motivation was the only measure to reach significance, $r = .33$, $n = 88$, $p < .05$, with the same effect size, $R^2 = .10$.

6.6 Research Question 4: Age

To investigate subquestion 4.a on the role of age for the two proficiency groups, exploratory correlations for AT and global L2 development were conducted. Results are shown in table 6.42.

Table 6.42 *Pearson r Coefficients for L2 Development and Age at Testing (AT)*

| L2 Development | Age at Testing |
|-----------------------|-------------------|
| Beginners $n = 52$ | -.38**, pwr = .58 |
| Advanced $n = 88$ | -.16 |

* $p < .05$, ** $p < .01$

For beginners, AT showed a moderate negative correlation with L2 development, $r = -.38$, $n = 52$, $p < .01$, with a medium effect size, $R^2 = 14\%$. Conversely, for advanced learners, the correlation did not reach significance.

The potentially differential age effects on the five language skills were then explored to investigate which skills were most impacted by age. Results are shown in table 6.43. As with other independent variables, AT played a very different role at two levels of proficiency: in the beginner group, reading was the most highly impacted skill, $r = -.49$, $n = 52$, $p < .01$, followed by speaking, $r = -.34$, $n = 52$, $p < .05$, listening, $r = -.28$, $n = 52$, $p < .05$, and writing, $r = -.28$, $n = 52$, $p < .05$, whereas for advanced learners AT impacted the listening skill, $r = -.52$, $n = 52$, $p < .01$ exclusively.

Table 6.43 *Pearson's r Coefficients L2 Language Dimensions and AT*

| Beginners | L2 Grammar | L2 Reading | L2 Listening | L2 Writing | L2 Speaking |
|---------------------------------|------------|---------------------|--------------------|--------------------|--------------------|
| Age at Testing (AT) $n = 52$ | -.20 | -.49** pwr = .87 | -.28* pwr = .52 | -.28* pwr = .52 | -.34* pwr = .69 |

| Advanced | L2 Grammar | L2 Reading | L2 Listening | L2 Writing | L2 Speaking |
|--------------------------------------|-------------------|-------------------|---------------------|-------------------|--------------------|
| Age at Testing (AT) <i>n</i> = 88 | .07 | -.14 | -.52** pwr = .99 | .12 | .02 |

* $p < .05$, ** $p < .01$

Subquestion 4.b enquired whether AT would play a mediating role with the main independent variables being investigated. First, correlations were conducted between L2 development and language aptitude, L1 reading comprehension, L1 spelling, and motivation. Results can be seen in table 6.44.

Table 6.44 *Pearson's r Coefficients L2 Development and Language Aptitude, L1 Literacy, Motivation*

| L2 Development | Language Aptitude | L1 Spelling | L1 Reading Comprehension | Motivation |
|----------------------------|--------------------------|--------------------|---------------------------------|--------------------|
| Beginners <i>n</i> = 52 | .39** pwr = .61 | .42** pwr = .70 | .31* pwr = .61 | .01 |
| Advanced <i>n</i> = 88 | .39** pwr = .88 | .23* pwr = .57 | .14 | .33** pwr = .71 |

* $p < .05$, ** $p < .01$

Then the same correlations were conducted again, this time controlling for AT. Results are displayed in table 6.45.

Table 6.45 *Pearson's r Coefficients Controlling for AT*

| L2 Development | Language Aptitude | L1 Spelling | L1 Reading Comprehension | Motivation |
|----------------------------|--------------------------|---------------------|---------------------------------|--------------------|
| Beginners <i>n</i> = 52 | .30* pwr = .58 | .55*** pwr = .84 | .50*** pwr = .84 | -.01 |
| Advanced <i>n</i> = 88 | .36*** pwr = .56 | .25* pwr = .65 | .15 | .33** pwr = .88 |

* $p < .05$, ** $p < .01$, *** $p < .001$

In the beginner group, AT mediated the relationship between L2 development and language aptitude: when controlling for AT, the correlation coefficient dropped from .39 to .30. Conversely, for L2 development and L1 spelling and L1 reading comprehension, correlation coefficients increased when AT was partialled out: for L1 spelling, from .42 to .55; and for L1 reading comprehension, from .31 to .50. It did not mediate the relationship between L2 development and motivation, which still failed to reach significance.

In the advanced group, AT only mediated the relationship between L2 development and language aptitude slightly (from .39 to .36), in a weaker manner than in the beginner group. It mediated the relationship between L2 development and L1 spelling in a negligible manner: the correlation coefficient increased from .23 to .25. Finally, it did not mediate the relationship between L2 development and L1 reading comprehension or motivation.

6.7 Research Question 5: Relationships Amongst Variables

Research question five investigates which individual differences impact L2 acquisition at two different levels of proficiency, and, as a secondary aim, how do they relate to each other, what may be the variable interactions impacting L2 development. As proposed by Dörnyei (2009), the goal is to identify not only which variables explain variance, but to explore complex systems of variables which show inherent change: language as a multifaceted adaptative system. Because this section is rather innovative and exploratory in nature, the following steps were taken to investigate complex relationships between variables and constructs: first, a picture of the independent variables with more explanatory power at the two levels of proficiency studied in this dissertation is provided. Given the high number of independent variables in this study, it was advisable to group some of the variables used to measure

underlying factors which were likely to have a high degree of overlap. In the study, there are a number of different variables drawing upon literacy and academic performance, as follows: L1 reading comprehension, L1 spelling, reading quantity, and enjoy reading. A fifth literacy-related variable was added because of the significant differences found in the two groups, although initially it had been designed as a control variable: academic level. A principal components analysis (PCA¹⁹), an exploratory factor analytic technique used to summarize the interrelationships amongst a set of original variables into a smaller set of dimensions (factors) with a minimum loss of information, was performed to empirically reduce the data included in such variables. First, the suitability of the data was assessed: in the beginner group, most inter-variable correlations were in the range of .29 to .68, so either very close or beyond the .30 correlation coefficient recommended as a minimum. The Kaiser-Meyer-Olkin (KMO) value was .62, and the Barlett's Test of Sphericity was significant ($p = .000$). In the advanced group, most inter-variable correlations were in the range of .27 to .46, so again very close or beyond the .30 recommendation. The KMO value was very close to the minimum recommended value (.60), .54, and the Barlett's Test of Sphericity was significant ($p = .000$). Therefore, data supported the factorability of the correlation matrixes.

For the beginner group, an unrotated PCA revealed the presence of two components with eigenvalues exceeding 1, explaining 43% and 24% of the variance respectively. The inspection of the scree plot revealed a clear break after the second component (see scree plot in appendix B, section B.4). Three

¹⁹PCA (principal components analysis) is preferred to CFA (common factor analysis) when the primary objective is prediction or the minimum number of factors needed to account for the maximum portion of variance represented by the original variance. PCA considers the total variance and derives factors which contain small proportions of unique variance. This is preferable when the resulting set of factors is to be treated as uncorrelated variables for multiple regression (Hair et al. 2012).

variables loaded on a first component ($\lambda = 2.191$) and four on a second component ($\lambda = 1.240$). An orthogonal Varimax²⁰ rotation was then performed. The three variables that loaded on the first component with values greater than .3 were enjoy reading ($\lambda = .887$), reading quantity ($\lambda = .884$), and L1 reading comprehension ($\lambda = .574$). The three variables that loaded on the second component with values greater than .3 were academic level ($\lambda = .853$), L1 spelling ($\lambda = .776$), and L1 reading comprehension ($\lambda = .337$). To enhance component independence, variables which loaded on more than one factor were candidates for deletion. L1 reading comprehension loaded on component one ($\lambda = .574$), and on component two ($\lambda = .337$), so it was deleted from the two-factor solution. A final PCA with Varimax rotation was then performed for the remaining variables. Factor loadings are presented in table 6.46.

Table 6.46 *Table Pattern/Structure for Coefficients Beginners. Varimax Rotation of Two Factor Solution*

| Item | Component 1 | Component 2 |
|-------------------------|-------------|-------------|
| Enjoy reading | .916 | |
| Reading quantity | .904 | |
| Academic level | | .864 |
| L1 spelling | | .795 |
| % of variance explained | 43% | 35% |

For the advanced group, an unrotated PCA outlined the presence of two components again, with eigenvalues exceeding 1. These two components

²⁰ Orthogonal rotation methods are preferred to oblique rotation methods when the objective is to reduce a large number of variables to a smaller set of uncorrelated variables for subsequent use in multiple regression (Hair et al., 2012)

explained 34% and 26% of the variance respectively. The inspection of the scree plot revealed a clear break after the second component, too (scree plot can be found in appendix B.4). Three variables loaded on a first component ($\lambda = 1.734$) and also three on a second component ($\lambda = 1.334$). An orthogonal Varimax rotation was performed for this group too. The three variables that loaded on the first component with values greater than .3 were enjoy reading ($\lambda = .842$), reading quantity ($\lambda = .833$), and L1 reading comprehension ($\lambda = .295$). The three variables that loaded on the second component with values greater than .3 were academic level ($\lambda = .625$), L1 reading comprehension ($\lambda = .764$), and spelling ($\lambda = .728$). Subsequently, and to enhance component independence, variables with loadings on more than one component were assessed. L1 reading comprehension loaded on component one ($\lambda = .295$), and on component two ($\lambda = .764$), so it was deleted from the two-factor solution. A final PCA with Varimax rotation was then performed for the remaining variables. Factor loadings are presented in table 6.47.

Table 6.47 *Table Pattern/Structure for Coefficients Advanced Learners. Varimax Rotation of Two Factor Solution*

| Item | Component 1 | Component 2 |
|-------------------------|-------------|-------------|
| Enjoy reading | .851 | |
| Reading quantity | .847 | |
| Academic level | | .761 |
| L1 Spelling | | .749 |
| % of variance explained | 37% | 28% |

As far as the interpretation of the two factors underlying the set of variables explored is concerned, they could be labelled as reading habits and academic development. PCA results suggest that reading habits is a construct contributing to L2 development, but that it develops independently from academic development. Therefore, individuals may show high or low levels of reading ability independently from their academic development.

Resulting variables representing main IDs in the study after literacy-related variables were submitted to PCA are shown in table 6.48.

Table 6.48 *List of Variables Representing Constructs*

| Constructs | Variables |
|-------------------|---|
| Language aptitude | Language aptitude |
| L1 literacy | L1 reading comprehension Academic development Reading habits |
| Motivation | Motivation Communicative orientations Professional orientations |
| Age | Age at testing |

Once variables were reduced, exploratory correlations were conducted between the set of variables representing the four main IDs and L2 development. Communicative orientations were not included in the correlational analysis as it had yielded no significant results in previous analysis for either group (see section 6.5). Results are presented in table 6.49.

Table 6.49 *Pearson's r Coefficients for L2 Development and Main Variables in the Study*

| Beginners | Language Aptitude | L1 Reading Comp. | Academic Developm. | Reading Habits | Motiv. | Prof. Orient. | AT |
|----------------------------|--------------------------|-------------------------|---------------------------|-----------------------|---------------|----------------------|---------------------|
| Grammar <i>n</i> = 52 | .33* pwr = .67 | .23 | .51** pwr = | .14 | -.11 | .13 | -.20 |
| Reading <i>n</i> = 52 | .38** pwr = .58 | .20 | .21 | .03 | .04 | .31* pwr = .61 | -.49** pwr = .87 |
| Listening <i>n</i> = 52 | .34* pwr = .69 | .28* pwr = .52 | .32* pwr = | .14 | .04 | .37** pwr = .55 | -.28* pwr = .52 |
| Writing <i>n</i> = 52 | .34* pwr = | .32* pwr = .64 | .51** pwr = | .22 | .00 | .28* pwr = .52 | -.28* pwr = .52 |
| Speaking <i>n</i> = 52 | .26 | .25 | .39** pwr = | -.04 | -.07 | .34* pwr = .69 | -.34* pwr = .69 |
| L2 Dev <i>n</i> = 52 | .39** pwr = .61 | .31* pwr = .61 | .47** pwr = .73 | .12 | -.02 | .33* pwr = .67 | -.38** pwr = .58 |

* $p < .05$, ** $p < .01$

| Advanced | Language Aptitude | L1 Reading Comp. | Academic Developm. | Reading Habits | Motiv. | Prof. Orient. | AT |
|----------------------------|--------------------------|-------------------------|---------------------------|-----------------------|--------------------|----------------------|---------------------|
| Grammar <i>n</i> = 88 | .25* pwr = .65 | .09 | .27** pwr = .48 | .27* pwr = | .29** pwr = .56 | -.07 | .07 |
| Reading <i>n</i> = 88 | .41** pwr = .92 | .13 | .05 | .19 | .01 | -.06 | -.14 |
| Listening <i>n</i> = 88 | .36** pwr = .81 | -.01 | -.18 | .41** pwr = .92 | .31** pwr = .64 | .08 | -.52** pwr = .99 |
| Writing <i>n</i> = 88 | .15 | .18 | .39** pwr = | .23* pwr = .57 | .30** pwr = .60 | -.18 | .12 |
| Speaking <i>n</i> = 88 | -.11 | .10 | .28** pwr = .52 | -.01 | .21* pwr = .50 | -.16 | .02 |
| L2 Dev <i>n</i> = 88 | .39** pwr = .88 | .14 | .21 | .33** pwr = .71 | .33** pwr = .71 | -.10 | -.16 |

* $p < .05$, ** $p < .01$

The following step was to conduct multiple regression analyses with the independent variables showing the highest correlation coefficients with L2

development, to identify which were the variables which had a stronger explanatory power for each stage of development.

A standard multiple regression analysis was conducted for the beginner group, with L2 development as the dependent variable and the five independent variables showing higher correlation coefficients: language aptitude, L1 reading comprehension, academic development, professional orientations, and AT. Assumptions for multiple regression were previously checked and are presented in appendix B, section B.2. Table 6.50 shows the results of the regression tests, where the multiple correlation coefficient (r^2) is presented, as well as the standardized coefficient (B), the t-test value and significance value, and, finally, the squared semipartial correlation (sr^2) for each explanatory variable.

Table 6.50 *Standard Multiple Regression Results for Main Variables Beginners*

| | R ² | Language Aptitude | | | L1 reading comprehension | | | Academic Development | | | Professional Orientations | | | Age at Testing | | |
|-------------------------|----------------|-------------------|------------|-----------------|--------------------------|--------------|-----------------|----------------------|--------------|-----------------|---------------------------|------------|-----------------|----------------|--------------|-----------------|
| | | B | t-t | sr ² | B | t-t | sr ² | B | t-t | sr ² | B | t-t | sr ² | B | t-t | sr ² |
| L2 Dev <i>n</i> = 52 | .54 | .05 | .51 .60 | - | .36 | 3.1** .00 | .09 | .40 | 3.7** .00 | .13 | .24 | 1.0 .06 | - | -.34 | -2.5* .01 | -.06 |

Standardized B coefficients are reported for variable comparability.

**significant at the 0.01 level (2-tailed)

* significant at the 0.05 level (2-tailed)

Independent variables explained 54% of variance, as indicated by the R² value. Also, it can be observed that only three out of five variables contributed to the regression: L1 reading comprehension, academic development, and AT. Language aptitude and professional orientations did not reach significance. Academic development and L1 reading comprehension had the highest unique contribution to the overall R, with 13% and 9% respectively, as indicated by the squared semipartial correlation (sr^2), followed by AT ($sr^2 = -6\%$).

Additional standard multiple regression tests were performed for all language dimensions to investigate the potential differential behaviour of the independent variables with the different skills. As with previous multiple regression analyses, assumptions were checked and can be found in appendix B, section B.5. Results are presented in table 6.51.

Table 6.51 *Standard Multiple Regression Analyses for Main Variables by Language Skill Beginners*

| | R ² | Language Aptitude | | | L1 reading comprehension | | | Academic Development | | | Professional Orientation | | | Age at Testing | | |
|----------------------------|----------------|-------------------|-------------|-----------------|--------------------------|--------------|-----------------|----------------------|--------------|-----------------|--------------------------|-------------|-----------------|----------------|---------------|-----------------|
| | | B | t-t | sr ² | B | t-t | sr ² | B | t-t | sr ² | B | t-t | sr ² | B | t-t | sr ² |
| Grammar <i>n</i> = 52 | .36 | .10 | .79 .43 | - | .18 | 1.3 .17 | - | .45 | 3.5** .00 | .17 | .09 | .64 .52 | - | -.17 | -1.1 .27 | - |
| Listening <i>n</i> = 52 | .39 | .07 | .55 .58 | - | .31 | 2.4* .02 | .07 | .28 | 2.2* .02 | .07 | .37 | 2.5* .01 | .08 | -.15 | -.96 .34 | - |
| Reading <i>n</i> = 52 | .42 | .10 | .79 .43 | - | .35 | 2.8** .00 | .01 | .11 | .92 .36 | - | .03 | .27 .78 | - | -.55 | -3.6** .00 | .16 |
| Writing <i>n</i> = 52 | .49 | .02 | .24 .80 | - | .33 | 2.7** .00 | .08 | .46 | 4.0** .00 | .18 | .26 | 1.9 .05 | - | -.23 | -1.6 .11 | - |
| Speaking <i>n</i> = 52 | .41 | - .05 | -.44 .65 | - | .32 | 2.5** .01 | .08 | .36 | 3.0** .00 | .11 | .29 | 2.0* .04 | .05 | -.30 | -1.9* .06 | .04 |

Standardized B coefficients are reported for variable comparability.

** significant at the 0.01 level (2-tailed)

* significant at the 0.05 level (2-tailed)

Analyses of the behaviour of independent variables unveiled distinct patterns of explanation depending on the language dimension explored. As far as grammar is concerned, 36% of the overall variance was explained, as indicated by the R² value. There was only one variable contributing uniquely to the explanation of this variance, academic development, by 17% (sr²). Listening behaved in a remarkably different manner: in this case there were three variables contributing to the explanation of a total 39% of variance (R²): L1 reading comprehension and academic development by the same percentage (sr² = 7%), and professional orientations (sr² = 8%). As for reading, the model

explained 42% of variance, as indicated by the R^2 value. Only two variables contributed uniquely: L1 reading comprehension very slightly ($sr^2 = 1\%$), and AT ($sr^2 = 16\%$). The highest overall variance explained was for writing ($R^2 = 49\%$), to which two variables contributed uniquely: L1 reading comprehension ($sr^2 = 8\%$), and academic development ($sr^2 = 18\%$). Finally, the set of variables explained a 41% of variance for speaking, with four independent variables contributing uniquely to that variance: L1 reading comprehension ($sr^2 = 8\%$), academic development ($sr^2 = 11\%$), professional orientations ($sr^2 = 5\%$), and AT ($sr^2 = 4\%$).

A standard multiple regression analysis was then conducted for the advanced group, with global L2 development as the dependent variable and the four variables showing higher correlation coefficients as independent variables: language aptitude, reading ability, motivation, and AT. Assumptions for multiple regression were previously checked and are presented in appendix B, section B.2. Table 6.52 shows the results of the regression tests, where the multiple correlation coefficient (r^2) is presented, together with the standardized coefficient (B), the t-test value and significance value, and, finally, the squared semi partial correlation (sr^2) for each explanatory variable.

Table 6.52 *Standard Multiple Regression Results for Main Variables Advanced*

| | R^2 | Language Aptitude | | | Reading Habits | | | Motivation | | | Age at Testing | | | |
|--------------------|-------|-------------------|-------|--------|----------------|------|--------|------------|------|--------|----------------|------|--------|---|
| | | B | t-t | sr^2 | B | t-t | sr^2 | B | t-t | sr^2 | B | t-t | sr^2 | |
| L2 Dev $n = 88$ | .31 | .37 | 3.2** | .09 | .25 | 2.7* | .08 | .28 | 3.1* | .10 | -.00 | -.08 | -.93 | - |

Standardized B coefficients are reported for variable comparability.

** significant at the 0.01 level (2-tailed)

* significant at the 0.05 level (2-tailed)

In this case, variables explained much less variance, 31%, as indicated by the R^2 value. Three out of four variables contributed to the regression: language aptitude, reading habits, and motivation. Motivation had the largest unique contribution to the overall R , 10%, as indicated by the squared semipartial correlation (sr^2); followed closely by language aptitude, which contributed by $sr^2 = 9\%$, and, eventually, reading habits ($sr^2 = 8\%$).

A standard multiple regression was then conducted for each language dimension. As with previous multiple regression analyses, assumptions were checked and can be found in appendix B, section B.5. Results are presented in table 6.53.

Table 6.53 *Standard Multiple Regressions for Main Variables by Language Dimension*

| | R^2 | Language Aptitude | | | Reading Habits | | | Motivation | | | Age at Testing | | |
|-----------------------|-------|-------------------|--------------|--------|----------------|--------------|--------|------------|--------------|--------|----------------|---------------|--------|
| | | B | t-t | sr^2 | B | t-t | sr^2 | B | t-t | sr^2 | B | t-t | sr^2 |
| Grammar $n = 88$ | .22 | .25 | 2.4* .01 | .05 | .23 | 2.3* .02 | .05 | .26 | 2.7* .00 | .06 | .20 | 1.9* .05 | .03 |
| Listening $n = 88$ | .48 | .14 | 1.7 .09 | - | .31 | 3.8** .00 | .09 | .26 | 3.3** .00 | .07 | -.42 | -5.0** .00 | .15 |
| Reading $n = 88$ | .18 | .39 | 3.7** .00 | .13 | .12 | 1.2 .22 | - | - | -.28 .77 | - | .00 | .05 .95 | - |
| Writing $n = 88$ | .19 | .16 | 1.5 .12 | - | .21 | 2.1* 0.3 | .04 | .28 | 2.8** .00 | .07 | .21 | 2.0* .04 | .04 |
| Speaking $n = 88$ | .05 | .12 | 1.0 .29 | - | -.04 | -.40 .68 | - | .20 | 1.9* .05 | .04 | .06 | .55 .57 | - |

Standardized B coefficients are reported for variable comparability.

** significant at the 0.01 level (2-tailed)

* significant at the 0.05 level (2-tailed)

Independent variables in the advanced group also behaved very differently depending on the language dimension. Concerning grammar, 22% of the overall variance was explained, with four variables contributing uniquely to the explanation of this variance; language aptitude ($sr^2 = 5\%$), reading habits

($sr^2 = 6\%$), motivation ($sr^2 = 6\%$), and, to a lesser extent, AT ($sr^2 = 3\%$). Unlike in the beginner group, the largest overall variance explained was for listening ($R^2 = 48\%$), with AT having the largest unique contribution, $sr^2 = 15\%$. Reading ability added 9%, and motivation 7%. The same variables explained variance for writing ($R^2 = 19\%$): motivation ($sr^2 = 7\%$), reading habits ($sr^2 = 4\%$), and AT ($sr^2 = 4\%$). In the end, the set of variables explained only a 5% of variance for speaking, with only one variable contributing uniquely: motivation ($sr^2 = 4\%$).

Regression analyses provided distinct pictures of explanatory variables at two levels of L2 development; but something which regression-based approaches cannot do, as the first-generation statistical technique which they are, is depicting more complex variable interaction situations in which variables have both a direct relationship and in which they may have a mediating or moderating role too, as suggested previously in this chapter for AT or L1 reading comprehension, or in which one variable influences a second variable which in turn has an impact on the dependent variable. At this point, second-generation statistical techniques are recommended, with emphasis on structural equation modelling for goodness-of-fit with adaptive systems (Dörnyei, 2009). The specific characteristics of the dataset used for this dissertation motivated the choice of Partial Least Squares (PLS): PLS analysis may be an alternative to Structural Equation Modelling (SEM) when the objective of the research is to 'handle causal paths relating predictors as well as paths relating the predictors to the response variable(s)', Garson (2012:7). This modelling technique can test complex models with multiple dependent and independent variables, as well as testing for relationships which cannot be tested by linear regression analyses, like interactions. Unlike standard SEM, which is based on co-variance-based techniques, PLS is the most prominent representative of variance-based modelling techniques (Henseler et al, 2009). The main strength of PLS is that its

objectives are exploration and prediction, and it is thus 'recommended in an early stage of theoretical development in order to test and validate exploratory models', (Henseler et al, 2009:282). Other specific advantages of PLS applicable to the data in this study are the fact that it can handle small sample sizes, that it has less stringent assumptions about data distribution, being thus able to handle data departing from normality moderately to highly, and finally that it can work with single-scale variables (Hair et al., 2012). While some of the workings of PLS are briefly described when reporting the results of the review of the assumptions for the data in this study, PLS has been frequently used in marketing and business publications over the past twenty years, and so the reader wanting to learn more about this technique is referred to Chin et al., 1998, Haenlein and Kaplan, 2004; Henseler et al., 2009, Hair et al., 2012, and Garson, 2012.

Two PLS-structural equation models are now proposed, one for the beginners' group and another for the advanced learners' group. The latent variables used and the manifest variables informing the latent variables have been selected following the results of the previous steps of data analysis: correlation, partial correlations, and standard multiple regressions.

PLS path modelling does not have any global goodness-of-fit criterion, and so model evaluations need to assess the outer model to assess to what an extent latent constructs are defined by their manifest variables (reliability and validity), the inner model to assess the explanation of variance of the latent constructs, and the model's predictive relevance (Henseler et al., 2009; Hair et al., 2012). For the outer model in this dissertation, all the latent constructs are considered reflective latent constructs and model validation is suited for such reflective latent constructs (for a state-of-the-art discussion on reflective versus formative measurement models, see Hair et al. 2012).

The assumptions and criteria reported for the PLS models in this dissertation are as follows:

For the outer model (a reflective measurement model):

Convergent validity, internal consistency or reliability: assessed by Cronbach's alpha²¹, and also by composite reliability. In PLS models the latter is preferred because Cronbach's alpha is known to under-estimate scale reliability (Garson, 2012; Hair et al., 2012). Recommended values for composite reliability are .60 for a model with exploratory purposes, and .70 for a model with confirmatory objectives (Chin, 1988).

Convergent and divergent validity: Average variance extracted (AVE) may be used to test both. It reflects the average communality shared by each latent factor, and so for convergent validity AVE should be greater than .5, meaning factors should explain at least half of the variance of their respective indicators, whereas for divergent validity AVE should be higher than its squared correlation with other latent variables (Garson, 2012).

Discriminant validity: tested by checking factor cross-loadings: models should have strong expected loadings and weak cross-loadings.

For the inner model (the structural model):

Path model estimates: coefficient of determination (R^2) of the latent constructs: .67 for substantial, .33 for moderate, or .19 for weak according to Chin, 1998.

²¹ For Cronbach's alpha, standard conventions apply: .80 is needed for a scale to be good, .70 for an acceptable scale, and .60 for a scale for exploratory purposes (Garson, 2012).

Estimates for path coefficients: standardised betas for comparability of path and significance via bootstrapping²². Path coefficients are standardised betas between 0 and 1 in which an increase of one unit in the independent variable creates an increase in the dependent variable which is equal to the path coefficient.

Prediction relevance: Q^2 calculated based on the blindfolding procedure's results. Values should range between 0 and 1. Values of .02 indicate a small predictive relevance, .15 a medium and .35 a large predictive relevance of a given latent construct to explain the dependent value in the model (Henseler et al., 2009).

6.7.1 MODELLING INDIVIDUAL DIFFERENCES IN L2 DEVELOPMENT

This section presents the results of the two PLS models developed to explore the relationships amongst the main variables in the study for beginners and advanced learners of English, outlined by first-order statistical techniques such as correlation, partial correlation, and standard multiple regression. The software used to build the models was SmartPLS 2.0 M3 (Ringle et al., 2005).

6.7.1.1 Assumptions for the Beginner Group

Convergent and divergent validity was assessed to assure the adequate psychometric properties of the measures used in this dissertation (see table 6.54 for reliabilities and latent variable correlations, and section B.6 in appendix B for other PLS assumptions and settings). As far as convergent validity is concerned, Cronbach's returned a low value for the latent construct academic development, but for composite reliability all constructs exceeded the .70

²² Bootstrapping, PLS algorithms, and blindfolding are statistical techniques which are key in PLS model development. Refer to Henseler et al., 2009, Hair et al., 2012, and Garson, 2012 for more information on these techniques.

threshold recommended by Chin (1988). Moreover, all AVE values were higher than the minimum .50 value necessary. In fact, note the exceptionally high AVE values for three of the five constructs (>.80), with academic development and L2 development showing also a high value at .68. Convergent validity is very strong in this model. For discriminant validity, AVE square root values were compared to the correlations between the latent constructs and are found to be outstandingly higher, as recommended by Garson, 2012. Therefore, the measures used for this group of learners were extremely sound.

Table 6.54 *Assessment of Convergent and Divergent Validity, Beginners (n = 52)*

| Latent Constructs | C's α | CR | AVE | 1 | 2 | 3 | 4 | 5 |
|--------------------------|--------------|-----|-----|---------|---------|---------|---------|---------|
| Academic development | .56 | .81 | .68 | 1 (.82) | | | | |
| Age at testing | 1 | .98 | .98 | .05 | 1 (.98) | | | |
| L1 literacy | 1 | .98 | .98 | .27 | .33 | 1 (.98) | | |
| L2 development | .88 | .91 | .68 | .47 | -.38 | .31 | 1 (.82) | |
| Professional orientation | .89 | .93 | .81 | -.16 | -.57 | -.16 | .34 | 1 (.90) |

Note: C's α = Cronbach's α , CR = Composite Reliability, AVE = Average Variance Extracted. The square root of AVE values is given in brackets.

6.7.1.2 Model for the Beginner Group

Model path coefficients were tested for significance by running the bootstrapping procedure with 500 iterations. All manifest variables were related to their associated latent variable at the .05 level, indicating that the manifest variables were appropriate indicators of the latent construct being measured. The relationships between the latent variables were significant at the .05 level too, thus providing support for the hypothesized relationships

amongst the latent constructs (see figure 6.17 for the PLS model, path coefficients and R^2 values).

This model provided support for the following hypotheses: There was a significant positive relationship between academic development and L2 development ($\beta = .44$). A significant negative relationship was observed for AT and L2 development ($\beta = -.38$). Additionally, AT exerted a significant positive impact on L1 reading comprehension ($\beta = .33$), and explained a weak 11% of the variance in the latter ($R^2 = 11\%$), which, in turn, held a significant positive relationship with L2 development ($\beta = .33$). Finally, professional orientations had a significant positive relationship with L2 development, although to a lesser extent than the other latent constructs ($\beta = .26$). Overall, the model explained 56% of variance in L2 development, which can be considered a moderate to substantial coefficient of determination (R^2) according to Chin (1998).

The model's predictive relevance was assessed by means of the goodness-of-fit Q^2 index, a measure which combines effect size with convergent validity (Garson, 2012). The value for the beginners' model was $Q^2 = .62$, which indicates that the model is an adequate fit to the data with a large predictive relevance according to Henseler et al., 2009.

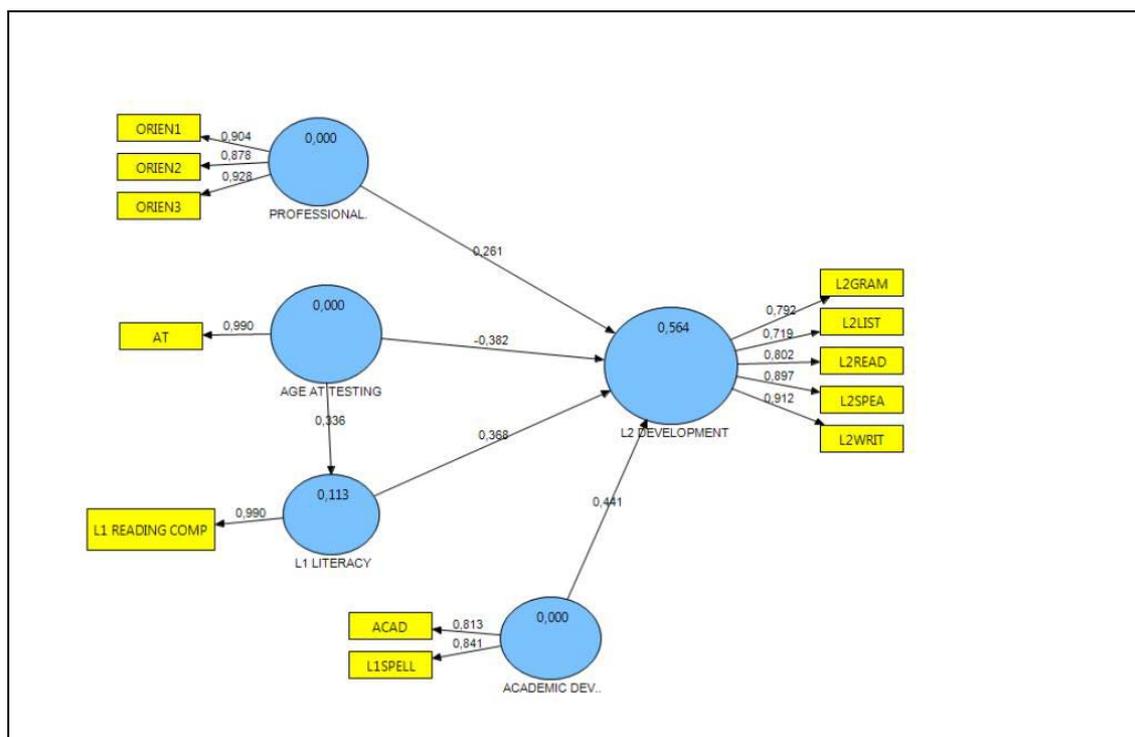


Figure 6.17 *Hypothesised PLS model for individual differences and L2 development, beginner group*

6.7.1.3 Assumptions for the Advanced Learners' Group

Convergent and divergent validity was assessed for the advanced group too (see table 6.55 for reliabilities and latent variable correlations, and section B.6 in appendix B for other PLS assumptions and settings). Concerning convergent validity, Cronbach's alpha returned a low value for the latent construct language aptitude, but composite reliability returned values surpassing the .70 threshold recommended by Chin (1998). In this model AVE values are close to the minimum .50 value necessary for convergent validity but for reading ability, which yielded a higher value of .72. Convergent validity was much weaker than in the beginner group. For discriminant validity, all AVE square root values were higher than the correlation indexes amongst latent constructs, as per by Garson, 2012. Therefore, the measures used for this group

of learners were statistically sound too, although to a much lesser extent than in the beginner group.

Table 6.55 *Assessment of Convergent and Divergent Validity, Advanced (n = 88)*

| Latent Constructs | C's α | CR | AVE | 1 | 2 | 3 | 4 |
|-------------------|--------------|-----|-----|---------|---------|---------|---------|
| L2 development | .72 | .81 | .46 | 1 (.67) | | | |
| Language aptitude | .51 | .72 | .41 | .42 | 1 (.64) | | |
| Motivation | .75 | .82 | .47 | .37 | .07 | 1 (.68) | |
| Reading habits | .63 | .84 | .72 | .37 | .22 | .05 | 1 (.84) |

Note: C's α = Cronbach's α , CR = Composite Reliability, AVE = Average Variance Extracted. The square root of AVE values is given in brackets.

6.8.1.4 Model for the Advanced Learners' Group

Model path coefficients were tested by running the bootstrapping procedure with 500 iterations. All manifest variables were related to their associated latent variable at the .05 level but for two manifest variables. For the language aptitude latent construct, the LLAMA D manifest variable was not significant, not reaching the 1.96 t-test value necessary for a .05 alpha level (Garson, 2012). Another non-significant manifest variable was observed in the motivation latent construct, motivation 2. While non-significant manifest variables are kept in the model on theoretical grounds, the low values obtained in the t-tests as a result of the bootstrapping procedure as well as in convergent validity are clearly suggestive of the need to improve the measurement of the outer model in this group. On the other hand, all the relationships between the latent variables were significant. The hypothesized relationships amongst the latent constructs were supported (see figure 6.18 for the PLS model, path coefficients and R² values).

The path model for advanced learners supported the following hypotheses: There was a significant positive relationship between language aptitude and L2 development ($\beta = .33$), which was just as strong as the significant positive relationship between motivation and L2 development ($\beta = .33$). Finally, reading habits showed a significant positive relationship with L2 development, although somehow weaker ($\beta = .28$). Overall, the model explained 36% of variance in L2 development, which can be considered a moderate coefficient of determination (R^2) according to Chin (1998).

The model's predictive relevance for the advanced group was assessed too, returning a goodness-of-fit value of $Q^2 = .41$, which, as in the beginner learners' case, indicates that the model is an adequate fit to the data showing a large predictive relevance (Henseler et al., 2009).

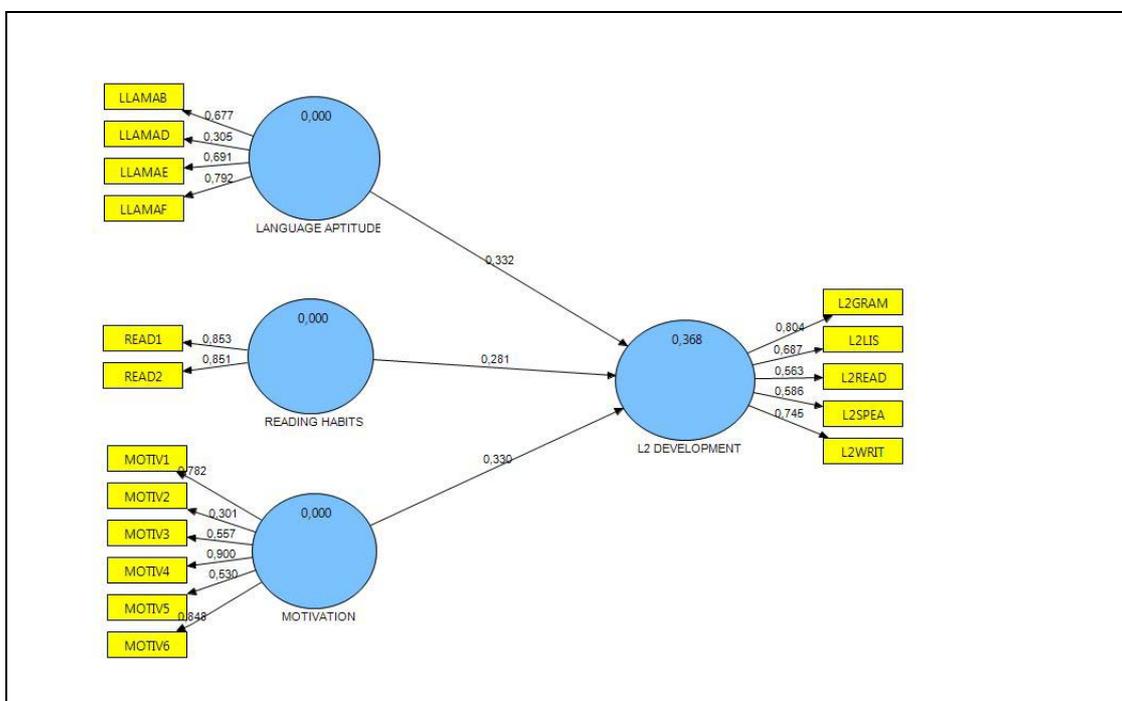


Figure 6.18 Hypothesised PLS model for individual differences and L2 development, advanced group

6.8 Summary of Results

This section summarizes the main findings of the current study organised by research question.

6.8.1 RESEARCH QUESTION 1: LANGUAGE APTITUDE

- A positive, medium correlation was found between global language aptitude and global L2 development for beginners ($r = .39, n = 52, p < .05$) and for advanced learners ($r = .39, n = 52, p < .05$).
- For beginners, LLAMA D was the aptitude test explaining more variance. This confirmed that for beginners the faster learner students were those exhibiting higher levels of auditory ability.
- For advanced learners, LLAMA F was the aptitude subtest explaining more variance, highlighting the role of language analytic ability in this group.
- For beginners, LLAMA D correlated with all language dimensions; whereas LLAMA F correlated with only three language dimensions: grammar, reading, and listening. All other subtests did not have any impact on L2 development.
- For advanced learners, LLAMA D did not correlate with any L2 development measures, while the other three measures correlated with some language dimensions.
- The tolerance of ambiguity construct did not correlate with L2 development in any of the two proficiency groups, not adding any explanatory value to language aptitude.

- A moderate correlation was found between L2 development and language aptitude after partialling out L1 reading comprehension for beginners. This moderating relationship was not upheld for advanced learners.

6.8.2 RESEARCH QUESTION 2: L1 LITERACY

- For beginners, a nearly medium correlation between L1 reading comprehension and L2 development was reported. There was no correlation in the advanced learners group.
- For beginners, a medium to large correlation was found between L1 spelling and L2 development. In the advanced learners group the same correlation was found but the effect size was small.
- Concerning L2 language dimensions, and for beginners, L1 reading comprehension correlated with L2 writing. No correlations reached significance in the advanced learners group.
- As far as L1 spelling is concerned, in the beginner group a medium to large correlation was found between L1 spelling and two language dimensions, grammar and writing. In the advanced group it correlated with the same dimensions with a medium effect size.
- In the beginner group the two literacy-related variables 'reading quantity' and 'enjoy reading' did not correlate with L2 development. Conversely, in the advanced learners' group moderate correlations were obtained for both variables. In the latter case, L2 listening was the skill most influenced by these two variables.

6.8.3 RESEARCH QUESTION 3: MOTIVATION AND ORIENTATIONS

- For beginners, only professional orientation correlated with L2 development, with a medium effect size.
- For advanced learners, only motivation correlated with L2 development, also with a medium effect size.

6.8.4 RESEARCH QUESTION 4: AGE

- For beginners, AT correlated moderately and negatively with L2 development, with a medium effect size. The language dimension most impacted was L2 reading.
- For advanced learners, correlations did not reach significance. The language dimension most impacted by age was L2 listening.

6.8.5 RESEARCH QUESTION 5: RELATIONSHIPS AMONGST VARIABLES

- A PCA conducted on the main literacy-related variables revealed two underlying factors, labelled as reading habits and academic development.
- Standard multiple regression analyses conducted on the variables yielding the highest correlation coefficients with the dependent variable in each proficiency group revealed the following predictive variables: for beginners, academic development, L1 reading comprehension, and AT, explaining a total 54% of variance. For advanced learners, predictive variables were language aptitude, reading ability, and motivation, explaining a total 31% of variance.

- A robust PLS model with high predictive relevance was obtained for the beginner group, which provided support for the following findings:
 - Significant relationships were observed for academic development, age at testing, and professional orientations with the dependent variable, L2 development. Path coefficients are provided in figure 6.17.
 - Additionally, AT explained 11% of the variance in L1 literacy in which the older the learner, the lower the level of L1 literacy. In turn, L1 literacy showed a significant relationship with L2 development. Path coefficients are provided in figure 6.17.
- A less robust PLS model with still high predictive relevance was obtained for the advanced learners group, providing support for the following findings:
 - Significant relationships were observed between language aptitude, reading habits, motivation and L2 development. Path coefficients can be found in figure 6.18.
 - LLAMA D did not contribute significantly to the language aptitude manifest variable.
 - Motivation 2 did not contribute significantly to the motivation manifest variable.

CHAPTER 7

Discussion

7.1 Individual Differences

Framed in the ID tradition, this study investigated the contention that IDs may impact L2 acquisition differently at two stages of the proficiency ladder, beginner and advanced. There were four IDs under scrutiny: language aptitude, L1 literacy, motivation and orientations, and age; of which language aptitude and L1 literacy were chosen for a closer, more in-depth analysis. Another goal of the study was to shed light on the interactions among the IDs studied, and on their potential evolution along a continuum of L2 development.

7.1.1 LANGUAGE APTITUDE

As far as the main question is concerned, the study hypothesised that language aptitude would impact beginners and advanced L2 learners differently. Hypothesis for research question 1 was not confirmed as, in a correlational analysis, the relationships between language aptitude and L2 development were statistically significant at both levels of L2 proficiency, with the exact same correlation coefficients ($r = .39, p = .00$), and a medium effect size.

Subquestion 1.a enquired about which language aptitude components would be relevant at each proficiency level, and hypothesised that for beginners, the faster learning students would show higher levels of auditory ability. Language analytic ability was hypothesised to be equally important at the two proficiency levels. Subquestion 1.b investigated which language dimensions language aptitude components contributed to. For subquestion 1.c a hypothesis was put forward: the 'tolerance of ambiguity' additional factor was expected to add explanatory power to language aptitude. Finally, subquestion 1.d enquired whether L1 literacy would play a mediating role between language aptitude and L2 development.

The hypothesis for subquestion 1.a was confirmed: when the global language aptitude score was broken down into its four components, differences appeared, suggesting that different aptitude components would impact the two L2 proficiency levels differently. While LLAMA D explained 16% of variance for beginners, LLAMA F was the test explaining more variance in the advanced learners' group, though by a much smaller amount, 8%. In the LLAMA test battery, LLAMA D subtest is aimed at identifying how well learners recognise patterns in oral language. This result is consistent with Skehan's (1998) prediction that phonemic coding ability is relevant at the early stages of L2 development. Language analytic abilities were expected to play a role at two levels of proficiency. This hypothesis was also confirmed by results: LLAMA F correlated significantly at the two proficiency levels, although the impact was larger in advanced learners than in the beginner group, and, in the latter, its strength was lesser than the effect of LLAMA D (see correlation indexes in section 6.4). In his Aptitude Complex/Ability Differentiation hypothesis, Robinson (2005) identified ten cognitive abilities which would contribute to processing and learning from input in the initial stages of SLA: processing

speed, pattern recognition, phonological working memory capacity, phonological working memory speed, semantic priming, lexical inferencing, text working memory capacity, text working memory speed, grammatical sensitivity, and rote memory. While the lack of tests measuring a good number of the abilities listed above in LLAMA is obvious, the fact that LLAMA D, purporting to measure sound recognition, is the test explaining most variance in beginners is consistent with the abilities related to phonological working memory abilities and their contribution to noticing the gap. Surprisingly, LLAMA B, the only test which aims at measuring memory, did not seem to play any role for any of the language dimensions, although in Robinson's framework rote memory is one of the ten basic cognitive abilities conducive to learning for beginners. As far as identifying cognitive abilities which are relevant in higher levels of L2 development, a number of researchers support the position that current language aptitude tests are not sensitive to these abilities (Carroll, 1990; Robinson, 2005, 2009, 2013; Doughty, 2010), notwithstanding the argument that cognitive abilities alone may not be able to predict advanced second language acquisition. The LLAMA test battery does not claim to measure all cognitive abilities that are important for advanced second language learners; while in this study some LLAMA tests were correlated with L2 development in advanced learners (LLAMA B, D, and F, specifically), it may be that there are more cognitive abilities at play which the LLAMA battery did not tap into. Again, the fact that these abilities were found to contribute to learning for advanced learners does not mean that there may be other abilities involved which the current test does not capture. Likewise, it is not known where exactly in the proficiency scale would language aptitude start to impact L2 development. Results in this study suggest that for the advanced learner group vocabulary

learning, sound-symbol correspondence and grammatical inference still were having an impact.

These results are consistent with Grañena's (2012) findings on a study on age and language aptitude in adult learners of English with different ages of onset in a naturalistic context. Grañena hypothesized that LLAMA subtests loaded on two factors: a purported analytic learning ability (LLAMA B, E, and F), interpreted as a composite measure of explicit learning; and a sequence learning ability (LLAMA D), suggested to measure an implicit learning ability. While analytic learning ability was a discriminating factor for both early starters and late starters alike, sequence learning ability only impacted early L2 learners. Grañena (2012) argued that implicit language learning played a role in late L2 learners' attainment on tasks requiring automatic use of L2 knowledge. Findings in the current study provide additional evidence that implicit learning mechanisms seem to play a role in adult foreign language learning at any age. This seems to be the case for early starters in naturalistic learning contexts, and for beginners in foreign language learning contexts. Furthermore, these findings contradict one of the main assumptions of the fundamental difference hypothesis (Bley-Vroman, 1990), by which the implicit learning mechanisms of the child are no longer accessible for the adult learner. Following Grañena's (2012) interpretation of LLAMA D results as measuring implicit learning mechanisms, implicit learning processes seem to clearly discriminate fast from slow L2 learners in the early stages of second language acquisition. The results obtained in the current study could be interpreted along the same lines.

The correlational analyses of language aptitude tests and language dimensions emphasized the two-factor structure of language aptitude proposed by Grañena (2012). LLAMA D played a significant and consistent role across all language dimensions for beginners, while it did not have any impact for

advanced learners. For the latter, LLAMA B, E, and F impact different language dimensions in different manners. LLAMA B, purported to measure vocabulary learning, impacted grammar, reading and listening, while LLAMA E, measuring the ability to match sounds to symbols, impacted grammar, reading and speaking. LLAMA F showed the strongest correlation indexes of the three tests, having an effect on grammar, reading, and listening. Reading was the only skill impacted by the three LLAMA subtests. The main characteristics of analytic learning ability, which involves strategy use and problem-solving techniques and in which learning happens by analysis seem to match well the explicit processes implicated in reading comprehension.

The possible contribution of an additional tolerance of ambiguity component to the language aptitude construct was not supported by the results, and so the hypothesis for subquestion 1.c was not confirmed. Statistical analyses did not flag any significant correlations between tolerance of ambiguity results and L2 development scores. At this point it is important to mention that the instrument used to measure tolerance of ambiguity (Herman et al., 2010) had only been used previously by Dewaele (2010) in a personality survey, and that Dewaele did not find any correlations with perceived language proficiency either –although he did with knowledge of other foreign languages. Interestingly, in a report on work in progress in the development of the Hi-LAB aptitude test, Doughty et al. (2010) describe how they included three measures of the tolerance of ambiguity construct in their instrumentation, one of them being Budner's scale (1962), but finally removed the construct altogether from the test as some participants loaded on the lie scale, thus reflecting the unreliability of the self-reported instrument. Consequently, recent evidence seems to suggest that although this scale connects in some way with foreign language learning and / or metalinguistic awareness, it is not suitable or

situated enough to measure the tolerance of ambiguity construct in language learning studies. In future research, this gap could be filled by developing a situated scale as in the case of the Canal-FT (Grigorenko et al., 2000), in which the tolerance of ambiguity subtest is fully integrated in the language aptitude test, so that a more objective measure of this otherwise elusive construct can be obtained.

The last research question related to language aptitude inquired whether L1 literacy (as L1 reading comprehension) would play a moderating role between language aptitude and L2 development. Results pointed to a minor L1 literacy moderating role for beginners. This minor moderating role present only for beginners seems to support the speculation that L1 language skills serve as the foundation for learning foreign languages underlying the LCDH (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995), and so in the event that the individual has not completed a successful development of the academic aspects of their L1, these difficulties may mediate and hinder any subsequent foreign language learning as well as any further L1 development.

7.1.2 L1 LITERACY

The main research question on the L1 literacy construct inquired whether results would provide support for the threshold hypothesis (Cummins, 1979a). Subquestion 2.a investigated what would be the contribution of each L1 literacy variable, L1 reading comprehension and L1 spelling. Then, subquestion 2.b inquired whether findings would be consistent with the LCDH (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995) by comparing L1 and L2 scores by skill. Finally, subquestion 2.c explored whether reading habits understood as activities fostering the development of literacy in adulthood would play a role in foreign language acquisition.

The hypothesis that L1 literacy as measured by a L1 reading comprehension test would play a key role for beginners and not for advanced learners as predicted by the threshold hypothesis (Cummins, 1979a) was confirmed. In the current study and interpreted for adult students with asymmetric levels of academic development, this hypothesis would predict that L1 literacy would act as a threshold for academically disadvantaged learners, who would not be able to profit from education in a second language until they have reached a minimum level of literacy in their L1. This finding was confirmed by the moderate correlation which was found between L1 reading comprehension and L2 development for beginners, and not for advanced learners. In the interdependency hypothesis Cummins (1979a, 1983) posited the interdependence of L1 and L2 skills, which were supposed to share a common underlying proficiency. While originally formulated concerning children in bilingual education in the US, this hypothesis in the field of adult education would predict a faster rate of L2 or Ln CALP development for adult learners showing a high level of L1 CALP, due to the existence of an underlying common language proficiency which would be shared across the languages known by the individual. According to Cummins (1999), CALP follows the curve of cognitive development which usually continues to develop throughout a lifetime. In this respect, the results of the present study are consistent with results of previous studies also finding connections between L1 and L2 literacies (Cummins, 1980, Krashen, Long & Scarcella, 1979; Muñoz, 2001, 2003, 2006). In addition, these findings also add to the evidence for links between L1 and L2 literacies posited in Sparks and Ganschow's LCDH (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995). The LCDH posits that student's L1 skills serve as the foundation for L2 learning, and that any learning difficulties experienced in the L1 will impact L2 learning accordingly. Learners who have

difficulties in their L1 may lack the ability to reflect on the equivalent structures in a foreign language: the ability to reflect on language in a decontextualised manner. Findings are therefore consistent with studies conducted with children and adolescents showing L1 skills impacting L2 learning conducted by Sparks and his associates (for a review of these studies see Ganschow & Sparks, 2001; Sparks, Humbach, & Javorsky, 2008; Sparks, Patton, Ganschow, & Humbach, 2009a, 2009b), with Dufva and Voeten (1999), and Muñoz (2001, 2003, 2006). For adult populations, this study is consistent with Artieda and Muñoz (2013) study on IDs impacting L2 rate of learning, in which L1 literacy was the main factor explaining variance for a group of adult beginner learners of English as a foreign language. Findings showing that L1 literacy continues to impact L2 learning many years after the end of formal L1 learning at school and high school are yet another type of evidence for the purported long-term relationships between early L1 skills and later L2 proficiency. Learners in the present study may be young adults in their twenties, who may be learning an L2 as a continuation of their mainstream studies; but they can also be middle-aged individuals who decided to learn a foreign language twenty or thirty years after they finished their academic studies. The evidence provided by this study of this enduring L1 proficiency effects is consistent with Skehan's follow-up study to the Bristol Language Project (Skehan & Ducroquet, 1988 cited in Skehan, 1998), in which they found exceptionally large correlation indexes between L1 measures taken from children and language aptitude scores obtained 10 years later from the same subjects. L1 proficiency effects also support long-lasting effects of L1 skill development (particularly vocabulary and reading comprehension) on L2 learning in longitudinal studies conducted reported by Sparks and his associates (Sparks, 2012; Sparks, Patton, Ganschow, Humbach, Javorsky, 2008; Sparks, Patton, Ganschow, Humbach, 2009a, 2009b),

and in a recent factor analysis in which they reported language aptitude factors shared across languages (Sparks, Patton, Ganschow, Humbach, 2011).

Another literacy-related question is the role of L1 spelling as a component of L1 literacy. The results of correlational analyses showed that spelling had a much stronger relationship with L2 development for both groups of beginners (a moderate to large correlation) and advanced learners (a small correlation), than L1 literacy as measured by a reading comprehension test. This finding is also consistent with the LCDH, as difficulties with spelling in the L1 are likely to impact L2 development. The moderate to large correlation reported for the beginner group is not surprising if we consider the key role played by spelling in word recognition. As seen in section 3.4, orthographic knowledge mediates phonological decoding and semantic access, and so difficulties in this area hamper the learner's ability to segment input and access word meanings which is so critical in the first stages of language acquisition. While research in this area provides no evidence of orthographic crosslinguistic transfer yet (Koda, 2005; Hamada & Koda, 2010; Abu-Rabia, 2001; Wang, Park, and Lee, 2006; Luk & Bialystok, 2008), learners who have automatized and efficient reading skills in their L1 are more likely to develop strong word decoding skills in their L2 (Proctor et al., 2006).

In terms of L1 literacy as a construct, the L1 spelling measure had been added as a measure of L1 literacy because it was identified by Sparks and associates as one of the components of L1 literacy which discriminated between successful and unsuccessful learners in their child and adolescent participant samples. In the current study, while initially included in order to measure L1 literacy better, the PCA conducted with all the literacy-related variables yielded interesting results. Both for beginner and advanced participants alike, the PCA revealed the presence of two components: factor one consisted of 'enjoy

reading' and 'reading quantity', and factor two grouped academic level and L1 spelling. L1 reading comprehension was removed from the solution because it loaded similarly on the two components, and so it was not adding any explanation to the analysis. Factor one was labelled as 'reading habits', possibly the most accessible and ordinary literacy-related activity in adulthood; factor two was labelled as 'academic development'. In Sparks' studies, L1 spelling is used to measure phonological decoding for child and adolescent speakers of English. However, with adult speakers, this measure does not make any sense as a measure of phonological decoding because the acquisition of listening skills is fundamentally complete in adulthood; instead, the speculation is that the close relationship of L1 spelling and academic level found in the present study outlines a spelling developmental route that is very closely aligned to the development of academic skills. In fact, in the current study the compound variable academic development is the most robust predictor of L2 development in beginners (see section 6.7). For children and adolescent populations this is never the case because usually studies take intact classes for the purposes of research; in this case, learners are always matched for academic level. But for adults, what is often found in classes is a mix of students with different academic levels. In the latter case, both academic level and L1 spelling seem to be measuring the same underlying academic proficiency which is responsible for the highest variance amongst adult learners of English as a foreign language at beginner levels.

Findings after this more fine-grained analysis of literacy-related variables for beginner learners can be summarized as follows:

a) Both L1 reading comprehension and L1 spelling were moderately correlated with L2 development, although L1 spelling's correlation was somehow stronger.

b) After conducting a PCA, L1 spelling was grouped together with academic level under a common factor, labelled as academic development. This factor explained more variance than L1 reading comprehension in a standard multiple regression analysis.

A possible interpretation for these results is that academic development is a key success factor in foreign language schools which do not have any entry requirement. Certainly, students with a low level of education may be at a disadvantage when placed in a classroom with students who have completed much higher levels of education and are much more trained in learning as a skill, and in the tasks which learning involves.

Why is it, then, that academic development explains the highest percentage of variance amongst beginners, while it is reading habits the literacy variable that explains variance amongst the advanced learner group? Following the argumentation above, the speculation is that academic development would be the lower threshold necessary for students to make progress in their foreign language learning class. If the academic gap is too broad, students will drop out. If it is not, students will catch up with their counterparts with a higher academic level and will bridge that gap. In that sense, it is worth mentioning that the school which took part in the research has a specific graded reader's program aimed at fostering literacy development as teachers are very aware of this academic gap amongst students. This study, however, cannot tell whether the fact that by grade four students' academic development does not explain variance any longer is a consequence of the reading program, of the weakest students dropping out, or a combination of the two, or even of more unknown factors. In any case, what results seem to suggest is that after grade four the academic development gap has been bridged and that it is reading habits the only literacy-related variable explaining variance.

While the instruments in this study were not developed to prove cross-language skill transfer, the correlational indexes obtained between L1 reading comprehension and L2 language dimensions seemed to indicate some level of skill transfer in the beginner group. The L1 reading comprehension test loaded on reading comprehension, vocabulary knowledge, and writing; unsurprisingly L2 writing was the language skill with the highest correlation with the L1 reading comprehension test, $r = .32$, $n = 52$, $p < .05$. Participants in the current study were adults, so at this very low level of development of their L2 it is very likely that successful students were transferring higher-order reading processes such as writing conventions and organisation of information (Durgunoglu, 2002), or, as Cumming (1994) proposed, that writing expertise is a central cognitive ability which, once developed, is easily transferrable across languages. The low level of development of the L2 would have made transfer of writing tasks really easy for those learners with a strong L1 reading and writing expertise.

As far as reading habits are concerned, this dissertation also investigated the effect that activities fostering literacy might have in an adult foreign language learning context, at a time in the learner's life in which in most cases a high degree of functional L1 literacy has been attained. Two concepts were explored: reading quantity and how much adults enjoyed reading. None of these instruments impacted beginners; on the contrary, the two measures of reading habits yielded moderate correlation indexes with L2 development in advanced learners, impacting L2 grammar and listening specifically. These findings extend the findings of previous studies reporting links between reading habits and L2 outcomes with child and teenage populations (Cunningham and Stanovich, 1991; Stanovich and Cunningham, 1993; Sénéchal and LeFevre, 2002; Sénéchal, 2006; and Sparks, Patton, Ganschow, Humbach,

2012) to an adult learner sample. The fact that reading habits seem to impact L2 development for advanced learners, who have typically overcome any basic (L1 or Ln) language difficulty is a very encouraging finding pointing to the possibility of enhancing high-level literacy at any age.

7.1.3 MOTIVATION AND ORIENTATIONS

Research question 3 explored whether motivation would play a different role for learners at two levels of proficiency. The study included a motivation instrument and two measures of orientations (communicative orientations and professional orientations). Findings provided support for the differential role of motivation at two stages of proficiency: a relationship which seems to suggest that motivation reconfigures as learners move up the proficiency ladder. A professional orientation correlated with L2 development for beginners, whereas motivation correlated with L2 development for advanced learners.

This reconfiguration of orientations and motivations as learners move up the L2 development ladder seems to be consistent with existing theories of motivation (Dörnyei, 2010) and with similar findings in previous studies (Tragant, 2006; Artieda, 2010): early adult learners seem to exhibit a professional, career development drive when they start their English studies, often motivated by a professional urge to make progress. For more advanced stages of L2 development, on the contrary, this orientation seems to evolve to an intrinsic type of motivation in which learners study for personal satisfaction and show a genuine interest in the language being studied and in the culture the language is an exponent of (Noels et al., 2000). An alternative explanation is that only learners who have this intrinsic-type of motivation persist in the program and reach advanced levels of L2 development; this interpretation would be consistent with the idea of motivation as perseverance put forward by

Ellis (2004), and Dörnyei and Skehan (2003). These are the motivational trends observed in the population used in this study, whose main characteristic is that learners do not have the same academic level. Further research is needed to shed more light on the evolutionary trends of the motivation construct for other population samples.

7.1.4 AGE

Age at testing was the last variable under scrutiny; research question 4 inquired whether age would play a role at two levels of proficiency, and whether it would play a mediating role between any of the other independent variables (language aptitude, L1 literacy, motivation) and L2 development.

In the beginner group, age at testing was the variable exerting the highest impact on L2 development, with a negative Pearson r value of $-.38$. This means that older learners obtained lower scores in L2 development. This finding is consistent with the linear decline in proficiency experienced with starting age reported by Bialystok and Hakuta (1999) and Birdsong and Molis (2001). However, an additional finding related to age in the beginner group seems to suggest something else: age at testing played a medium moderating role with L2 development and L1 spelling, but a strong mediating role between L2 development and L1 reading comprehension. This is not surprising if we consider that the age range of subjects in the beginner group was very broad (the youngest participant was 16 years old and the eldest was 62), so it is likely that the older participants' academic level was lower than the academic level of younger participants because older learners had been raised under Franco's dictatorship in the 1950s and 60s, a time when education was not extensive across the country. What this close relationship with measures of L1 literacy seems to suggest is that, in concert with Marinova-Todd et al (2000) and Moyer

(1999)'s similar findings with age of onset, age at testing plays a role because of its association with other social and psychological factors impacting L2 proficiency. For beginners, age impacts reading more than any other language dimension; another result which can be interpreted as an exponent of the close relationship of age with literacy, reading being one of the two key skills of literacy in any language. This mediating role of age on literacy does not stand for advanced learners and could in fact be highlighting the fact that the two groups are different in terms of academic level: while 50% of adults in the beginner group reported having tertiary education, this percentage rose to 70% in the advanced group. Statistical analysis confirmed that the difference was significant (see section 6.2.2), favourable to the group that had tertiary studies. What this study cannot tell is whether the two groups were simply different from each other and the academic level distribution was totally random, or whether learners with tertiary studies are more likely to succeed in L2 learning and therefore learners in the advanced group are a successful sub-sample of the main learner pool which began learning four years earlier. Longitudinal research is needed to shed further light in this area.

Perceptual decline seems to be a possible interpretation for learners in the advanced group if we take a look at correlations by language dimension. Although if we look at the relationship between age at testing and L2 development the correlation index does not reach significance, when we look at the impact of age on the individual language dimensions we find a remarkably strong negative correlation between age at testing and listening ($r = -.52$, $n = 88$, $p < .01$, $pwr = .99$). Other studies have reported similar findings in aural comprehension skills which may be attributable to a decreasing hearing acuity, which begins as early as in the 20ths and the 30ths (Seright, 1985; Artieda & Muñoz, 2013; Ribeiro, 2013). This interpretation would be consistent with

Singleton and Ryan's (2004) and Salthouse's (2004) in that slight decrements in hearing begin to appear in the early 20s but can be quite substantial beyond the 50s.

A minor moderating role of age at testing on language aptitude can be observed for beginners, although much smaller than that of spelling or L1 reading comprehension. A negligible moderating role can be observed too between the same variables in the advanced group.

7.2 Interactions Amongst Individual Differences

The last research question investigated which interactions would be found among the main variables in the study, and whether there would be different patterns of relationships for the two levels of L2 development. This approach would be consistent with DeKeyser's (2012) call for further research on interaction studies in individual differences, and with Dörnyei's (2009) suggestion to identify higher level constellations of cognition, affect, and motivation and their relationships in a dynamic systems theory framework.

First, a series of regression analyses were conducted in order to explore which were the variables explaining variance in our population samples. The set of variables entered in the equation for the beginner group explained a noteworthy amount of variance, 56%. Out of five variables entered (language aptitude, L1 reading comprehension, academic development, professional orientations, and age at testing), only three had predictive power, from higher to lower: academic development, L1 reading comprehension, and age at testing. Language aptitude and professional orientations were dismissed from the regression equation. This variable configuration is consistent with Artieda and Muñoz's (2013) findings by which L1 literacy was the variable explaining most variation in a beginner learner group. Again this seems to suggest an

interpretation of the results following Cummins' (1979a, 1983) interdependence hypothesis and Sparks and Ganschow's LCDH (Sparks, 1995; Sparks & Ganschow, 1991, 1993, 1995), and would emphasize the importance for learners to have reached a threshold level of proficiency in the literacy skills in their L1 to be able to capitalise on those skills for the successful development of any L2. What Cummins and Sparks' studies had in common, though, is that they largely worked with children and adolescent populations. Conversely, and given the adult population in this study, findings seem to indicate that the above mentioned hypotheses could apply to adult learners of English as a foreign language who have not reached this threshold level of L1 literacy; this could easily be the case for language schools not having any entry requirements, as the one in the current study. In that case, academic level differences would be apparent in the early stages of L2 development, and it is likely that this variation in academic level is what is being highlighted in these results. More studies are needed to support this result.

Although the role of age at testing was considerably reduced after the academic variables were subsumed in a composite academic development variable, it remained significant and explained 6% of variance. It was speculated above that L1 literacy and academic development were a function of the age of learners, in that older learners may have had fewer opportunities to study when they were young due to an unfavourable political environment. If that is the case, then it would make sense that the two variables explained most of the differences amongst learners, as well as contributing to the interpretation of the fact that the skill most highly impacted by age was reading, one of the key literacy skills. However, the impact of the literacy-related variables was more across the board, influencing most L2 dimensions in a similar fashion.

Noticeably different results were obtained for the set of variables entered for the advanced learners' group. To begin with, variables predicted much less variance than in the beginner group, 31%. Secondly, the set of variables contributing to the equation were totally different from the variables which had explained variance for beginners. In this case, three out of four variables were predictive with very similar squared semipartial coefficients (between 8% and 10%). From highest to lowest, these were: motivation, language aptitude, and reading habits. The role played by reading habits, a literacy measure, in this subsample is worth emphasizing: note that it explains nearly the same amount of variance than motivation and language aptitude. This is actually a very encouraging finding, as it opens the possibility of adults enhancing their L1 literacy levels at any age by engaging in meaningful and demanding literacy activities, such as reading. This is another unique contribution of this study, as previous research had only explored the impact of literacy variables for learner groups mostly including children and adolescents (Cunningham and Stanovich, 1991; Stanovich and Cunningham, 1993; Sénéchal and LeFevre, 2002; Sénéchal, 2006; Tarone, 2009; Sparks, Patton, Ganschow, Humbach, 2012). Finally, unlike for beginners, note the considerable role played by language aptitude for advanced learners, explaining 9% of variance. In this case we have L1 reading comprehension and academic development not explaining any variance, while language aptitude emerges again. Consistent with the idea that aptitudes reconfigure as students reach higher levels of L2 development (Robinson, 2005), it could be speculated that by the time learners attain advanced levels of L2 development they have crossed the necessary literacy threshold for cross-skill transfer to happen. At that point, academic development ceases to cause learner differences and learners build on the specific cognitive talents that they have to

acquire high levels of L2 proficiency. Further research is warranted to support or refute this speculation.

The fact that L2 development scores were available by language dimension permitted some very fine-grained analyses; for instance: while age at testing was factored out of the multiple regression for advanced learners, if we look at the results of the multiple regressions by language dimension we notice that for listening the three variables above mentioned explain a substantially large amount of variance, 48%, to which age at testing has the largest unique contribution, 15%. This finding is consistent with Seright's (1985), Artieda and Muñoz's (2013), and Ribeiro's (2013) findings that listening was the language skill most influenced by biological age at testing. This finding was related to aural comprehension declines in adulthood, which have been reported to begin as early as in the 20s (Singleton & Ryan, 2004; Salthouse, 2004).

As far as the PLS path model for beginners is concerned, the main structural paths as suggested by the standard regression analyses were confirmed. There were three moderately significant relationships: between academic development and L2 development, between L1 reading comprehension and L2 development, and, unexpectedly, between professional orientations and L2 development. The fact that the structural model revealed a relationship which the multiple regression analysis had failed to highlight may be due to the fact that PLS is able to detect much slighter relationships than multiple regression since it is not dependant on a normal distribution of the data (Hair et al., 2012). Note that in the multiple regression analysis professional orientation was close to reaching significance ($p < .06$). Finally, a significant negative relationship was upheld between age at testing and L2 development. This relationship was also consistent with the results of the multiple regression analysis. A remarkable unique contribution of the structural

model is a second-order relationship between age at testing, L1 reading comprehension, and L2 development. Both latent constructs contributed to L2 development separately. In addition, biological age at testing explained 11% of variance in L1 reading comprehension, which in turn contributed to L2 development. It is in this higher order of relationships in which PLS modelling can shed light on the multiple interactions amongst latent constructs which can operate as dependent and independent variables at the same time. An additional advantage of PLS is that it assesses the individual contribution of each manifest variable to the latent variable in terms of maximum variance explained; in that sense, it is similar to a PCA analysis, and provides the researcher with precious information as to how relevant is each manifest variable to the latent construct. The measurement model for the beginner group was very robust, as shown by its convergent and divergent validity indexes (see section 6.7.1.1). This means that the instruments used to measure the latent construct were fit for purpose. In that sense, this outer model provided validity for a new scale for measuring professional orientations for adults, as well as for a new composite measure of academic development composed of a self-reported academic level question and an L1 spelling instrument.

PLS can also uncover moderator relationships among variables. In this study, partial correlations pointed to mediating relationships of L1 reading comprehension between language aptitude and L2 development in beginners; and of age at testing between language aptitude and L2 development, spelling and L2 development, and L1 reading comprehension and L2 development, also in the beginner group. In the advanced group age at testing mediated the relationship between language aptitude and L2 development, but to a lesser extent. While these mediating relationships were entered in the PLS models, they were not upheld. This does not mean that they do not exist, only that the

structural models failed to detect them. This may have been due to the way in which PLS calculates moderator relationships²³. Chin et al. (1998) advise that in order for PLS models to be able to detect moderator effects researchers should use a minimum sample size of 150 subjects and from eight to nine manifest variables. This was not the case in the present study and thus it was not possible to explore the moderator relationships which the partial correlations were suggesting.

On the other hand, the PLS model for the advanced learners' group had less structural complexity but was especially informational as far as the measurement model is concerned. Overall the model explained less variance than the beginners' model: 36% according to the R^2 coefficient of determination. The structural model emphasized the unique relationships between the three latent constructs (language aptitude, reading ability, and motivation) and the L2 development construct respectively. However, low values in the t-tests and in convergent validity in two of the manifest variables clearly indicated the need to improve the outer model for this group. The first non-significant manifest variable was the LLAMA D subtest of the LLAMA language aptitude battery. This means that for these learners the cognitive ability purportedly measured by this instrument (i.e. the ability to recognise patterns in oral language) did not play any role, and that the same amount of variance could be explained by the remaining three manifest variables measuring the language aptitude construct. This would be consistent with Skehan's (1998) alleged relationships between language aptitude components and L2 proficiency, in which he speculated that after the early stages of L2 proficiency have been overcome, phonemic coding ability plateaus and its contribution to L2 learning

²³Refer to Chin et al. (1998) for a detailed account on how PLS treats moderator effects and how to increase power in this type of relationships.

success decreases in favour of other abilities such as language analytic ability and memory. As a matter of fact, this interpretation would be fully consistent with voices claiming that language aptitude is not a monolithic construct, but that the cognitive aptitudes involved in language learning reconfigure as a function of the L2 development stage in which the learner is immersed (Skehan, 1998; Robinson, 2005; Doughty, 2010). Following this argumentation a fair expectation would be that if we were to use a continuous test of language aptitude composed of several instruments to measure different cognitive abilities along a learner's full L2 development process, the same instruments would yield different results depending on the stage of L2 development of the learner. Alternatively, different aptitude tests could be used to measure learners at different L2 development stages. This is the option preferred by Doughty et al (2010) when they set out to develop a language aptitude test designed to identify individuals having the language aptitude required to achieve near-native foreign language proficiency. The constructs which they are taking into consideration for the test include updated measures of memory (working memory and long-term memory), acuity, speed, primability, induction, pragmatic sensitivity, and fluency, which are the cognitive abilities purported to underlie high-level L2 performance²⁴. This initiative addresses the claims of several researchers that current language aptitude tests do not tap into all or the main cognitive abilities at play in advanced stages of foreign language acquisition (Carroll, 1990; Robinson, 2005). The use of this test specially designed to capture these cognitive and perceptual abilities is of paramount importance to gain a better understanding of the role of language aptitude in foreign language acquisition and of its relationships with other individual differences.

²⁴ For additional information, refer to Doughty et al, 2010.

The second manifest variable which was not contributing to a latent construct was the second question (motivation 2) in the motivation scale. As explained in section 5.3.4.3, this scale was originally developed for an adolescent population, and it was adapted for an adult audience in this study. This is, therefore, a very new instrument, which would greatly benefit from additional use in other studies which larger samples to increase its reliability and construct validity.

All in all, PLS structural models in this dissertation are a methodological innovation which presumably can be used in further studies as a statistical technique which is able to capture the complexity of interactions among several constructs. In this respect, this study follows the holistic tradition initiated by Snow (1978) and Ackerman (2003), who questioned that variables existed in isolation and believed that the combination of variables had more value than the independent traits on their own, and which continued by Dörnyei and his understanding of individual differences as complex adaptive systems in which cognitive, affective and motivational factors combine to work in a blended manner (Dörnyei, 2009). Other researchers support this view (Ellis and Larsen-Freeman, 2006; Hinton, 2012). Second-generation statistical techniques open the door to a full range of statistical possibilities which can help researchers identify and understand the 'higher-order amalgams' (Dörnyei, 2010) of learner characteristics which are conducive to language learning success.

7.3 Limitations and Suggestions for Further Research

Possibly the main limitation of this study is sample size. Whereas the number of participants was sufficient to uncover relationships between variables, larger group sizes would have increased robustness and generalisability of results. Recruiting large adult samples is not an easy task,

though. Unlike child and adolescent populations, who are expected to follow compulsory education, adult learners do not follow any established learning routes, and any study with testing happening in more than one sitting or with a longitudinal design faces a considerable risk of participant mortality. That is why, in certain situations, it may be easier to gather empirical evidence by having several cross-sectional studies than with longitudinal studies. Further studies with adult populations should always take that risk into consideration when defining research designs.

The second limitation is also methodological. The PLS-SEM technique used in this dissertation is highly recommended for research designs with exploratory and prediction purposes, like this one, and is a technique which is very good for uncovering not very strong relationships even in small population samples. However, it does so at the expense of generalisability, and for that reason further studies should be carried out to confirm or refute the findings of this dissertation.

These are exciting times for researching language aptitude. This study has reported how different components of aptitude contributed to L2 development at two levels of L2 proficiency, but, as acknowledged in previous sections, the LLAMA test used may not have been the best choice as it may not tap into all the language aptitude constructs contributing to L2 learning at these two levels of proficiency, above all at higher levels. Further studies should consider using specific language aptitude tests that are better aimed at catching aptitudes involved at a specific proficiency level, like Hi-LAB for higher levels, or else exploring the possibility to develop a continuous granular language aptitude test. If the latter, then different components of the overall test would yield results or not depending on the learner's stage in the development ladder. In that case we would not be talking about a global aptitude score any more,

but about the activation and inhibition of individual aptitude components which could be traceable along a student's learning process.

Despite the voices in the literature making the case for the importance of tolerance of ambiguity as part of language aptitude, no correlations were flagged between tolerance of ambiguity and L2 development in this dissertation. As suggested previously, it may be that the instrument used to measure it, the tolerance of ambiguity scale, is not reliable (Doughty, 2010), or situated enough. Further research should look at alternative ways of measuring this construct.

This study provided evidence of the influence of L1 literacy in the L2 learning processes in adults, and suggested that a threshold of L1 literacy may be necessary for adults to become successful formal language learners at any age. However, it did not find where that threshold would be found, or how it could be measured with efficacy. There were a number of literacy-related variables investigated in this study which can serve as a starting point from which further studies can shed light on the theoretical underpinnings of L1 literacy and its relationships with age and academic development. A better understanding of these processes can provide invaluable insights which can help instructors design interventions aimed at helping students with low L1 literacy strengthen this weakness by using what is known about crosslinguistic skill transfer.

Finally, structural equation modelling techniques have been used in second language research with confirmatory purposes for some time now. Partial least squares, belonging to the same family, is an excellent statistical tool to investigate research areas for which theory building is still incipient, with a potential to reveal simultaneous relationships amongst variables as well as

providing valuable insights on the direction of the relationships. Further research should consider using this technique to propose new exploratory models for variable interaction in individual differences research.

APPENDIX A

Instrumentation

A.1 The L1 Literacy Tests

PRUEBA DE CASTELLANO

Tiempo máximo: 30'

Un escritor nunca olvida la primera vez que acepta unas monedas o un elogio a cambio de una historia. Nunca olvida la primera vez que siente el dulce veneno de la vanidad en la sangre y cree que, si consigue que nadie descubra su falta de talento, el sueño de la literatura será capaz de poner techo sobre su cabeza, un plato caliente al final del día y lo que más anhela: su nombre impreso en un miserable pedazo de papel que seguramente vivirá más que él. Un escritor está condenado a recordar ese momento, porque para entonces ya está perdido y su alma tiene precio.

Mi primera vez llegó un lejano día de diciembre de 1917. Tenía por entonces diecisiete años y trabajaba en *La Voz de la Industria*, un periódico venido a menos que languidecía en un cavernoso edificio que antaño había albergado una fábrica de ácido sulfúrico y cuyos muros aún rezumaban aquel vapor corrosivo que carcomía el mobiliario, la ropa, el ánimo y hasta la suela de los zapatos. La sede del diario se alzaba tras el bosque de ángeles y cruces del cementerio del Pueblo Nuevo, y de lejos su silueta se confundía con la de los panteones recortados sobre un horizonte apuñalado por centenares de chimeneas y fábricas que tejían un perpetuo crepúsculo de escarlata y negro sobre Barcelona.

La noche en que iba a cambiar el rumbo de mi vida, el subdirector del periódico, don Basilio Moragas, tuvo a bien convocarme poco antes del cierre en el oscuro cubículo enclavado al fondo de la redacción que hacía las veces de despacho y de fumadero de habanos. Don Basilio era un hombre de aspecto feroz y bigotes frondosos que no se andaba con ñoñerías y suscribía la teoría de que un uso liberal de adverbios y la adjetivación excesiva eran cosa de pervertidos y gentes con deficiencias vitamínicas. Si descubría a un redactor proclive a la prosa florida lo enviaba tres semanas a componer esquelas funerarias.

Carlos RUIZ ZAFÓN. *El juego del ángel*. Barcelona: Planeta, 2008

PRUEBA DE CASTELLANO

Nombre: _____

1. ¿Qué es lo que más desea un escritor?

- a) un elogio a cambio de una historia
- b) poder vivir de la literatura
- c) ver su nombre impreso en papel
- d) dinero

2. ¿Dónde trabajaba el narrador de la historia?

- a) en el cementerio de pueblo nuevo
- b) en una fábrica de ácido sulfúrico
- c) en un panteón
- d) en un periódico

3. ¿Qué tipo de prosa valoraba el subdirector del periódico?

- a) la prosa parca y sucinta
- b) la prosa florida
- c) la que usa muchos adverbios y adjetivos
- d) la prosa funeraria

4. Sustituya la palabra frondoso por un antónimo en la expresión: «bigotes frondosos».

5. La tercera persona del singular del pluscuamperfecto de subjuntivo del verbo languidecer es:

- a) languidecía
- b) languideciera
- c) hubiera o hubiese languidecido
- d) hubo languidecido

6. Señale la función sintáctica de Mi primera vez en la frase “Mi primera vez llegó un lejano día de diciembre de 1917”:

- a) sujeto gramatical
- b) complemento circunstancial
- c) objeto directo
- d) complemento preposicional

7. Pase a tiempo presente el párrafo: «Don Basilio era un hombre de aspecto feroz y bigotes frondosos que no se andaba con ñoñerías y suscribía la teoría de que un uso liberal de adverbios y la adjetivación excesiva eran cosa de pervertidos y gentes con deficiencias vitamínicas».

Don Basilio _____ un hombre de aspecto feroz y bigotes frondosos que no se _____ con ñoñerías y _____ la teoría de que un uso liberal de adverbios y la adjetivación excesiva _____ cosa de pervertidos y gentes con deficiencias vitamínicas.

8. Señale cuál de estas palabras es sinónimo de proclive en la frase: «Si descubría a un redactor proclive a la prosa florida lo enviaba tres semanas a componer esquelas funerarias».

- a) vago
- b) destinado
- c) opuesto
- d) propenso

9. Según el contexto, el sinónimo más adecuado para el verbo rezumaban en la frase “cuyos muros aún rezumaban aquel vapor corrosivo” sería:

- a) soportaban
- b) carecían
- c) mostraban
- d) exudaban

10. Resuma el contenido del texto en un máximo de cinco líneas.

LANGUAGE LITERACY TEST –SPANISH: KEY

| | |
|---|---------------------------------|
| 1. ¿Qué es lo que más desea un escritor? c) ver su nombre impreso en papel | 1 punto |
| 2. ¿Dónde trabajaba el narrador de la historia? d) en un periódico | 1 punto |
| 3. ¿Qué tipo de prosa valoraba el subdirector del periódico? a) la prosa parca y sucinta | 1 punto |
| 4. Sustituya la palabra frondoso por un antónimo en la expresión: «bigotes frondosos». Ralos, escasos, claros, etc. | 1 punto |
| 5. La tercera persona del singular del pluscuamperfecto de subjuntivo del verbo <u>languidecer</u> es: c) hubiera o hubiese languidecido | 0,5 puntos |
| 6. Señale la función sintáctica de Mi primera vez en la frase “Mi primera vez llegó un lejano día de diciembre de 1917”: a) sujeto gramatical | 0,5 puntos |
| 7. Pase a tiempo presente el párrafo: Don Basilio <u>es</u> un hombre de aspecto feroz y bigotes frondosos que no se <u>anda</u> con ñoñerías y <u>suscribe</u> la teoría de que un uso liberal de adverbios y la adjetivación excesiva <u>son</u> cosa de pervertidos y gentes con deficiencias vitamínicas. | 1 punto (0,25 por respuesta) |
| 8. Señale cuál de estas palabras es sinónimo de proclive en la frase: «Si descubría a un redactor <u>proclive</u> a la prosa florida lo enviaba tres semanas a componer esquelas funerarias». d) propenso | 1 punto |
| 9. Según el contexto, el sinónimo más adecuado para el verbo rezumaban en la frase “cuyos muros aún <u>rezumaban</u> aquel vapor corrosivo” sería: d) exudaban | 1 punto |
| 10. Resuma el contenido del texto en un máximo de cinco líneas. Respuesta modelo: Lo más importante para un autor es ver su obra publicada y su nombre impreso en papel, reflejo de su vanidad. Para nuestro protagonista, esto sucedió por primera vez cuando el subdirector del periódico para el que trabajaba, que no apreciaba la prosa expresiva, le llamó a su despacho. | 2 puntos |
| Total de puntos: | 10 puntos |

PROVA DE CATALÀ

Temps màxim: 30'

Mai aquesta societat no havia confiat tan poc en la seva classe política. Mai. I tampoc mai els ciutadans d'aquest país no havien tingut tantes raons per a considerar els partits com un obstacle per al bon funcionament de les institucions. La successió —vertiginosa— de casos de corrupció està corcant la confiança d'una societat que, a més, ho està passant molt malament per culpa d'una crisi econòmica sense precedents.

Així, doncs, ha arribat el moment en què els dos grans partits d'aquest país s'han de plantejar quines estructures de poder s'han establert durant els últims trenta anys, quins han estat els vicis de funcionament que han desembocat en aquesta situació i quines responsabilitats hi tenen ells.

I això no és un desig ingenu. És una necessitat urgent, perquè, en cas contrari, la mateixa espiral descendent acabarà arrossegant els que han afeblit les institucions durant tres dècades [...].

S'han d'afrontar reformes profundes i és imprescindible una regeneració dels partits[...]. Hi ha d'haver criteris objectius per a encarregar des d'un informe fins a una requalificació urbanística i cal rearmar ideològicament els partits, que no estan pensats per a esdevenir *lobbies* econòmics ni sindicats d'interessos, sinó forces de transformació social i nacional.

Salvador COT. «Prou!». *Avui* (28 octubre 2009)

PROVA DE CATALÀ

Nom: _____

Encerclieu la resposta correcta o empleneu el buit corresponent.

1. Qui obstaculitza el bon funcionament de les institucions?

- a) la successió de casos de corrupció
- b) la societat
- c) la crisi econòmica
- d) la classe política

2. Qui s'ha de fer un replantejament del que no ha funcionat els darrers anys?

- a) les institucions
- b) els dos grans partits del país
- c) la societat
- d) els ciutadans d'aquest país

3. Els partits polítics d'un país han de ser:

- a) forces de transformació social i nacional
- b) lobbies econòmics
- c) sindicats d'interesos
- d) els principals partits del país

4. El pronom feble amb què, si s'hagués de pronominalitzar, se substituiria el sintagma en la seva classe política és:

- a) hi
- b) en
- c) ho
- d) li

5. D'acord amb el text, un mot o una expressió sinònim de corcant és:

- a) consolidant
- b) destruint lentament
- c) ennoblint
- d) canviant a poc a poc

6. D'acord amb el text, un mot sinònim de afeblit és:

- a) debilitat
- b) engrandit
- c) reforçat
- d) ocupat

7. Passeu a temps present el fragment següent: “Així, doncs, ha arribat el moment en què els dos grans partits d’aquest país s’han de plantejar quines estructures de poder s’han establert durant els últims trenta anys, quins han estat els vicis de funcionament que han desembocat en aquesta situació i quines responsabilitats hi tenen ells.”

Així, doncs, _____ el moment en què els dos grans partits d’aquest país es _____ quines estructures de poder s’estableixen durant els últims trenta anys, quins _____ els vicis de funcionament que _____ en aquesta situació i quines responsabilitats hi tenen ells.

8. La tercera persona del singular de l'imperfet de subjuntiu de esdevenir és:

- a) esdevenís
- b) esdevinguessi
- c) esdevingués
- d) esdevindria

9. El nom del qual deriva l'adjectiu vertiginosa és: _____.

10. Resumi el contingut del text en un màxim de cinc línies (problema, solució(s), conclusió):

LANGUAGE LITERACY TEST –CATALAN: KEY

| | |
|--|-------------------------------|
| 1. Qui obstaculitza el bon funcionament de les institucions? d) la classe política | 1 punt |
| 2. Qui s'ha de fer un replantejament del que no ha funcionat els darrers anys? b) els dos grans partits del país | 1 punt |
| 3. Els partits polítics d'un país han de ser: a) forces de transformació social i nacional | 1 punt |
| 4. El pronom feble amb què, si hagués de pronominalitzar-se, se substituiria el sintagma en la seva classe política és: a) hi | 0,5 punts |
| 5. D'acord amb el text, un mot o expressió sinònim de corcant és: b) destruint lentament | 1 punt |
| 6. D'acord amb el text, un mot o expressió sinònim de afeblit és: a) debilitat | 1 punt |
| 7. Passeu a temps present el fragment següent: Així, doncs, <u>arriba</u> el moment en què els dos grans partits d'aquest país es <u>plantegen</u> quines estructures de poder s'han establert durant els últims trenta anys, quins <u>són</u> els vicis de funcionament que <u>desemboquen</u> en aquesta situació i quines responsabilitats hi tenen ells. | 1 punt (0,25 per resposta) |
| 8. La tercera persona del singular de l'imperfet de subjuntiu de esdevenir és: c) esdevingués | 0,5 punts |
| 9. El nom del qual deriva l'adjectiu vertiginosa és: vertigen | 1 punt |
| 10. Resumi el contingut del text en un màxim de cinc línies (problema, solució(s), conclusió): Model de resposta: L'autor denuncia la pèrdua de confiança en la classe política deguda als freqüents casos de corrupció, quan aquesta és ara més necessària que mai degut a la greu crisi econòmica. Els partits polítics s'han de reformar per esdevenir formes de transformació social i nacional. | 2 punts |
| Total de punts: | 10 punts |

A.2 The Questionnaire

**PERFIL BIOGRÁFICO Y LINGÜÍSTICO
DEL PARTICIPANTE EN LA INVESTIGACIÓN
UNIVERSIDAD DE BARCELONA**

Barcelona, febrero y marzo de 2012

Estimado participante,

Nos gustaría contar con tu ayuda para investigar el aprendizaje de lenguas extranjeras en Cataluña. Esta investigación se realiza bajo la tutoría de la Universitat de Barcelona, y esperamos que sus resultados nos permitan entender mejor el aprendizaje de idiomas en la edad adulta con el fin de mejorar y personalizar nuestros programas educativos. Tu colaboración es muy valiosa para nosotros, y por eso te pedimos que respondas a todas las preguntas con sinceridad. No hay respuestas correctas o incorrectas. Lo que realmente nos interesa es conocer tu opinión y experiencia personal.

Muchas gracias por colaborar.

El equipo investigador

Universitat de Barcelona

El contenido de este cuestionario, así como el del resto de los elementos de la investigación, es estrictamente confidencial. No se revelará información identificativa de los participantes bajo ningún concepto. Aunque te pedimos tu nombre y apellidos para identificar las diferentes hojas de las pruebas, se te asignará un número aleatorio en la base de datos, y cualquier referencia a tus datos se realizará siempre con este número anónimo.

SECCIÓN 1 – ¿Por qué estudias inglés? Marca la casilla más adecuada para cada una de las afirmaciones siguientes:

| | Totalmente De acuerdo | De acuerdo | Bastante de acuerdo | Bastante en desacuerdo | En desacuerdo | Totalmente en desacuerdo |
|--|-----------------------|------------|---------------------|------------------------|---------------|--------------------------|
| Tengo mucho interés en aprender inglés | | | | | | |
| Me gustaría hablar inglés tan bien como el catalán o el castellano | | | | | | |
| No estoy interesado em aprender inglés | | | | | | |
| La lengua inglesa me resulta atractiva | | | | | | |
| Cuando veo algo escrito en inglés, intendo entender qué pone | | | | | | |
| Me gusta aprender inglés | | | | | | |

| | Muy importante | Importante | Algo importante | Poco importante | No es importante | Irrelevante |
|--|----------------|------------|-----------------|-----------------|------------------|-------------|
| Para conocer gente de otros países | | | | | | |
| Para poder comunicarme con gente de otros países | | | | | | |
| Para viajar al extranjero | | | | | | |
| Para tener más oportunidades laborales | | | | | | |
| Porque lo necesitaré para mejorar en el trabajo | | | | | | |
| Porque lo necesitaré para poder acceder a mejores puestos de trabajo | | | | | | |

SECCIÓN 2 – Escoge la opción que te defina mejor:

1. En la escuela, ¿tenías facilidad para las asignaturas de lenguas (catalán/castellano)

Mucha Bastante Un poco No mucha Poca Ninguna

2. En la escuela, ¿cómo eran tus notas en lengua extranjera (inglés/francés)?

Muy buenas Buenas Regulares Bajas Muy Bajas Malas

3. ¿Cómo es tu ortografía en tu lengua materna?

Muy buena Buena Regular Pobre Muy pobre Mala

4. En la actualidad, ¿te resulta fácil o difícil aprender inglés?

Muy fácil Bastante fácil Fácil Difícil Muy difícil Extremadamente Difícil

5. En general, ¿crees que tienes facilidad para aprender idiomas?

Mucha Bastante Un poco No mucha Poca Ninguna

SECCIÓN 3 – Escoge la opción que te defina mejor:

1. Cuando aprendo una lengua extranjera:

- a) Me fijo sobre todo en las reglas gramaticales. Soy una persona muy analítica y se me dan bien.
- b) Memorizo largas listas de vocabulario, de verbos irregulares, de expresiones hechas, de lo que sea.
- c) Lo que más me interesa es entender y hablar: participo en clase todo lo que puedo y me esfuerzo en entender al profesor y las actividades de comprensión oral.
- d) No tengo ninguna estrategia ni técnica concreta. Voy tirando.
- e) Ninguna de las cuatro. En mi caso, _____

2. En clase, cuando me piden un ejercicio de redacción en inglés:

- a) Disfruto. Puedo practicar lo que he aprendido, y luego ver los errores que he cometido.
- b) Los hago; redactar es una forma útil de aprender idiomas.
- c) Los hago, pero se me dan fatal. Siempre cometo muchos errores.
- d) Nunca los hago. A mi lo que me interesa es hablar y hacerme entender. No me interesa saber redactar.
- e) Ninguna de las cuatro. En mi caso, _____

3. En clase, cuando leemos en inglés:

- a) Me gusta; en general, me gusta leer y se me da bien. Sólo me cuesta el vocabulario nuevo.
- b) Tengo que esforzarme, pero al final consigo entender los textos.
- c) Me cuesta muchísimo y me aburre. Para entender el texto tengo que releerlo varias veces.
- d) Se me da fatal. A menudo malinterpreto el texto y no lo entiendo bien.
- e) Ninguna de las cuatro. En mi caso, _____

4. Creo que:

- a) Hay personas que tienen un talento innato para aprender idiomas, y yo soy uno de ellos.
- b) Hay personas que tienen un talento innato para aprender idiomas, y yo no soy uno de ellos.
- c) El talento innato no existe: todo consiste en esfuerzo y dedicación.
- d) El talento innato existe, pero hace falta dedicación y esfuerzo para obtener resultados.
- e) Ninguna de las cuatro. Creo que _____

Hábitos de lectura

Por favor, indica aproximadamente cuántos libros de cualquier tipo y en cualquier idioma lees al año.

IMPORTANTE: no cuentan los libros de lectura obligatoria de la EOI.

Ninguno De 1 a 5 De 6 a 10 De 11 a 15 De 16 a 20 21 o más

Ahora valora cuánto te gusta leer (libros, revistas, etc.) en una escala de 1 (nada) a 10 (muchísimo):

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | | | | | | |

Nada Muchísimo

SECCIÓN 4

Todos tenemos una forma distinta de hacer las cosas, y esto se refleja en aspectos tan diversos como el trabajo o el aprendizaje de idiomas. Indica con una cruz si estas de acuerdo o en desacuerdo con las siguientes afirmaciones generales.

| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
|--|--------------------------|------------------------|-------------|---------------------|-----------------------|
| 1. Evito ir con gente que no comparte mis valores/ideas. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 2. Disfruto cuando estoy con gente que tiene valores o ideas diferentes a los míos. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 3. Me gustaría vivir una temporada en el extranjero. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 4. Me gusta rodearme de cosas familiares y conocidas. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 5. Cuanto antes compartamos todos los mismos valores e ideas, mejor. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 6. Me siento a gusto con todo tipo de personas. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 7. Si puedo escoger, prefiero ir de vacaciones al extranjero que quedarme en mi país. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 8. Un buen profesor es aquel que hace que te cuestiones tu forma de ver las cosas. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 9. Un buen trabajo es aquél en el que siempre sabes qué tienes que hacer y cómo. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 10. Las personas que tienen una vida sin sorpresas ni sobresaltos deberían sentirse agradecidas. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 11. Aquello a lo que estamos acostumbrados es siempre mejor que aquello que no conocemos. | | | | | |
| | Totalmente en desacuerdo | Más bien en desacuerdo | Indiferente | Más bien de acuerdo | Totalmente de acuerdo |
| 12. Prefiero los grupos de gente donde conozco a todo el mundo a los grupos en los que conozco a poca gente. | | | | | |

SECCIÓN 5: DATOS BIOGRÁFICOS

Nombre y apellidos: _____

Fecha de nacimiento: _____ Curso en la EOI _____

1) ¿Cuál es tu nivel de estudios? Elige el grado más alto **terminado**:

- Hasta los 9-10 años: educación primaria (plan antiguo)
- Hasta los 11-12 años: educación primaria actual
- Hasta los 13-14 años: EGB, o educación primaria + bachiller elemental (plan antiguo)
- Hasta los 15-16 años: ESO, FP I
- Hasta los 16-17 años: BUP, bachiller superior (plan antiguo), FP II o ciclo formativo grado medio
- Hasta los 17-18 años: COU, PREU, bachillerato actual
- Cualquier tipo de estudios universitarios: diplomaturas, licenciaturas o grados. También ciclos formativos de grado superior.

2) ¿Has seguido o sigues algún tipo de estudios una vez finalizada tu formación inicial? Marca tantas casillas como necesites:

- Cursos de formación en temas específicos (ej: fotografía, pintura, jardinería, etc.)
- Programas de formación en el trabajo o seminarios profesionales (ej: atención al cliente, congresos, dirección de proyectos, etc.)
- Otros estudios superiores (segunda carrera universitaria, master, postgrado, etc.)
- Otros: _____

3) Conocimientos de catalan y castellano. Escoje la opción que te defina mejor:

- a. Soy castellano hablante. Entiendo el catalán pero lo hablo poco/nada y no lo escribo bien.
- b. Soy catalano hablante. Entiendo el castellano pero lo hablo poco/nada y no lo escribo bien.
- c. Soy bilingüe; entiendo y me expreso correctamente oralmente y por escrito en las dos lenguas.
- d. Soy bilingüe, pero me expreso mejor en castellano.
- e. Soy bilingüe, pero me expreso mejor en catalan.

4) ¿Cuántos años llevas estudiando inglés?

En la escuela: _____ años

En la educación secundaria: _____ años

En escuelas de inglés fuera de la escuela o el instituto _____ años

Más o menos, ¿recuerdas tu nota final del último curso (de Insuficiente a Sobresaliente)? _____

5) ¿Has estudiado alguna otra lengua extranjera? Sí No

Si la respuesta es sí, indica cuál y durante cuántos años, y la nota final del último curso (de Insuficiente a Sobresaliente):

Lengua: _____ Años: _____ Nota Final (aprox): _____

Lengua: _____ Años: _____ Nota Final (aprox): _____

6) ¿Has hecho estancias lingüísticas de más de 15 días en países de habla inglesa para mejorar tus habilidades comunicativas en esta lengua? Sí No

Si la respuesta es sí, indica en qué país, durante cuánto tiempo y a qué edad la realizaste.

País: _____ Duración _____ Edad: _____

País: _____ Duración _____ Edad: _____

Para terminar... Queremos agradecerte una vez más tu participación en nuestro estudio. Si estás de acuerdo en participar y te interesa conocer el resultado de tus pruebas de aptitud, será un placer para nosotros enviártelas por correo electrónico una vez las tengamos analizadas. De ser así, déjanos tu dirección de correo electrónico aquí:

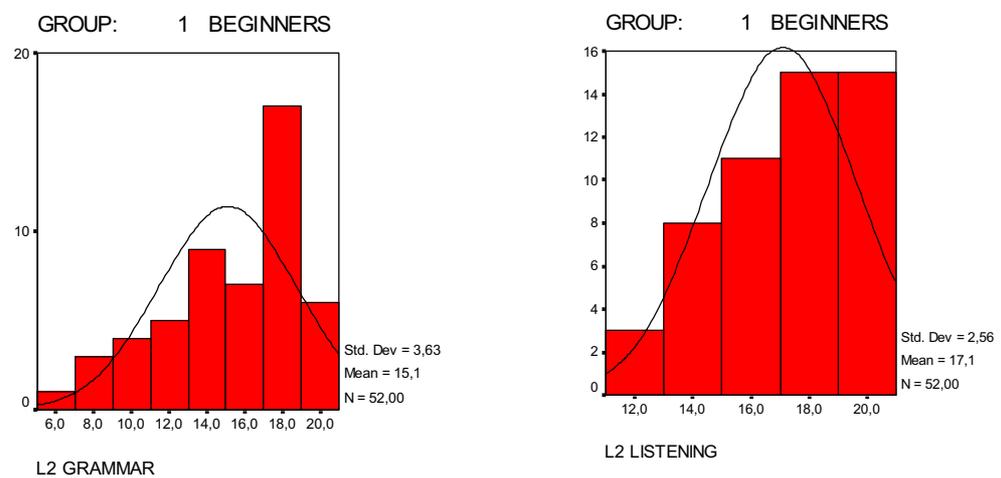
_____ ¡Muchas gracias! _____ Firma

APPENDIX B

Supporting Statistical Information

B.1 Histograms with Normality Curve

Figure B.1.1 L2 development histograms, beginner group



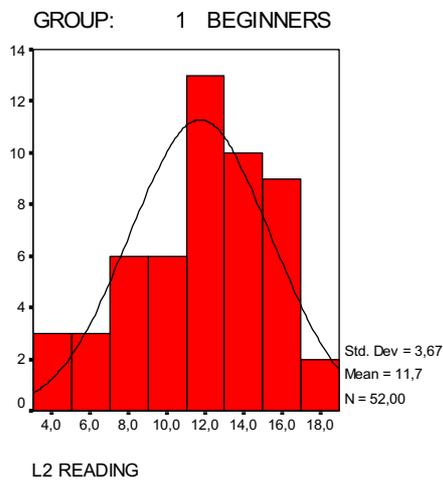
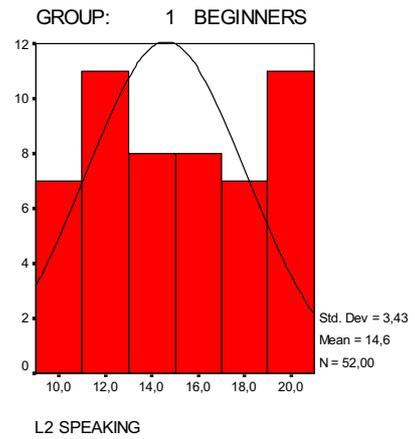
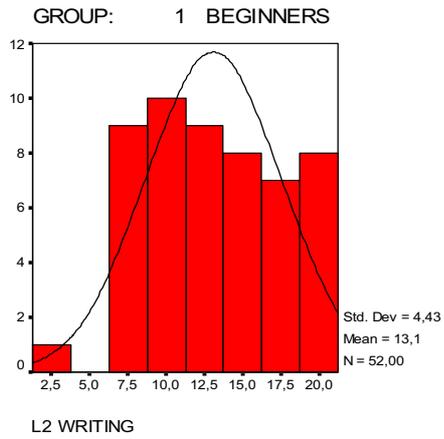
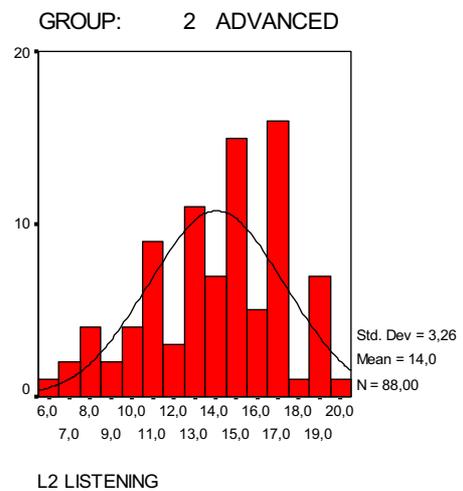
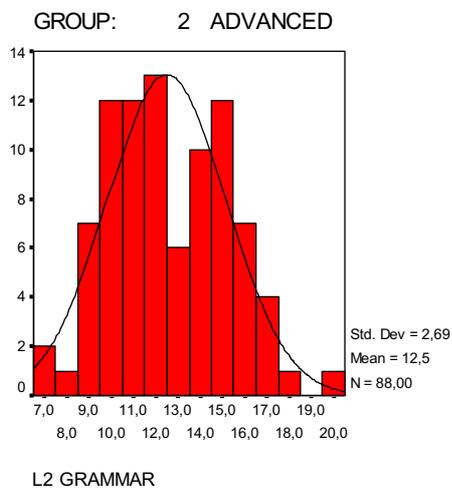


Figure B.1.2 L2 development histograms, advanced group



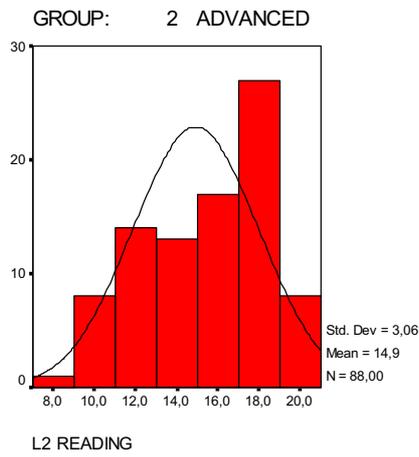
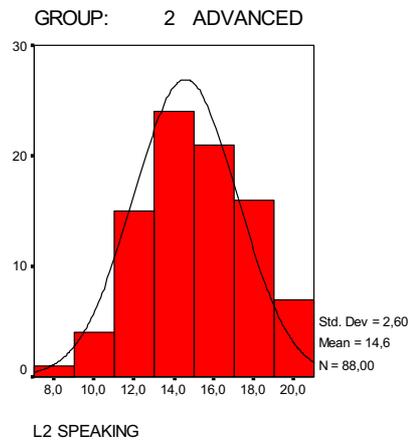
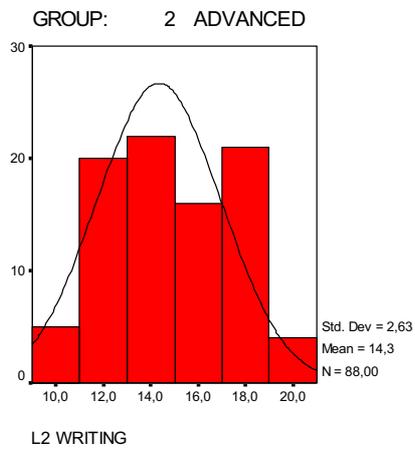


Figure B.1.3 L2 global development histograms

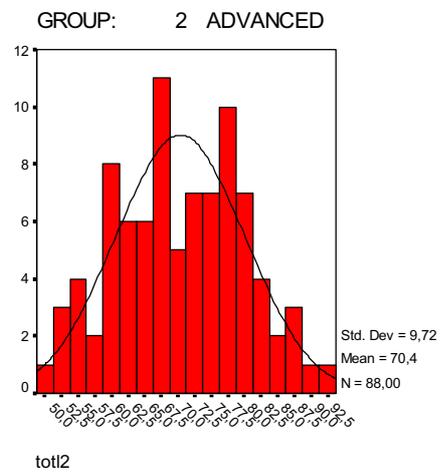
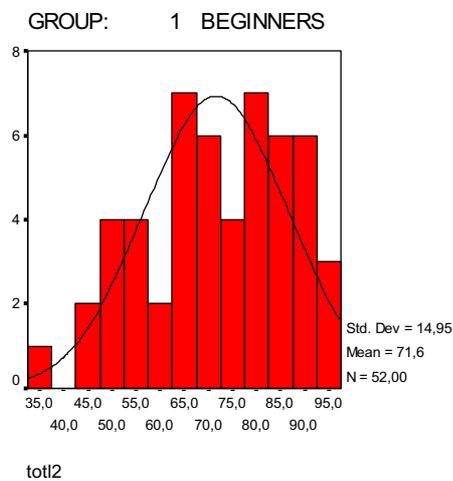
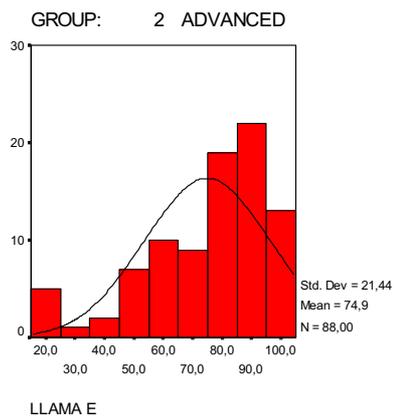
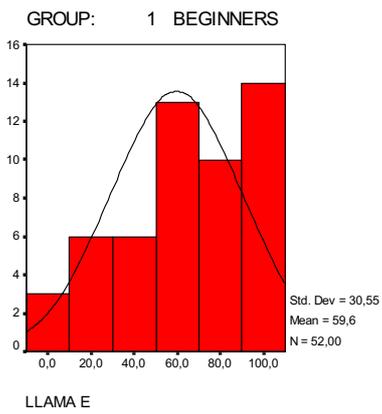
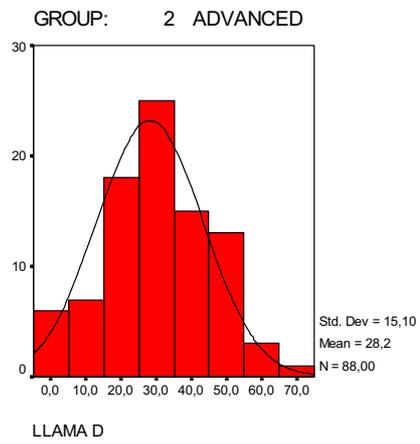
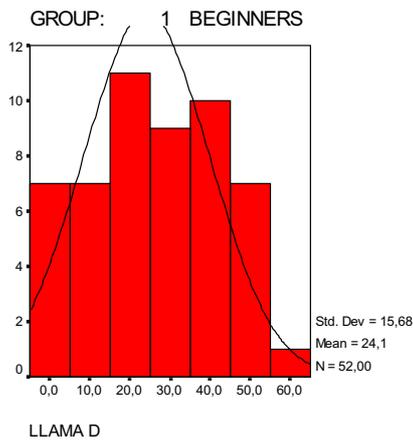
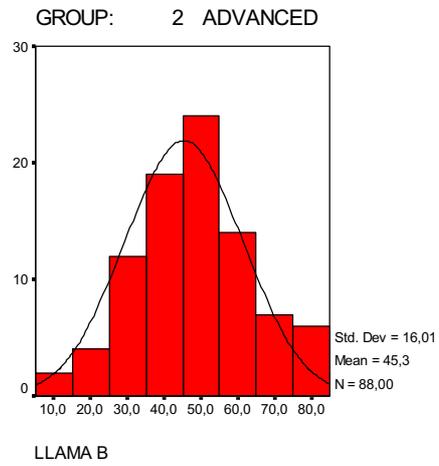
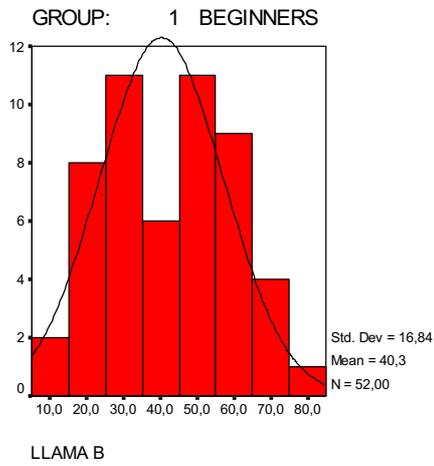


Figure B.1.4 Histograms with normality curve, language aptitude



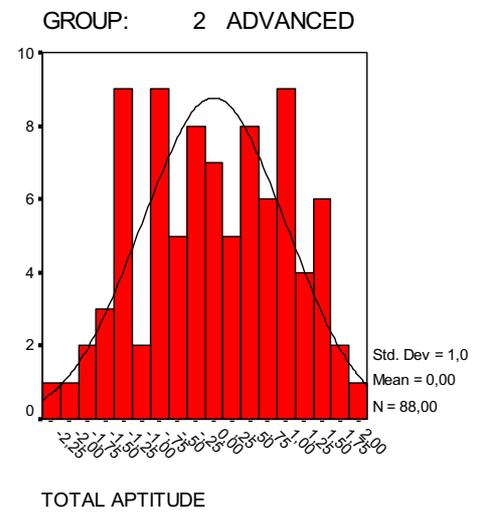
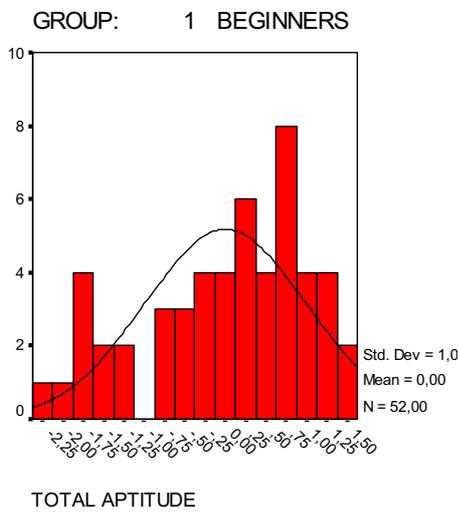
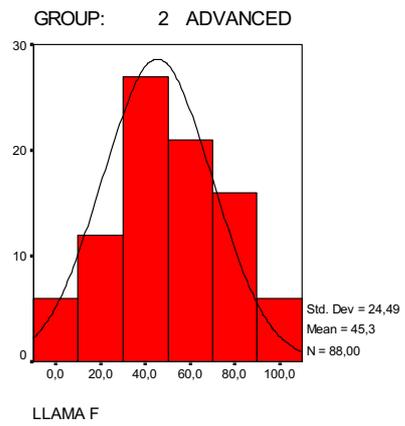
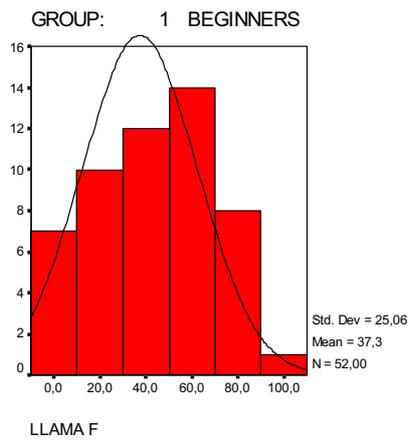


Figure B.1.5 Total L1 reading comprehension

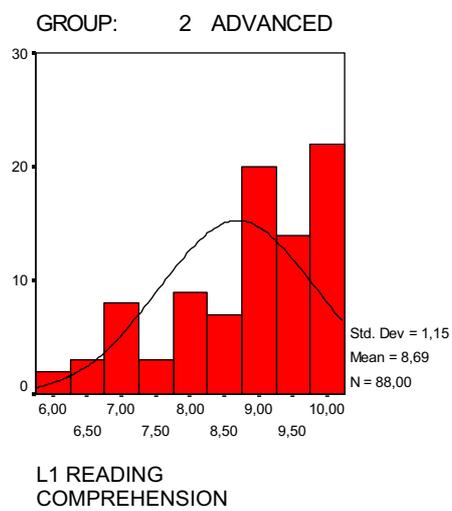
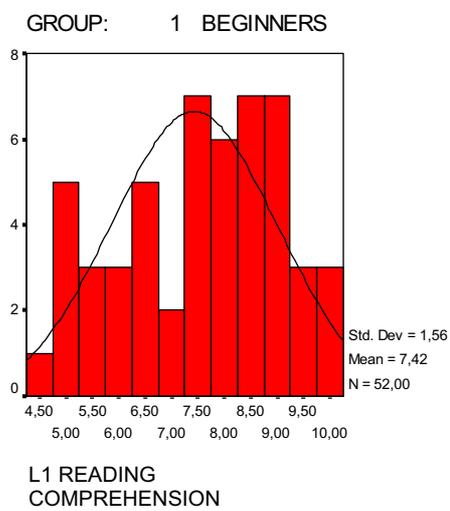


Figure B.1.6 *L1 spelling*

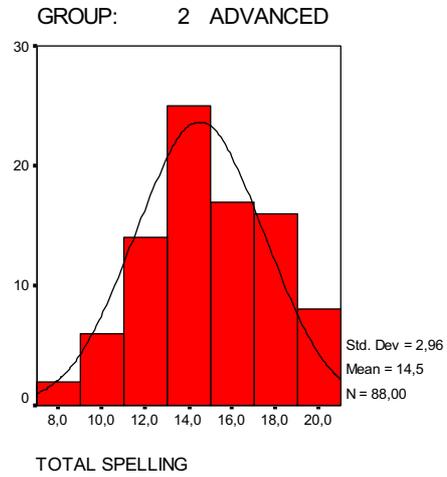
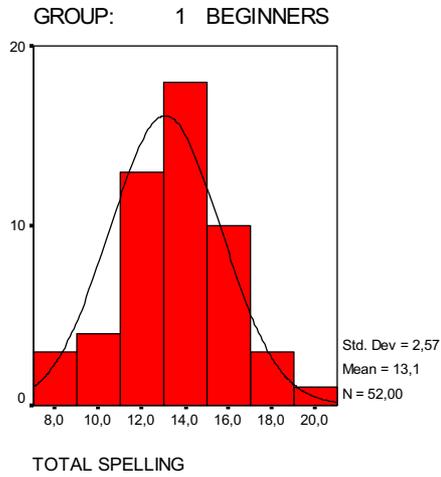
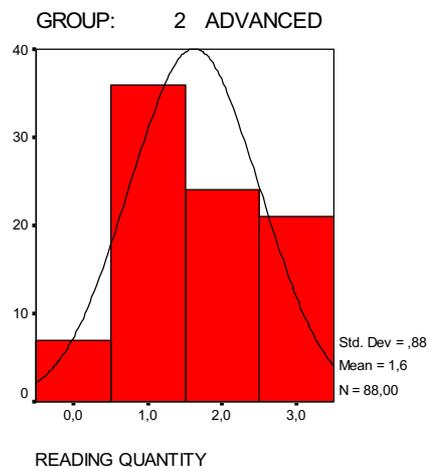
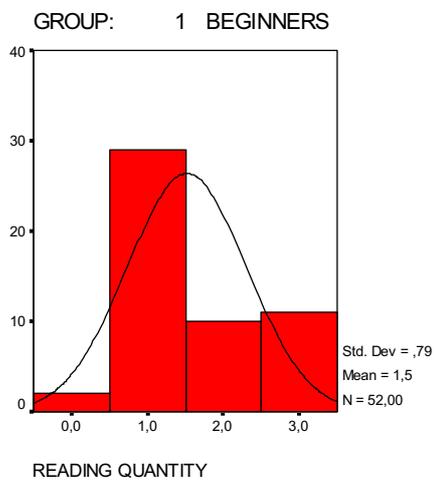


Figure B.1.7 *Reading quantity and enjoy reading*



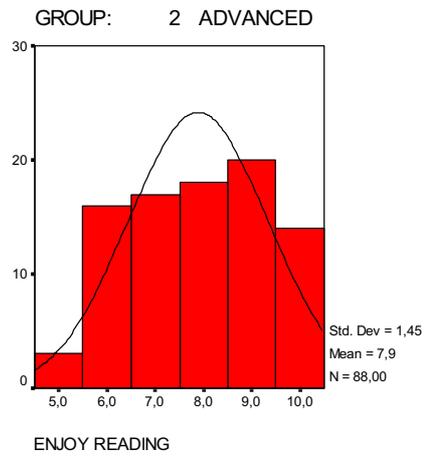
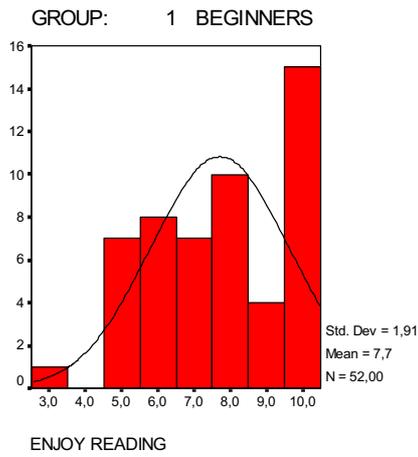
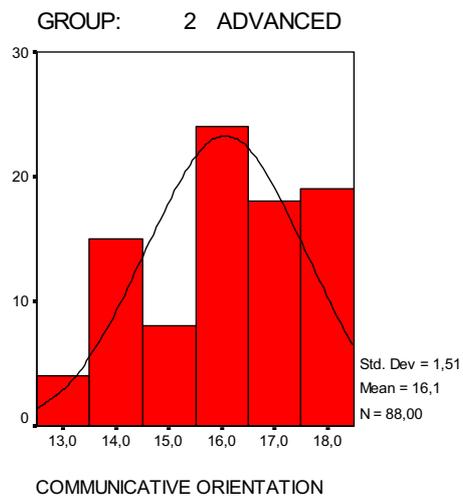
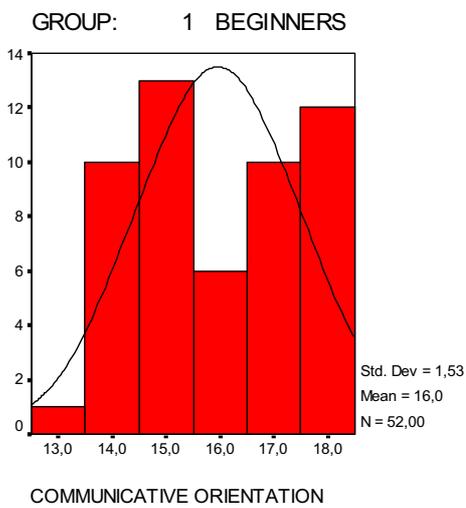
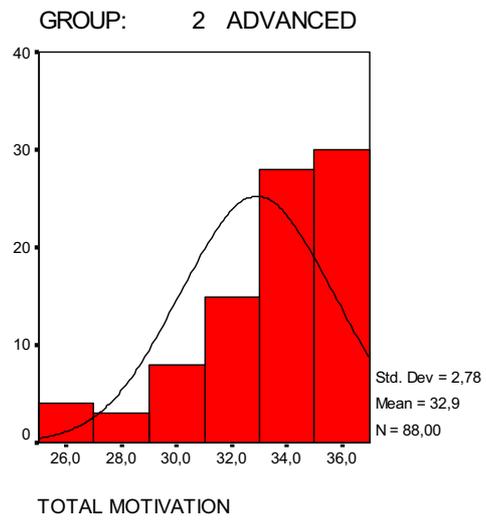
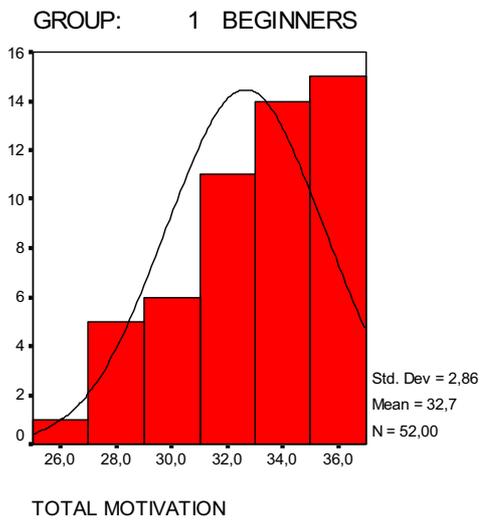


Figure B.1.8 Motivation and orientations



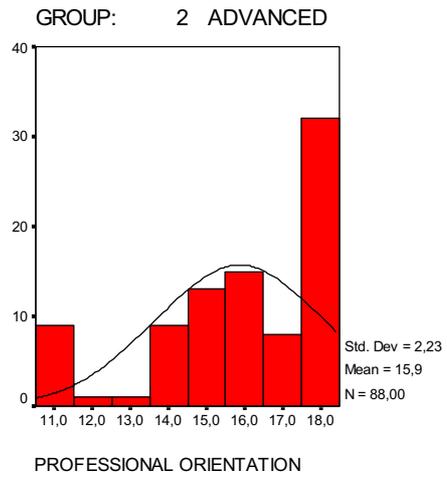
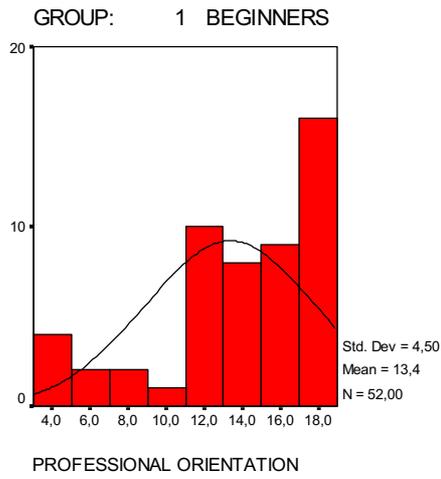


Figure B.1.9 Age at testing

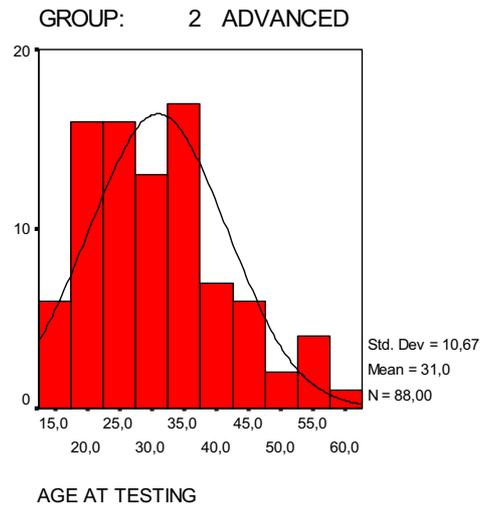
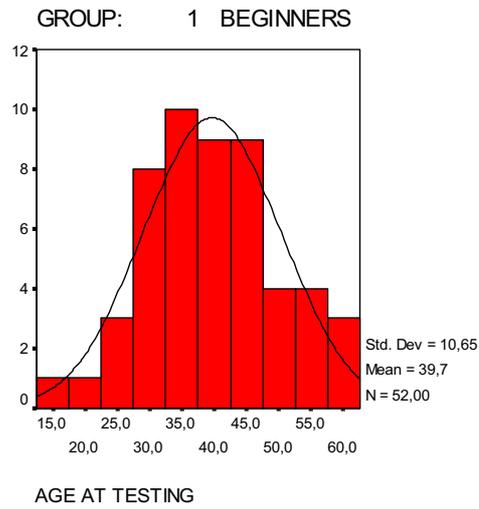


Figure B.1.10 Other foreign languages

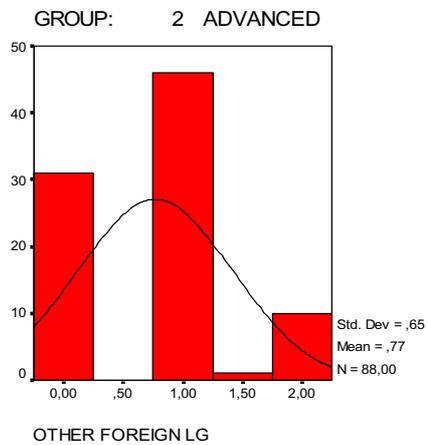
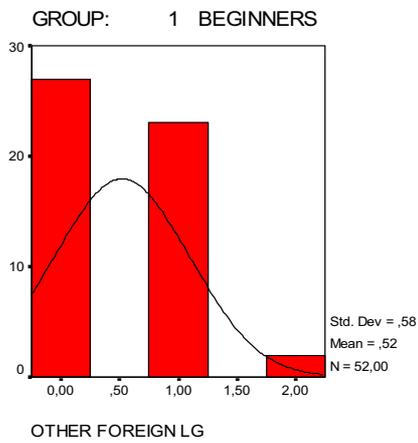


Figure B.1.11 *Stays abroad*

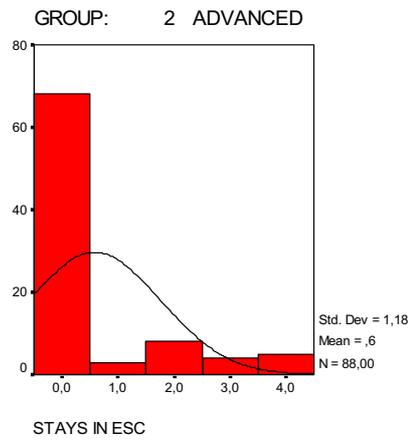
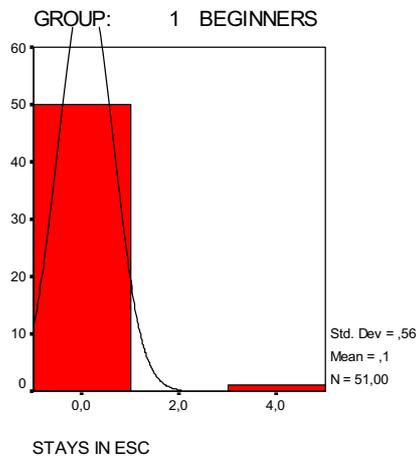
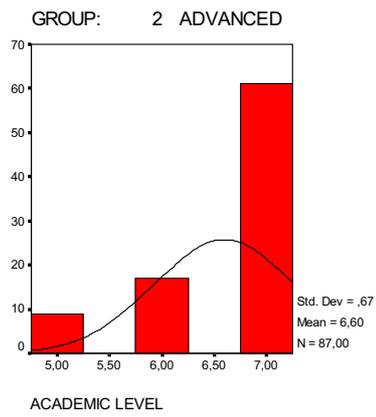
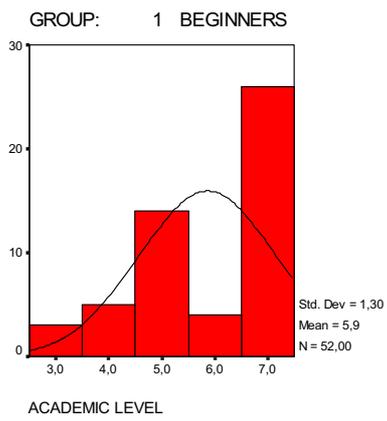


Figure B.1.12 *Academic level*



B.2 Equality of Variance Assumptions for T-tests and ANOVAs in Section 6.2.2

For language preference (T-test):

Independent Samples Test(a)

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|-------|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|----------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | e | Lower | Upper |
| totl2 | Equal variances assumed | ,479 | ,492 | ,565 | 50 | ,574 | 3,1176 | 5,51530 | -7,96024 | 14,19538 |
| | Equal variances not assumed | | | ,603 | 12,421 | ,558 | 3,1176 | 5,17392 | -8,11321 | 14,34836 |

a. GROUP = BEGINNERS

Independent Samples Test(a)

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|-------|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|---------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | e | Lower | Upper |
| totl2 | Equal variances assumed | 3,778 | ,055 | -1,391 | 86 | ,168 | -2,8731 | 2,06539 | -6,97896 | 1,23276 |
| | Equal variances not assumed | | | -1,408 | 85,835 | ,163 | -2,8731 | 2,03986 | -6,92832 | 1,18212 |

a. GROUP = ADVANCED

For literacy language (T-test):

Independent Samples Test(a)

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|-------|-----------------------------|---|------|------------------------------|-------|-----------------|-----------------|-----------------------|---|-----------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| totl2 | Equal variances assumed | ,013 | ,909 | ,429 | 50 | ,670 | 4,6600 | 10,86452 | -17,16203 | 26,48203 |
| | Equal variances not assumed | | | ,394 | 1,068 | ,758 | 4,6600 | 11,81790 | 124,68354 | 134,00354 |

a GROUP = BEGINNERS

Independent Samples Test(a)

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|-------|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|---------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| totl2 | Equal variances assumed | 3,277 | ,074 | -,727 | 86 | ,469 | -1,6215 | 2,22992 | -6,05445 | 2,81141 |
| | Equal variances not assumed | | | -,784 | 64,107 | ,436 | -1,6215 | 2,06697 | -5,75064 | 2,50759 |

a GROUP = ADVANCED

For language dominance (One-way Between-groups ANOVA):

Test of Homogeneity of Variances(a)

| | Levene Statistic | df1 | df2 | Sig. |
|------------------|------------------|-----|-----|------|
| totl2 | 1,560 | 3 | 48 | ,211 |
| totapt | 2,730 | 3 | 48 | ,054 |
| TOTAL LITERACY | 4,864 | 3 | 48 | ,005 |
| TOTAL MOTIVATION | 3,091 | 3 | 48 | ,036 |

a GROUP = BEGINNERS

Robust Tests of Equality of Means(b)

| | | Statistic(a) | df1 | df2 | Sig. |
|------------------|----------------|--------------|-----|--------|------|
| totl2 | Welch | ,579 | 3 | 4,073 | ,659 |
| | Brown-Forsythe | ,913 | 3 | 8,869 | ,473 |
| totapt | Welch | ,267 | 3 | 4,018 | ,847 |
| | Brown-Forsythe | ,348 | 3 | 4,699 | ,793 |
| TOTAL LITERACY | Welch | 24,379 | 3 | 10,646 | ,000 |
| | Brown-Forsythe | 13,885 | 3 | 25,136 | ,000 |
| TOTAL MOTIVATION | Welch | ,935 | 3 | 4,874 | ,490 |
| | Brown-Forsythe | 1,391 | 3 | 14,748 | ,285 |

a Asymptotically F distributed.

b GROUP = BEGINNERS

Test of Homogeneity of Variances(e)

| | Levene Statistic | df1 | df2 | Sig. |
|------------------|------------------|-----|-----|------|
| totl2 | 4,037(a) | 3 | 83 | ,010 |
| totapt | ,474(b) | 3 | 83 | ,701 |
| TOTAL LITERACY | 3,890(c) | 3 | 83 | ,012 |
| TOTAL MOTIVATION | ,880(d) | 3 | 83 | ,455 |

a Groups with only one case are ignored in computing the test of homogeneity of variance for totl2.

b Groups with only one case are ignored in computing the test of homogeneity of variance for totapt.

c Groups with only one case are ignored in computing the test of homogeneity of variance for TOTAL LITERACY.

d Groups with only one case are ignored in computing the test of homogeneity of variance for TOTAL MOTIVATION.

e GROUP = ADVANCED

Robust Tests of Equality of Means(b,c,d,e,f)

| | | Statistic(a) | df1 | df2 | Sig. |
|------------------|----------------|--------------|-----|-----|------|
| totl2 | Welch | . | . | . | . |
| | Brown-Forsythe | . | . | . | . |
| totapt | Welch | . | . | . | . |
| | Brown-Forsythe | . | . | . | . |
| TOTAL LITERACY | Welch | . | . | . | . |
| | Brown-Forsythe | . | . | . | . |
| TOTAL MOTIVATION | Welch | . | . | . | . |
| | Brown-Forsythe | . | . | . | . |

a Asymptotically F distributed.

b Robust tests of equality of means cannot be performed for totl2 because at least one group has the sum of case weights less than or equal to 1.

c Robust tests of equality of means cannot be performed for totapt because at least one group has the sum of case weights less than or equal to 1.

d Robust tests of equality of means cannot be performed for TOTAL LITERACY because at least one group has the sum of case weights less than or equal to 1.

e Robust tests of equality of means cannot be performed for TOTAL MOTIVATION because at least one group has the sum of case weights less than or equal to 1.

f GROUP = ADVANCED

For other foreign languages (One-way Between-groups ANOVA):

Test of Homogeneity of Variances(a)

| | Levene Statistic | df1 | df2 | Sig. |
|------------------|------------------|-----|-----|------|
| totl2 | ,574 | 2 | 49 | ,567 |
| totapt | ,557 | 2 | 49 | ,576 |
| TOTAL LITERACY | ,919 | 2 | 49 | ,406 |
| TOTAL MOTIVATION | ,819 | 2 | 49 | ,447 |

a GROUP = BEGINNERS

Test of Homogeneity of Variances(e)

| | Levene Statistic | df1 | df2 | Sig. |
|------------------|------------------|-----|-----|------|
| totl2 | ,078(a) | 2 | 84 | ,925 |
| totapt | 1,729(b) | 2 | 84 | ,184 |
| TOTAL LITERACY | ,852(c) | 2 | 84 | ,430 |
| TOTAL MOTIVATION | 1,041(d) | 2 | 84 | ,358 |

a Groups with only one case are ignored in computing the test of homogeneity of variance for totl2.

b Groups with only one case are ignored in computing the test of homogeneity of variance for totapt.

c Groups with only one case are ignored in computing the test of homogeneity of variance for TOTAL LITERACY.

d Groups with only one case are ignored in computing the test of homogeneity of variance for TOTAL MOTIVATION.

e GROUP = ADVANCED

For stays abroad, advanced (One-way Between-groups ANOVA):

Test of Homogeneity of Variances(a)

| | Levene Statistic | df1 | df2 | Sig. |
|------------------|------------------|-----|-----|------|
| totl2 | 2,183 | 4 | 83 | ,078 |
| totapt | 1,173 | 4 | 83 | ,329 |
| TOTAL LITERACY | 1,053 | 4 | 83 | ,385 |
| TOTAL MOTIVATION | ,093 | 4 | 83 | ,984 |

a GROUP = ADVANCED

For academic level, beginners (One-way Between-groups ANOVA):

Test of Homogeneity of Variances(a)

| | Levene Statistic | df1 | df2 | Sig. |
|------------------|------------------|-----|-----|------|
| totapt | 2,111 | 4 | 47 | ,094 |
| TOTAL LITERACY | 1,002 | 4 | 47 | ,416 |
| TOTAL MOTIVATION | 2,735 | 4 | 47 | ,040 |

a GROUP = BEGINNERS

Robust Tests of Equality of Means(b)

| | | Statistic(a) | df1 | df2 | Sig. |
|------------------|----------------|--------------|-----|--------|------|
| totapt | Welch | 1,583 | 4 | 8,978 | ,260 |
| | Brown-Forsythe | 1,783 | 4 | 18,030 | ,176 |
| TOTAL LITERACY | Welch | ,735 | 4 | 7,763 | ,594 |
| | Brown-Forsythe | ,729 | 4 | 8,713 | ,595 |
| TOTAL MOTIVATION | Welch | 2,477 | 4 | 12,024 | ,100 |
| | Brown-Forsythe | 2,083 | 4 | 34,376 | ,104 |

a Asymptotically F distributed.

b GROUP = BEGINNERS

For academic level, advanced (One-way Between-groups ANOVA):

Test of Homogeneity of Variances(a)

| | Levene Statistic | df1 | df2 | Sig. |
|------------------|------------------|-----|-----|------|
| totapt | ,389 | 2 | 84 | ,679 |
| TOTAL LITERACY | ,454 | 2 | 84 | ,637 |
| TOTAL MOTIVATION | 1,661 | 2 | 84 | ,196 |

a GROUP = ADVANCED

B.3 Assumptions for Standard Multiple Regression, Language Aptitude

Assumption about sample size: a minimum of 15 participants per variable (Stevens, 2002). In this regression analysis, there are three independent variables (Llama B, E, and F) and 88 participants, so the assumption is met.

Assumption of multicollinearity: independent variables should not display correlations among each other higher than $r = .70$ (Tabachnick and Fidell, 2001). A correlation matrix is shown in table B.3.1, with no correlation coefficients being higher than .38.

Table B.3.1 *Correlations Between Variables*

| | TOTL2 | LLAMA F | LLAMA B | LLAMA E |
|---------------------------|-------|---------|---------|---------|
| TOTL2 | 1 | .39** | .21* | .26** |
| LLAMA F –analytic ability | | 1 | .36** | .35** |
| LLAMA B –analytic ability | | | 1 | .29** |
| LLAMA E –analytic ability | | | | 1 |

* $p < .05$, ** $p < .01$

Assumption of normality: distribution of residuals. Figure B.3.1 shows a P-P plot with some curvature of points in its distribution, although non-normality does not appear very extreme.

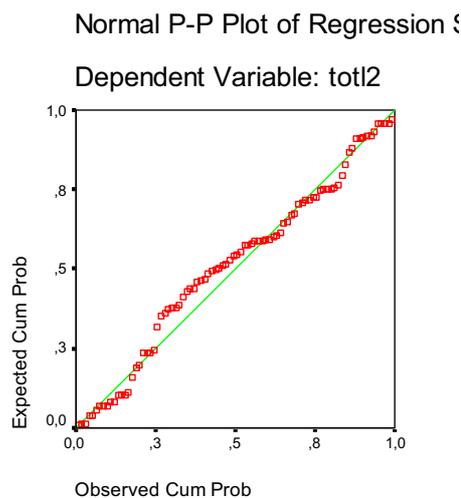


Figure B.3.1 *Normal P-P plot of regression standardized residuals*

No outliers potentially influential are observed in standardized residuals, Cook’s distances or Mahalanobis distances. Standardized residuals’ lowest value is -2.5, below -3, there are no Cook’s distances anywhere close to 1 or -1, and no Mahalanobis distances close to 15. See table B.3.2 for reference.

Table B.3.2 *Standardized Residuals for Standard Multiple Regression*

| Residuals Statistics(a) | | | | | |
|-----------------------------------|----------|---------|---------|----------------|----|
| | Minimum | Maximum | Mean | Std. Deviation | N |
| Predicted Value | 62,5237 | 78,0441 | 70,3552 | 4,04449 | 88 |
| Std. Predicted Value | -1,936 | 1,901 | ,000 | 1,000 | 88 |
| Standard Error of Predicted Value | 1,00004 | 3,08834 | 1,84600 | ,51977 | 88 |
| Adjusted Predicted Value | 62,7080 | 78,0473 | 70,3263 | 4,06348 | 88 |
| Residual | -21,0148 | 16,7147 | ,0000 | 8,83505 | 88 |
| Std. Residual | -2,337 | 1,859 | ,000 | ,983 | 88 |
| Stud. Residual | -2,370 | 1,891 | ,002 | 1,002 | 88 |
| Deleted Residual | -21,6162 | 17,2910 | ,0289 | 9,18369 | 88 |
| Stud. Deleted Residual | -2,439 | 1,921 | ,000 | 1,012 | 88 |
| Mahal. Distance | ,088 | 9,275 | 2,966 | 2,203 | 88 |
| Cook's Distance | ,000 | ,053 | ,010 | ,013 | 88 |
| Centered Leverage Value | ,001 | ,107 | ,034 | ,025 | 88 |

a Dependent Variable: totl2

Assumption of homogeneity of variances: figure B.3.2 shows a cloud of data randomly scattered, confirming the assumption.

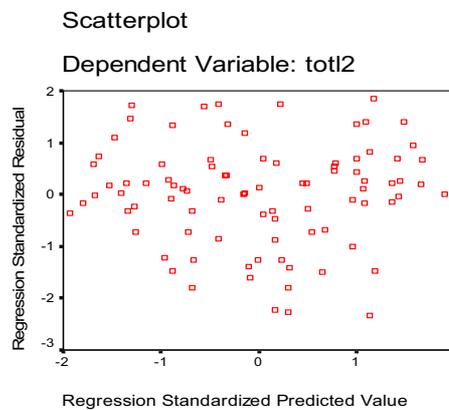
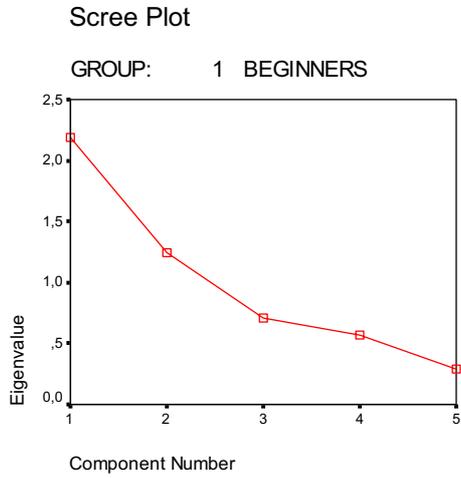


Figure B.3.2 *Studentized-standardized residuals scatterplot*

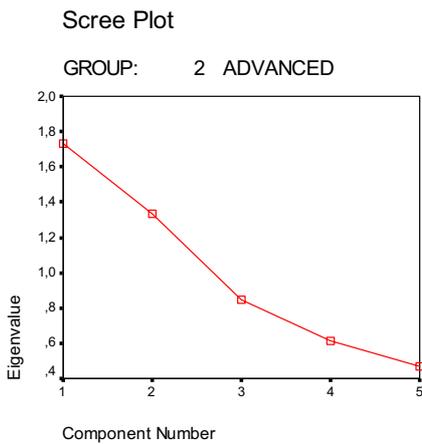
B.4 Principal Components Analysis (PCA): Scree Plots and Rotated Matrixes (Varimax)



Rotated Component Matrix(a,b)

| | Component | |
|------------------|-----------|-------|
| | 1 | 2 |
| READING QUANTITY | ,887 | ,114 |
| ENJOY READING | ,884 | -,056 |
| L1 READING COMP. | ,574 | ,337 |
| ACADEMIC LEVEL | -,058 | ,853 |
| L1 SPELLING | ,265 | ,776 |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
 a Rotation converged in 3 iterations.
 b GROUP = BEGINNERS



Rotated Component Matrix(a,b)

| | Component | |
|------------------|-----------|-------|
| | 1 | 2 |
| ENJOY READING | ,842 | ,109 |
| READING QUANTITY | ,833 | -,032 |
| L1 READING COMP. | ,295 | ,764 |
| L1 SPELLING | ,079 | ,728 |
| ACADEMIC LEVEL | -,238 | ,625 |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
 a Rotation converged in 3 iterations.
 b GROUP = ADVANCED

B.5 Assumptions for Standard Multiple Regression, Main Variables

BEGINNERS, TOTAL L2 DEVELOPMENT

Assumption about sample size: a minimum of 15 participants per variable (Stevens, 2002). In this regression analysis, there are five independent variables (language aptitude, L1 reading comprehension, academic

development, professional orientations, and age at testing) and 52 participants, so there is a slight deviation of the assumption.

Assumption of multicollinearity: independent variables should not display correlations among each other higher than $r = .70$ (Tabachnick and Fidell, 2001). A correlation matrix is shown in table B.5.1, with no correlation coefficients being higher than .58.

Table B.5.1 *Correlations between Variables*

| | TOTL2 | Language Aptitude | L1 Reading Comp | Acad Dev | Prof Orient | AT |
|---------------------------|-------|-------------------|-----------------|----------|-------------|--------|
| TOTL2 | 1 | .39** | .31* | .43** | .33** | -.38** |
| Language aptitude | | 1 | .16 | .19 | .27* | -.33** |
| L1 reading comprehension | | | 1 | .31* | -.18 | .33** |
| Academic development | | | | 1 | -.15 | -.12 |
| Professional orientations | | | | | 1 | -.58** |
| Age at testing | | | | | | 1 |

* $p < .05$, ** $p < .01$

Assumption of normality: distribution of residuals. Figure B.5.1 shows a P-P plot with some very mild curvature of points in its distribution.

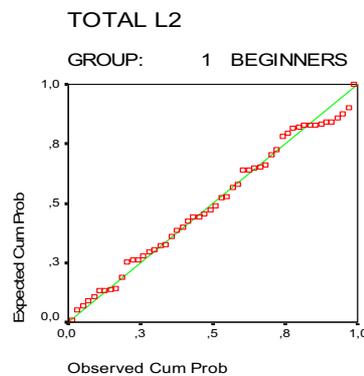


Figure B.5.1 *Normal P-P plot of regression standardized residuals*

No outliers potentially influential are observed in standardized residuals, Cook’s distances or Mahalanobis distances. Standardized residuals’ lowest value is -2.5, below -3, there are no Cook’s distances anywhere close to 1 or -1, and no Mahalanobis distances close to 15. See table B.5.2 for reference.

Table B.5.2 *Standardized Residuals for Standard Multiple Regression*

| Residuals Statistics(a,b) | | | | | |
|-----------------------------------|----------|---------|---------|----------------|----|
| | Minimum | Maximum | Mean | Std. Deviation | N |
| Predicted Value | 45,2314 | 88,6664 | 71,6442 | 10,67638 | 52 |
| Std. Predicted Value | -2,474 | 1,594 | ,000 | 1,000 | 52 |
| Standard Error of Predicted Value | 1,93203 | 5,48426 | 3,63135 | ,90634 | 52 |
| Adjusted Predicted Value | 43,3821 | 88,2983 | 71,8241 | 10,87763 | 52 |
| Residual | -25,3400 | 34,4345 | ,0000 | 10,45841 | 52 |
| Std. Residual | -2,301 | 3,127 | ,000 | ,950 | 52 |
| Stud. Residual | -2,389 | 3,453 | -,008 | 1,020 | 52 |
| Deleted Residual | -27,3152 | 41,9912 | -,1799 | 12,08679 | 52 |
| Stud. Deleted Residual | -2,525 | 3,968 | -,002 | 1,065 | 52 |
| Mahal. Distance | ,589 | 11,668 | 4,904 | 2,822 | 52 |
| Cook's Distance | ,000 | ,436 | ,027 | ,064 | 52 |
| Centered Leverage Value | ,012 | ,229 | ,096 | ,055 | 52 |

a Dependent Variable: totl2

b GROUP = BEGINNERS

Assumption of homogeneity of variances: figure B.5.2 shows a cloud of data randomly scattered, confirming the assumption.

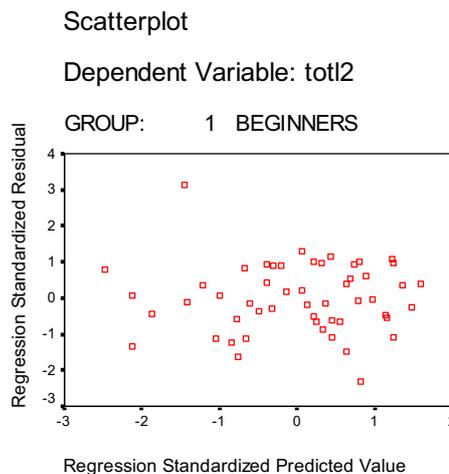


Figure B.5.2 *Studentized-standardized residuals scatterplot*

ADVANCED, TOTAL L2 DEVELOPMENT

Assumption about sample size: a minimum of 15 participants per variable (Stevens, 2002). In this regression analysis, there are four independent variables (language aptitude, reading ability, motivation, and age at testing) and 88 participants, so the assumption is met.

Assumption of multicollinearity: independent variables should not display correlations among each other higher than $r = .70$ (Tabachnick and Fidell, 2001). A correlation matrix is shown in table B.5.3, with no correlation coefficients being higher than .39.

Table B.5.3 *Correlations Between Variables*

| | TOTL2 | Language Aptitude | Reading habits | Motiv | AT |
|-------------------|-------|-------------------|----------------|-------|--------|
| TOTL2 | 1 | .39** | .33** | .33** | -.16 |
| Language aptitude | | 1 | .18* | .08 | -.32** |
| Reading habits | | | 1 | .08 | -.14 |
| Motivation | | | | 1 | -.03 |
| Age at testing | | | | | 1 |

* $p < .05$, ** $p < .01$

Assumption of normality: distribution of residuals. Figure B.5.3 shows a P-P plot with some very mild curvature of points in its distribution.

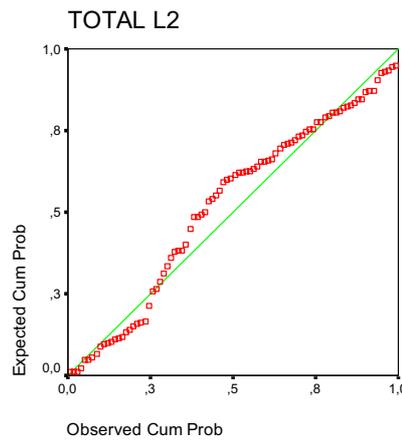


Figure B.5.3 Normal P-P plot of regression standardized residuals

No outliers potentially influential are observed in standardized residuals, Cook’s distances or Mahalanobis distances. Standardized residuals’ lowest value is -2.5, below -3, there are no Cook’s distances anywhere close to 1 or -1, and no Mahalanobis distances close to 15. See table B.5.4 for reference.

Table B.5.4 Standardized Residuals for Standard Multiple Regression

Residuals Statistics(a)

| | Minimum | Maximum | Mean | Std. Deviation | N |
|-----------------------------------|----------|---------|---------|----------------|----|
| Predicted Value | 57,4230 | 82,2421 | 70,3552 | 5,40694 | 88 |
| Std. Predicted Value | -2,392 | 2,198 | ,000 | 1,000 | 88 |
| Standard Error of Predicted Value | 1,08339 | 2,96413 | 1,91628 | ,46070 | 88 |
| Adjusted Predicted Value | 57,1395 | 81,7449 | 70,3908 | 5,39488 | 88 |
| Residual | -18,6405 | 13,6208 | ,0000 | 8,07348 | 88 |
| Std. Residual | -2,255 | 1,648 | ,000 | ,977 | 88 |
| Stud. Residual | -2,314 | 1,681 | -,002 | 1,006 | 88 |
| Deleted Residual | -19,6239 | 14,1777 | -,0356 | 8,56349 | 88 |
| Stud. Deleted Residual | -2,378 | 1,700 | -,006 | 1,015 | 88 |
| Mahal. Distance | ,506 | 10,199 | 3,955 | 2,412 | 88 |
| Cook's Distance | ,000 | ,110 | ,012 | ,018 | 88 |
| Centered Leverage Value | ,006 | ,117 | ,045 | ,028 | 88 |

a Dependent Variable: totl2

Assumption of homogeneity of variances: figure B.5.4 shows a cloud of data randomly scattered, confirming the assumption.

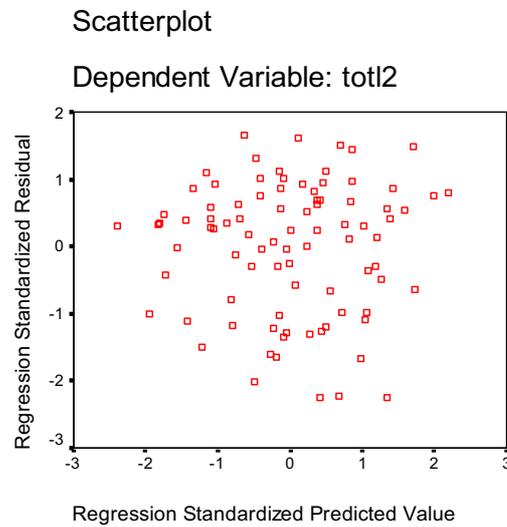


Figure B.5.4 Studentized-standardized residuals scatterplot

B.6 Assumptions for Partial Least Squares (PLS-SEM)

Table B.6.1 Cross-loadings for Latent Constructs and Manifest Variables, Beginners

| Manifest Variable | ACADEMIC | AGE AT | L1 READING | L2 | PROFESSIONAL |
|-------------------|-------------|-------------|---------------|-------------|--------------|
| | DEV | TESTING | COMPREHENSION | DEVELOP. | ORIENTATION |
| ACAD | 0,81 | -0,13 | 0,15 | 0,38 | -0,13 |
| AT | 0,05 | 0,99 | 0,33 | -0,38 | -0,57 |
| L1 READING C. | 0,27 | 0,33 | 0,99 | 0,31 | -0,17 |
| L1SPELL | 0,84 | 0,21 | 0,29 | 0,41 | -0,14 |
| L2GRAM | 0,51 | -0,20 | 0,24 | 0,79 | 0,14 |
| L2LIST | 0,32 | -0,28 | 0,28 | 0,72 | 0,36 |
| L2READ | 0,22 | -0,49 | 0,21 | 0,80 | 0,31 |
| L2SPEA | 0,38 | -0,34 | 0,25 | 0,90 | 0,34 |
| L2WRIT | 0,52 | -0,28 | 0,32 | 0,91 | 0,28 |
| ORIEN1 | -0,17 | -0,50 | -0,07 | 0,30 | 0,90 |
| ORIEN2 | -0,11 | -0,49 | -0,27 | 0,27 | 0,88 |
| ORIEN3 | -0,15 | -0,57 | -0,13 | 0,36 | 0,93 |

Table B.6.2 *Cross-loadings for Latent Constructs and Manifest Variables, Advanced*

| Manifest Variables | L2 | LANGUAGE | MOTIVATION | READING |
|--------------------|-------------|-------------|-------------|-------------|
| | DEVELOPMENT | APTITUDE | | HABITS |
| L2GRAM | 0,80 | 0,27 | 0,33 | 0,28 |
| L2LIS | 0,69 | 0,36 | 0,29 | 0,41 |
| L2READ | 0,56 | 0,43 | 0,03 | 0,19 |
| L2SPEA | 0,59 | 0,14 | 0,27 | -0,02 |
| L2WRIT | 0,74 | 0,18 | 0,34 | 0,24 |
| LLAMAB | 0,23 | 0,68 | 0,11 | 0,18 |
| LLAMAD | 0,16 | 0,30 | 0,09 | -0,02 |
| LLAMAE | 0,24 | 0,69 | 0,00 | 0,06 |
| LLAMAF | 0,39 | 0,79 | 0,04 | 0,25 |
| MOTIV1 | 0,30 | 0,08 | 0,78 | 0,01 |
| MOTIV2 | 0,15 | 0,19 | 0,30 | 0,17 |
| MOTIV3 | 0,26 | 0,07 | 0,56 | 0,15 |
| MOTIV4 | 0,34 | 0,05 | 0,90 | 0,00 |
| MOTIV5 | 0,08 | -0,02 | 0,53 | -0,02 |
| MOTIV6 | 0,27 | -0,02 | 0,85 | -0,03 |
| READ1 | 0,32 | 0,15 | -0,04 | 0,85 |
| READ2 | 0,32 | 0,23 | 0,14 | 0,85 |

Significance levels as per bootstrapping procedure are shown below.

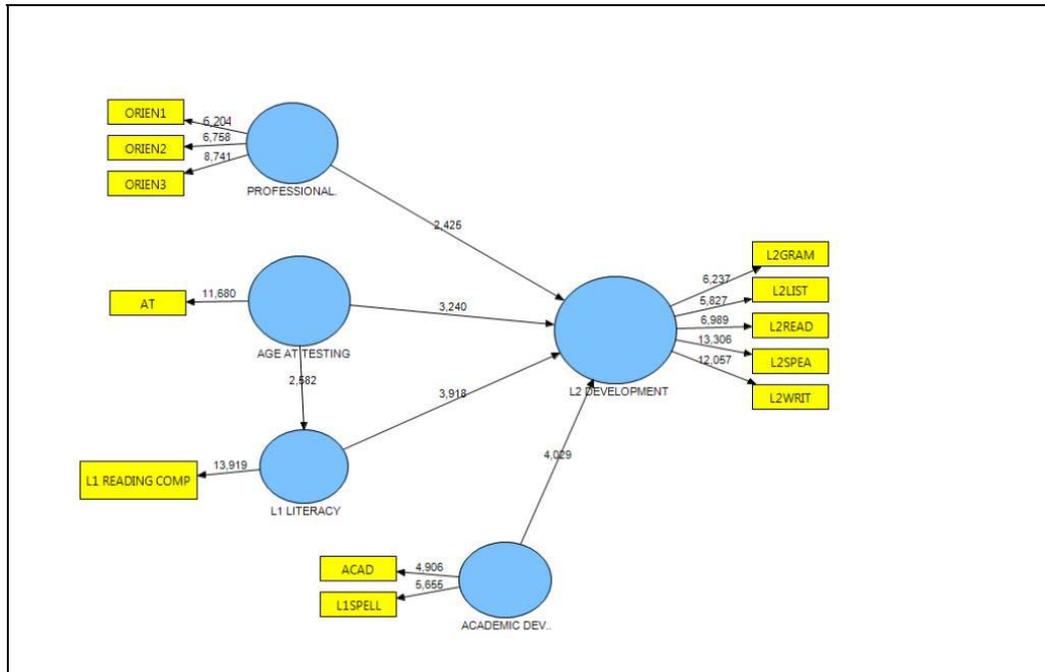


Figure B.6.1 Path significance values from bootstrapping procedure, beginners

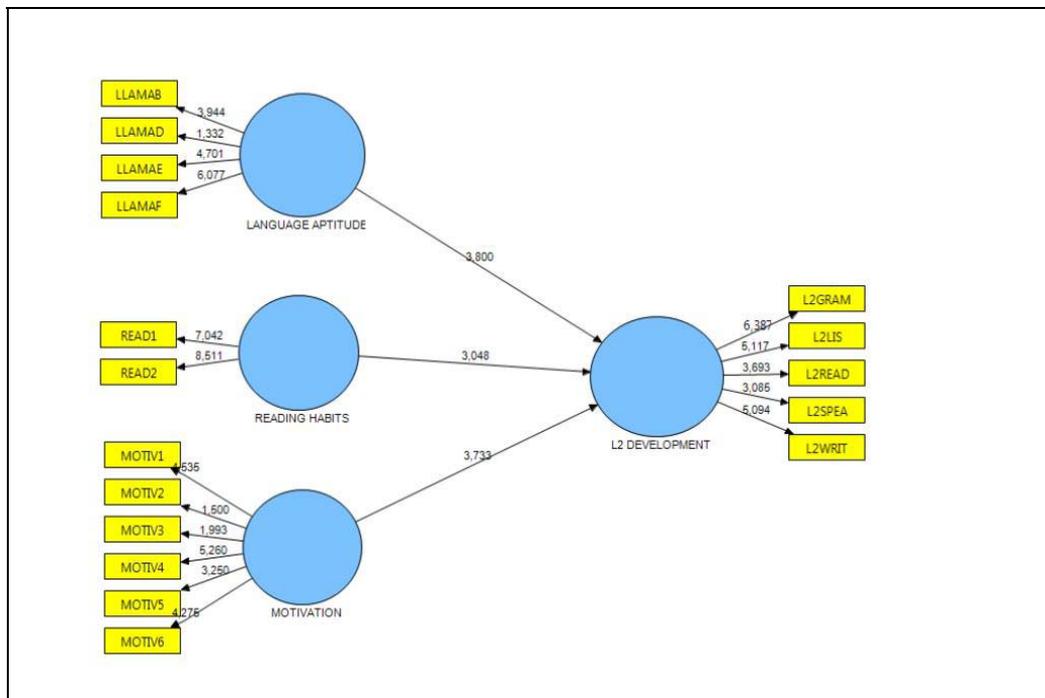


Figure B.6.2 Path significance values from bootstrapping procedure, advanced

Settings for PLS Procedures:

PLS-Algorithm:

Weighting Scheme: Path Weighting Scheme

Data Metric: Original (previously converted into z-scores)

Maximum Iterations: 300

Abort Criterion: 1.0E-5

Initial Weights: 1.0

Bootstrapping:

Sign Changes: No Sign Changes

Cases: 52 for beginners, 88 for advanced learners

Samples: 500

Blindfolding:

Omission Distance: 7

Constructs: For beginners: L2 development

For advanced learners: L2 development, L1 reading
comprehension

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