

Metalinguistic Awareness in Multilinguals

**Implicit and Explicit Grammatical Awareness
and its Relationship with Language Experience
and Language Attainment**

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Abstract

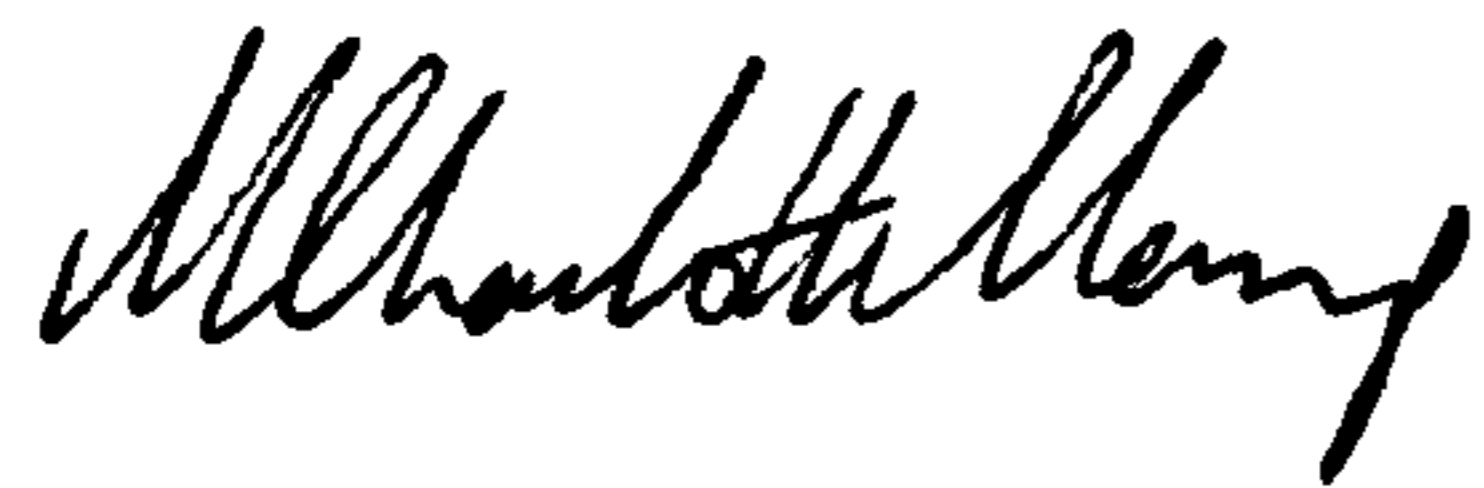
Anecdotal evidence suggests that multilinguals' ability to learn languages increases the more languages they know; experimental evidence supports the idea that language learning promotes the development of metalinguistic awareness. The aim of this study was to investigate whether multilinguals' grammatical metalinguistic awareness is related to their attainment over and above their language experience. In order to do this, it was necessary to investigate empirically the hypotheses that attainment in another language is related to multilinguals' experience of learning languages and to their metalinguistic awareness, and that metalinguistic awareness is related to language learning experience. Thirty native English-speaking educated adult multilinguals were assessed on their ability to learn the initial stages of Basque under controlled conditions, their previous language learning experience, and their metalinguistic awareness (explaining native language grammaticality judgements, MLAT4, translation from Middle Egyptian, knowledge of Basque rules, implicit and explicit artificial grammar tests). The data were analysed using regression analyses in a within-participants design.

The results show that the multilinguals were better at learning Basque (1) the more languages they could read and had, at least partly, studied, and (2) the more explicit grammatical metalinguistic awareness they had developed. Multilinguals' explicit metalinguistic awareness assisted language learning over and above language experience when the Basque rule knowledge test was included in the set of metalinguistic variables, but not when it was excluded. Multilinguals' language experience was related to their performance on the tests of explicit metalinguistic awareness, but not to the implicit test, nor to hypothesised overacceptance of ungrammatical items on the implicit and explicit artificial grammar tests. As a group, the multilinguals were better at the explicit than the implicit artificial grammar tests. In an exploratory factor analysis of the six metalinguistic tests two factors were found, interpreted as deductive and inductive grammar awareness, which appear to correspond to Carroll's (1993) 'grammatical sensitivity', and 'inductive language learning'. Performance on metalinguistic tests that assessed both inductive and deductive grammar awareness was related to language learning attainment.

The results suggest that multilinguals' language learning ability may be related to their development of explicit grammatical metalinguistic awareness, in addition to the other abilities they gain through their experience of language learning.

Declaration of Authorship

I declare that this thesis is my own work and was composed by me.

A handwritten signature in black ink, appearing to read 'Charlotte Kemp', written in a cursive style.

Charlotte Kemp

20 March 2001

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'It is an important aspect of our unique capacities as human beings that we can not only act, but reflect back on our own actions; not only learn and use language, but treat it as an object of analysis and evaluation in its own right. Meta-linguistic awareness, the ability to make language forms opaque and attend to them in and for themselves, is a special kind of language performance, one which makes special cognitive demands, and seems to be less easily and less universally acquired than the language performances of speaking and listening' (Cazden 1976: 603).

'It is because metalinguistic aspects of language are not necessarily specific to particular languages that their discovery may be influenced by the mastery of two languages, and it is because metalinguistic awareness is consequential for other aspects of cognition, both linguistic and non-linguistic, that its study is important' (Bialystok 1991: 113).

Chapter 1: Overview

Language is an astonishing faculty: humans are the only animal able to communicate complex and abstract ideas, which may be distant in time or place, to express their emotions, needs, culture, identity, and creativity, in social interaction, using fully formed grammatical systems. The invention of writing, sometime before five and a half thousand years ago, allows us to see language as a spatial concept as well as a temporal one, and the invention of the printing-press has permitted the wide-spread distribution of numerous identical texts on a massive scale. Written language permits us to look at the form of language as well as its meaning, not just the physical shape of the writing system, but the order of words and their morphology: writing makes linguistic structure visible to the eye and its durability means we can go back and reread what we have read or written.

Just as we normally look through a window to see the view, we normally look through language to understand the meaning. But we can also look at the glass itself, which may be cracked or distorted – we can focus on the form of language rather than its meaning, which has the effect of making language structures that are normally transparent, opaque (Cazden 1976). This ability to focus on language form is called metalinguistic awareness.

A number of psycholinguistic variables have been linked to metalinguistic awareness: the experience of learning other languages, learning to be literate, growing older, going to school, and formal, rule-based language learning (often taught in the language classroom). Most of the research has centred on children, especially school-age children (eg, Hakes 1980; Saywitz & Wilkinson 1982; Van Kleeck 1982; Tunmer, Pratt & Herriman 1984; Gombert 1992; Cromdal 1999; Francis 1998; Carlisle *et al.*

1999; Edwards & Kirkpatrick 1999; Karmiloff-Smith 1996). In contrast, little research has been carried out on the development of metalinguistic awareness in adults, and very little indeed on individuals who know a number of languages, in spite of the fact that it has been estimated that about sixty percent of the current world population is multilingual (though not necessarily multiliterate), which would seem to indicate that multilingualism is the norm rather than the exception (Richards & Rodgers 1986; Cook 1991).

This study investigates the relationships between metalinguistic awareness, language learning experience, and language learning attainment in 30 adult educated multilinguals (all are native English-speaking students or graduates) using a within-participants design. It should be noted that this study is designed to assess the 'breakthrough effect' of language learning, i.e. the effects on metalinguistic awareness and language learning of the *number* of different languages (grammars) that participants have learned rather than participants' depth of knowledge of each language's grammar.

1.1 Statement of the Research Question

Why are multilinguals better language learners than people with less language learning experience? What is it that they learn to do?

Intuitively, multilinguals should be better language learners than other people on account of their previous experience, and evidence from individuals as they become multilingual suggests that this is the case. Indeed, Edwards (1994: 60) states that the anecdotal evidence from the "Mezzofantis, Murrays and Burtons of the world"¹ and many others suggests that the more languages a person has, the easier it is to add

¹ Giuseppe Mezzofanti (1774-1849) held the post of chief curator in the Vatican Library, and "reportedly spoke 60 languages fluently, and could translate more than 150 languages and dialects" (Edwards 1994: 34). James Murray (1837-1915), editor of the Oxford English Dictionary spoke at least 24; as did Sir Richard Burton, the Victorian scholar-explorer (Edwards 1994).

more. However, very little empirical research has been carried out on why this should be the case. How does the process of language learning affect the ability to learn further languages? Do multilinguals develop particular skills through language learning? Might metalinguistic awareness be one of these skills?

The evidence from the handful of studies that have investigated this phenomenon is that experienced second language learners do appear to develop the ability to use knowledge gained from previously learned languages when adding another to their repertoire. This may be based on a number of abilities such as learning strategies developed when learning previous languages (Ramsay 1980), on 'aptitude' (Carroll 1981, 1990), on knowledge of languages' structure (Thomas 1985, 1988, 1992), and may also be due to crosslinguistic transfer (Sharwood Smith 1991).

There is a scarcity of empirical research on the role of metalinguistic awareness in multilinguals' language learning ability. Everyone possesses metalinguistic awareness to some degree whether they are literate or non-literate, and monolingual, bilingual or multilingual. However, certain circumstances appear to be more conducive to its development than others.

1.2 Purpose of the Study

The purpose of this thesis is to investigate whether metalinguistic awareness relates to multilinguals' language learning attainment over and above their language experience. In order to find this out, it is necessary to investigate firstly the hypothesis that multilinguals' attainment in learning the initial stages of another language is linked to their language experience and cognitive and affective variables (multilinguals' number of languages, number of literacies, and number of languages studied; associative memory; language motivation, attitudes, and anxiety), and secondly, to their grammatical metalinguistic awareness. It is also necessary to investigate the hypothesis that multilinguals' language experience is related to their performance on

the metalinguistic tests, which are designed to assess their ability to focus on grammatical form. A range of different metalinguistic tests are used because metalinguistic awareness is not thought to be a unitary construct. A factor analysis of the six grammatical metalinguistic tests will investigate this assumption.

I also propose to test the hypothesis that multilinguals are biased to accept ungrammatical items, as has been hypothesised by Zobl (1992) and M. Thomas (1990), and lastly, the hypothesis that multilinguals are better at explicit than implicit grammar learning (cf. Nation 1983; Reber 1993).

1.3 Rationale for the Study

The rationale behind the thesis is based on the theory of epigenetic development, that the continuous complex interaction between individuals' genes, self-regulation, and their environment changes the course of individuals' development with regard to their abilities (see *Epigenesis*, Section 2.1.4). Therefore, the more individuals have had to expend cognitive effort on internalising and focusing on grammatical structure the better they will be able to cope with further demands (see *The Practice Hypothesis*, Section 2.1.3). This theory lies behind psycholinguistic accounts of language acquisition whether they are based on information-processing, cognitive, generative, connectionist, or neurolinguistic approaches. More particularly, as individuals learn a third language (fourth, fifth...) this may require them implicitly, and also to some extent explicitly, to reanalyse all their languages in terms of each other. In consequence, any skills they have developed in one of their languages, such as academic skills, can be transferred to the others (known as Cummins' "interdependence hypothesis" or "interdependency principle", see Cummins 1984, 1987) and in reanalysing their languages they come to know something, which may be implicit or explicit, about the form of language – in other words, they develop 'metalinguistic awareness'. Metalinguistic awareness is likely to affect language learning because the ability to focus on the form (i.e. grammar) of the target language

should speed up the learning process (Seliger 1975; Thomas 1988; Schmidt 1994). Learning with some regard to form, such as learning grammatical rules, has been shown to promote the development of explicit metalinguistic awareness under certain conditions and learners who learn solely communicatively or in an immersion environment may not necessarily develop explicit metalinguistic awareness to the same extent (Thomas 1988).

1.4 Definition of Terms

The terms ‘multilingualism’, ‘second language acquisition’, ‘multilingual acquisition’, ‘metalinguistic awareness’, and ‘form’, are discussed below and defined as used in this study.

1.4.1 A Definition of Multilingualism

‘Multilingualism’ in this thesis refers to the use of three or more languages by an individual and does not necessarily mean that the individual, described as ‘multilingual’, has equal control over all the languages they know (McArthur 1992; R. Ellis 1994; Edwards 1994). In this thesis ‘multilingualism’ does not refer to societal multilingualism unless explicitly stated.

A multilingual is an individual who knows three or more languages: the individual may have acquired more than one first language before adolescence, indeed four or five is perfectly possible, and may also know a foreign language or a number of foreign languages. It is not necessary to be able to read and write these languages to be ‘multilingual’, indeed millions of multilinguals across the world are not literate in even one of their languages, and may never have received any classroom education. However, in this thesis, all participants are highly literate and educated as this is the norm for adult educated multilinguals in Western Europe, the population under research.

1.4.2 A Definition of Second Language Acquisition and Multilingual Acquisition

The terms 'second language acquisition' and 'L2' are often used in the literature to denote any language learning apart from the first language/s in any learning environment. Sometimes the terms are also used to denote learning a language while the first language is still being acquired, i.e. 'early second language acquisition', as opposed to 'foreign language learning'. Berns (1990: 9) proposes a cline of language status with foreign language learning at one end merging into second language learning towards the other end depending on how a language is used in a speech community, as it is often individuals who determine the foreign/second language status of each of their languages depending on which speech communities they maintain contact with.

Multilingual acquisition differs from second language acquisition in that it only refers to the acquisition of three or more languages and therefore excludes bilingualism. Lines of enquiry for multilingual research are based on and will develop out of bilingual research for years to come, however, bilingual research is limited in its transferability from a psycholinguistic perspective because of the enormous complications arising from multilingual acquisition. For instance, there are only two acquisition orders possible for bilingualism, simultaneous L1 and L2, or consecutive L1 then L2: for trilingualism there are four possible acquisition orders and for quadrilingualism eight possible acquisition orders (see Cenoz 2000). This resulting diversity and complexity is further complicated by the acquisition process of any of an individual's languages being suspended in order to acquire another language/s and then resumed (Cenoz 2000). Cross-linguistic influence between an individual's numerous languages may depend on typological differences not just between two related languages but between them all, whether these similarities are perceived or otherwise. The social context and sociocultural status of each of these languages, and how they are learned, i.e. through instruction, communicatively, or both, also make the study of multilingual acquisition enormously complex.

It is for this reason that a distinction is drawn in this thesis between second language acquisition and multilingual acquisition. For the sake of simplicity this thesis refers to 'second language acquisition' as the general overarching term for all language learning apart from an individual's native language/s, and 'multilingual acquisition' for all cases of language learning after the second language, except when a specific order is defined such as L3, L4, and so on.

1.4.3 A Definition of Metalinguistic Awareness

Between 1950 and 1960 linguists used the neologism 'metalinguistics' for activities related to metalanguage, i.e. linguistic terminology, whose sole purpose is to describe language (eg, 'word', 'sentence', 'syntax', and 'phoneme') (Gombert 1992: 1). For psycholinguists, metalinguistics has since evolved to mean "linguistic activity which takes language itself as its object" (ibid: 2). This self-referential ability implies that greater cognitive effort is required than for normal linguistic activities. In psycholinguistic terms, it is this cognitive effort that differentiates metalanguage from language and gives rise to the term 'metalinguistic awareness'. In other words, psycholinguists' metalinguistic awareness is 'cognition about language' rather than the linguists' 'language about language' (ibid: 8).

Definitions of metalinguistic awareness vary enormously. There is a clear differentiation between declarative and procedural aspects of metalinguistic awareness which results in various authors placing different emphases in their definitions (Sharwood Smith 1981; Sorace 1985; Gombert 1992). Authors who incline to a declarative view of metalinguistic awareness regard language as an object of thought, but emphasise the aspects of knowledge and awareness. In this way, linguists such as C. Chomsky (1979) define metalinguistics as the knowledge of the characteristics of language and how it functions, and Read "correlates the primary linguistic ability of knowing something and the metalinguistic capacity of knowing that one knows it" (1978, cited in Gombert 1992: 2-3). Authors who incline to a procedural view of

metalinguistic awareness (eg, Hakes 1980) define metalinguistics in terms of the operations used in comprehension or production. For instance, individuals are able to control their attention in order to switch from a focus on language content to a focus on language form, and are then able to manipulate that form. Certain researchers such as Bialystok (1991) and Karmiloff-Smith (1986) also include *implicit* cognition about language under procedural definitions: Karmiloff-Smith (1986) distinguishes between implicit and explicit knowledge, Bialystok (1991) uses the terms unanalysed and analysed, and Gombert (1992) uses the terms epilinguistic and metalinguistic after Chaudron (1983), who suggests if the term “epilinguistic” were used to designate unconscious metalinguistic activity the term “metalinguistic” could be reserved for conscious activity. However, this usage has so far failed to catch on outside French-speaking countries.

Implicit and explicit metalinguistic awareness can be characterised as a continuum (Karmiloff-Smith 1986), demonstrating lack of polarity (see Figure 1.1). It is debatable whether there is any interface between implicit and explicit processes (Reber 1993 is certain that there is, Krashen 1981a certain that there is not) but it seems likely that they inform one another (see Sections 2.1.2, 3.1.3 and 4, and 4.1.4).



Figure 1.1 *Implicit and explicit metalinguistic awareness.*

This gradability of awareness helps to explain researchers' differing definitions of metalinguistic awareness as:

Whatever point on the continuum is considered to differentiate implicit from explicit knowledge will largely determine the extent to which second language knowledge is said to be conscious or unconscious, but a careful reading of the second language literature

indicates no consensus on where the line is to be drawn.' (Schmidt 1990: 134)

But is 'implicit metalinguistic awareness' not an oxymoron? Implicit structural knowledge may be metalinguistic, but can awareness be implicit? This debate centres on the degree of consciousness required for 'awareness', which is inevitably tangled up with a further debate on where to draw the line between consciousness and unconsciousness. Schmidt (1990: 134-5) surveys different uses of unconscious (i.e. implicit) learning across the literature and finds varying definitions in use. He distinguishes between:

1. Learning when learners are unaware that they have learned something.
2. Learning subliminally, without noticing.
3. Learning unintentionally (is noticing automatic or must learners pay attention?).
4. Learning implicitly by induction without conscious understanding or insight.
5. Learning as 'an unintended by-product of communicative interaction' rather than intentionally and deliberately using strategies.
6. Learning when learners are unable to report what they know, as opposed to being able to give an 'articulate report'.

Although these definitions overlap to some (debatable) extent in that they all concur that at some level learners are aware even if they do not know they are aware, they also demonstrate the lack of consensus on the degree of consciousness required for awareness. For the purpose of this thesis, 'implicit metalinguistic awareness' encompasses all cognition regarding grammatical structure where learners focus on grammatical form but are not explicitly aware of it, and therefore is not an oxymoron.

Returning to declarative and procedural aspects of metalinguistic awareness – "knowing that" and "knowing how" (Reber 1993: 16, citing Ryle 1949) – Gombert (1992) points out that many authors when they define metalinguistics encompass *both* declarative and procedural aspects and do not appear to regard them as different types

of metalinguistic activity (Tunmer & Bowey 1984; Tunmer & Herriman 1984; Pratt, Tunmer & Bowey 1984, cited in Gombert 1992: 3). Others, however, do (Kolinsky 1986; Martlew 1983; Bialystok & Ryan 1985a, b; Bialystok 1986b, cited in Gombert 1992: 4).

These differing definitions lead to the term 'metalinguistic' being used in different capacities in the research literature. Bialystok (1991) points out that the term 'metalinguistic' has been used to refer to tasks, skills, and awareness: to these may be added activities, abilities, and knowledge. These designations may be used to refer to the same concepts as those above, but not always. Bialystok (loc. cit.) has come to the conclusion that the term metalinguistic is best defined in terms of the operations necessary to solve a set of tasks. In this way a "learner performing a task classified as metalinguistic is demonstrating metalinguistic ability" (ibid: 114).

As a consequence of the term 'metalinguistic' being used for different concepts and in different capacities, different authors regard different phenomena as metalinguistic. Many authors consider spontaneous self-correction of errors to be an example of metalinguistic awareness (Clark 1978; Berko 1958; Gallagher 1977, cited in Gombert 1992), but Tunmer and Herriman (1984) argue that there is a difference between awareness of errors and awareness of linguistic structure, and that only the latter is metalinguistic in nature. Karmiloff-Smith (1986) is in agreement with this stance as she claims that it is nearly impossible to prove that detection and correction of grammatical errors show awareness of language *form* – learners may be using solely semantic rather than structural criteria. And Chaudron (1983) also believes that a distinction should be made between abilities observed in spontaneous behaviour and skills based on systematically represented knowledge that can be applied intentionally. The debate over what does and what does not constitute metalinguistic awareness is likely to continue, however, researchers do tend to concur that (explicit) metalinguistic awareness may be demonstrated by the participant giving the tester an *explanation* of why a particular error is incorrect and why it should be corrected in

the way the participant suggests. Grammatical explanations are indisputably both explicit and metalinguistic (Gregg 1984; Krashen 1981a; Sharwood Smith 1981). Nevertheless, there is a great difference between being able to explain grammatical form through experience and being taught a grammatical form as a rule to start with. When linguistic knowledge is learned implicitly a representation develops, which may be considered metalinguistic if it objectifies linguistic structure, and which may over time become more explicit (see Section 4.1.4). If linguistic knowledge is learned as an explicit rule, it is internalised differently by each learner according to their interpretation, understanding, and previous knowledge – it is not represented solely as a rule (Sorace 1985).

It seems unlikely that researchers in the near future will agree on a definition of metalinguistic awareness, which concepts metalinguistic awareness can refer to, or which phenomena are metalinguistic in nature.

For the purpose of this thesis, metalinguistic awareness concerns activities of cognition about language form and its use, and encompasses the ability of learners to plan and monitor their linguistic processing. Although metalinguistic awareness generally refers to cognition about language form and form-to-meaning relationships in areas such as phonology, syntax, morphology, phrasal constructions, semantics, pragmatics, knowledge about text types and their structure, and conversational rules (Dakowska 1993: 84), this thesis will concentrate on cognition about morphological and syntactic form, i.e. grammatical metalinguistic awareness. By ‘grammatical metalinguistic awareness’ I mean the ability to focus on grammatical form, and to change focus between grammatical form and semantic content, either implicitly or explicitly, or both.

1.4.4 A Definition of Form

I will use the term ‘form’ in two different but related ways. The first refers to the grammar of a language, or in other words its structure as opposed to its meaning or

content (cf. Sinclair 1991, for whom there is no distinction between form and meaning). For instance, a phrase like “Colorless green ideas sleep furiously” (Chomsky 1957: 15) is not meaningful though it has normal grammatical form, i.e. it has typical English phrase structure.

The second refers to the written form of language – by this I mean the physical shape of the symbols on paper or other writing surface. For example, we could take the same famous nonsensical but grammatical (if semantic/collocation restrictions are ignored) sentence composed by Chomsky (loc. cit.) and manipulate it by changing the order of words or letters: -

*Colorless green ideas sleep furiously
green sleep furiously colorless ideas
ylsuoiruf peels saedi neerg sselroloc
acdeeeeefgiilllnoooprrrsssusuuy*

Or we could write the same initial sentence in the same language using a different alphabetic script: -

Κόλορλες γκρίν αϊντίας ολίπ φιούριασλι

or translate it into a different language and use a completely different script: -

無色的綠的主意睡覺生氣地

These two aspects of ‘form’ are closely related in that literacy enables a representation of linguistic and grammatical form to be externally visible or tangible for analysis or manipulation as a formal object. For example, representing a sentence in the form of a syntactic tree diagram enables us to analyse it graphically. The dependent relationship between literacy and grammatical analysis is crucial to our understanding of highly developed metalinguistic awareness.

1.5 Delimitations and Limitations

This section contains a definition of the scope of the thesis: it is necessary to delimit the extent of the study in order to restrict the subject-matter and to focus the thesis on a particular end-point, namely to find out whether multilinguals' metalinguistic awareness is related to their language learning ability when their language learning experience is held constant.

The other side of the coin is the thesis's limitations, which I state openly in order to give a clear picture of the scope of the thesis.

1.5.1 Delimitations

This study is confined to testing adult multilinguals who are native speakers of English in order to ensure equity, as all the test instructions are in English.

The study is further confined to multilinguals who have undergone a certain amount of education. All the participants had started or completed a degree course: they are either studying as undergraduates, have finished a degree sometime in their lives, are registered for higher degrees such as an MSc (masters) or PhD (doctorate), have completed higher degrees sometime in their lives, or are university teachers. It has been shown that people's ability to perform well on metalinguistic tasks is affected by their level of education (Scribner & Cole 1981), therefore it would not be informative to compare people who have spent relatively little time in education with those who are very highly educated.

All participants were educated adult multilinguals who had experienced 16 years or more of full-time education. In practice this meant that individuals under the age of 22 were not included in the study. A thirty year age-span was sought in order that the sample was representative of the wider population of adult educated multilinguals.

Participants over the age of 52 were excluded from the study as research has indicated that metalinguistic awareness may decrease after the age of 50 (Deakin 1995).

A further delimitation is that there is no control group of monolinguals or bilinguals for comparative purposes. Multilinguals have so much language learning experience that comparing them with participants who are known to have very little language learning experience, when we know that they perform differently (Ramsay 1980; Nation & McLaughlin 1986a, 1986b; Klein 1995), is not as informative as comparing them with other multilinguals who also have extensive experience but may have a different language learning background.

In addition, having so many languages may mean that multilinguals internalise them somewhat differently from monolinguals and bilinguals, who have less crosslinguistic influence and language separation to cope with: more research is required on this. Qualitative differences are also likely between individual multilinguals because of their different language learning backgrounds, but their representations are all likely to have reached a certain degree of complexity, each having at least three languages, and their differences beyond this point require examination, which in this thesis is carried out using a within-participants research design.

A further restriction is that there is only one test of implicit metalinguistic learning in this study, the Implicit Artificial Grammar Test, which does not test natural language awareness but allows comparison with an Explicit Artificial Grammar Test under the same controlled learning conditions. Testing implicit knowledge outside these conditions is problematic as it is hard for participants to access, and so hard for a tester to assess.

Although a large proportion of the world population is multilingual without being multiliterate, this thesis investigates metalinguistic awareness in relation to multiliterate multilingualism of the sort that is considered common in Western Europe

for those in tertiary education and afterwards. People who are not highly literate would have great difficulty taking some of the tests. On the other hand, many tests are not viable for this study because highly educated, literate multilinguals would all achieve perfect or near-perfect results. Testing what may be just the top end of the scale of metalinguistic abilities requires care in order to find tests that can discriminate between different multilinguals' abilities to carry out metalinguistic tasks.

1.5.2 Limitations

The most obvious limitation of this study is that the participants have come, inevitably, from very different language backgrounds, even if they are all educated adult multilinguals who are native speakers of English. For instance, although there may be numerical equivalence in the number of languages known by two participants, a multitude of differences lies behind this in terms of when they started language learning, the sociolinguistic settings they acquired the languages in, and how much grammar they were taught at school. It is impossible to take account of every single difference between learners in a small-scale study. In addition, the only way to discover this information is to ask the participants themselves (see the Language Background Questionnaire in Appendix 1.1), which means that the data on learners' language background variables, essential for the statistical analysis, rely on participants' self-report, which is subjective and not assessed by an independent external observer able to judge all the participants equally and objectively.

Further limitations are that the results of my study are not generalisable to a less educated population as too many of the background variables, which aid the development of metalinguistic awareness, will differ. The three major statistical limitations are the small sample size of only 30 participants, that the participants are not a random sample but a convenience sample, and the close relationship in the sample between the number of languages known, number of literacies known, and the number of languages studied (i.e. the three variables for language experience).

Multilinguals' languages are treated as countable as it is the breakthrough effect of learning each language that is hypothesised to develop multilinguals' metalinguistic awareness. Participants' depth of knowledge in each of their languages is not analysed.

Lastly, multilingualism, metalinguistic awareness, and language learning and the relationships between them are such enormously complex subjects that it is impossible to take all the variables that can influence them into account in one study. Those investigated here are only the most obvious ones, judged on the basis of previous research. The distinct paucity of experimental research on adult multilinguals' metalinguistic awareness means that I am unable to compare the results with other studies of this nature or to place this study in a more narrow context, and that I frequently refer to research into bilingualism for support for the argument. This thesis is in the nature of an exploratory investigative study.

1.6 Organisation of the Thesis

I use a quantitative research design to assess whether the more languages a multilingual knows the better they are at learning another, and to assess whether metalinguistic awareness is one of the variables that multilinguals develop which helps them in learning additional languages. I evaluate a group of multilinguals on their language background, their metalinguistic awareness (assessed using a series of metalinguistic tests), and their language learning ability judged on the basis of their ability to learn a language previously unknown to them. A quantitative research design enables the results to be related to a wider population.

The thesis is organised as follows. Chapter 1 presents an outline of the thesis. I use a psycholinguistic approach, bringing together research on implicit and explicit learning, universal processes, and individual differences, and this is reviewed in Chapter 2. Chapter 3 assesses the research on multilinguals, including the few psycholinguistic

and second language acquisition studies that have been carried out, and argues that multilinguals should be faster language learners than other learners on account of their language learning experience. There is a dearth of quantitative research so far on metalinguistic awareness in adult multilinguals, but a fairly substantial body of literature exists on metalinguistic awareness relating mainly to children and to monolingual or bilingual individuals, and this is reviewed in Chapter 4, where I conclude by arguing that metalinguistic awareness should assist multilinguals to learn languages. The research question, premises, hypotheses, design, methodology, and data coding and analysis are defined in Chapter 6, and the results are given in Chapter 7. A discussion of the results for the six hypotheses (Chapter 8) and conclusions based on them (Chapter 9) follow. The thesis concludes with an assessment of the study's significance (Section 9.2).

This thesis attempts to capture something of the major shifts in the process of language learning which is extraordinarily complicated but which many multilinguals seem to achieve naturally and easily. The research is theoretical in nature, and empirical in its execution, as I hope that it may eventually contribute to our overall practical understanding of language learning. I also hope it may be another small step towards helping learners learn languages more quickly and easily, and towards helping teachers to facilitate their learning. This study is a contribution to the research on metalinguistic awareness and on multilingualism, and has pedagogical implications for the enhancement of learner input, and optimising learner intake.

Chapter 2: Universalist and Individualist Approaches to Second Language Learning

Psycholinguistic approaches to language learning fall approximately into two areas: research into universal approaches, which concentrate on what learners have in common, and research into individual differences, which concentrate on how learners differ (Fillmore, Kempler & Wang 1979). Adult educated multilinguals are likely to differ as a result of their experiences, both from each other and from individuals with less language learning experience: at the same time, multilinguals probably share a number of characteristics. Both approaches will therefore be outlined below.

2.1 Universalist Psycholinguistic Theories of Second Language Learning

The main direction of psycholinguistic theories of second language acquisition over the last 50 years has moved from behaviourist theories (where learning is believed to occur through imitation, repetition and reinforcement of stimuli), to mentalist theories, which emphasise the role of an innate learner-internal language learning mechanism, and to theories that emphasise the role of the physical processes of the brain, such as neurolinguistics and connectionism (PDP).

A division is often made between mentalist/nativist accounts of language learning, for example Chomsky (1976; 1981a, 1981b), who proposes that neonates are born with pre-specified principles and parameters and universal grammar (UG) and that language is a separate module in the brain (see also Fodor 1983); and non-nativist accounts of language learning, such as cognitivist approaches, which treat language

learning as a part of general cognition. However, an alternative possibility is that modularity may evolve over the course of development. Karmiloff-Smith (1991: 176) suggests that “with development and in interaction with the constraints of the environment, the organism recreates its basic organization to form modular-like processes within central processing and central-like processors within specific input systems”. If mental processes become modularised in the course of development (Karmiloff-Smith 1996), then “modularity may be the result of learning rather than its cause” (Elman *et al.* 1998: 387). However,

considering development domain-specific does not necessarily imply modularity. In other words, the storing and processing of information may be domain specific without being encapsulated, hard-wired, or mandatory (Karmiloff-Smith 1996: 6).

However, it is simplistic to divide psycholinguistic research into nativist and non-nativist approaches as many nativists consider that the environment influences learning, and many non-nativists consider that *something* has to be biologically specified. An epigenetic approach proposes that genetic, environmental, and self-regulatory factors constantly interact over the course of an individual’s lifetime and that this process affects all subsequent language development (see Section 2.1.4). An epigenetic approach is taken in this thesis because mentalist (nativist) approaches to language learning emphasise universal processes in a monolingual framework independent of environmental factors, which is inappropriate for investigating individual differences in multilinguals’ metalinguistic awareness, and because non-nativist accounts do not account for the human-specific nature of language.

2.1.1 Implicit and Explicit Language Knowledge

It is widely accepted that there are two kinds of knowledge in second language learning, implicit and explicit (Hamers & Blanc 1989; R. Ellis 1994; Fabbro 1999; cf.

McLaughlin 1987). Implicit knowledge is such that “learners are not conscious of what they know. It becomes manifest only in actual performance” (R. Ellis 1994: 356). Implicit knowledge may be formulaic, so that language is represented in chunks, or rule-based, so that generalised and abstract structures have been internalised (R. Ellis 1994). Implicit knowledge arises from implicit learning and is often gained in naturalistic social situations –

where the input is not consciously structured and the primary focus is on message conveyance, while formal learning occurs in contexts where the input is usually carefully organized and the primary focus is on form. Informal learning involves implicit knowledge, while formal learning is likely to involve at least some explicit knowledge of L2 rules. (R. Ellis 1994: 108)

Chan (1992, cited in Berry & Dienes 1993: 136) argues that “an important characteristic of implicit knowledge is the absence of [explicit] metaknowledge”. He replaced the letters of an artificial grammar (see Section 5.1) by computer file operations (new, open, append, edit, read, define and close) and participants had to memorise ‘grammatical’ sequences of computer operations, after which they were able to discriminate permissible new operational sequences from non-permissible ones. They were then asked to generate new permissible strings and because their performance (47%) was much higher than their confidence ratings, Chan believes that they were using implicit knowledge. This might help to explain a study by Eisenstein (1980), who was puzzled that her multilingual participants were so much better at natural language learning than the monolingual and bilingual language learners but so lacking in confidence in their ability. Sorace (1985) also noticed that uncertain students progressed faster than those who showed a high degree of certainty in Kohn’s (1979) longitudinal study. Implicit knowledge does indeed appear to be robust, but is difficult to access and leaves the learner lacking certainty.

Explicit knowledge, on the other hand, is available to learners as a conscious representation which they may be able to explain either in everyday language or in

technical terms. Explicit knowledge can be gained through searching for information and building and testing hypotheses, or as a result of explicit instruction by a language teacher or from studying textbooks. Implicit knowledge arises from implicit learning and is stored in implicit memory, and explicit knowledge arises from explicit learning and is stored in explicit memory. The cognitive distinction between implicit and explicit knowledge has led researchers to put forward various hypotheses for language learning.

One of the most debated hypotheses to have been put forward is Krashen's Monitor Hypothesis (1981a, 1985). Krashen argues that humans acquire language by receiving comprehensible input, and distinguishes between 'acquisition' which uses the language faculty in essentially the same way as in first language acquisition, and 'learning' in which knowledge is gained through conscious understanding of the rules of language (Cook 1993): acquisition is implicit and learning is explicit (Krashen 1982). Krashen believes that acquisition is a superior way of picking up a language to learning, as it gives the learner abstract knowledge, is more robust, and gives rise to intuition about the language. Krashen (1981b: 156) proposes that learners cannot consciously analyse naturalistic input, and that learned knowledge cannot become 'acquired' knowledge but is only available for speakers to check consciously on what they are saying, which he calls 'Monitoring' (Krashen 1981a; 1982). This 'non-interface' position is criticised by many (Gregg 1984; Sharwood Smith 1981; McLaughlin 1978, 1987), who argue that when learned knowledge becomes automated it *can* be used in spontaneous speech (cf. Paradis 1994).

Krashen also argues that for acquisition to take place the learner needs to hear comprehensible input, and that there is a natural order of language acquisition which will dictate what the learner acquires from this input (Krashen 1982). However, not all learners are equally as successful at acquiring languages, so Krashen postulated the existence of "a mental block that prevents acquirers from fully utilizing the comprehensible input they receive for language acquisition" (Krashen 1985: 3). He

called this an “affective filter” and proposed that it was caused by the acquirer being unmotivated, anxious, or lacking in self-confidence (loc. cit.).

Krashen’s original hypothesis was heavily criticised for being simplistic, and unfalsifiable as it could not be tested empirically (eg, Gregg 1984; McLaughlin 1987), and while recent work on negative evidence and formal instruction (Zobl 1995) show that Krashen’s refinements to his original hypothesis may be falsifiable after all, it is still controversial: many researchers endorse the implicit/explicit distinction without endorsing the ‘non-interface’ position (R. Ellis 1994).

Karmiloff-Smith (1986), Gombert (1992), and Bialystok (1994a) each also put forward a hypothesis based on the distinction between implicit and explicit knowledge, in which implicit corresponds to unanalysed knowledge and explicit to analysed knowledge. These models will be described in the section on psycholinguistic models (Section 4.3) as they are designed to characterise the development of metalinguistic awareness. Because multilinguals’ implicit and explicit knowledge encompasses a number of different languages within the individual, crosslinguistic influence may occur between an individual’s languages, eg, between lexical items, semantic fields, phonology, pragmatic use, and morpho-syntax (see Section 2.1.2).

2.1.2 Implicit and Explicit Language Learning Processes

Implicit learning can be defined as “acquisition of knowledge about the underlying structure of a complex stimulus environment by a process which takes place naturally, simply and without conscious operations” (N. C. Ellis 1994: 1). Explicit learning, on the other hand, is more conscious, and may involve information searching, hypothesis testing, search for structure, and rule-learning. The implicit and explicit processes of *transfer*, *creativity*, and *learning* enable learners over a period of time to learn another language. The processes also seem likely to develop within the individual

over time as increasing psycholinguistic complexity and interrelations build up as a result of learning a number of languages.

The first of these three sources of language knowledge, *transfer*, can be defined as “the influence resulting from similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired” (Odlin 1989: 27). Any language feature can be transferred, but transfer of grammatical structures between languages has been particularly well researched. Transfer of grammar is complex as many more processes are at work than simple transfer of a structure in its entirety.

Learners learning their first foreign language often make conscious recourse to native language forms to compensate for their lack of target language knowledge, but more advanced learners are more likely to transfer structures from the foreign language typologically nearest to the target language (see Williams & Hammarberg 1998). It has been noted that speed of learning is related to the typological distance between the target language and another language a multilingual knows. For example, English speakers with experience of instruction in German understand a Dutch text better than those without this experience (Singleton & Little 1984). Psycholinguists term transfer of target-like forms as ‘positive transfer’ as it takes advantage of similarities between languages, and transfer of non-target-like language forms ‘negative transfer’ or ‘interference’ (R. Ellis 1994). Implicit transfer occurs when learners are not aware of using forms from their other languages – this may occur even if they are careful to separate their languages as crosslinguistic influence between the languages they know is to a large degree out of their conscious control. Transfer can occur between any of a multilingual’s languages, not just from their native language/s to a foreign language.

Literate language learners are also able to transfer their ability to read and write from one language to another, if the writing systems follow the same principles. The more similar the writing systems the quicker learners will be able to pick up target language

orthographic conventions. Even when the target language is represented in a system of symbols very different from other systems the learner knows, over time and through their “mastery of encoding and decoding skills” (Odlin 1989: 124) they are able to learn the new system. For example, a native English speaker learning to read Mandarin must learn to recognise a large number of characters in a logographic rather than an alphabetic script (Taylor & Olson 1995). Considerable time is required for an individual to achieve automaticity in a number of different orthographies or scripts. Differences between different orthographies and conventions is likely to promote awareness of differences between languages in multilinguals.

Relatively little research has taken place into the implicit and explicit process of *creativity* in language learning, another potential source of language knowledge. The study of error analysis (Corder 1967) has demonstrated that foreign language learners contribute creatively to their own language learning (eg, Dulay & Burt 1973), and that they play with target language forms. Karmiloff-Smith (1991, 1996) argues that creativity is a result of representational flexibility – “If systems were to remain rigid, there would be little if any room for cognitive flexibility and creativity” (Karmiloff-Smith 1991: 174). Creativity can also be seen as an implicit or explicit strategy learners adopt to help them communicate in a situation where they do not have full proficiency: they invent the word or phrase they require, based on their knowledge of the target language and their other languages.

Turning finally to *learning*, it has been suggested that learning is one of the most fundamental characteristics of the human organism: humans learn whatever the form of the input that is presented to them. For example, Reber (1993) notes that researchers have found that people are able to learn artificial grammars from exemplars, from fragments, and are able to transfer their knowledge across letter-sets and modalities, suggesting that they create abstract representations of the patterns. People learn both through their own experience and through other people’s, through the exchange of information. Because explicit learning is more highly trainable than

implicit learning (Reber 1993), educated multilinguals with considerable language experience should perform better on explicit tests.

Most research on language learners has been on their explicit language learning abilities, particularly grammar learning in a classroom environment, but interest has also turned over the last thirty years to what Reber (1965) was the first to call "implicit learning", a concept akin to Krashen's (1981a) 'acquisition'. The characteristics of implicit learning are that, firstly, it appears to be tied to the surface characteristics of stimuli, so that shifts in modality between learning and testing reduce performance on implicit memory tests (Berry & Dienes 1993: 13-15). Secondly, implicit learning is inaccessible to free recall, more accessible to forced-choice tests (though it is still debatable whether this is testing explicit or implicit knowledge), and may only show limited transferability to related tasks. Thirdly, implicit learning tends to be associated with incidental learning situations, gives rise to a sense of intuition, and is robust with regard to time, psychological disorder, and secondary tasks (*loc. cit.*).

Although acquisition may lead to native-like skills in adult language learners, formal learning may be a useful way of learning a language, especially in acquisition-poor environments where the learner has little access to native speakers communicating naturally and informally. Learning that encourages learners to pay attention to the formal properties of language has been shown to help learners develop greater proficiency and greater linguistic accuracy, particularly if it is linked with natural exposure to develop their communication skills. For example, N. C. Ellis (1993) examined three groups of native English speakers learning Welsh on certain morphological rules, and found that the group that was given both instruction in the complex rules and structured exposure to examples performed better on a test of well-formedness than either the group exposed only to instruction or the group exposed only to a structured set of examples (see also Chihara & Oller 1978; Briere 1978; Long 1983). Doubts have been cast on the durability of formal learning, as learners

have been observed to forget what they have been taught very quickly (eg, Pienemann 1984), but other evidence suggests that, depending on the appropriacy of the structure to learners' stage of development, if it is perceived as being useful and used regularly afterwards the learners will not forget it (Lightbown 1991; Pienemann 1989; White, Spada, Lightbown, & Ranta 1991). Learners are also able to learn a considerable number of explicit rules (loc. cit.) that can considerably improve their output.

The traditional philosophy of the teaching profession is that rule presentation is an important aspect of instruction because the condensed information contained in grammar rules possesses a highly productive potential (Dakowska 1993: 84).

However, learners assimilate rules in different ways (Sorace 1985). Rules may be stored for their propositional content or internalised into procedural representations, with the effect that they will be used in different ways. Learners can also make false analogies on the basis of taught rules (White 1984; Schwartz & Gubala-Ryzak 1992). And just as learners internalise information differently, teaching can take many forms and does not necessarily draw learners' attention to target language form or explicit rules. Learners can also direct their own learning, and may use a variety of learning approaches, such as problem solving and hypothesis testing, on their own initiative.

Many researchers argue that explicit or controlled processes become automatic through extensive practice of the target language (eg, R. Ellis 1994: 391), and many that they can turn into in implicit knowledge. Nevertheless, Paradis (1994) refutes both theories, and argues that practice does not render controlled processes automatic, and "Practice does not convert explicit knowledge to implicit competence." (Paradis 1994: 403). Paradis argues that practising a rule leads to knowledge of the rule, whereas practising the process of producing grammatical utterances leads to implicit knowledge, therefore learned knowledge cannot be converted into implicit knowledge. As a result, explicit processes can neither become

automatised nor implicit as implicit representations are not equivalent to explicit representations. He points out that grammatical rules do not convert to automatised knowledge over time, rather, what becomes automatised is the application of the processes that result in output that is consistent with the application of the rule. In other words, *the ability to produce implicit grammatical output is automatised*. No one, neither children nor adults nor experienced linguists nor multilinguals, is able to access these implicit processes.

Paradis believes that explicit knowledge is useful for focusing attention, monitoring output, and, for example, for focusing on grammatical form as an aid to comprehension, but that it is practice that improves automatic performance (Paradis 1994). Furthermore, he points out that internalisation through practice is dependent on the type of activity carried out rather than the context in which it is learned. In this way, learners can acquire implicit knowledge in the language classroom, and learn explicit knowledge outside the classroom.

Paradis' theory describes the way in which prior explicit knowledge relates to subsequent implicit knowledge in a parallel system. Conversely, other researchers have investigated the way in which prior implicit knowledge relates to subsequent explicit knowledge. Rozin (1976) argues that gaining access to the cognitive unconscious could be achieved by two processes, either connecting the two systems or duplicating one system in another part of the brain. In response, Karmiloff-Smith (1991) argues that representations are redescribed, not simply duplicated, and proposes that "representational redescription is a process by which implicit information *in* the mind subsequently becomes explicit knowledge *to* the mind, first within a domain and then sometimes across domains" (Karmiloff-Smith 1991: 172). Redescription results in "increasing explication and accessibility at the cost of detail of information" (Karmiloff-Smith 1991: 178). Although this is compatible with Paradis' view that implicit and explicit representations are not equivalent, it is not compatible with the strict division between implicit and explicit processes that Krashen (1981a,

1985) proposes. Instead, it suggests a cline of implicit to explicit knowledge. Karmiloff-Smith (1996) points out that there is evidence for a cline, for example, that participants may be able to correct a sentence explicitly while being unable to explain why they found the sentence unacceptable (see also Gombert's 1992 'epilinguistic awareness'). As Reber (1993) states:

It is one thing to have an appreciation of the differences between the implicit and the explicit: it is another entirely to conclude that they are processes of altogether different kinds. We do not want to allow ourselves to be seduced by what we can call, for want of a better name, "the polarity fallacy." That is, we need to be careful not to treat implicit and explicit learning as though they were completely separate and independent processes; they should properly be viewed as interactive components or cooperative processes, processes that are engaged in what Matthews (1991) likes to call a "synergistic" relationship. There is, so far as I am aware, no reason for presuming that there exists a clean boundary between conscious and unconscious processes or a sharp division between implicit and explicit epistemic systems – and no one from Sigmund Freud on has ever argued that there was. [But see Krashen (1981a, 1985) above].

And so, we have a rather tricky issue here. To explicate the distinctions that exist between implicit and explicit cognitive processes, it will often be necessary to present evidence that emphasizes the functional and behavioral differences between them. To convince an audience that the arguments concerning the specialness of implicit learning and tacit knowledge are sound, it becomes incumbent upon the proponent of the theory to sharpen differences and soft-pedal similarities. This is unfortunate but, given the nature of the give and take of academic and scientific discourse, unavoidable.

The relationship between implicit and explicit processes and the processes that lie in between may be vital to understanding the development of metalinguistic awareness. Following Karmiloff-Smith (1991, 1996), if cognitive flexibility and consciousness, and therefore metalinguistic awareness, are the result of the repeated process of representational redescription over time, then the development of explicit

metalinguistic *awareness* is contingent on the evolving relationships between implicit and explicit processes. In comparison, explicit metalinguistic *knowledge* may either be the result of evolved representations or instruction. More research is needed into the processes by which representations evolve and awareness develops.

2.1.3 The Practice Hypothesis

Under all theories of learning, eg, information processing, connectionism, behaviourism, the more an activity is practised, in general the better people will succeed at it, all other things being equal – I will call this the ‘Practice Hypothesis’, in the same strain as Johnson and Newport’s (1989) Exercise Hypothesis (‘use it or lose it’), and the Maturation State Hypothesis (i.e. the Critical Period Hypothesis). The sigmoid curve of the Practice Hypothesis evens out as more and more effort is required for less and less gain, often called the law of diminishing returns.

If we apply the Practice Hypothesis to language learning, the more people practise (exercise, rehearse, train, prepare) a foreign language, the better they will succeed at being able to communicate in it. But the Practice Hypothesis goes further than this: in addition to improving proficiency in a target language, practice should result in the learner being better able to learn other languages in general. The time required by an experienced language learner to learn another language to a certain level of proficiency should therefore be shorter than a learner with less language experience. The effects of the Practice Hypothesis are cumulative, so that the more and wider experience learners have of different languages the faster they become. For example, for monolinguals learning a first foreign language, learning will be slow as they have to learn to learn at the same time as learning the language. But in developing their ability to learn, they become better ‘equipped’ to cope with learning another language, which will be learned more quickly. Each additional language they learn enables them to become faster at the process of language learning. An experienced adult multilingual should be a very capable language learner. By learning to learn, I do not

refer just to learning strategies, or the motivation gained in the process of language learning, although these undoubtedly help, but to the ease of cognitive processes taking place.

In addition to language learning, the Practice Hypothesis is also pertinent to the development of metalinguistic awareness: the more individuals practise their metalinguistic awareness, the more they will develop the ability to use it. It is possible that multilinguals develop metalinguistic awareness to a high degree because the more they expend cognitive effort on focusing on grammatical structure the better they are able to cope with further demands (Section 5.1).

Levelt (1974, 1978) categorises language as a skill. It is the nature of skills that they are acquired gradually, require practice and it is impossible not to use them once they have been learned. (Levelt does not appear to consider language attrition, where native speakers of a language may move to a different speech community where their native language competence attrites through lack of use). Practice at a skill ensures that what is slow and arduous to learn at the beginning becomes easier as implicit knowledge slowly accumulates over time. For example, reading is a skill: learners build up implicit as well as explicit knowledge in a basic literacy task such as mapping letters to sounds through practice, enabling them to concentrate on more difficult tasks such as sight recognition of increasing numbers of common lexical items. By the time recognition has become automatic learners attend primarily to the meaning rather than the form of the words. Through this process of continual development of implicit processes, more and more facets of the skill become automatic, although if there is some problem in processing learners will become aware of the form again.

Reading and writing are undoubtedly skills, but it is debatable whether language learning can be regarded solely as a skill. Language is a human universal whereas skills vary in nature from community to community, depending on what is required in their environment. Languages can be learned in leaps and bounds and learners do not

necessarily need practice or feedback (Pinker 1994). Skills are domain-specific, whereas it has been noted that language development “tends to be accompanied by development in other cognitive abilities” (Carroll 1993: 152). Nevertheless, learners should improve at language learning the more experience they have gained. The process of learning the first foreign language may be slow, but as implicit and explicit knowledge accumulate over time, the process should become easier.

2.1.4 Epigenesis

The Practice Hypothesis is a logical result of the theory of epigenetic processes, a causal explanation of the phenomenon of development resulting from the Mendelian theory of heredity with consequences for the Darwinian theory of evolution (Løvtrup 1974). In an epigenetic view of development, individuals and their abilities are the result of the continuous complex interaction between their genes and their environment (Waddington 1968; Løvtrup 1974; Changeux 1980). Epigenesis “is a series of causally related events, the nature of which is determined by information prevailing in the embryogenetic substrate” (Løvtrup 1974: 14), where there is a causal relationship between successive developmental stages. Von Baer (1828/1837) hypothesised that each developmental stage is a necessary condition for the next one to be realised, and Roux (1895) that it was also sufficient. As a result, “The fact that epigenesis almost always follows the course thus specified may easily convey the impression that it is ‘predetermined’” (Løvtrup 1974: 14).

However, it seems unlikely that the whole process of development is programmed in the genome as even a small change occurring early in the sequence of successive stages of development might have far-reaching consequences on the adult (see N. C. Ellis 1997). This epigenetic amplification of one small mutation might have the possible consequence of abolishing a compound phenomenon, such as language, even if constraints on mutation make this likely to be a rare event – but humans’

development of language appears to be robust. By the same argument it also seems unlikely that language content is highly specified in the genome.

Just as genes alone cannot determine any individual aspect of the organism, nor can environmental factors: the interaction between genome and environment is so intertwined that no aspect can be accurately depicted as either primarily genetic or environmental. Every interaction between environmental and genetic factors, from the early foetus to the end of life, affects the individual's life from that time on, in humans just as in other organisms. Three types of factors constrain development: genetic endowment, environment (both social and physical), and self-regulation of the organism. Mentalist theories emphasise the role of the genome: Piagetian theory the role of self-regulation: Vygotskian theory the social environment (Fischer & Bidell 1991).

Experiential induction is central to epigenetic processes (Fischer & Bidell 1974). The epigenetic effect of experience on development can be shown by developmental clusters, where organismic and environmental factors result in a sequence of behavioural responses. Some apparent responses appear to develop in close synchrony or to be sequentially tied even when the age of emergence changes (*loc. cit.*). As R. Ellis (1994: 77) points out, "children appear to follow a fairly well-defined pattern of development" in their native language/s even when the age of emergence differs (see Crystal 1976; Brown 1973; de Villiers & de Villiers 1973; Klima & Bellugi 1966; Cazden 1972). Second language acquisition is more variable as more factors affect development, such as transfer from other languages and the teaching of explicit rules, but some researchers claim that learners with different language backgrounds follow a similar path of development in the target language (eg, Meisel, Clahsen & Pienemann 1981).

Order of development also informs Karmiloff-Smith's theory, which is based on epigenetic processes, so that "Nature specifies initial biases or predispositions that

channel attention to relevant environmental inputs, which in turn affect subsequent brain development” (Karmiloff-Smith 1996: 5). Innate predispositions that are specified in detail may simply be triggered by the environment, or if they are specified as a bias, the environment may have a greater effect in influencing “the subsequent structure of the brain via a rich epigenetic interaction between the mind and the physical/sociocultural environment.” (Karmiloff-Smith 1996: 15). She believes that language may therefore be a result of both detailed specifications and predispositions interacting with environmental factors.

The epigenesis of language learning is demonstrated by the following two conditions being necessary to have grammatical language. Firstly, grammatical language is specifically a human characteristic – other animals can communicate, but humans are unique in using a grammatical system, i.e. where word order carries semantic information. For example, primates brought up in a language-rich human environment may learn words but they do not acquire grammar (Terrace *et al.* 1979; Premack 1985). Secondly, the timing of first language input is crucial to human development of language – it must occur during the critical period, before puberty. Individuals who do not receive any language input during childhood are not able to acquire normal grammar in any language (see Curtiss 1977, 1982, 1988). The two conditions demonstrate the epigenetic nature of language: human genes continuously interact with language-rich environmental input during a specific developmental period in individuals’ lives. After the critical period, qualitatively different language learning processes appear to occur in most individuals but the interaction continues between what originally were genes and environment. Epigenesis continues to affect all further language learning processes.

When we apply the theory of epigenesis to multilinguals, we can see that their language learning experiences continually interact with their heritable characteristics and their self-regulation (such as seeking out language input and using strategies). The more languages multilinguals are required to learn through being exposed to them

in their environment, the more they develop the cognitive processes necessary to learn them, and subsequently, through using their developed cognitive processes they are able to learn another better. In other words, their experiences lead to gradual, sequential formation of new abilities over an extended period of time. In this way, "... knowledge acquisition tends to specialize as a function of individual experiences and choices" (Carroll 1993: 531, on human cognitive variability).

One outcome of epigenetic interaction between individuals' heritable characteristics, environmental context, and self-regulation is that individuals' native and non-native language system is dynamic and in a constant state of flux (eg, Mägiste 1986). This results in developmental variability between organisms: individual differences in foreign language learning are discussed below.

2.2 Individual Differences in Language Learning

In counterbalance to the study of universal processes, the study of individual differences explores the way in which learners systematically vary, both from person to person and within the same individual over time. As Schütze (1996: 98) points out, "Despite their common genetic makeup, humans exhibit individual differences in virtually every aspect of behavior."

In this section, I examine language learners' massive individual variation as regards their cognitive, affective, and experiential attributes, and relate the research to multilinguals. Social attributes are not included in this study, nevertheless, it is an underlying assumption of this thesis that speakers' knowledge of their languages and literacies is shaped by the social context in which they are acquired, whether through interaction with speakers or written material: for individuals and societies, languages are located in historical, cultural, and socio-political contexts, social practices, and social relationships and therefore social context affects the development of all language learning (Romaine 1995; Wald 1984). I will argue that epigenetic processes

continually interacting over time between multilinguals' heritable characteristics and their language environment produce individual differences with regard to grammar learning.

2.2.1 Cognitive Attributes

Cognitive attributes, i.e. the intellectual and verbal abilities and skills that learners bring with them to the language learning situation, for example, 'aptitude', memory, intelligence, and language learning strategies, have been found to affect the outcome of language learning (Skehan 1989; R. Ellis 1994). There has been a substantial amount of research into the relationship between bilingualism and bilinguals' cognitive attributes, which will be drawn on in the following discussion, but research specifically on how multilinguals' cognitive attributes affect their language learning has not been carried out, except into their use of strategies. It is therefore unclear what effect individuals' multilingualism may have on pre-existing cognitive individual differences, and how cognitive individual differences may develop through a learner becoming multilingual or learning an additional language. Although metalinguistic awareness is a cognitive attribute, it is not usually included in discussions of learners' individual differences. As it is the principal attribute under investigation in this thesis, I have devoted a chapter to it, Chapter 4.

The ability that is usually called 'aptitude' is discussed here because many researchers describe it as a cognitive individual difference (Skehan 1989; Carroll 1993). Nevertheless, I will argue that it should be regarded as an outcome of the interaction between learners' cognitive, affective, social, and experiential attributes, language learning processes, and language knowledge, and therefore would more accurately be labelled 'language learning ability'.

2.2.1.1 Aptitude for Learning Languages

Individuals differ in their ability to learn foreign languages both in ease and rate of attainment. Some learn quickly and easily even when not particularly motivated, and

others have difficulty even when highly motivated and interested, but given enough motivation, everyone is capable of learning to communicate in another language in adulthood “to a reasonable level of proficiency” (R. Ellis 1994: 495). The ability to learn grammatical language is a capability that is shared by all humans: what differs between individuals is the rate of attainment with regard to learning phonology, lexicon, grammar, semantics and pragmatics (this study concentrates on grammar learning), in other words, the amount of time needed by the individual to learn the material or develop the skill (Carroll 1962).

This much is agreed on by most researchers in most research fields. What follows was hotly debated until research on aptitude dried up. To add to the debate, in this thesis I argue that language learning ability is, like all human abilities including language, epigenetic, a result of the interaction of genes with environment (up to the moment of measurement). The two are inseparable and gestalt. Using this as a basis, I outline the three main debates in ‘aptitude’ research, namely the ‘origins’ or causes of language learning ability, whether it is constant across an individual’s lifetime, and whether it is monadic.

Firstly, several causes or ‘origins’ of language learning aptitude have been proposed such as that it is innate, due to early environmental variables, or based on a first language (Skehan 1989). For instance, Skehan (1986) states that aptitude appears to have its roots in first language competencies, as students who develop faster in their first language, have superior vocabularies as children and come from better educated homes tend to score higher on indices of aptitude than students lower on these first-language advantages. From an epigenetic perspective, from the point of view that individuals’ language learning ability develops through the combinatory interaction of their genetic makeup and linguistic input, I argue that all three of these observations are the result of individuals’ language development, so that aptitude is partly heritable, partly due not just to early childhood environmental variables but to all since conception, with the interaction of the two resulting in first language/s competence,

and all of these including first language/s competence, continuing to interact throughout the individual's lifetime affecting all subsequent language learning. This argument has an immediate and obvious impact on the next debate in aptitude research – the 'fixed' nature of language learning ability.

The idea that "aptitude is stable in nature, not susceptible to easy training or modification, and is not environmentally influenced, to any significant degree, at least after the early years" (Skehan 1998: 187) has gained wide credibility, mainly due to the work done on aptitude test results and factor analytic studies, which are likely to have mainly used monolingual participants. But in looking at the following three studies – one on children, one on adults, and one on both – we may become more sceptical of this claim.

The first, the Bristol Language Project, tested children on their native English aged about three to four, and on an aptitude for foreign language learning test ten to twelve years later. Their first language measures, particularly on the pronoun system and auxiliary verbs correlated above .4 with their later aptitude (Skehan 1998) and with their foreign language learning ability (Skehan 1989). But 16% is *not* an enormous proportion of variance. If aptitude were stable across a person's lifetime we would expect a much higher correlation. Instead, the children appear to be developing differentially, which I argue is an outcome of their previous experiences interacting with their background – and I hypothesise that the older they become the more they would diverge from the original assessment.

The second study (Politzer & Weiss 1969) is sometimes cited as the only experiment to examine whether aptitude is trainable, but methodological problems are likely to have affected its result, primarily the small amount of time allocated to training and the short time span over which the training took place. The first phase included both US Defense Institute employees and high school children as participants, and found that it was not possible to train either group in taking aptitude tests after six weeks of

training five different skills. There appears to have been some antipathy to the experiments among the children, so in the second phase the researchers reworked the children's training programme and were careful to include their teachers in its construction (all the participants in the second phase were high school pupils). There was no significant effect of training in the second half either, but again this is hardly surprising as the children were only receiving 10 minutes of training two or three times a week over 11 weeks, which works out at a total of about 4.5 hours over the entire training period. The training time was taken from their learning time. It seems likely that a considerable amount of training would be required to make a statistically significant difference to children's score on a language 'aptitude test' over such a short period. In sum, this is not a reliable piece of evidence to cite for demonstrating that aptitude is untrainable: using unwilling participants in the first phase and little training over a short training period in both phases does not adequately demonstrate that training has no effect on 'aptitude'.

The third study is a study carried out by Parry and Child (1990) while investigating the relationships between two aptitude tests (the MLAT and the VORD) and language proficiency. Parry and Child (1990: 36) "found that the time required for comfortable completion by skilled language learners was about 45 minutes, while average participants required 60-70 minutes. Participants' scores varied in proportion to the number of foreign languages they had studied". The effect occurred on a trial run when the participants were ten US Department of Defense employees, and shows not only that there was an effect of experience on their ability, but that this effect was systematic.

These three studies together indicate that aptitude is *not* totally fixed, nor even fixed with a degree of leniency, but that there *is* evidence that people can improve at language learning on account of their previous experience: there is no *reliable* evidence to show that 'aptitude' is untrainable. Carroll himself, who has done more research into aptitude than anyone, believes that foreign language aptitude is more or

less fixed over an individual's life span, and not modifiable in any significant way (1981: 86). However, in the same paper, he states that aptitude may be "considered as the individual's initial state of readiness and capacity for learning a foreign language, and probably degree of facility in doing so" which is "crucially dependent upon past learning experiences" (Carroll 1981: 86), implying that it is *not* fixed. He also states that he and others have found "that from childhood through adolescence foreign language aptitude increases rather than declines, contrary to the popular impression" (1981: 113). In a later publication Carroll defines constancy as a criterion of aptitude, i.e. his conditions for regarding an ability as an aptitude include, "No significant change in aptitude is observed from time A to time B" (1993: 16; condition 4), and we understand that this means that any development in aptitude is discounted *a priori* for not being stable. Defining aptitude as stable constrains the concept of aptitude enormously and results in a position where any variables that may influence it are dismissed without consideration.

The third highly debated point in aptitude research – whether foreign language learning aptitude is unitary in nature – is closely bound up with the debate over whether aptitude is a specific talent only for language learning. Again, 'aptitude' is defined as a measurement statistically related to subsequent language learning attainment, but there is very little theoretical justification to substantiate what it actually measures. Aptitude tests consist of items that have previously related well to learners' post-test language achievement. Through this process, aptitude seems to become reified in some researchers' minds as a single testable entity, when it appears to be more like a construct of different abilities. Viewing aptitude as a type of 'cognitive sponge' which may facilitate positive transfer of abilities or knowledge that the individual already possesses (Gardner & MacIntyre 1992: 215) is also reification. Bearing in mind the complexities of language learning, aptitude is more likely to be a group of abilities than a single entity. There is supporting evidence for this in the considerable range of sub-tests within aptitude tests – a result of assessing learners

using tests that have consistently correlated with language learning attainment in the past (Carroll 1993; Skehan 1998).

Ehrman (1990: 169) points out that it seems increasingly unlikely that language aptitude is a “unitary factor but rather the confluence of a variety of circumstantial and psychological variables” such as “internal variables of cognitive style, motivation, need for affiliation, need for control, flexibility, comfort with unstructured stimuli, liking for teachers, sensitivity to cross-cultural values, and ego-boundary permeability” which “interact with such external factors as goal and purpose of learning, setting, immediacy of real-life use, methodology, and other demands on student time”. This supports Carroll’s view that aptitude is not a homogeneous concept but can be divided up into different abilities that are to a certain degree measurable (cf. Ricciardelli, Rump & Proske 1989, on children). These positions are supported by empirical research on testing aptitude which shows that it is not monolithic, but rather a group of fairly distinct and separable abilities, eg, a phonemic coding ability, a language analytic ability, and memory (Skehan 1998). In turn, the research supports the argument that ‘aptitude’ is trainable, as a number of abilities are even less likely to be stable than one.

It seems probable that ‘aptitude’, i.e. language learning ability, is a range of skills, and that individuals with good language learning ability can generalise from their own to other languages, they may have a good memory for speech sounds and grammar, and may also have well-developed reasoning skills. Critics have suggested that variables such as personality and attitude (Hubbard 1975, cited in Skehan 1989) may be of greater significance in language learning, and others that aptitude is only relevant to formal learning (Krashen 1981a). However, Gardner and MacIntyre (1992: 215) believe that “research makes it clear that in the long run language aptitude is probably the single best predictor of achievement in a second language”. This may well be the case, so long as we understand that aptitude is not ‘single’ at all but a group of abilities, and that aptitude tests test the abilities that have previously been found to

correlate with target language attainment, such as memory. Finally, if 'aptitude' is an underlying construct, it should operate in all language learning situations, perhaps even more so in an informal setting where learners have a greater problem in imposing structure on the language. Little research has been done on aptitude in an informal learning environment, but Reves (1983, cited in Skehan 1989, Skehan 1998) tested a group of Arabic speakers living in Israel who were learning Hebrew informally and English formally (so they acted as their own control) and found that prediction was just as effective in an informal learning environment.

To sum up the three debates in aptitude research, in general, researchers concluded that they were not sure where aptitude came from, that it was constant over a person's lifetime, wherever it came from (for example, the "capability is presumed to depend on some combination of more or less enduring characteristics of the individual" Carroll 1981: 83), and that it was not unitary, but this did not prevent researchers from treating it as if it were. Little research has been carried out into aptitude in the last twenty years as interest has switched to lines of research considered to be more productive in helping us understand how learners learn and teachers teach. Research into aptitude for foreign language learning has been neglected in comparison with other areas of individual differences in second language learning such as motivation and language learning strategies. Because researchers have argued that it appears to be either innate or stable, with some individuals "having more of it than others" (Skehan 1989: 39), it has been criticised for being an "undemocratic" concept. I contend that language learning ability is not stable, although it still cannot be regarded as democratic, as individuals may vary widely as a result of their environment, including their experiences and the day-to-day and lifetime choices they have made, interacting with their heritable characteristics. The opposing 'everyone has aptitude' position (Neufeld 1979) is perfectly tenable with the opinion that not everyone has exactly the same degree of ability to learn languages.

I argue that language learning ability is a result of the interaction of heritable and environmental effects, but that individual attribution to either of the two is impossible. It is well known that individuals differ in ability at any number of skills and abilities: at a fundamental biological level, a spread of all possible variables is necessary for the survival of the species under varying circumstances. It is more pertinent to investigate to what extent language learning ability, or rather at a practical experimental level, cognitive correlates of language learning attainment, may develop across a person's lifetime. Because 'aptitude' tests are the best method for predicting language learning success currently available (Skehan 1998: 192) when administered just before a language course, it would be interesting to obtain more statistical evidence on how 'aptitude' test data at a single point in time relate to attainment tested at various intervals in the long term over learners' lifetimes, particularly if participants learn languages in the interim.

There are no studies specifically researching the relationships between multilinguals' language experience and their so-called 'aptitude'. Carroll does not relate the concept of aptitude to adult multilinguals, who may have a vast amount of the "past learning experiences" he mentions (Carroll 1981: 86), the cumulative effect of which may affect their language learning abilities.

Turning to the best known test of 'aptitude' ('ability' is used from here on for 'aptitude', and 'aptitude test' as shorthand for 'cognitive correlates of foreign language attainment'), the Modern Language Aptitude Test (MLAT) was first published in 1959, and is the best-known and most widely used method of predicting student success in various institutional settings (Wesche, Edwards & Wells 1982: 130). It has not yet been superseded in predictive power to any degree.

Unlike the IQ construct, where many have claimed that IQ tests only test the ability to take IQ tests, it is possible to assess an individual's language learning ability using an 'aptitude test', and then measure their subsequent degree of achievement in a foreign

language over a certain period of time after exposure to a learning programme (Carroll 1981: 84). Special prognosis tests such as the Modern Language Aptitude Test (MLAT) attempt to predict an individual's potential based on their capability to learn – as long as they are motivated and have the opportunity. In correlating large numbers of test items with approximately 5,000 participants' attainment after following taught language courses (Draycott 1997), Carroll found four specific abilities to relate to foreign language attainment and named them phonetic coding, grammatical sensitivity, rote-learning memory and inductive language learning, however, the MLAT does not assess inductive language learning to any great extent, as Carroll (1981: 109) states:

This ability is represented only weakly in the MLAT, possibly in MLAT-1, Number Learning. More valid tests of this ability that were developed in the research program that I conducted in the 1950s with Stanley Sapon proved to be too long and difficult to administer to make it feasible to include them in the battery.

Carroll constructed the MLAT using five subtests in either written or aural form, to test these abilities. The five subtests are Number Learning (MLAT1), Phonetic Script (MLAT 2), Spelling Clues (MLAT3), Words in Sentences (MLAT4) and Paired Associates (MLAT5).

In the Number Learning test (MLAT1), participants hear a new language for numbers and are required to translate from the new language to English after some practice. It measures general auditory alertness and memory (Gardner 1985: 20) and possibly inductive language learning ability to a small degree (Carroll 1990: 22). The Phonetic Script test (MLAT2) measures both phonetic coding ability and memory, tested by pairing four similar speech sounds with an orthographic script. Following a series of such sets, participants are asked to indicate one speech sound that is repeated from each set. Spelling Clues (MLAT3) also tests phonetic coding ability (Gardner 1985: 20) and English vocabulary knowledge. Participants must choose from five alternatives the word which is nearest in meaning to a test word, which is spelled

phonetically. Words in Sentences (MLAT4) measures grammatical sensitivity. Participants are asked to find a grammatical construction, in one or more English sentences, that has a function analogous to that of an indicated word or phrase in a key sentence: it is a 'power' test rather than a 'speed' test as the items are presented in the order of their empirical difficulty and there is little pressure of time (Carroll 1990: 19). Lastly, the Paired Associates test (MLAT5) assesses rote memory. Participants are given a total of four minutes to memorise 24 'Kurdish'-English pairs, and retention is tested by means of a multiple choice test in which the 'Kurdish' words have to be matched with one of five English words all contained in the original list (Gardner 1985).

These five subtests are correlated with language proficiency scores consisting of the results of a language test or teachers' grades. The MLAT usually correlates in the range of 0.4 to 0.6 with subsequent language learning achievement (Carroll 1981: 93), showing that between 16% and 36% of the total variance in grade levels can be accounted for by 'aptitude'. This appears to be low, but language learning success depends on so many variables that proportionally it is quite substantial. In this study only MLAT4 and MLAT5 are used: MLAT4 as a test of metalinguistic awareness (see Section 6.5.2.4) and MLAT5 as a test of associative memory.

2.2.1.2 Memory

The acquisition and retrieval of information is a vital part of learning, and one which appears to be highly trainable: memory is also a cognitive attribute of the individual. Research has shown that training over an extended period of time can lead to remarkable memory feats, such as the example of Steve Faloan, whose memory was trained under experimental conditions by researchers and was eventually able to memorise 80 digits in the digit-span task (Chase & Ericsson 1981, 1982). In the same strain, it seems reasonable to propose that it should be possible to train learners' memory for lexical items. With regard to grammar, many psycholinguistics

researchers believe that there are two main objects of memory in foreign language learning – remembering rules and remembering chunks of language.

One coding system is rule-based, creative, and flexible, but because of the processing overheads, slower. The other is memory-based, reliant on chunks, less flexible, and based on redundant storage (Bolinger 1975, cited in Skehan 1998: 204).

Learning chunks may rely on storage but probably has the advantage of fast retrieval (loc. cit.). There is also a third possible object of memory – memory for exemplars on which to model similar structures. I have found no experimental research attempting to train memory for natural grammatical structures as rules, as chunks of language, or exemplars.

There appears to be no specific memory applicable only to language learning or to grammar learning but many have found that associative memory, the ability to make connections between items, such as native and foreign words or between objects or concepts and foreign words, to be an important correlate of language learning attainment, though it is not the only memory ability useful for learning languages (see below). In general, researchers have found memory for content to be much better than memory for form (Sachs 1967, cited in Schütze 1996: 86).

Carroll's reanalyses of factor analytic studies on human cognitive abilities find that test data on memory abilities load on a number of different factors. Apart from general memory, Carroll (1993: 302) identifies associative memory, memory span, free recall memory, meaningful memory, and visual memory. These five factors should tally with the neurolinguistic evidence regarding memory, but this is not the case, partly I suspect because implicit memory tests have not been included in Carroll's survey so a factor for implicit memory cannot appear. Carroll's 'Memory Span' may be partly analogous, but Carroll states that he can find no factor for working memory, found by Baddeley (1990), whereas Fabbro (1999: 97) identifies

working memory as short-term memory – in spite of the theoretical distinction between them (see Figure 2.1). Short-term memory was conceived as limited structural temporary storage for information before it passed to long-term memory or was forgotten (eg, Broadbent 1975). It was replaced by the theory of working memory, which includes processing as well as storage, in order to explain evidence that people differ in functional storage capacity, that is, in the amount of capacity left over for temporary storage once task processing demands have been met – people do not vary much on processing ability (Daneman 1987). Working memory has been shown to be very important in first language and learning to read (Gathercole & Baddeley 1993), but I have not found any experimental studies specifically relating it to second language attainment in a formal context.

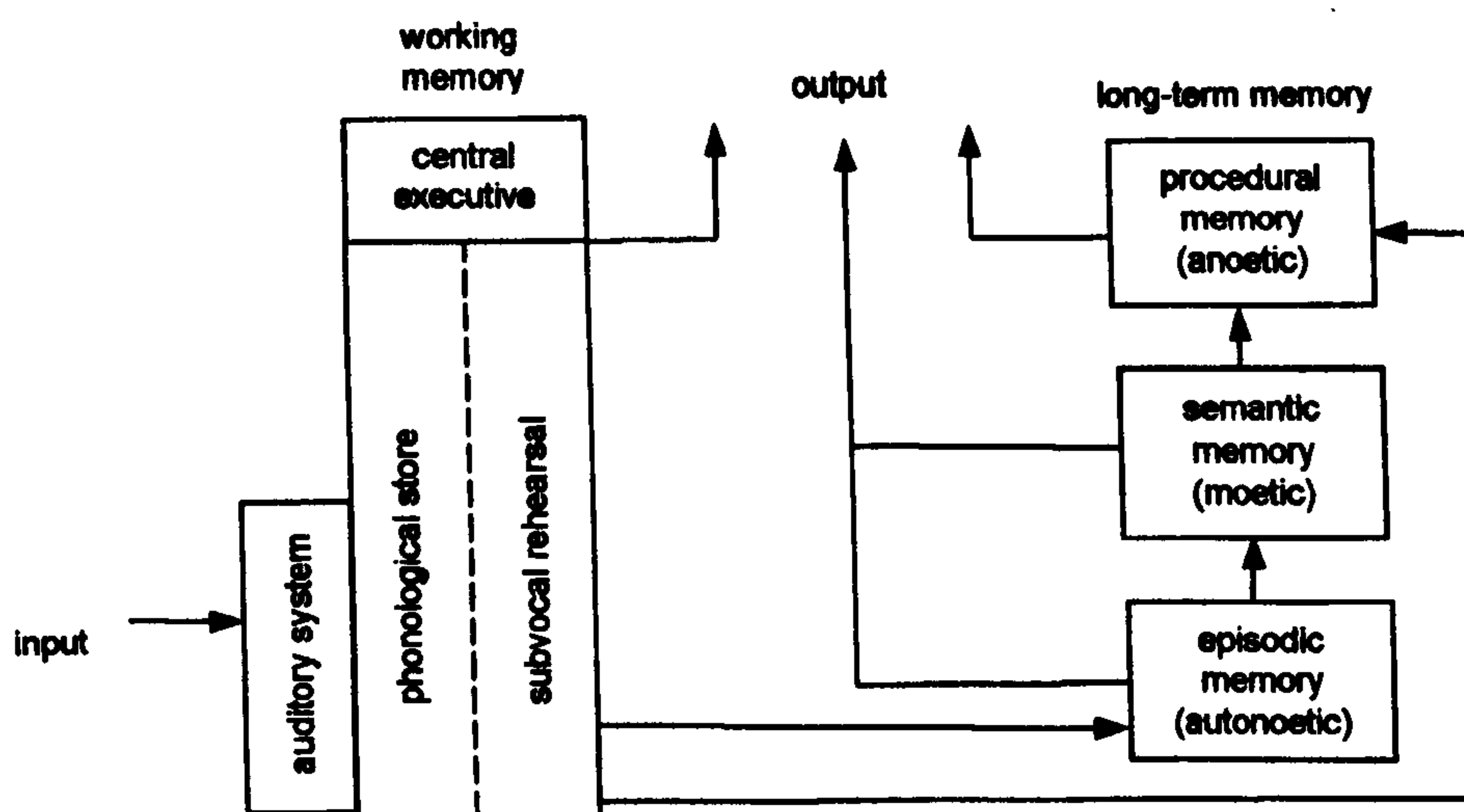


Figure 2.1 *Human memory model (Fabbro 1999: 94, adapted from Darò & Fabbro 1994).*

Fabbro states that working memory can influence memory span for digits, which in turn influences capacities for mental calculation because this requires the calculated items to be stored. For example, Welsh native speakers have been shown to have a greater memory span for digits in English, their second language, than in Welsh, because Welsh digits have more syllables than the equivalent English ones: it should

be noted that the Welsh children were the same as the English on their intellectual capacities (Fabbro 1999: 95). Of these five factors listed above, if we include Carroll's 'Memory Span' under working (short-term) memory, together with 'Free Recall Memory' on the grounds that they may be related, we are left with Associative Memory which seems to fit under Fabbro's semantic memory, a sub-group of explicit memory; and 'Meaningful Memory' may be related to Fabbro's episodic memory. Visual memory, important in learning written language material as well as other visual input, does not appear in Fabbro's diagram (see Figure 2.2).

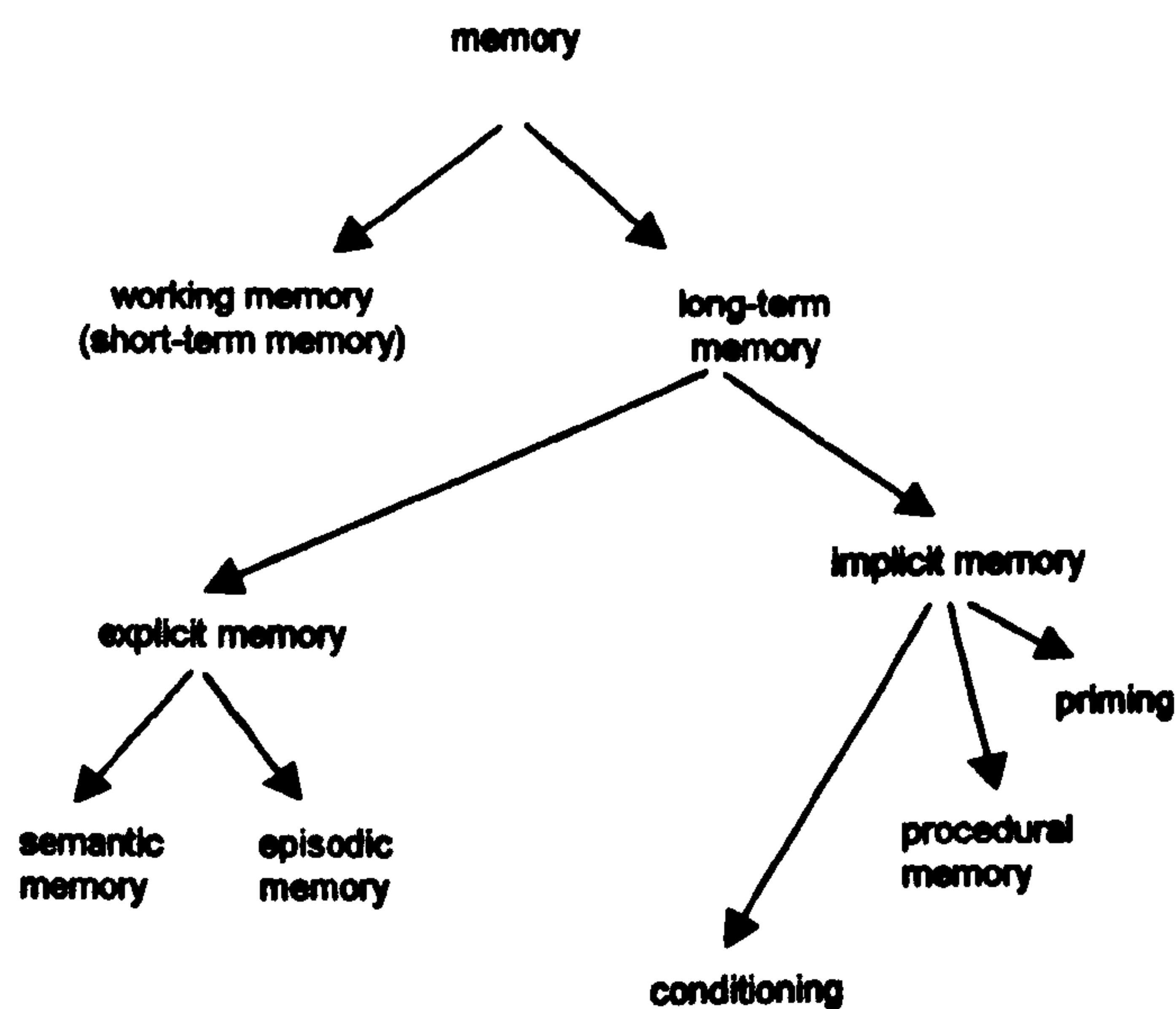


Figure 2.2 *Hierarchical classification of memory components (Fabbro 1999: 97).*

Repeated electric stimulation of a neural circuit causes reduction in its activation threshold which results in 'long-term potentiation', thought to be functionally associated with long-term memory (Fabbro 1999: 90). Evidence from studies on amnesia has shown that long-term memory is probably organised into implicit and explicit (declarative) memory, which are each sub-divided (see Figure 2.2). Within implicit memory: procedural memory concerns an individual's learning of motor and

cognitive procedures; priming concerns “learning acoustic or visual fill-in-the-blanks, lexical decision” and so on (Fabbro 1999: 98), and conditioning concerns association of unrelated events on account of previous experience (eg, Pavlov’s dogs). Within explicit memory, semantic memory stores knowledge, such as grammar rules and the meaning of words, and episodic memory stores conscious recall of an individual’s past experiences (Fabbro 1999: 97).

Fabbro’s diagram outlining neurolinguistic research concerns processes of memory rather than the object of memory learning, such as learning a language, but it is clear that in a neurolinguistic model, both native and foreign vocabulary and grammar may be implicit or explicit, with native grammar being mostly implicit, and foreign grammar entirely dependent on the way in which the individual learned the language, implicitly, explicitly, or both.

Of these different types of memory, associative memory reoccurs more than any other in the research literature, though it is likely that this is because it is the most obvious type of memory to affect language learning rather than the only one. For example, some exceptional language learners have been found to have exceptionally good associative memory for lexical items (together with an interest in grammatical patterns), but are average on their other mental abilities and even on other types of memory. Their lexical memory may be self-trained. For example, an exceptional language learner, CJ, performed at the 91 percentile on vocabulary and pairing digits with symbols, but only at average on the digit span test of memory (Novoa, Fein & Obler 1988), demonstrating that associative memory may be important in language learning, but that there are different types of memory, and memory is often domain-specific. Referring back to the example at the beginning of the section, Steve Faloan’s trained ability eventually enabled him to memorise 80 digits in the digit-span task, but it did not transfer to memory for letters rather than numbers (Chase & Ericsson 1981, 1982). Associative memory for lexical items appears as a sub-test in The Modern Language Aptitude Test (Carroll & Sapon 1959) because Carroll found

that it was highly predictive of language learning attainment, though not as predictive as MLAT4, Grammatical Sensitivity.

In conclusion, the evidence points towards associative memory being trainable, and an important attribute of the individual with regard to language learning, as together with other types of memory, associative memory affects learning outcome. In spite of the fact that memory is highly trainable, memory tests are often included in intelligence tests (see below).

2.2.1.3 Intelligence

Intelligence is a very complex construct: intelligence tests actually test a number of different abilities, only some of which appear to affect language learning, such as tests of verbal ability and tests of memory. Intelligence tests therefore have a much lower predictive power for language learning than tests for foreign language learning aptitude, as aptitude tests have been selected for their high prediction for the particular end-purpose of language learning (Carroll 1981).

If the collection of abilities that aid language learning were the same as general intelligence, then we would expect very able language learners to be very intelligent, but this is demonstrably not the case. For example, Novoa, Fein and Obler (1988) found that CJ, a native English speaker who had learned French, German, Italian, Spanish and Moroccan Arabic to a native-like standard as an adult, had only average IQ when tested on the WAIS-R (he had a Verbal IQ of 105 and a Performance IQ of 110 giving a full-scale IQ of 107), but he was exceptionally good at learning vocabulary, acquiring a new code, and discerning and completing formal patterns. We would also expect language learners' target language ability to relate to their intelligence, but this is not the case either. For example, Masny and d'Anglejan (1985) did *not* find participants' non-verbal intelligence to be associated with their ability to correct ungrammatical target language sentences.

Intelligence and aptitude have been shown to be different collections of abilities in a number of studies (eg, Wesche, Edwards & Wells 1982), even if they overlap with regard to what Cummins (1983) has termed 'cognitive academic language proficiency', i.e. CALP (Genesee 1976; Ekstrand 1977, cited in R. Ellis 1994). Moreover, this overlap occurs precisely because language testing is a component of intelligence tests (along with test-taking strategies) – by testing aptitude we are already testing the overlap, rendering an intelligence test unnecessary. In other words, language aptitude tests already cover the language elements of IQ tests, the only part of IQ tests demonstrably relevant to language learning.

Intelligence and metalinguistic awareness have also been shown to be different abilities. For instance, Saywitz and Wilkinson's (1982) study shows that although IQ, metalinguistic awareness and age appear to increase together, when they analysed the data controlling for IQ, the results showed that the increase of children's metalinguistic awareness with age could not be accounted for by their increase in IQ. In conclusion, therefore, as intelligence is not relevant to this study, it is not assessed.

2.2.1.4 *Language Learning Strategies*

Although much research has been carried out into language learning strategies which shows that their use aids language learning, there is great variability as to what strategies are most effective for each learner. Strategies may include compensatory strategies when speakers cannot express themselves in the target language, such as paraphrase, circumlocution, repetition, hesitation, avoidance, guessing, shifting register or style, switching language, using a relevant native word but rendering it 'foreign' by altering the pronunciation and morphology, and translating a phrase literally (see Savignon 1983; Poulisse & Bongaerts 1994; Poulisse, Bongaerts, & Kellerman 1987; Oxford 1990); learning strategies, such as deliberately seeking out native speakers to talk to, setting aside time at certain points in the day to learn; and motivation strategies, such as self-reward for achieving goals, and planning a visit to the country of the target language. Chamot and O'Malley (1994) group strategies

into cognitive strategies for associating new with prior knowledge, classifying words, terminology and concepts according to their attributes, using inference, and summarising information; metacognitive strategies for planning, monitoring, and evaluating a learning task; and social/affective strategies for co-operation with other learners, questioning for clarification, and using self-talk to reduce anxiety.

Research attempting to identify the strategies used by very able language learners in order to teach them to less able language learners finds that all learners use strategies, but that strategy training has little effect on attainment. What is vital is that strategies are used appropriately and flexibly (Skehan 1998). With regard to multilinguals, it has been found that experienced language learners use few strategies because in the course of learning their languages they have worked out which strategies are effective for them and no longer use those that are not (Naiman, Frohlich, Stern & Todesco 1975). Consequently the strategies multilinguals retain are specialised according to each individual's language experience and requirements, and the number and type of different strategies multilinguals use is not indicative of their language learning attainment (see Cohen & Apeh 1981, but cf. Nayak, Hansen, Krueger & McLaughlin 1990, who use an artificial grammar task). This can be shown by Gardner, Tremblay & Masgoret's (1997) descriptive model of native English speakers with an average 11.37 years learning French (other languages are not mentioned), which shows no significant correlation between the number of strategies used and measured achievement at language learning – in fact there is an insignificant negative correlation. So, not only do experienced language learners use few strategies, but the choice of strategies they persist with varies from learner to learner.

Specialisation makes it very difficult to generalise about multilinguals' language learning strategies as the use of strategies is dependent on the language task, the use intended for the target language, and the culture of those learning (Stevick 1989). Because research into strategies has been inconclusive and may be of limited use in characterising multilinguals based on the evidence above, participants in this study are

not tested on their strategies. However, research is needed into whether multilinguals group into types regarding the sort of strategies they hone as a result of specific languages or language situations they have experienced, and whether the amount and type of exposure multilinguals receive in communicative learning or teaching methodologies they experience affect the strategies they develop, in order to find out how multilinguals' strategy use relates to their language attainment.

2.2.2 Affective Attributes

In addition to language learners' cognitive attributes (their intellectual and verbal abilities and skills), learners' affective attributes, i.e. the emotional and predispositional characteristics that influence perceptions of foreign language learning, the target language, and the target language community, have been found to affect the outcome of language learning (see Skehan 1989; R. Ellis 1994; Gardner & Lambert 1972; Gardner & MacIntyre 1993).

In this section, I will discuss the affective attributes of language motivation, language attitudes, and language anxiety, together with their effect on language learning attainment. No research has been carried out on multilingual learners, so I will discuss the research on bilinguals and attempt to extend this to multilinguals. I will argue that multilinguals' affective attributes are closely related to their language learning experience. The more experience of language learning multilinguals have had, the more they are likely to have positive attitudes to language learning and target language communities, and to be motivated to learn languages, and the less they are likely to be anxious in foreign language social contexts.

2.2.2.1 Language Motivation

Studies on motivation have concluded that it is one of the most influential affective variable for language learning (eg, Gardner & MacIntyre 1992). Learners' success at language learning has been linked to their motivation to learn languages (Gardner, Lalonde & Pierson 1983; Lalonde & Gardner 1985; cf. Au 1988), and so motivation

should be a key characteristic of multilinguals and an important consideration to take into account with regard to multilinguals' language learning attainment.

R. Ellis (1994: 509) lists the following hypotheses for language learning motivation: -

1. **The Intrinsic Hypothesis:** motivation derives from an inherent interest in the learning tasks the learner is asked to perform.
2. **The Resultative Hypothesis:** learners who do well will persevere; those who do not do well will be discouraged and try less hard.
3. **The Internal Cause Hypothesis:** the learner brings to the learning situation a certain quantity of motivation as a given.
4. **The Carrot and Stick Hypothesis:** external influences and incentives will affect the strength of the learner's motivation.

Firstly, the Intrinsic Hypothesis states that learners are motivated by interest and when their 'curiosity is aroused and sustained' (ibid: 515). This interest may arise through communication in the target language (McNamara 1973; Rossier 1975, cited in R. Ellis 1994), and by learners becoming self-directed. As for the Resultative Hypothesis, motivation may be an effect of successful language learning (Strong 1983; Savignon 1972; Hermann 1980, cited in R. Ellis 1994), and also a cause (Gardner 1985; Gardner, Smythe & Brunet 1977; Gardner, Smythe & Clement 1979, cited in R. Ellis 1994), or cause and effect may be interactive.

Many of the early studies on motivation followed research by Gardner and Lambert (1972) who assume there is a motivation specific to language learning. Gardner and his colleagues, who have researched motivation for thirty years, sometimes characterise motivation as being on a par with language attitudes (eg, Gardner, Tremblay & Masgoret 1997), and sometimes as being superordinate, for instance when the following equation is proposed to characterise motivation (Gardner 1985): -

$$\text{Motivation} = \text{Effort} + \text{Desire to Achieve a Goal} + \text{Attitudes}$$

Gardner describes 'Effort' as a mixture of compulsiveness, desire to please teachers and parents, social pressure such as rewards or examinations, a need to achieve, and good study habits. 'Attitudes' is defined as "an evaluative reaction to some referent or attitude object, inferred on the basis of the individual's beliefs or opinions about the referent" (ibid: 9).

Gardner and MacIntyre (1993: 188) have researched whether their motivation test assesses separate factors. They conclude that there may be four major constructs, Integrativeness, Attitudes Toward the Learning Situation, Motivation, and Language Anxiety. "There is also evidence that the variable of Instrumental Orientation could form a fifth higher order construct" (loc. cit.). The battery that they have used as a basis to their work is a questionnaire which asks participants to respond to a set of randomised questions based on the following component parts (Skehan 1989: 55): -

1. *Attitudes to French-speaking Canadians*
2. *Attitudes to European French people*
3. *Interest in foreign languages*
4. *Integrative orientation*
5. *Motivational intensity*
6. *Desire to learn French*
7. *Attitudes towards learning French*
8. *French teaching – evaluative*
9. *French course – evaluative*
10. *Instrumental orientation*
11. *French class anxiety*

Gardner's studies show that the Index is a significant and consistent correlate of grades as it has a median correlation of 0.37 (i.e. about 14%). This is fairly high considering the number of variables involved in language learning and others' lack of success in finding consistent correlates apart from aptitude for foreign language learning.

A considerable amount of research by other researchers apart from Gardner has been carried out into the theory behind motivation, but much of it lacks empirical support

mainly because the work has yet to be done. In fact, other approaches to assessing motivation, drawing more from education and psychology, have criticised Gardner's work, but have not yet moved much beyond the theoretical stage (eg, Au 1988; Crookes & Schmidt 1991; Oxford & Shearin 1994; Dornyei 1994a, 1994b; and Kalaja & Leppänen's (1998) discursive social psychology of L2 language learning).

To summarise what is known about motivation, highly motivated individuals want to learn the language, work hard at it and find language learning rewarding (Gardner 1990). If these characteristics are related to multilinguals, they are likely to have a very positive attitude to language learning, a strong desire to achieve success in it, and to be prepared to put effort into achieving that success on account of their previous experience. These characteristics would be likely to lead to greater language learning attainment than individuals with less motivation.

2.2.2.2 Language Attitudes

Gardner and Lambert (1972) propose that attitudes divide into integrative and instrumental orientations. They describe attitudes as integrative if the learners want to understand the culture of the people who speak a language, participate in it, and would like to resemble the native-speakers (see 3. *the Internal Cause Hypothesis*). They describe attitudes as instrumental if the learners are motivated because they may gain some benefit from learning a language (see 4. *the Carrot and Stick Hypothesis*). This could be, for example, if they know they will be promoted at work, or be able to read technical literature in the target language. Gardner and Lambert hypothesised that integrative orientation would lead to greater success in language learning than instrumental orientation because the language becomes part of learners' personality. Not all studies carried out support this (Skehan 1989: 54). Of course, the same learners can have both an integrative and instrumental orientation: in a study on American students learning Spanish by Muchnick and Wolfe (1982, cited in R. Ellis 1994) both orientations loaded on the same factor, perhaps showing that it is impossible to separate them.

Attitudes to the target language community can have a significant effect on language learning attainment. For example, Benson (1999) asked 54 native-English multilinguals (British) who also knew Spanish and Portuguese which of the three nationalities contained people who came closest to their ideal, in order to ascertain whether preference for a particular nationality had any significant effect on the amount of crosslinguistic transfer taking place. She then tested them on their Portuguese clitic pronouns. In English, pronouns come after the verb (I see you), but in Spanish they come before (Te veo), and in Portuguese they can be either: they come after the verb in simple declaratives (Vejo-te) and polar interrogatives, and before the verb in other interrogatives, negatives, and embedded clauses.

While the Spanish-oriented and Portuguese-oriented groups' scores were more homogeneous, the British-oriented group "scored significantly higher on those sets of items where English knowledge would help them (i.e. in accepting correct English-like post-verbal clitics; and in rejecting incorrect Spanish-like preverbal clitics) than on those items where Spanish would help (i.e. where the correct response would be rejection of incorrect English-like post-verbal clitics, and acceptance of correct Spanish-like pre-verbal clitics)" (Benson 1999: 213). The result suggests that learners' preference for people from their own nationality can relate to their acceptance of a syntactic structure present in their own language in another language, regardless of whether the structure is correct in the target language. Learners' attitudes to the target language community *can* affect their target language attainment.

2.2.2.3 Language Anxiety

Two causes of anxiety are often reported among language learners: anxiety speaking and listening in real-life situations, when learners may experience loss of communicative ability; and anxiety in the language classroom, when other learners appear to be more advanced (Horwitz & Young 1991).

Researchers have compared monolinguals learning a second language with bilinguals learning a third and found that bilinguals are less anxious in foreign language situations and in the classroom. Bilinguals' experience of language learning may help them acquire coping strategies, and they may become more confident about learning and managing real-life situations. I have found no study that compares language anxiety in multilinguals with less experienced learners, but multilinguals' extensive language learning experience may enable them to cope better and so to feel less anxiety than bilinguals in foreign language situations and in the classroom.

2.2.3 Experiential Attributes

I propose that individual differences in the amount and type of experience multilinguals have had in learning languages continually affect their cognitive, affective, and social attributes, their learning processes, and their language knowledge with the effect that they become progressively better at language learning (see Section 2.1.4, *Epigenesis*).

I propose that the development in multilinguals' ability to learn languages is because multilingualism is not just an experiential attribute but a qualitative change in learners' overall language system. In other words, proficiency in a number of languages enables multilinguals not only to communicate with other speech communities or access literature, but affects their attitudes to those language communities, promotes knowledge of other cultures and social contexts, and enhances the development of their cognitive abilities. Multilinguals also become better at learning languages the more experience they have had at learning because they learn to learn (see *The Practice Hypothesis*, Section 2.1.3). Limited support for the proposal that language experience affects the outcome of language learning comes from research on bilingualism (see Section 3.2).

In this study, three experiential attributes are under investigation – multilingualism (as Number of Languages), multiliteracy (as Number of Literacies), and studying languages (as Number of Languages Studied) – for their relationship with language learning attainment (i.e. an assessment of language learning ability) and metalinguistic awareness. Written material should be an important source of input for educated adult multilinguals that they should find easy to learn through their highly developed visual memories. Written input also provides a medium for analysing grammatical form, therefore the process of becoming literate in another orthography should encourage multilinguals to focus on grammatical form (see Sections 3.1.2 and 4.2.2). Learning languages at least partly in a formal learning environment, such as the classroom or autonomous learning situations, should also assist multilinguals to learn languages because again, they may be encouraged to focus on grammatical form, and perhaps learn rules, as well as develop communicative competence (see Hymes 1971). Learning grammar has been shown to speed the process of language learning (Krashen, Jones, Zelinski & Usprich 1978) especially when combined with natural exposure (Savignon 1972; Spada 1986).

2.3.4 Conclusions of Individual Differences in Language Learning

Interaction between multilinguals' attributes, learning processes, and language knowledge throughout their lives results in individual differences in language learning. Multilinguals should systematically differ in their ability to learn additional languages if they systematically differ in their cognitive, affective, and experiential attributes. Multilinguals' language learning experiences appear to be crucial to their language learning ability, but the inference requires empirical investigation.

Therefore, in light of the evidence above regarding the effects of certain attributes on language learning, the individual differences in learners' attributes which will be investigated in this study are: metalinguistic awareness and memory (cognitive);

language motivation, attitudes, and anxiety (affective); and multilingualism, multiliteracy, and language learning in a formal environment (experiential). Although metalinguistic awareness is a cognitive attribute, it is not usually included in discussions of learners' individual differences. As it is the principal attribute under investigation in this thesis, I have devoted a chapter to it, Chapter 4, where I put forward evidence for metalinguistic awareness being another important source of individual difference in language learning.

2.3 Conclusions of the Chapter

I have argued that multilinguals' languages are interdependent so that development in one may lead to reanalysis of others, depending on the social circumstances in which they are learned. Multilinguals' languages do not remain stable within the system of languages: when a language is used it develops, and when a language is not used for a period of time, the language attrites as other languages more in use continue to develop. Maintaining a number of languages outside the target language environment requires a considerable amount of effort.

I have argued that educated adult multilinguals should be better at using their explicit than their implicit metalinguistic awareness because they are trained in using explicit learning processes through their education and because they may also have studied languages.

I have proposed a 'Practice Hypothesis', that the more languages multilinguals have learned, the better they become at learning others. They not only develop proficiency in their target language/s, but through their language experience they learn to learn languages. Their experiences continually interact with their heritable characteristics over time and so their ability to learn increases. In other words, the more cognitive demands they make on themselves to learn languages, the better they become at coping with these demands. The Practice Hypothesis also relates to their

development of metalinguistic awareness: the more experience multilinguals gain in focusing on grammatical form in different languages, the better they are able to focus on form in other target languages.

Individual differences in language learning resulting from multilinguals' differing cognitive, affective, and experiential attributes should also affect their ability to learn languages, and consequently their language learning attainment. For example, the more languages multilinguals are able to read, the more quickly they should be able to learn to be literate in another language.

Chapter 3: Multilingualism

In this chapter I discuss the evidence that multilinguals' languages are interdependent, so that they may partially share functions, and development in one language affects the others qualitatively as learners implicitly and explicitly reanalyse their languages in terms of each other. I also discuss the evidence that multilinguals' languages are constantly in a state of flux according to the extent they are used and in what domains. I present evidence from psycholinguistic, neurolinguistic, and literacy research, and discuss the way in which various researchers' psycholinguistic models characterise development and interdependency in multilinguals' languages. Literacy is not only another domain but another modality in language learning – being either visual or tactual as opposed to auditory – and is an integral part of language development and interdependent relations between languages in multiliterate multilinguals.

From this information, I draw together evidence that the experience of learning languages and their literacies assists multilinguals in learning other languages. We have seen that multilinguals differ with regard to their language learning experience (Section 2.2.3) – from the available evidence, I argue that the more experience multilinguals have gained, the faster they are able to learn another language. In other words, practising a number of languages not only leads to increased proficiency in those specific languages, but also leads to an increase in multilinguals' rate of learning in other languages. Specifically, I argue that the more languages multilinguals are able to read, and the more formal language learning experience multilinguals have gained, the faster they are able to learn another language, because learning to read and write and learning grammatical rules places cognitive demands on learners. Cognitive and affective variables such as language learning memory and motivation,

crosslinguistic influence, and transfer of knowledge are also likely to play a part in multilinguals' increased rate of learning.

It should be noted, however, that multiliteracy is not necessarily a consequence of multiple language learning: some learn a language without its literacy, and some learn a literacy without learning any communicative skills in a language, eg, when they learn Latin or Sanskrit in a classroom environment. Nor is literacy necessarily a consequence of learning a language in the classroom, as a language may be taught without recourse to writing, eg, Mandarin taught for communicative purposes alone.

The scarce evidence from the psycholinguistic and second language acquisition literature on multilingualism reflects the fact that most of the literature on multilingualism is sociolinguistic or ethnographic in nature (see Section 3.1.1) and that relatively little has been published so far on psycholinguistic and neurolinguistic aspects of multilingualism. The chapter finishes with a discussion of the few empirical studies that have been carried out that compare multilinguals' language learning abilities with other learners, which support the anecdotal evidence that multiliterate multilinguals find it easier to learn languages the more languages they know.

3.1 Research into Multilingualism

Multilingualism is an unremarkable necessity for many people throughout the world and yet in the West, because a majority are monolingual in powerful 'languages of wider communication' such as English, Spanish and French, many consider monolingualism to be the norm and multilingualism to be an aberration (Pattanayak 1986). But multilinguals may be considered normal: 60% of the world's population has been estimated to be multilingual (Edwards 1994). As Edwards (*ibid*: 1) points out, 'there exist something like 5,000 languages in about 200 countries, a fact which itself argues for the prevalence of multilingualism', but 'only a quarter of all states

recognize more than one language'. On an individual basis, people tend to learn the languages they need to get by, for instance: -

A Bombay spice merchant has, as his maternal variety, a Kathiawari dialect of Gujarati, but at work he most often uses Kacchi. In the marketplace he speaks Marathi and, at the railway station, Hindustani. On internal air flights English is used, and he may watch English-language films at the cinema. He reads a Gujarati newspaper written in a dialect more standard than his own. (Edwards 1994: 2)

This example demonstrates that people learn the languages that are relevant to their lives and do not tend to learn more of a language than is necessary (see also Dalgalian 2000: 21-22). They may use particular languages in specific domains, such as their domestic or working environments, and find it hard to use a language outside its usual domain, which means that they do not have equal proficiency in all their languages. In addition, multilinguals may be literate in one or more of their languages, depending on their educational and personal circumstances, access to written materials, and how similar or dissimilar the orthographies or scripts are. For this reason, in this thesis 'multilingualism' is defined as the use of three or more languages by individuals and does not necessarily mean that they have equal proficiency in all the languages they know, nor that they necessarily have any degree of written competence in one or any language (see Section 1.4.1, *A definition of multilingualism*).

3.1.1 Previous Research into Multilingualism

Research into multilingualism only began in any detail in the last forty years and has mainly been sociolinguistic in nature. Although there have been substantial amounts of research into the sociolinguistics of bilingualism, and considerable research into psycholinguistic aspects of bilingualism, little has been carried out on individuals or communities using more than two languages (see for example Baetens Beardsmore 1991; Grosjean 1982; Hagege 1996; cf. Hoffmann 1985). But interest has been spreading to multilingualism over the last ten years, particularly in sociolinguistics and

in codeswitching – research in these areas is outlined below to show recent areas of interest, to emphasise how vibrant research in these areas is compared with psycholinguistic research into multilingualism, and to point out potential new lines for psycholinguistic enquiry.

Sociolinguistic research has included research into areas as diverse as attitudes to multilingualism, eg, in the Philippines (Hidalgo 1998), and the Netherlands (de Bot & Weltens 1997); language spread and decline, eg, Phillipson & Skutnabb-Kangas (1996); language contact, eg, Nelde (1992), Sidibe & Aniwali (1998) writing on Niger; and language contact between dialects, eg, between New High German and Swiss-German (Rash 1998).

Ethnicity, nationalism and language rights are another fertile area of research, for example, in Africa (Mansour 1993; Reagan 1998), and multilingualism has become highly politicised in countries where the state has tried to repress indigenous and immigrant languages in order to forge a more homogeneous national identity. The politics of multilingualism work on all social levels and have an enormous effect on people's day-to-day lives, whether they are portrayed by researchers as being on a community level (eg, Hsiau 1997 on ethnic language politics in Taiwan), or national level (eg, Ozolins 1994 on language politics in the Baltic States). Little psycholinguistic research has been carried out on the effects on multilinguals of managing their different identities and languages in different social circumstances.

Multilingual education is also a political and economic issue that gives rise to very different opinions on the best way to educate the young for their future lives. Education is a fundamental way of teaching literacy in an individual's languages and of supporting multiple languages (Pattanayak 1981; Skutnabb-Kangas & Garcia 1995; Bridges 1995; Lo Bianco 2000). Lack of access to literacy learning in formal teaching environments such as home, school, university, and community centres can mean that individuals lose a medium of communication with their other speech-

communities and are excluded from literacy activities, such as letter or email writing, and these communities' written literature (Kreindler *et al.* 1995). There is plenty of scope for psycholinguistic research into multilingual education.

Research into language education is closely linked to language planning and language policy studies (eg, Ould-Abdallah 1992; Skutnabb-Kangas 1996; Martinet 1994; Haugen 1987). There have been a number of studies on language planning in particular countries: Algeria (Morsly 1996), the CIS (Kreindler 1997), Estonia (Rannut & Rannut 1995), Israel (Spolsky 1997), Southern Africa (Peirce & Ridge 1997), the USA (McKay 1997), and Vanuatu (Early 1999). Language choice also has direct consequences for language education, eg, in the European Union (Truchot 1996; Quell 1998; Fontenelle 1999), and in Asia (Pakir 1993). These studies are immensely varied in their fields of study and show huge potential for further research.

Code-switching has practically become a discipline of its own, and research on individuals switching between two languages in their communities is extending to research on switching between three and more languages (eg, Green 1986; Domingue 1990; Merritt, Cleghorn, Abagi & Bunyi 1992; Myers-Scotton 1992, 1993). This is a vastly more complicated task as the options for switching increase dramatically: in binary switching, i.e. between two languages, there are only two directions, but with four languages, for example, there are twelve directions into which a speaker can change, each language having its own domain of use in the individual's life and social situation.

Two languages	x 1	=	2 directions for switching
Three languages	x 2	=	6 directions for switching
Four languages	x 3	=	12 directions for switching
Five languages	x 4	=	20 directions for switching
...			

Turning to country studies on language use, most of the research has been carried out on countries with census material available for public information, eg, Australia (Clyne 1982, 1997), Ghana (Boahene-Agbo 1985), the British Isles (Alladina & Edwards 1991a, 1991b), Scotland (MacKinnon 1995), and England (Rampton, Harris & Leung 1997). Evaluations of the usefulness of multilingualism (Fishman 1985) and of the economic benefits to a country of widespread multilingualism (Grin & Vaillancourt 1997) show that multilingualism can be beneficial to nation-states, as well as to the cultures of individual speech communities.

Multilingual research has also been carried out into individual countries' literature to show how different cultures interact, eg, Moroccan literature (Wegimont 1992), and the USA (Sollors 1998; Chametzky 1998). In the area of stylistics, the effect of writers' individual multilingualism on their written works has been explored, eg, in Milton (Hale 1997), Victor Hugo (Losada-Goya 1995), Joseph Conrad (Pousada 1994), and a trilingual poem attributed to Dante (Brugnolo 1983).

To sum up, until recently, most multilingual research has been sociolinguistic. A notable exception to this is Vildomec's "Multilingualism" (1963), the sole book in the early literature on psycholinguistics and multilingualism, which anticipates many of the themes which are now beginning to be researched empirically, such as how we learn languages, how multiple languages are processed, how an individual's languages relate to one another, and whether they interact.

3.1.2 Effects of Literacy, Biliteracy, Multiliteracy

Developing some literacy skills in the languages they acquire or learn is a part of becoming multilingual for most people in Western Europe, particularly for those who undertake higher education. Of course, literacy in each of a multilingual's languages depends on the individual's requirements and the domain they use it for, eg, a native Spanish speaker in Spain conducting business in English whose husband is French will

have a very different literacy profile from a native speaker of German and Polish working in Greece for twenty years. Literacy use is likely to entail some of the following: being able to understand written information when watching television, read shop and road signs, read magazines and newspapers, take notes and messages, use a computer and write email, and undertake class-based education.

Unsurprisingly, becoming biliterate requires more cognitive effort than monoliteracy. This is shown by Francis's (2000) study of Náhuatl children who had been schooled in Spanish and were able to read and write in Spanish, but had not used literacy to represent their own native language before the study. The younger children in particular found it hard to complete the written tasks in Náhuatl, and some even switched to Spanish as they preferred to use the skills in which they had already achieved automaticity. Children performing a literacy task in their native language when schooling has only taken place in a second language find it difficult because it conflicts with their expectations regarding language choice in the classroom; because they are not familiar with the orthographic conventions; and because they experience temporary loss of automaticity of processing as they lack the ability to recognise words at sight and must decode them phonologically. In writing they experience information overload (Francis 2000).

Multiliteracy, whether in languages which use the same script or different scripts, entails familiarity with different combinations of letters or syllables (which represent different sounds) or of characters (which represent different semantic-phonemes), and knowledge of different grammatical patterns. Multiliteracy requires even more cognitive effort than biliteracy, as the permutations of lexicons, grammars, phonologies, orthographies and scripts, and how to keep them apart when appropriate, increases. Multiliteracy is vitally important in the study of multilingualism because writing makes linguistic structure visible to the eye. People who are literate in many languages have had the experience of seeing language and thinking about it in a visual rather than an oral and aural way. As Coulmas (1989:

272) points out, "Writing systems are semiotic systems which have properties not found in speech". Written language is spatial, not temporal: written language has different functions from spoken language, even if both are communicative, because writing overcomes the temporal limitations of the spoken word.

In addition, using different scripts may require more effort on the part of the reader, not only because they have had to expend more effort in learning them initially, but also in storing and retrieving them (memory) and in developing automaticity in using them. Different scripts may require a different approach or way of thinking on behalf of the reader-writer and therefore make different cognitive demands. For example, in Korean, a language that uses two scripts depending on the origin of the word, it has been found that Korean participants are better at remembering words presented in Chinese script than words presented in Han'gul, suggesting that the two scripts, one logographic, the other syllabic, are processed differently (Park & Arbuckle 1977; Park & Vaid 1995).

Not only is a language analysed through its script and remembered through it, literacy is a part of a speech community's culture and "going from one literacy to another, like going from orality to literacy, is not merely a technological step, but a major break in the pattern of learning and cognition" (Coulmas 1989: 135 on Becker 1983). This results in multiliteracy having an immense effect not just on language learning, but also on the development of metalinguistic awareness (see Section 4.2.2).

3.1.3 Neurolinguistic Research into Multilingualism

Neurolinguistic research into multilinguals' language learning abilities has investigated the effect of literacy on the way that language is processed by the brain. Language is represented not only through acoustic components but also through motor, kinaesthetic, and visual components which individuals use to differing extents. Formal education results in learners using inner visualisation (mental imagining) of

words and sentences to a greater extent (Fabbro 1999: 121), particularly with regard to classical languages, such as Latin and Ancient Greek, when they are learned in a traditional way through the written medium. Because literacy affects the way that language is processed, different parts, or rather different functions, of the brain are used. This is demonstrated by aphasics who sometimes only regain languages that they could read and write in but never learned to speak, showing that literacy, or more particularly, visual memory of language, results in different language processes from those used in communicative language learning (Hinshelwood 1902/1983; Pötzl 1925; Gelb 1937/1983; Halpern 1941). The following example from Pötzl's (1925) work is one of many such cases.

The patient was a professor who knew many modern languages (German, French, Italian, and English) and had long studied Latin and classical Greek. Following a stroke he became aphasic. During the recovery phase he was able to express himself only in Latin and classical Greek, and he seemed to have lost the capacity to speak modern languages. Pötzl suggested that this phenomenon was due to the fact that only these two languages had been acquired through reading and they were thus organized in the patient's brain according to peculiar modalities... Apparently, aphasia had inhibited all modern languages acquired by the patient through acoustic-verbal strategies, but had spared the languages learnt by writing modalities (Fabbro 1999: 129).

In addition, different orthographic systems may be represented separately in the brain. Some Japanese participants suffering aphasia after trauma are able to read Kanji (logographic characters from Chinese) but not Kana (syllabic characters), and some can read Kana but not Kanji, when both are normally used in reading Japanese (Paradis, Hagiwara, & Hildebrandt 1985). Differential effects have also been noted in normal, non-aphasic native speakers of Korean, which uses a very regular syllabic script together with Chinese characters for Chinese loan words (Park & Vaid 1995). Differential effects seem likely to affect multilinguals who know more than one script, and suggest that being proficient in both spoken and written modalities in several

languages is likely to require more cognitive effort than either literacy or oral/aural proficiency alone.

Multiliteracy, where the brain processes different languages with different orthographic conventions, is cognitively demanding, particularly when both different letter combinations and different scripts are used. Automatisation of processing, i.e. learning and subsequent use of a particular literacy, requires considerable time and practice, and switching between literacies requires inhibition of the individual's other languages and activation of the relevant language together with its literacy. Managing a number of languages and their literacies places considerable cognitive demands on a multilingual, and this area has given rise to research into the following questions. How is it possible for one person to know more than one language? Are multilinguals' languages organised in the same or different areas of the brain? How do different languages relate to one another? How do their relationships affect the processing of so many different languages?

We know that people are indeed able to speak more than one language, dialect, and register, and logically, this can only be possible if the brain processes for each language are not identical (Paradis 1985; Grosjean 1989). Much neurolinguistic research has concentrated on discovering where language processes are organised in the brain and how different languages are organised differentially. Fabbro (1999: 207-209, referring to Paradis 1985, 1993, 1996, and to Paradis & Lebrun 1983) outlines the different hypotheses that have been proposed. These are that multilinguals' languages are organised:

1. in the same cerebral areas (Freud 1891; Pitres 1895/1983; Minkowski 1927/1983)
2. in separate areas of the brain (Scoresby-Jackson 1867)
3. in specialised neuro-anatomical centres (Pötzl 1925; 1930)
4. in the same cortical areas but in distinct neural circuits (Minkowski 1927/1983)
5. partly in common areas and partly in specific and separate areas of the brain.

Evidence from a number of different strands of neurolinguistic research come together to support this last hypothesis, that multilinguals' languages are organised partly in common areas and partly in specific and separate areas of the brain. However, even if different languages are partly organised in the same cortical areas, they may be organised in distinct neural circuits (Fabbro 1999), therefore we must distinguish between evidence for localisation and evidence for association. Localisation refers here to evidence that functions physically occur in the same cortical areas, so that trauma to one locale may affect processing and output in one or more languages either because a part of the system is affected or because several systems are affected. Association refers to evidence that there is a connection between language functions such that there appears to be a common link. Evidence that multilinguals' languages are organised partly in common areas *and* are partly associated would give partial support to the argument that languages are interdependent and interrelated, as development in one language would be shown to affect development in those already learned and those learned subsequently.

Firstly, the evidence for multilinguals' languages being associated is that after trauma many multilinguals recover their languages together: this occurs in 40% of published cases of aphasia (Paradis 1977; Fabbro 1999). Also:

It has been proven that generally the benefits of rehabilitation in one language tend to extend to the untreated languages (Fredman 1976; Junqué, Vendrell, Vendrell-Brucet & Tobeña 1989). This "mass effect" does not seem to be due to the degree of structural similarity between languages, as it is effective in both structurally similar and structurally different languages (Fabbro, De Luca & Vorano 1996). (Fabbro 1999: 186-187).

However, aphasia may affect multilinguals' languages in different ways, and aphasics do not normally exhibit exactly parallel language recovery (Fabbro 1999: 114): this may be a result of trauma influencing functional relations between languages.

The evidence in support of different languages' processes being disassociated is, firstly, that it is fairly normal for aphasia to affect only one of the languages known by the patient (Fabbro 1999: 114). Usually aphasics recover the language most familiar to them (Pitres 1895), which according to Ribot is usually their native language (Pitres 1895, cited in Fabbro 1999: 114), but aphasics sometimes regain their formally learned language/s rather than their native language/s (Kainz 1960/1983, cited in Fabbro 1999: 125) at great inconvenience to themselves and their families. This can occur with the loss of the speaker's native 'dialect' and paradoxical recovery of the standard language (i.e. taught at school), showing that these are represented separately in the brain. On the whole, this disassociation indicates that their trauma has affected their implicit and automatic processes but left their explicit and more conscious processes less affected, as native language acquisition is based on implicit processes to a greater extent than second languages (Skehan 1998; see also Klein, Milner, Zatorre, Evans & Meyer 1994; Klein, Zatorre, Milner, Meyer & Evans 1995). Disassociation is also supported by evidence from aphasics who only regain languages that they could previously read and write in but never learned to speak.

Secondly, there is evidence for language processes being *localised* in specific areas of the brain from functional magnetic resonance imaging (fMRI), which records haemodynamic changes and blood oxygenation, does not use radioactive compounds, and has much better spatial and time resolution than positron emission tomography (PET), which was often used in the past, but which uses radioactive glucose or oxygen that are then used by the brain as sources of energy while performing a task. Kim, Relkin, Lee and Hirsch (1997) found that early bilinguals' native and second languages tend to be represented in common frontal cortical areas (Broca's area), whereas late bilinguals' second languages are spatially separated from their native languages within Broca's area: however, both early and late bilinguals demonstrate little or no separation of activity in temporal-lobe language-sensitive regions (Wernicke's area). Whereas Kim, Relkin, Lee and Hirsch (*loc. cit.*) assessed participants while they performed a global language task and silently described what

had happened the previous day, Näätänen *et al.* (1997) used electroencephalographic techniques (EEG) to compare a group of Finnish participants with a group of Estonian participants on their ability to categorise phoneme stimuli. Finnish and Estonian are closely related languages that share the same vowel system except for a vowel that occurs in Estonian but not Finnish. In both Finnish and Estonian participants, the brain's automatic change-detection response was enhanced in the auditory cortex of the left hemisphere when a vowel occurring in their native language was used as the stimulus relative to when an unfamiliar vowel was used: there was no enhancement in the Finnish participants' change-detection response when the vowel unique to Estonian was used. Both experiments demonstrate that under specific circumstances localisation of language processes can take place in separate areas of the brain.

The evidence supporting multilinguals' different languages' processes being both associated and disassociated comes from cases of alternating antagonism (when aphasics are able to speak only one language, but the language they are able to speak can change at any given time, and they may be able to understand their other languages even if they cannot speak them, see Nilipour & Ashayeri 1989), and paradoxical translation (when aphasics can translate into their second language/s better than into their first language, which is the opposite case from normal).

Evidence of localisation both in common and in specific and separate areas of the brain comes from clinical and experimental data from differential aphasia, where trauma affects the languages differently, for example, Wernicke's aphasia may affect the native language and Broca's aphasia a L2. There is also evidence from studies of electrical stimulation of the cortex. In these studies, the patient names an object while the exposed cortex is electrically stimulated under surgical conditions. In the few multilingual aphasic cases that have been investigated, some cortical sites inhibit both languages and some only one, demonstrating that there are centres common to the languages known by the patients, and sites where one language is active but others are

inhibited. This is further evidence that different languages may be represented by different but overlapping cerebral regions (Ojemann & Whitaker 1978; Rapport, Tan & Whitaker 1983; Zatorre 1989).

The studies outlined above give partial support for the argument that multilinguals' languages are interdependent and interrelated as they demonstrate that languages may be partly associated and partly disassociated, and localised partly in common areas and partly in specific and separate areas of the brain. One of the potential consequences of a multilingual's languages being interdependent is that development in one language may affect development in those already learned and those learned subsequently.

To sum up, it is possible for one person to know more than one language because the brain has an immense capacity, and because different languages, dialects, and registers do not use exactly the same brain processes in an identical way although some may be used in common. With regard to whether multilinguals' languages are associated, and to whether they are localised in the same or different areas of the brain, the research from various different methods shows that different languages may be partly associated and partly disassociated. Multiliteracy, often a consequence of formal language learning, enhances multilinguals' visualisation and can result in multilinguals' languages being processed differentially: different scripts used within the same language may also be processed differentially.

The study of how the brain processes language is in its infancy (not far behind how the *mind* processes language), but as technology advances and the research possibilities widen, it should be possible to learn much more about how language is processed in the brain, and perhaps, with new techniques in the future, not only how language is *represented* in the brain, but how representations of *multiple* languages develop and interact over time.

3.1.4 Psycholinguistic Models for Multilingualism

We turn now to psycholinguistic research into multilingualism. Much psycholinguistic research is now theory-led and confirmatory, having developed out of the research-then-theory exploratory research at the beginning of the discipline. But there is a dearth of theory available for research into multilingualism, and this extends to few psycholinguistic models being put forward on which to base further research. Even if some researchers argue that multilingualism should be seen as the norm in language acquisition as a larger proportion of the world's population is multilingual than monolingual, the task of putting together a model appears to be too daunting. Models of multilingualism are useful as a demonstration of the current state of knowledge and as a basis for further research, as Meara (1989: 12, cited in de Bot 1992: 2) indicates, "Using a model as a starting point makes clear what problems we are addressing, what problems we are ignoring, and forces us to make explicit some of our central assumptions". As multilingualism is the norm across most of the world's population, the standard model for language processing should be multilingual, with the option of having bilingual or monolingual alternatives (Williams & Hammarberg 1998). However, few studies model multilingualism from a psycholinguistic perspective. There is indeed a vast corpus of psycholinguistic research on bilingualism, for example, into the mental lexicon, phonology, codeswitching, how language is stored, and models of language acquisition on which to base further bilingual research, but very little has been carried out into multilingualism. This may be because it is more complicated to find participants, design experiments, collect data, process large amounts of data, process the results, and draw any definite conclusion from the research when the increase in languages results in so many variables; and these complications result in little research being done.

It is not only the experimental considerations that are difficult: participant-based factors also complicate psycholinguistic research. For instance, different types of language learner may instantiate internal representations of their languages in different ways. Weinreich (1953) proposes a model that has been very influential and a focus

for bilingual research for many years (see Figure 3.1). He suggests a distinction between co-ordinate, sub-coordinate, and compound bilingualism: languages learned successively may have different conceptual systems (co-ordinate), or be translated one through the other (sub-coordinate), whereas a bilingual learning two or more languages concurrently may develop a joined neurological representation and use the same conceptual system (compound) (see de Groot 1993). The representation of a bilingual's languages may also be partly of one type and partly of another. When this is extended to the organisation of a multilingual's languages, it seems probable that there is mixed structural representation both across and within languages.

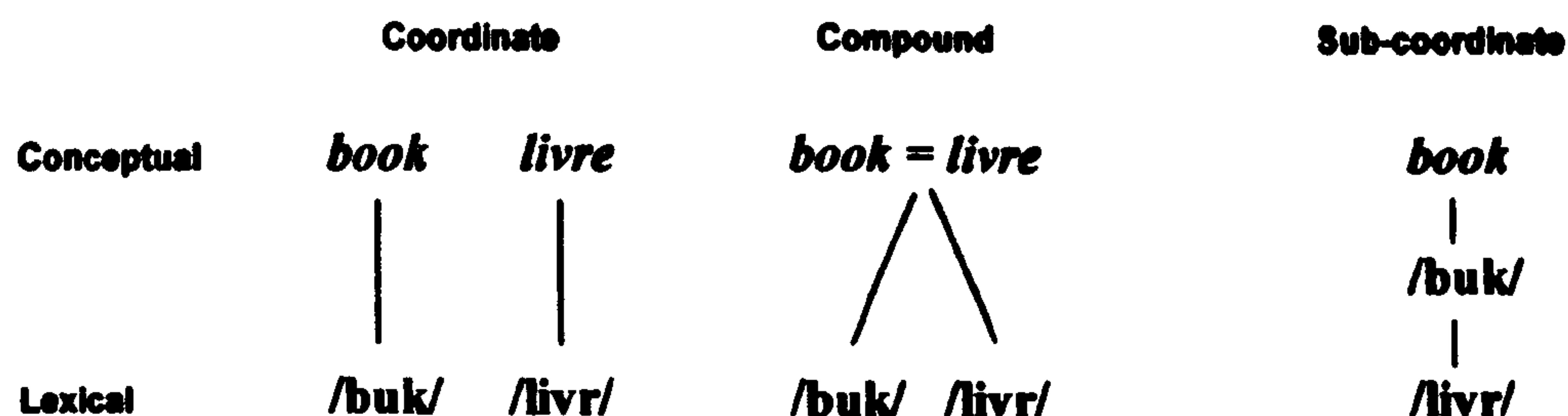


Figure 3.1 *Weinreich's model (Romaine 1989: 79).*

Multilingual language learners, then, may have structures internalised in a different way according to whether they are bilingual or multilingual from a very young age, the age at which they started L2 learning, how many languages they have competence in (at whatever level), how these are typologically related to one another, and in what way they have been learned. A very complex model is required to describe a multilingual even with five languages with the varying relationships, interactive or otherwise, between lexicon, grammar, phonology, semantics, and other features, such as those connected with literacy. These complications mean that bilingual models require much adaptation to have explanatory power for multilingual research.

What we are looking for in a psycholinguistic model of multilingualism, is the capacity to characterise an individual's development of proficiency in various languages over time, interdependence between these languages, differences in an individual's proficiency between languages, multiliteracy and language learning in a formal environment and their effects on language learning, learner variability in attributes that affect proficiency and individual differences in ability to learn languages, taking account of the neurolinguistic, empirical, and observational evidence currently available. If the model does not include all these features, it should, at least, not exclude them.

A good model of multilingualism should also be able to cope with the demands required by de Bot (1992) for a bilingual model: that each language system should be usable separately, or mixed, in order to account for multilinguals' ability to code-switch; that the functioning of the model should take account of crosslinguistic influence; that the production system should not decelerate however many languages a multilingual knows; that differences in multilinguals' proficiency in different languages (or language domains) should be taken account of; and that the model should be able to deal with typological differences between a multilingual's languages – to whatever extent they are related or unrelated – and cope with a “potentially unlimited number of languages” (de Bot 1992: 6).

The logical alternatives for the organisation of multilinguals' languages in the brain are that: there is one unified system; there is a separate system for each language; or that language-specific constituents are stored and processed separately and common constituents together. Alternatively, there is a single storage system where links between constituents are strengthened by use, so that the links between constituents in the same language become strengthened in multilinguals who do not codeswitch, whereas in multilinguals who do codeswitch, links between constituents in different languages also become strengthened (Paradis 1987).

Of the psycholinguistic models adapted for multilingualism or relevant for multilingual research, there is Cummins' Interdependence Hypothesis (1981b); de Bot's (1992) model for bilingualism, based on Levelt's (1989) monolingual 'Speaking' model; Williams and Hammerberg (1998); Bialystok's (1994b) model of interacting knowledge sources; and Herdina and Jessner's Dynamic Model (2000). Cook (1991, 1992), a notable proponent of research into "multicompetence", does not propose a model, though he does state he holds the view that multiple languages are represented in a unified system because multilingual speakers do not have the same representations of their languages as monolingual speakers, demonstrated for example by their metalinguistic awareness.

The first model, Cummins' Interdependency Principle (Cummins 1979, 1981b), states that basic interpersonal communication skills (BICS) develop separately in the L1 and L2, whereas cognitive/academic language proficiency (CALP) is common across languages and can therefore be transferred from one language to another. BICS is required for context-embedded use of language in communicative tasks, whereas CALP is required for context-reduced and cognitively demanding communication. A number of studies support the interdependence of CALP across individuals' languages (Cummins *et al.* 1984; Cummins *et al.* 1990; Cummins & Nakajima 1987; Verhoeven 1991) – and there is also evidence that BICS is interdependent from studies which show that children's ability to produce context-embedded language is matched in both their languages (Snow 1987; Verhoeven 1991, cited in R. Ellis 1994). As R. Ellis points out:

The notion of interdependency is an important one because it suggests that the development of full L1 proficiency confers not only cognitive and social advantages attendant on mother tongue use but also benefits the acquisition of L2 proficiency (R. Ellis 1994: 224).

Cummins' Interdependency Principle is a crucial element of his Threshold Theory (1979), which states that learners' common underlying proficiency is neither part of

their L1 or L2, in contrast to their separate underlying proficiencies in their two (or more) languages, and that for the common underlying proficiency to develop educational support is needed, preferably in the L1. Research has confirmed that learners with supported competence in two languages find it easier to learn another language, and have more positive attitudes towards language learning (eg, Lasagabaster 1998). Cummins's model's main strength is this characterisation of interdependence between an individual's languages and the way it can be extended without limit to the number of languages. While it does not explain the processes by which languages develop or attrite, nevertheless, it does not exclude the other characteristics listed above.

De Bot's (1992) model is based on Levelt's monolingual 'Speaking' model (1989), which de Bot proposes is infinitely extendable to accommodate any number of additional languages. De Bot's model is modular, with a single knowledge component containing language/ discourse/ encyclopaedic knowledge that feeds into the first active component, the 'conceptualizer', which generates a pre-verbal message and monitors messages. De Bot reasons that the first stage of the 'conceptualizer' is not language specific, but that the second stage must be language-specific because different languages have different concepts. The pre-verbal message is encoded into a grammatical and phonological form by the 'formulator' using information from the 'lexicon', resulting in a phonetic plan in internal speech. It seems unlikely that a multilingual possesses only one system to represent and store all the information about their different languages (labelled for language), but at the same time nor does it seem likely that the formulator and lexicon are completely separate for each language. The organisation of the formulator and lexicon appears to depend on a multilingual's degree of proficiency in their languages, the psychotypological distance between the languages, and the age at which the languages are learned, but de Bot concludes that a single lexicon seems likely. The phonetic plan is passed to the 'articulator', which then converts it to overt speech. Evidence for a single articulator being shared between multilinguals' languages comes from bilinguals' accents in one

language being influenced by their other language (see Flege 1986; Holmes 1995). 'Audition' is passed to the 'speech comprehension system', which provides feedback for both overt and internal speech, so enabling the speaker to adjust the message in the conceptualizer. All the constituents can work simultaneously, so different parts of the same sentence are at different stages of processing at the same time, and processing is mostly automatic.

De Bot's model can cope with multilinguals' individual differences with regard to which languages they know, their varying proficiency in their various languages (in each of the constituents), differences in their conceptual knowledge and also takes account of neurolinguistic evidence in the organisation of the model. However, de Bot's model is a "steady-state" model and does not describe or explain the process of development, nor is it concerned with literacy. It is hard to locate where multilinguals' grammatical metalinguistic awareness might be shown in the model – the only possible location appears to be as part of the knowledge component, where declarative knowledge is stored, leaving the location of procedural metalinguistic knowledge unspecified. De Bot's (1992: 3) sole comment, "Procedural knowledge forms part of the different processing components" takes no account of multilinguals' ability to objectify language, focus on form, and switch focus between grammatical structure and semantic meaning.

Based on de Bot's (1992) model, Williams and Hammarberg (1998) propose a developmental model that separates the instrumental role from the role of default supplier, roles that are subsumed into one in bilingual acquisition. In the study, Williams, a native English speaker, is also a near-native speaker of German, and at the beginning of the research starts to learn Swedish. L2 German is activated in parallel with L3 Swedish and is used to supply lexical material when Williams does not know the appropriate Swedish lexical item. L2 German also dominates codeswitches that have no identified pragmatic purpose, and so assumes the role of default supplier. The participant's comments about her L3 Swedish, termed the "metalinguistic

function”, are all in her native English, which therefore assumes the “instrumental” role. Williams and Hammarberg suggest that the instrumental role is assigned on the basis of the learner’s identification with a particular language, together with knowledge of which languages are known by the interlocutor, and the interlocutor’s identification of the learner with a particular language. The role of default supplier is the result of interaction between four learner variables: proficiency, typology, recency, and L2 status. This last variable, that the language is a non-native language, appears to be a crucial characteristic of the default supplier. Williams and Hammarberg (*loc. cit.*) propose that only the language assigned the role of the default supplier is activated in parallel to the L3, the language being learned, and that a mechanism for specifying the default supplier is required at a higher level. The alteration resolves a criticism raised by Poulisse and Bongaert (1994) with regard to de Bot’s (1992) model, that a potentially unlimited number of languages could be activated in parallel in multilinguals. This alteration brings a developmental aspect to de Bot’s model because over time the roles of the L1 and the L2 diminish and are taken over by the L3. However, it does not result in the entire model being developmental, and the other criticisms outlined above still stand.

Bialystok (1994b) describes the following model as having explanatory power for the issue of representation of multiple languages in the brain (see Figure 3.2). It is based on the assumption that language must have two distinct parts, one part containing all the language specific elements and the other part being universal and relevant to all the speaker’s languages (*ibid*: 564): interdependence is thus also a part of Bialystok’s model. A third part represents the speaker’s conceptual knowledge. All three parts ‘communicate’ with each other and develop, eg, when a new word is learned in the Language Specific Details store (L.S.D.), this may lead to the Language representation being reanalysed and restructured, where it becomes more explicit (see Bialystok’s model of analysis and control, Section 4.3.4). The Language and Conceptual representational stores begin with pre-programmed information such as language universals, and perceptual and conceptual principles about the world,

whereas the information in the Language Specific Details store is learned through general principles of learning. The model can cope with a limitless number of languages by adding more stores to the L.S.D.

Bialystok's model demonstrates that a multilingual's language knowledge is partly separate, and partly shared and therefore interdependent, and so is consonant with the neurolinguistic evidence presented in Section 3.1.3. The model also takes development into account with the possibility of development occurring in all three components, presumably with differential development in proficiency in each language represented in the L.S.D. If the model can cope with differential development in a single multilingual, we can assume that it can cope with differential development across multilinguals. It is not clear how crosslinguistic or psychotypological influence occurs between L.S.D. such as within the lexicon.

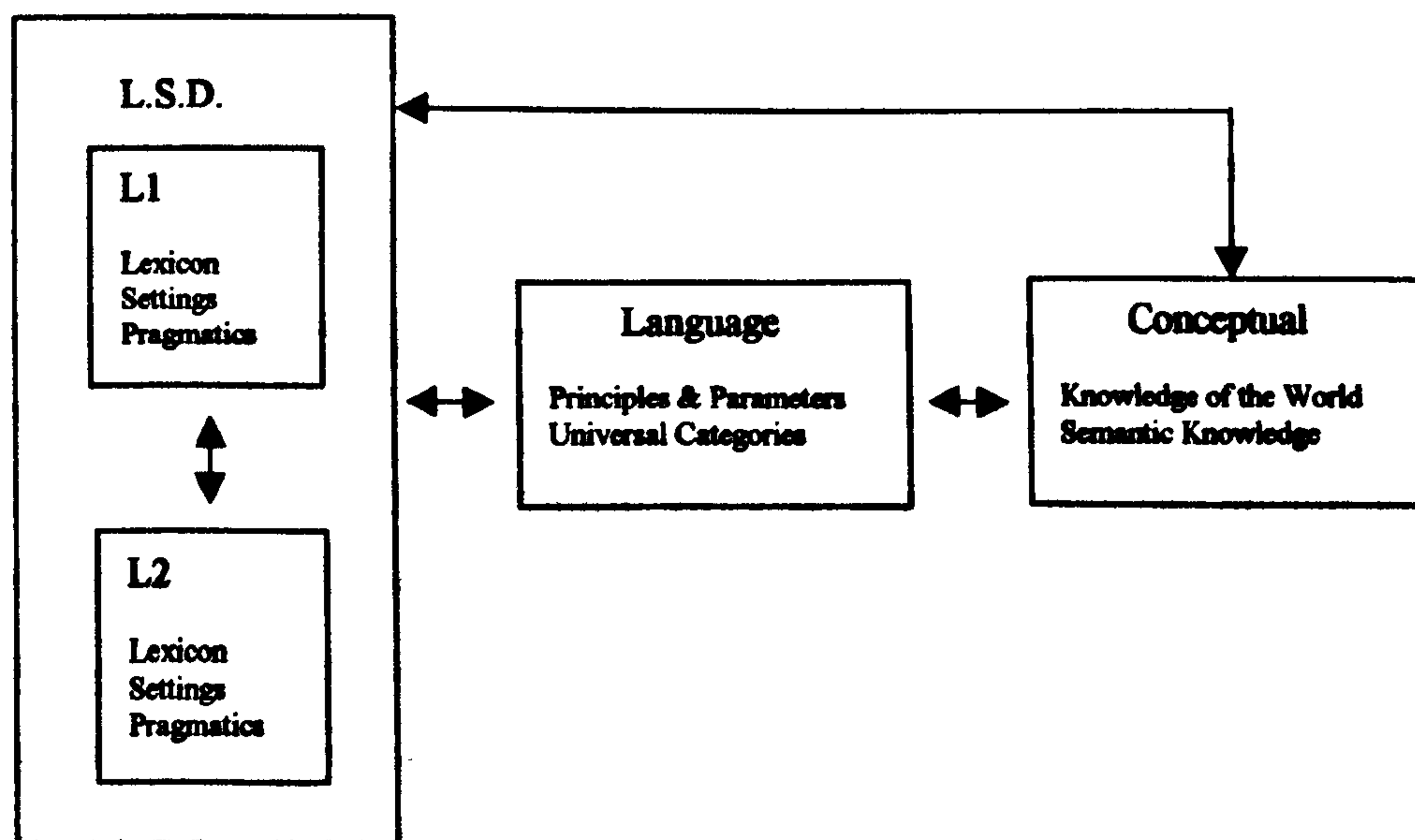


Figure 3.2 *Bialystok's (1994b) model of interacting knowledge sources.*

The model does not account for literacy or multiliteracy although it seems possible that general literacy knowledge would be represented in the Conceptual store and

specific knowledge in the L.S.D, nor does the model account for the influence of learners' affective states on language learning. The model does not describe on-line processing but overall relations between different stores, therefore production and phenomena such as codeswitching are not characterised.

The last model of multilingualism to be described here is Herdina and Jessner's dynamic model of multilingualism (Jessner 1997, 1999; Herdina & Jessner 2000). As Herdina and Jessner (2000: 92) point out, the multilingual system is not "a mere accumulation of the effects of concatenated or sequential individual systems". Multilinguals' languages do not develop in isolation, and previous and subsequent development in other languages affect the development of each language. This means that a 'multilingual system' is more than the sum of its parts. However, conventional experimental language research examines multilinguals' individual languages, rather than the overall system of languages known to the multilingual at a particular time.

Herdina and Jessner's dynamic model takes into account that language development in multilinguals, as in other learners, follows biological growth processes so that development is not linear, and not constant over time. Slow initial growth in the system is followed by an increase in the rate of acceleration, and then the rate of growth lessens and evens out because learners have limited cognitive resources. Herdina and Jessner state that restructuring and improvement phases in individual languages' sub-systems mean that the curve is not smooth but irregular and cyclical, as interdependent relations between languages result in effects throughout the system. The complexity of a multilingual's system of languages results in an 'autodynamic' system because the variables in the system act in a recursive manner.

Learning another language results in a qualitative change in multilinguals' psycholinguistic system, and new skills are required to cope with the change: Herdina and Jessner (2000) cite three in particular. Firstly, multilinguals need language learning skills in terms of cognitive and strategic expertise, to enable them to learn

how to learn another language. Secondly, they need language management skills both at psycholinguistic and sociolinguistic levels, as according to the situational context, multilinguals must choose a language in which to communicate and either integrate other languages, or inhibit them in order not to codeswitch, i.e. they must develop “the multilingual art of balancing communicative requirements with language resources” (Herdina & Jessner 2000: 93). Lastly, multilinguals need language maintenance skills in order that their languages do not attrite through lack of use. Maintaining proficiency in a number of languages requires considerable effort if multilinguals do not use their languages frequently in the normal course of life.

Herdina and Jessner’s dynamic model of multilingualism is clearly developmental and encapsulates the interdependence of a multilingual’s languages. These two characteristics are vital in a model of multilingualism. The model takes language to be homogeneous and therefore does not specify the details of how multilinguals’ languages may be interdependent with regard to function or process, nor how a multilingual’s conceptual and world knowledge, their cognitive and metalinguistic ability, cross-linguistic knowledge, and the lexicon, grammar, and phonology of each language interacts, and so does not include evidence from literacy or neurolinguistic research.

In conclusion, of the few psycholinguistic models for multilingualism that have been proposed, all fulfil some of the following requirements for this study but none fulfil all: to account for evidence of interdependency between languages and (differential) development in proficiency, to be able to cope with individual differences, to take into account neurolinguistic evidence and the effects of cognitive development, literacy, and metalinguistic awareness. The models described above are designed to account for specific issues in bilingualism or multilingualism, and were not designed to be comprehensively descriptive of multilingualism, multilinguals’ psycholinguistic state, or capturing all the processes of development that take place as multilinguals learn languages.

3.1.5 Conclusions of Research into Multilingualism

Language learning in multilinguals is extremely complicated because so many variables interact to affect learning outcome. This complexity results in relatively little psycholinguistic research being carried out into multilingual acquisition, even though multilingualism, i.e. knowledge of three or more languages but not necessarily with equal proficiency, can be considered the norm across the world's population.

Neurolinguistic research shows that multilinguals' languages are partly associated and partly disassociated, suggesting that a multilingual's languages interact to some extent but are also represented independently of each other. Interaction suggests that the language representations known by a multilingual change in relation to one another (see Herdina & Jessner 2000). If multilinguals access a single level of representation for the lexicon and phonological system of each of their languages, in addition to shared world knowledge, cognitive abilities, and metalinguistic awareness, then multilinguals must also develop the skill to inhibit this knowledge in languages they do not want to use (*loc. cit.*). The few models for multilingualism that exist do not really get to grips with the considerable number of complexities that arise from the psycholinguistic state of knowing a number of languages.

Practice in learning a number of languages seems likely to train multilinguals in the skills required to learn additional languages. Multilinguals should 'learn to learn' through their cumulative experiences, with the cognitive abilities which are required to learn other languages being developed and adapted further in the process of learning. In particular, learning to be literate is an important part of language learning for learners in Western Europe, and is crucial for developing a high degree of metalinguistic awareness because writing makes linguistic structure visible to the eye. Multiliteracy is cognitively demanding and requires considerable practice for automaticity to develop in each language and for multilinguals to be able to switch between languages.

3.2 Are Multilinguals Faster Language Learners Than Other Learners?

Many studies have shown that bilinguals are faster language learners than monolinguals – that they can learn languages to a higher level in the same period of time (Jacobsen & Imhoof 1974; Lerea & Kohut 1961; Lerea & Laporta 1971; Ringbom 1985; Saif & Sheldon 1969, cited in Valencia & Cenoz 1992: 445). The study by Thomas (1988) described in Section 4.2.5 also concludes that classroom experience and literacy in both the bilinguals' languages can lead to better results in learning a third language formally. Ringbom (1987) describes a study in which Finnish schoolchildren who knew Swedish performed better at learning English than Finns who did not, but as English and Swedish are typologically related and the effect may be due to transfer of knowledge this does not demonstrate that bilinguals are better at learning another language in general.

Only a few studies have considered whether multilinguals are in general faster language learners than monolinguals (Ramsay 1980; Klein 1995), and only one study I have found compares multilingual to bilingual participants (as well as to monolinguals), that of Nation (1983; Nation & McLaughlin 1986a, 1986b), though the experiment is on artificial rather than natural grammar. I have not found any study on rate of language learning that compares multilinguals who are multiliterate with those who are not.

In the following study, Ramsay (1980) sets out to test learners on their 'language learning styles' to investigate why multilinguals can learn natural languages faster and with greater ease than monolinguals in the initial stages. She tested participants on a number of different tasks, but the only two relevant to this study are for language learning and memory. Of the sixteen women and four men, an equal number of each sex were monolingual or multilingual. The participants were aged 21-61, "all but one had some college education" (Ramsay 1980: 75), and the number of languages the multilinguals knew ranged from three to eight. No indication is given whether or to

what extent the multilinguals were literate in their languages apart from English. Five of the multilinguals were native speakers of other languages, and two are described as having two native languages. The multilinguals were tested in conversation with speakers of languages in which they claimed competence, and are described as “able to sustain an adult level of unspecialised social interaction in each of three or more languages” (Ramsay 1980: 75).

Here there is a problem with regard to the different definitions of monolingual used in this thesis and in Ramsay’s study. Ramsay’s monolinguals are described as adults who have “never in their lives been able to use any but their native tongue in extraacademic social interaction” (Ramsay 1980: 75) and “were selected by self-report and on the basis of academic grades in foreign language classes” (ibid: 77): a table shows that they had each attempted to learn between one and three foreign languages. Ramsay’s definition is problematic as it demonstrates that the monolingual participants were chosen because they were unsuccessful language learners rather than because they had never been exposed to another language. As the participants are sorted into the two groups on the basis of their previous success, the study is bound to produce the expected result – the two groups have been predefined by their ability or otherwise to learn a foreign language. Experienced successful multilinguals will outperform experienced unsuccessful learners. However, the point of Ramsay’s study is to find out why the multilinguals are successful, where language experience is an intervening variable with a mediating effect on learning, not specifically to investigate the effects of language learning experience on attainment in a task of learning the initial stages of another language.

Ramsay (1980) compared the ten adult multilinguals with the ten adult monolinguals on a task learning Euskera (i.e. Guipuzcoan Basque), a language that is not typologically related to any other language. They were exposed to a large but limited amount of material over three separate sessions of 40 minutes (plus an extra 12 minutes watching the language video) and to this end were given a video of a

conversation between two native speakers with an accompanying script, a box of vocabulary cards, an audiocassette, grammar cards, and a primer. During the sessions, they were tested on their target language phoneme recognition, phonetic recall, lexical memory, reading aloud, sentence recall and recognition, oral and written composition (she does not state what the exact tasks are and does not give the results), and nonverbal comprehension. At the end of all the sessions, they were tested on "ten questions of varying difficulty, designed to tap diverse language skills and linguistic levels" (ibid: 82), where a ratio of 'answers attempted' to 'correct responses' was computed for each question. A memory test was also administered. A fourth session served as a debriefing session. Overall the five most successful learners were all multilingual, and the five least successful all monolingual. Ramsay does not compute whether the result is significant, but it is possible to work it out from her tables¹ using an independent samples *t*-test to investigate the hypothesis that the multilinguals are better learners than the monolinguals ($t(18) = 2.38, p < .05$). Her study (loc. cit.) supports her hypothesis that successful multilingual learners perform better than unsuccessful 'monolingual' learners in learning a foreign language.

Ramsay draws several conclusions from her study; for example, multilinguals tend to have a more positive attitude, show a "lack of reticence" (ibid: 94), and are better able to cope with a large quantity of material than monolinguals. She also points out that processing real life phenomena requires an ability to operate on many levels simultaneously and that language learning requires an ability to switch between form and content (ibid: 92). Consistent with the argument put forward here, she concludes that, on account of their previous linguistic experience, multilinguals develop skills that help them in further language learning.

¹ NB in Table 3 (Ramsay 1980: 83), Respondent 17's Total should read 3.528, and in Table 4 (ibid: 84) Respondent 15's Total Score should read 5.340.

The second study to compare multilinguals with monolinguals at language learning is Klein's (1995) study on the acquisition of syntax/grammar. Klein compares participants on their acquisition of lexis and syntax/grammar in order to investigate whether multilinguals may be superior learners of vocabulary or syntax, or whether they perform better on both. Acquisition of lexis and acquisition of grammar would appear to be the most important abilities at the initial stages of learning a language – communicative ability depends on having at least a small amount of knowledge of the L2. Her study uses a universal grammar (UG) parameter-setting model of acquisition.

Based on Chomsky's Government and Binding Theory (Chomsky 1981[b]; 1986) the model assumes that the human language faculty consists of a system of innate principles (ie Universal Grammar or "UG") that helps constrain the hypotheses that a child makes in acquiring the syntax of the L1. In addition, these principles are parameterized across languages, with different values permitting specified types of variation. The learning task in L1 acquisition consists of the child's setting these parameters to the particular values that match the language input received. Thus, although abstract principles are innate, the child must have positive evidence in the target language to "trigger" the setting of parameters to the values necessary for that language. (Klein 1995: 421)

Klein (loc. cit.) refers to the lexical learning hypothesis, which proposes that lexical items, along with their properties, trigger the restructuring of a child's grammar. She suggests that the model might predict that enhanced lexical acquisition will have consequences for parameter setting. She then asks whether multilinguals organise their previous nonnative linguistic knowledge to help them in learning another language. This may mean 'choosing' from their broad range of parameter settings those they should transfer to the new language, those which should change, and those which are inapplicable (ibid: 423). She points out that parameter setting may become easier with more practice, or may stay the same if UG is still operative and all parameter values are available to the learner. Lastly, she points out that in a parameter setting model, it is possible that either there is no difference between L2

and L3 learners with regard to parameter setting because the entire range is available to learners (ibid: 425), or that the rate of acquisition may be affected by matches and mismatches between previous and target language parameter settings (loc. cit.).

In order to test her hypothesis, Klein (1995) compared 17 monolingual with 15 multilingual children and a control group of native speakers, whose ages ranged from twelve to nineteen and who were acquiring English as a second, or as a third or fourth language. The participants were matched for socioeconomic background and English proficiency six months before the study so that she could test whether the multilinguals' previous language experience had an effect on their acquisition of lexis and syntax. The lexical learning task tested the participants' knowledge of specific verbs and their prepositional complements or, in other words, their "subcategorisation requirements" (ibid: 432). The syntactic learning task tested preposition stranding, for example, "What are the boys waiting *for*?" (Klein 1995: 422) as this is a very rare construction across the world's languages (limited to Germanic languages eg, English, Dutch and Swedish), and did not occur in any of the participants' previous languages. This means that they had all started from the same base line in this respect.

The participants were presented with a grammaticality judgement and correction task of twelve target sentences which were mixed with sentences for a different experiment and 'distracter' sentences consisting of constructions unrelated to those being tested. Six of these sentences were declaratives and tested subcategorisation knowledge, and the other six were questions and tested knowledge of stranding. They used the same lexical items, for example (Klein 1995: 436): -

- | | |
|--------------------------|---|
| <i>Subcategorisation</i> | a. <i>The young girl waited the school bus yesterday.</i> |
| <i>Stranding</i> | b. <i>Which bus did the young girl wait yesterday?</i> |

The participants had to judge whether each sentence was acceptable or unacceptable in English, and if it was unacceptable, to correct it. Learners who judged the subcategorisation question to be correct were considered to lack the subcategorisation knowledge for that verb, whereas those that corrected it were considered to know it, so the second question was examined. If the second was accepted as correct it was coded as 'null-prep', as it should have been corrected by adding a preposition in clause initial or clause final position.

The results (ibid: 439) indicate that the multilinguals showed significantly greater knowledge of subcategorisation requirements than the monolinguals – 75% compared to 47%. On the stranding test, the multilinguals produced accurate responses 69% of the time, whereas the monolinguals produced them 54% of the time. Each of the multilinguals also exhibited stranding at least once, but this was not true of the monolinguals. Of the learners who were able to subcategorise the verb correctly, but did not exhibit stranding, the multilinguals did so 26% and the monolinguals 42% of the time – as their ability to subcategorise increased they tended to respond with less null-prep. Seven of the seventeen monolinguals showed no evidence of stranding at all – the same seven who showed fewer than three subcategorisations (ibid: 442).

These results show that multilinguals develop both a higher degree of lexical learning (subcategorisation) and a higher degree of preposition stranding than monolinguals. From her statistical analyses, Klein concludes that there appears to be a connection between lexical learning and the acquisition of syntactic patterns (ibid: 447). However, she believes that the multilinguals are not actually 'better' at setting parameters than the monolinguals, but that they are faster. They learn the lexicon more quickly and this encourages more active parameter setting: because none of the learners' previous languages had preposition stranding this could not have affected their ability. Klein (ibid: 452) suggests that this ability to reset parameters "could be propelled by lexical knowledge that may accompany or result from the enhanced cognitive and metalinguistic skills of multilinguals". Once parameters have been set,

learners with a higher degree of metalinguistic awareness (who may also be less 'conservative'), will exhibit preposition stranding whenever possible. Klein's suggestion is problematic, as in generative theory, the linguistic ability to set parameters has no relationship with cognitive ability because it is a separate component: nor is there any empirical evidence to support the suggestion. Klein also takes no account of any improvement in memory or strategies multilinguals may achieve as they gain more experience in language learning, but puts all change down to parameter setting ability resulting from improved lexical learning, and claims that parameter setting does indeed appear to become easier with more practice, implying that not all parameter values are equally available to learners and that learners do not have equal access to UG. She adds that more research is needed on the subject (*ibid*: 454).

Klein's (1995) study demonstrates that if lexis and grammar alone are tested to show that multilinguals learn more, but not participants' memory skills or awareness of form, it is difficult to pinpoint why multilinguals should improve at learning another language. Although Klein suggests among other possibilities that metalinguistic skills are responsible for multilinguals' faster ability to reset parameters, there is no evidence in her study that they are using their awareness of grammatical form rather than semantic content to learn the target language.

Of these two studies, Ramsay (1980) demonstrates that successful multilingual learners, as we would expect, do learn languages more quickly than previously unsuccessful 'monolingual' learners, and Klein (1995) demonstrates that multilinguals are faster at learning two specific related grammatical constructions. However, there are some problems. Although Ramsay's study controls exposure to the target language, Klein's does not – her multilingual participants may have sought greater exposure to English than her monolinguals in the six months after they were matched and before they were tested, an interesting possibility in itself but one that does not prove that they would be better language learners if given the same exposure. And

both are very small-scale – Ramsay’s study has only 10 multilinguals and 10 monolinguals and Klein’s 15 multilinguals and 17 monolinguals – leading me to hesitate about their generalisability without additional evidence.

If, on this limited evidence, both biliterate bilinguals (Thomas 1988) and multilinguals (Ramsay 1980; Klein 1995) are better at learning another language than monolinguals, are multilinguals also better than bilinguals? And does multiliteracy affect the outcome? This would seem a logical proposition if linguistic experience positively affects areas such as motivation and attitudes to other language: multilinguals may be presumed to have wider linguistic experience than bilinguals. The study that goes some way to supporting this, Nation (1983, Nation and McLaughlin 1986a, 1986b), will be summarised in Section 5.1 as it investigates multilinguals’ metalinguistic abilities.

So, experimental evidence from two small-scale studies shows that multilinguals are indeed better language learners than other language learners, but why are they better? It must be connected to their language learning experience – but how exactly? Which experiences assist their language learning ability? Is metalinguistic awareness one of the skills multilinguals develop through learning languages, and if so, does it increase their capacity to learn a new grammar more quickly?

3.3 Conclusions of the Chapter

In this chapter I have argued that multilinguals’ languages develop constantly so proficiency does not remain static – as long as a language is used it continues to develop but if a language is not used it attrites and other languages used more frequently and/or more extensively continue to develop. I have also argued that individuals’ languages are interdependent, so that development in one affects others qualitatively as learners implicitly and explicitly reanalyse their languages in terms of each other. Interdependency results in crosslinguistic influence between languages

even in multilinguals who have separate domains for their languages. There is some neurolinguistic evidence that multilinguals' languages are partly represented in common areas, and partly represented in separate areas of the brain, *and* also that languages can be partly associated and partly disassociated from one another. Association signifies that language functions may be partially shared between languages, and therefore that development in one language may affect development in multilinguals' other languages at a functional level. Out of a number of psycholinguistic models of multilingualism, only Bialystok's (1994b) model, Cummins' (1979, 1981b) Interdependence Model, and Herdina and Jessner's (2000) Dynamic Model take account of this interaction between multilinguals' languages.

In addition to language learning, multiliteracy, i.e. learning a number of scripts or literacies, developing automaticity in using them, and storing and retrieving them when required is cognitively demanding. The written medium is not only an additional source of input in language learning, but has different functions and therefore additional registers, styles, and genres with which learners must become familiar. In the process of becoming multiliterate, multilinguals become experienced in thinking about language as a visible system that is spatially meaningful as well as temporally meaningful (see Chapter 4).

I propose that practice in language learning, in addition to an improvement in proficiency in those particular languages, leads to an improvement in the ability to learn languages – in other words, learners become progressively faster at learning languages the more languages they know beforehand (the Practice Hypothesis). There is a small amount of empirical support for anecdotal evidence that learning languages becomes easier as individuals learn more languages, as Ramsay (1980) finds that multilinguals have a higher degree of attainment than previously unsuccessful 'monolinguals' at learning the initial stages of another language, and Klein (1995) finds that multilinguals are better than monolinguals over a six month period at learning two specific grammatical constructions. It seems likely that multilinguals'

ability to learn languages is improved through the experience of language learning because the brain adapts to cope with environmental demands, i.e. the cognitive demands of learning many languages results in multilinguals' cognitive processes being better able to cope with learning further languages. Learning is epigenetic in that the complex interaction of multilinguals' heritable characteristics with their environment throughout their lives continuously changes the course of their language development. The other two processes in language learning are also epigenetic, namely, transfer, where multilinguals are able to use their pre-existing language knowledge in learning other languages, and creativity. In addition, it seems likely that experienced language learners not only benefit from their languages having shared functions at the level of representation, but that they improve at language learning on account of the cognitive, affective, social, and experiential benefits of becoming multilingual. I therefore consider it likely that multilinguals' success at learning another language is proportionate to their previous language experience.

In the following chapter I discuss the evidence for the development of metalinguistic awareness through language learning and the effect of metalinguistic awareness on language learning attainment.

Chapter 4: Metalinguistic Awareness

This chapter contains a literature review examining the research on grammatical metalinguistic awareness. Because of the scarcity of research on metalinguistic awareness in multilinguals, the research on grammatical metalinguistic awareness carried out in other fields such as bilingualism and child language acquisition studies is reviewed, as the conclusions are highly informative. The characteristics of grammatical metalinguistic awareness are described, such as the evidence for it being both cognitive and linguistic, its non-unitary nature, the distinguishing features of implicit and explicit metalinguistic awareness, and the way in which language can be *seen* to be a formal grammatical system on account of its representation as written language. The variables that have so far been found to be important in developing metalinguistic awareness are reviewed and their relevance for multilinguals described. A review of the literature on the various psycholinguistic models that have been proposed to help characterise the development of metalinguistic awareness follows, and the chapter concludes by proposing that metalinguistic awareness assists language learning.

4.1 Characteristics of Metalinguistic Awareness

The debate on what constitutes a demonstration of metalinguistic awareness is inextricably bound up with consideration of the characteristics of metalinguistic awareness, and how we can be certain that learners demonstrate metalinguistic awareness. The following section contains a brief discussion of the development of metalinguistic awareness – research has concentrated on the development of metalinguistic awareness in children, which is reflected in the discussion, but the approach taken in this thesis is that epigenetic development continues throughout learners' lives.

4.1.1 The Development of Metalinguistic Awareness

All children develop metalinguistic awareness – including grammatical metalinguistic awareness – to some extent, even if emergent metalinguistic awareness is very difficult to for researchers to assess, but some children seem to be more involved with language as an object of thought on which to comment than others. Monolingual children's metalinguistic development is characterised by its cumulative growth over a long period of time, with periods of bursts in development, particularly around the age of seven to eight (see Hakes 1980). Researchers into grammatical metalinguistic awareness (the following account is abbreviated from Birdsong 1989: 16-19) claim that aged a year and a half to two and a half, children are usually able to recognise structurally deviant commands (Shipley, Smith & Gleitman 1969); aged two, to correct (simple) deviant word order (Gleitman, Gleitman & Shipley 1972); at under three years old to judge sentences as "good" or "silly" (*loc. cit.*); at under four years, to divide sentences into words and syllables, and to object to deviant sentences (Clark 1978); at four, to reject sentences with subcategorisation errors (eg, Howe & Hillman 1973; James & Miller 1973); at between four and five years of age, to recognise and correct (harder) deviant word order (de Villiers & de Villiers 1974); aged five, to distinguish grammatically primitive from well-formed sentences (Scholl & Ryan 1975); at five and a half, to detect ungrammaticality resulting from morpheme deletion (Tunmer & Grieve 1984); and aged eight or nine, to understand structural ambiguity (Hirsh-Pasek, Gleitman & Gleitman 1978). By the age of 11, schooled and literate children's grammatical metalinguistic awareness is usually well-developed (*cf.* Karanth, Kudva & Vijayan 1995, on unschooled children).

Although identifying at what age (roughly) children begin to show evidence of grammatical metalinguistic awareness has occupied a number of researchers, from a psycholinguistic perspective it is difficult to gauge whether children have developed explicit grammatical metalinguistic awareness before they have reached a certain level of cognitive maturity. Evidence from children's self-repair of spontaneous but ungrammatical utterances, and their repair of others' perceived errors are the only

evidence for young children's metalinguistic awareness, and there is considerable dispute regarding whether this is sufficient proof (see Tunmer & Grieve 1984; Birdsong 1989; Karmiloff-Smith 1986). Nor does children's linguistic proficiency necessarily indicate their level of metalinguistic awareness. For instance, when children acquire a construction in their native language, this does not signify that they are consciously aware of the grammatical structure, able to focus on its form, reason about its form, or exercise intentional control over applying grammatical rules (Gombert 1992). Nor does acceptance of grammatical and rejection of ungrammatical sentences demonstrate metalinguistic awareness. Children's rejection of ungrammatical sentences may well be based on rejection of unfamiliar sound sequences, or lack of comprehension of distorted sentences, i.e. on semantic rather than grammatical criteria. In addition, it has often been found that children judge sentences' acceptability on the basis of the truth value of what they hear, rather than on the basis of sentences being syntactically well-formed (see Birdsong 1989). Even consistently being able to correct ungrammatical sentences is not enough to demonstrate metalinguistic awareness beyond all doubt, as responses may still be based on semantic criteria alone. Gombert uses the term 'epilinguistic' awareness, where children make spontaneous self-corrections but cannot be said to have full grammatical awareness, in order to distinguish this emergent stage of development from the later stage of full metalinguistic awareness. Distinguishing between semantic and grammatically-motivated corrections from experimental and observational data is almost impossible. What is required is that children are able to demonstrate that they can *explain* what is wrong with ungrammatical sentences, and this is an advanced metalinguistic skill.

Most research on early child development of metalinguistic awareness concentrates on their phonological awareness, and then as their ability converse increases, to their semantic awareness, then to lexical awareness, grammatical awareness, and metaphorical awareness. When children begin to learn to be literate, all these different types of metalinguistic awareness come into play. For example, Magnusson and

Naucner (1990) examined a group of language disordered children and a group of matched normal readers on various linguistic, metalinguistic and non-linguistic variables' relationship with reading and spelling, and found that – unsurprisingly – as a group the language disordered children performed less well than the matched group. Yet out of the group of language disordered children some performed better on metalinguistic tasks, reading, and spelling than the matched normal children; out of the group of normal language children some were among the best on these tasks and some were among the worst. The children – both disordered and normal – who were good at reading and spelling also had high scores on the metalinguistic tasks (a metasyntactic acceptability task, and four metaphonological tasks), on syntactic production, and on language comprehension. There appears to be a connection between metalinguistic awareness and language-related tasks such as comprehension, grammar, and reading and writing: capable learners tend to be more linguistically aware than poor ones (for reviews see Bertelson 1986; Morais 1985). This is probably connected to the finding that children's early acquisition of their native language grammar is based on the form of the input, not its meaning. For example, Karmiloff-Smith (1978, 1979) found that when French children were given items where the phonological and semantic clues to the gender of each noun were in contradiction, the youngest children were the most likely to pay attention to phonological form, such as word-endings, rather than the semantic clues. Research into first language acquisition in a number of languages has concluded that young children's "acquisition of grammatical gender is based on formal rather than semantic criteria" (Harley 1998: 161, see Levy 1983; Pérez-Pereira 1991).

Metalinguistic awareness appears to continue to develop throughout individuals' lives, according to the purpose for which it is used and to what extent it is used. For instance, Edwards and Kirkpatrick (1999) include adults' results on the same measures as children in their study of metalinguistic awareness, which required participants to respond when they noticed anomalous or nonsense lexical items in a short story. The results demonstrate that metalinguistic ability is not set by the age of

12: the adults performed better than the oldest children on all of the measures, and are faster to respond, confirming that cognitive and linguistic development continue into adulthood.

4.1.2 Is Metalinguistic Awareness Cognitive or Linguistic?

The brief outline of the development of metalinguistic awareness in children is also relevant to the issue of whether metalinguistic awareness is cognitive or linguistic in nature. Central to this debate is whether metalinguistic awareness is a cause or effect of cognitive development, or a cause or effect of language development. Researchers' opinions relate to their position on the theoretical issue of whether language is a separate module in the brain (those who take a mentalist approach) or a part of general cognition (those who take a cognitivist approach) (see Section 2.1 on modularisation). The main reason that relations between metalinguistic awareness and cognitive and linguistic development is unclear is that all develop throughout childhood and it is therefore difficult to separate them experimentally in children. Little research takes place on adults' metalinguistic awareness.

With regard to the relationship between metalinguistic awareness and cognition, many researchers consider that metalinguistic abilities (cognition about language) form a part of metacognition (cognition about cognition), and so place metalinguistic under metacognitive abilities, but this is far from a unanimous position. Gleitman, Gleitman and Shipley (1972) believe that metalinguistic awareness and cognition are totally separate but linked by underlying skills dependent on the general development of consciousness. Clark (1978) believes that there are both similarities and differences between metalinguistic and metacognitive abilities. And Van Kleeck (1982) believes that both metalinguistic awareness and metacognition are dependent on cognitive development and so should be distinguished as different abilities that can overlap when they become new areas of competence (Gombert 1992). Psycholinguists who believe that the development of metalinguistic awareness is related to cognitive

development do so because “metalinguistic awareness involves cognitive processes that are different from those operating for language perception and production” (Masny & d’Anglejan 1985), i.e. on account of the relatively late age that children apparently demonstrate awareness, long after their comprehension and production abilities are well-developed (eg, Gleitman, Gleitman & Shipley 1972).

A large amount of evidence that metalinguistic awareness is connected to language skills comes from research into both first language acquisition (eg, de Villiers & de Villiers 1974; Marshall & Morton 1978; Bohme 1983; Hawkins 1984; Gombert 1992; Karanth, Kudva & Vijayan 1995) and second language acquisition (Cummins & Mulcahy 1978; Diaz 1985; Galambos & Hakuta 1988; Galambos & Goldin-Meadow 1990; Yelland, Pollard & Mercuri 1993). Metalinguistic awareness is found to be particularly strongly related to literacy and grammar-related activities (Bialystok 1988b; Camps & Milian 1999). For example, Ryan (1980) finds that syntactic awareness is related to reading proficiency, on account of literacy activities requiring the ability to focus on, analyse, and manipulate language.

Taking the results together, the empirical evidence suggests that metalinguistic awareness may be both cognitive *and* linguistic in nature, in other words, that it is both dependent on and has consequences for both cognitive and linguistic development. Briefly, metalinguistic awareness appears to relate to linguistic processes because metalinguistic tests also correlate with tests of language attainment (eg, the MLAT4, see Carroll 1981, 1993; Masny & d’Anglejan 1985); and to cognitive processes because research shows that metalinguistic tests and cognitive tests correlate, although not very highly (Carroll 1993; cf. Saywitz & Wilkinson 1982) and in factor analytic studies load on the same factor (eg, Ricciardelli, Rump & Proske 1989; Carroll 1993). See also Section 4.2 for an account of the well-researched relationships between metalinguistic awareness and the following variables, which each could be considered to make demands on both cognitive and linguistic abilities: bilingualism, reading and writing, maturation, schooling, and

studying languages. Following the argument that epigenetic development is a result of continuous interaction between genetic endowment, environment (both social and physical), and self-regulation of the organism (see Section 2.1.4), it is likely that because these factors make demands on the learner, they promote the development of the requisite skills.

The amount and varied nature of the evidence suggests that the relationships between metalinguistic awareness, linguistic, and cognitive processes are reciprocal rather than unidirectional, and that together they may assist further epigenetic development. For example, Cummins in his developmental interdependence hypothesis (Cummins 1984, 1987) proposes that children's second language competence is partly dependent on the level of competence already achieved in the first language due to the transference of cognitive-academic, linguistic, and metalinguistic skills across their languages.

4.1.3 Are Metalinguistic Abilities Unitary?

Most research has concentrated on specific metalinguistic abilities such as word awareness or explanation of grammatical errors. However, there has also been some research on whether there is a *general* metalinguistic ability. This has been studied through intercorrelating monolingual children's performances on different metalinguistic tasks: these studies have often found moderate positive correlations which would go some way towards supporting the concept of metalinguistic awareness as a unitary construct across areas of study such as phonemic awareness and grammatical awareness (Hakes 1980; Saywitz & Wilkinson 1982; Smith & Tager-Flusberg 1982; Tunmer, Herriman & Nesdale 1988).

In striking contrast to this research supporting a general metalinguistic ability, Scribner and Cole (1981: 139) report that their studies show metalinguistic awareness to be non-unitary. In their five year study in Liberia comparing firstly the abilities of adult Vai literates (people who learned a traditional script outside schooling),

secondly the abilities of adults who had learned Classical Arabic/Qu'ranic formally, and thirdly the abilities of adults who were non-literate, they found that those who scored well on one task did not necessarily perform well on the others. They tested metalinguistic abilities through tasks such as requiring participants to discuss whether the names of objects are exchangeable, and asking for the longest word the individual knew, which calls for "knowledge of words as constituent units of language, knowledge of syllables as constituent units of words, and awareness of the independence of linguistic units from the material world" (ibid: 157). In fact, no consistent pattern of intercorrelations emerged either when they compared each of the groups separately or when they compared those studied as a whole. Ryan and Ledger (1984) and Gjerlow-Johnson (1992) also found performance on metalinguistic tests inconsistent across different tasks.

Supporting Scribner and Cole's finding is a study by Ricciardelli, Rump, and Proske (1989) who factor analysed ten metalinguistic tests in order to examine the relationships between metalinguistic abilities in 71 five to six year old children. The ten tests load on two factors, with the nine tests that assess children's knowledge of the characteristics of words loading on the first factor, and the sole test of phonemic segmentation on the second factor together with a test for correcting word order that mainly loads on the first factor. In spite of finding two factors the authors conclude that metalinguistic awareness is unitary on the grounds that they cannot interpret the second factor. It is unfortunate that only one test of phonemic segmentation was included, as interpretation of a factor analysis is completely dependent on the tests that are included in the analysis: a second phonemic test where the children were required to state the missing initial consonant from the second of two words (e.g., meal, eel) loaded on the first rather than the second factor, indicating that the two phonemic tasks tested different abilities. It may appear from the study that children's lexical awareness is a different ability from their phonemic and syntactic awareness, but the finding is not secure on methodological grounds, as the factors are not rotated to find the optimum solution as is normal procedure in factor analyses of human

abilities where the factors are likely to be correlated, and therefore the first factor is over-represented (see Gould 1981).

The authors, Ricciardelli, Rump, and Proske (1989), carry out another factor analysis in the same study, including the ten metalinguistic tests, the children's age, length of time at school, and twelve tests of 'intellectual abilities' such as verbal abilities, sensory-motor skills, reading ability, and numerical ability. The factors in the analysis are obliquely rotated, and again, two factors are found, with the children's reading ability, age, and length of time at school loading heavily on the second factor, together with many of the tests of word awareness and the test of supplying the missing initial consonant of the second of a pair of words, but not the test of phonemic segmentation. The analysis not only shows that lexical metalinguistic awareness is related to children's age and schooling, but also demonstrates the non-unitary nature of metalinguistic awareness.

These two lines of research, one showing metalinguistic abilities to be unitary, the other that they are not, appear to be contradictory. However, the European and American studies test monolingual (and monoliterate, obviously) children of the same type of education and language background, where only very sensitive tests or tests that assess notably different metalinguistic skills find differences (such as in the study by Ricciardelli, Rump & Proske 1989), whereas the Liberian study tested adults of very different language backgrounds with widely varying literacy skills. The evidence from Scribner and Cole (1981) suggests that speaking and being literate in more than one language develops metalinguistic skills to varying degrees, and as adults have lived longer than children, they have had more time in which to develop them differentially. Indeed, Scribner and Cole conclude from their study that metalinguistic awareness is complex, draws on a number of different abilities, develops over many years, and is heavily influenced by schooling, literacy, and activities such as word games and code using (some of these variables are discussed below, see Section 4.2).

Saywitz and Wilkinson (1982: 247) surmise that the “debate concerning metalinguistic awareness as a multidimensional or unitary construct may be an artifact of individual investigators’ conceptualisations of the concepts” and that the data from their study “suggest that children develop different aspects of metalinguistic awareness at a similar rate”. In short, considering the different abilities involved in metalinguistic awareness, the varying lengths of time it takes for them to develop, the multiple dependency relationships between them and individual learner differences and environmental variables, it seems unlikely that metalinguistic awareness is a “monolithic faculty” in either children or adults, but a “collection of skills” (Birdsong 1989: 49).

I can find no research that examines whether *grammatical* metalinguistic awareness alone is unitary or not, either in children or adults. In order to investigate the role of grammatical metalinguistic awareness in adult multilinguals’ language learning ability it is necessary to know whether there is only one grammatical ability, so that if there are more, the relevant one or ones which relate to their language learning ability can be examined. Therefore, the six metalinguistic tasks to be used in this study will be factor analysed to find out if they test the same or different grammatical metalinguistic abilities.

4.1.4 Implicit and Explicit Metalinguistic Awareness

Metalinguistic awareness as used in this thesis is cognition about the grammatical structure of language and can be implicit, explicit, or at an intermediate stage on the implicit/explicit continuum (see Sections 1.4.3 and 2.1.2). Implicit metalinguistic awareness is difficult to research, on account of its very nature – its inaccessibility means that it is difficult to test. It is not possible to test implicit awareness of grammatical form without testing understanding of meaning when natural language is of necessity and purpose meaningful, and there is the additional problem of inaccessibility. In order to get round this, some researchers have therefore tested

awareness of grammatical form by using artificial grammars of meaningless strings of letters which conform to a strict set of rules (see Section 5.1, Figure 5.1, and Table 5.1). A learning condition is followed by a testing condition that usually presents stimuli produced from the same grammar but which are previously unseen, in order that participants are not just tested on their ability to memorise specific stimuli (Reber 1993).

Learning artificial grammars is unlike learning languages in several ways (see Schmidt 1994). Artificial grammars are meaningless: language communicates meaning. Artificial grammar learning takes place over a short timespan: language learning takes a long time. Syntactic structure is not just a spatial pattern, unlike simple letter order, and the parts of speech and the meaning affect how the structure changes in different contexts. Language learners do not approach learning a language with the instructions just to use rule-search, or memorisation, unlike the situation in artificial grammar learning, and learners often receive instruction in language learning, whereas artificial grammar tests in general provide no instruction, feedback, or interaction. However, both language and artificial grammars are the “product of a complex underlying system” (Schmidt 1994: 167), and are structure dependent (Reber 1993; see also Section 4.1.5).

Evidence from studies using artificial grammars shows that participants’ explanations of the rules and strategies they use in classifying grammatical strings as acceptable or unacceptable are impoverished compared to their ability to classify the strings correctly (eg, Dienes, Broadbent & Berry 1991). They seem to know more than they are capable of explaining. However, there are problems with this type of test: implicit metalinguistic knowledge may not be accessible to explanation, and low confidence knowledge is not detected. Forced-choice tests where the participants must pinpoint the part of the string which is correct or incorrect may get round this (Dulany, Carlson & Dewey 1984), however, these are also problematic (see Berry & Dienes 1993: 43-47).

Implicit representations may remain implicit, or may gradually become more explicit through the process of 'representational redescription' (Karmiloff-Smith 1991, 1996; cf. Krashen 1985). Just as there is a debate regarding the relationship between implicit and explicit language learning processes as to whether they are discrete and do not interact, or whether they can better be described as a gradual cline (see Figure 4.1 for a representation of the cline shown by grammaticality judgement tasks), so there is a corresponding debate regarding the relationship between implicit and explicit metalinguistic awareness. Quite where the line is between implicit and explicit metalinguistic awareness depends on researchers' definitions of explicit awareness: we have seen that some encompass the idea of spontaneous self-correction as a sign of metalinguistic awareness, while some reject it (see Section 1.4.3).

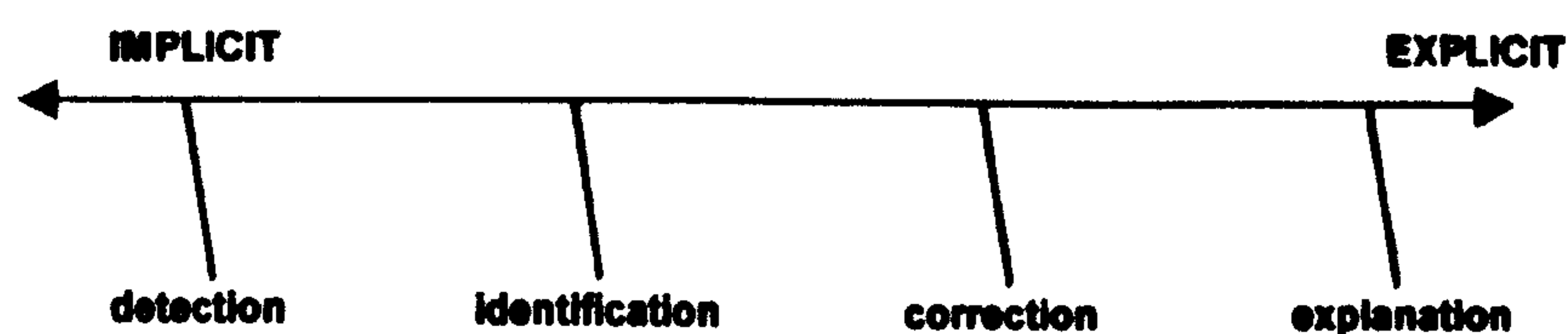


Figure 4.1 *Continuum of implicit to explicit metalinguistic awareness.*

The language learner may also learn about grammatical structure through explicit instruction, which may take the form of rules (Dakowska 1993). However, teaching can take many forms. Although some teaching does not incorporate any form of explicit metalinguistic information, much teaching attempts to combine the aims of providing input with meaningful grammar points about structures relevant to learners' level of knowledge (see Sharwood Smith 1981; VanPatten 1996; Long & Robinson 1998), and some language teaching methodologies are heavily reliant on explicit learning. Much pedagogical literature is devoted to explicit grammar teaching and raising awareness of language (eg, James & Garrett 1991). Experienced language learners may have developed considerable implicit, 'epilinguistic' (Gombert 1992), and explicit awareness of grammar through the process of learning their various

languages. Adults may have also have exceptionally well-developed and specialised explicit metalinguistic awareness, for example, if they proof-read, or read or write extensively.

Considerable debate has taken place regarding the nature of what learners internalise from their input (see Schmidt 1994; Reber 1993). It is possible that implicit learning is a result of the unconscious abstraction of rules (Lewicki 1986; Reber 1989; Winter & Reber 1994, cited in Schmidt 1994), and/or gradual accumulation of frequency information (Hasher & Zacks 1979, 1984), and/or exemplars (Brooks & Vokey 1991; Mathews *et al.* 1989; Medin & Ross 1990; Perruchet & Pacteau 1990, 1991). Explicit learning may, in addition, take the form of memorised rules, which can be used in monitoring output – however, it seems likely that for these to be integrated into automatic processes, practice is necessary to develop implicit representations (see Paradis 1994).

Implicit processes such as implicit learning, memory, and awareness can be seen as one system: explicit processes, such as explicit learning, memory, and awareness, as another. There may also be intermediate systems (Karmiloff-Smith 1991, 1996; Reber 1993; cf. Krashen 1985). Explicit metalinguistic awareness focuses learners' attention on features of the input that are salient to their learning situation, which facilitates learning. For example, Reber *et al.* (1980, cited in Schmidt 1994) found that the earlier explicit information was given in training learners on artificial grammars, the better their performance when tested, from which he concluded that explicit instruction directed and focused learners' attention so that they were able to teach themselves.

Although Schmidt argues that "Attention to input (not mere exposure to comprehensible input) is a necessary condition for explicit learning and may be both necessary and sufficient for implicit learning" (Schmidt 1994: 198), learners *can* implicitly be aware of the structure of language without noticing that they are 'aware'.

Schmidt claims that awareness at this level does not give rise to learning, but Reber (1993) argues not only that it does, but that this is the default mode of learning, based on evidence from experiments using artificial grammars, and arguments grounded in evolutionary biology (Reber & Lewis 1977; Reber, Allen & Regan 1985; Reber 1969, 1992; Reber 1993).

Reber argues that implicit processes developed early in human's evolution and that features that evolve earlier show less variation, whereas "Consciousness is a late arrival on the evolutionary scene" (Reber 1993: 86), and therefore shows much greater variability across the population. Variability of explicit processes is partly due to their greater trainability, and partly due to the widespread phenomenon of childhood education, which results in greater potential being realised in some children.

Reber's theory of the primacy of the implicit can be extended to the development of metalinguistic awareness in multilinguals. In the process of learning a number of languages, multilinguals may become better at coping with the cognitive demands arising from learning and maintaining their languages, and using them in a socially-appropriate way (eg, in situations of diglossia; when codeswitching is acceptable; when total separation between languages is required). Through the epigenetic processes of development, multilinguals' capacity to use both implicit and explicit processes increases, but because explicit processes are more trainable, they develop to a greater extent. Explicit learning appears to be less robust than implicit learning, but is faster, and the two processes (and those in between) functioning together within the individual appear to constitute a powerhouse for learning.

The precise role of implicit and explicit metalinguistic awareness in language learning, i.e. the process by which metalinguistic awareness assists learners to internalise input, is difficult to assess, but it does appear that focusing on form (at some level) increases the likelihood that the pattern of the grammar is internalised, together with its meaning.

4.1.5 Language as a Formal System

Many researchers from very different approaches to linguistics have pointed out that language can be seen as a formal system and that learners' ability to focus on and manipulate the form of language rather than its meaning has important consequences (Skehan 1998).

However, researchers from different fields differ considerably on how this system develops. For Vygotsky (1978), language is a universal symbol system whose acquisition is vital to the development of higher psychological processes. The functional organisation of these processes varies according to the nature of the symbol systems used, and how the processes are used. This means that a language's orthography and the way learners functionally use language will affect their organisation of knowledge. For Hamers and Blanc (1989: 60-62) language is part of the semiotic or symbolic function, in other words, of learners' representations of the outside world and their own actions and experiences. They add that organisation of higher-order knowledge draws mainly on propositional or symbolic representations, which use the learners' ability to categorise relations in order to store and organise information. Analysing linguistic form gives learners access to its structure, which they can then manipulate in order to reorganise their knowledge (*loc. cit.*). This analysis of linguistic form is metalinguistic awareness.

Awareness of language as a formal system, and awareness of grammatical form overlap conceptually. Variables that have been found to affect awareness of language as a formal system appear to be the same set of variables that affect metalinguistic awareness – for example, literacy, and knowing more than one language (see Section 4.2). Regarding literacy, reading requires a knowledge of the code, the ability to decode, and the ability to extract meaning from the text (Colley 1987). Vygotsky (1978) states that written language is a symbol system that has important consequences for the 'transformation' of cognitive processes (see also Olson 1991). The process of writing is considered to have even greater consequences

for triggering the realisation that language is a formal system than the passive use of literacy in reading. For example, Scribner and Cole (1981: 135) state that through the “processes of self-conscious composition, a literate person should gain a greater understanding of the systematic nature of language, its regularities, or in general parlance, its grammar”.

Learning a second language or being raised in a multilingual environment also produces a greater awareness of language as a formal system. For instance, Bialystok (1991: 113) points out that language can be seen as a logical symbolic system that is capable of being known and is also capable of guiding and shaping other aspects of cognition, so that learning a second language will have cognitive consequences. When these two variables are combined, and individuals become literate in a second language, there are even greater consequences for their awareness of language as a formal system.

Becoming literate in a second language... forces the language learner to examine the structure of the second language through the process of analysis so that the language is represented as a formal system. This means that bilingual children who are also biliterate have had the experience of analyzing two linguistic systems, the result of which must translate into a more powerful and more analytic conception of language in general (Bialystok 1991: 130).

4.1.6 Conclusions of Characteristics of Metalinguistic Awareness

From the research reviewed above, it appears that metalinguistic awareness develops throughout childhood and continues developing in adulthood. Metalinguistic awareness is associated with both cognitive and linguistic development. It can be implicit, where learners know more than they are able to explain, or explicit, where they are able to verbalise their knowledge, or at intermediate stages in between (Karmiloff-Smith 1991, 1996; cf. Krashen 1985). Metalinguistic awareness appears to be unitary in monolingual children who share the same background, but non-unitary

in multilingual adults who vary with regard to their education. Metalinguistic awareness is dependent on language being a formal system. For a definition of metalinguistic awareness, see Section 1.4.3.

4.2 Variables Known to Affect Metalinguistic Awareness

An examination of the literature on metalinguistic awareness leads to the conclusion that a number of circumstances lead to increased metalinguistic ability: learning another language, becoming literate, growing older, attending formal education, and learning a language in a formal learning environment. It is probable that these circumstances influence each other through being interdependent, and that they interact in their effect on metalinguistic awareness to some extent. They will be described here separately for ease of organisation in spite of the difficulties separating some of them under experimental conditions.

The two circumstances which may block the effect of these five circumstances are: acquiring a language that is not held in sociocultural esteem by the individual (this is often a reflection of the views in their surrounding speech communities), and not being literate in the native language/s, or not being literate in any language (Cummins 1978; Scribner & Cole 1981; Swain, Lapkin, Rowen & Hart 1990; Swain & Lapkin 1991; Wagner, Spratt & Ezzaki 1989; Baker 1988).

4.2.1 Bilingualism

Childhood bilingualism has been shown to benefit the development of a number of aspects of metalinguistic awareness, although, rather than grammatical metalinguistic awareness, the majority of studies focus on word awareness and, in particular, the child's appreciation that an object and its name share no more than an arbitrary

relationship (Vygotsky 1962; Ben Zeev 1977; Bialystok 1986b, 1988a; Ianco-Worrall 1972; Yelland *et al.* 1993: see Piaget 1929 on ‘nominal realism’).

Diaz and Klingler (1991: 173) list positive effects of bilingualism assessed by a range of metalinguistic tasks. These may include sensitivity to language structure and detail (Ben-Zeev 1977), detection of ambiguities and analysis of tautological sentences (Cummins & Mulcahy 1978), syntactic orientation in sentence processing (Galambos 1985), correction of ungrammatical sentences and detection of language mixing (Diaz 1985), and control of language processing (Bialystok 1986b).

Bilingualism seems to speed the development of grammatical metalinguistic awareness in young children, so that they show the metalinguistic abilities of older monolingual children at a much younger age. For instance, Galambos and Goldin-Meadow (1990) compared 32 Spanish-English bilinguals with 32 Spanish and 32 English monolinguals all between the ages of four and a half and eight. They were matched for age, intellectual development and sex. They were tested on fifteen incorrect sentences, each of which had a different type of error construction – for example, the English sentences included (Galambos & Goldin-Meadow 1990: 12): -

<i>Irregular verb</i>	<i>The little boy eated the cookies.</i>
<i>Comparative</i>	<i>Jonathan is the fattest than Mike.</i>
<i>Mass noun</i>	<i>William puts milks on his cereal.</i>

Galambos and Goldin-Meadow asked them orally to say whether a construction was correct or incorrect, secondly to correct the errors they spotted, and thirdly to explain why the errors were wrong. This last part tests their explicit knowledge. The “older” monolingual children (*ibid*: 33), who were able to detect a grammatical error were likely to be able to correct it, so Galambos and Goldin-Meadow suggest that noticing and correcting errors appears to tap similar metalinguistic skills. In contrast, explaining an error or underlying rule appears to be a different sort of ability, as the

children found it much more difficult and even if they were able to detect and correct, it did not mean they could explain why it was wrong.

As for the bilingual children, even though some of them were not as proficient in English as the English-speaking monolinguals, when their mean number of errors was adjusted to take their level of proficiency into account, it showed that they noticed more grammatical errors than the monolingual children at every age. Galambos and Goldin-Meadow (1990: 37) suggest that bilingual children are able to detect more grammatical errors than they would be expected to detect on the strength of their language proficiency alone (although the differences did not reach significance). In addition to this, in the pre-nursery age group the bilingual children were found to have an advantage over the monolingual children in producing grammar-oriented corrections, but not in grammar-oriented *explanations*. However, they produced proportionally fewer content-oriented explanations and more no-explanation responses than the monolinguals in both languages, and so behaved more like the older bilingual and monolingual children.

Galambos and Goldin-Meadow (1990) conclude from their results that the monolinguals followed the same acquisition order in detecting, correcting and explaining grammatical errors as the bilinguals. However, the bilingual experience speeded the transition from a content-based to a form-based approach to language for detection and correction, although their explanations were less influenced by this. They conclude that the experience of learning two languages speeds the development of grammatical metalinguistic awareness in young children, but does not alter the course of their development.

The last metalinguistic benefit to be discussed here that arises as a result of bilingualism is called 'control of attention' proposed by Bialystok in her model for the development of metalinguistic awareness (1986a, 1986b; 1987; 1988a, 1988b; 1991; 1992; 1994a, see Section 4.3.4). Bialystok (1992) points out that grammaticality

judgements require children to recognise a sentence that deviates from a standard pattern, or in other words, to analyse it and compare it to what they would expect. Standard grammaticality judgement tasks test children's 'analysis'. However, the task can be modified slightly, so that the sentence is 'grammatically correct' but contains a semantic error, for example, "Apples grow on noses" (Bialystok 1992: 506). If children are asked to ignore the meaning and judge whether the grammatical pattern is acceptable, this makes high demands on the child's control of processing. Even with a response bias for accepting sentences, monolingual children overwhelmingly claim that these sentences are unacceptable whereas bilingual children have been shown to make 'correct' judgements far more successfully (Bialystok 1986b; 1988a, see also Ben-Zeev 1977).

Bialystok (1992) argues that bilinguals' greater control over selective attention manifests itself as the ability to reorganise both language and knowledge. She cites Hamers and Blanc (1989: 50) who refer to bilinguals' "higher creativity and reorganization of information" as being the unifying factor that distinguishes their abilities. Bialystok (1992) also argues that bilingualism, either in children or in adults, only develops the control component of her model of metalinguistic awareness, not the analysis component.

Other studies have shown that advanced bilingualism is not necessary for a learner's metalinguistic skills to develop – even a limited amount of contact with a second language can have a beneficial effect, which has been observed to carry on into the acquisition of literacy (Yelland, Pollard & Mercuri 1993). On the other hand, Galambos and Hakuta (1988) found that children's proficiency in both their L1 and L2 affected metalinguistic awareness. As their Spanish-English speaking children gained proficiency in English, their ability to perform metalinguistic tasks in Spanish improved as well. Galambos and Hakuta (loc. cit.) refer to Cummins' developmental interdependence hypothesis (Cummins 1984), which suggests that a child's second language competence is partly dependent on the level of competence already achieved

in the first language. They suggest that if the two languages are interdependent, then the development of the L2 should also affect the L1. Cummins (1987: 64) states that there is “a considerable body of research ... which shows that cognitive-academic skills transfer across languages given sufficient exposure and motivation”. He suggests that an implication of this finding is that metalinguistic skills as well as linguistic skills will transfer across languages (he uses metalinguistic skills in its broadest sense, not just for grammatical structure), and indeed there is some evidence of this. For instance, Hague and Olejnik (1989) report that awareness of textual structure (which aids comprehension) transfers across languages, and Block (1986) notes the similarity of learners’ strategies for comprehension of an English text, regardless of their language background. Not only multilinguals’ languages, but their metalinguistic awareness appears to be interdependent.

Taking these findings as a basis, multilingualism should have an even greater effect on children’s metalinguistic awareness than bilingualism. Processing three or more languages must take more cognitive effort than two, so the effects discussed above should develop to a greater extent in multilinguals than in bilinguals. In this way, it would seem logical that child multilinguals perceive an even looser connection between a name and its referent than bilinguals and are also disabused of the notion of “nominal realism” at a younger age. They may possibly develop from a content-based to a form-based based approach to language at the same speed or faster than bilinguals so that they are able to detect and correct errors with greater ability, and develop attentional and selective control more quickly on account of having to attend to different languages with their different forms, different social conventions, and different linguistic variation within each of the languages (Bialystok 1992). Child multilinguals may develop a greater awareness of grammar – syntax and morphology – as a result of their greater cognitive effort.

In the same way, but to an even greater extent when the greater length of time for differential development through epigenetic interactions is taken into account, adult

bilinguals should develop a greater awareness of grammar than monolinguals. It is possible that learning languages after the critical period is even more cognitively demanding, as the natural 'plasticity' of the early years lessens (see Lenneberg 1967; Johnson & Newport 1989, Newport 1991; cf. Birdsong 1992; Cummins 1981a), social-affective states change (Krashen 1981b), and more effort and greater motivation may be required.

4.2.2 Literacy

There has been considerable discussion as to whether metalinguistic awareness gives rise to literacy or literacy gives rise to metalinguistic awareness (Bertelson 1986, cited in Birdsong 1989). Spoelders and Van Damme (1989) believe that the precise nature of the relationship between metalinguistic awareness and the acquisition of the reading skill has not yet been revealed, but state that recent research suggests that metalinguistic ability functions as a facilitator in the initial stages. As they point out, children's knowledge of language is implicit, yet in order to learn how to read they have to develop some degree of metalinguistic awareness so that they can map their phonological representations onto the letters. In contrast to this, many researchers (Morais, Cary, Alegria & Bertelson 1979; Donaldson 1978; Olson 1991) believe that metalinguistic awareness is a *product* of literacy. Both these lines of research have adequately proven their case using empirical research, which leads to the conclusion that metalinguistic awareness is both a requisite for literacy learning and a consequence.

Literacy encourages the development of metalinguistic awareness on account of language being turned into a visual medium: no longer dependent on aural or oral memory (Rubin 1995), listeners and speakers also become readers and writers able to see language, which becomes analysable and manipulable. But turning language into a visual medium has a number of consequences in addition to enabling readers to focus

on form, because writing fulfils a number of functions in ways which spoken language can not. Coulmas (1989) lists these functions as:

1. ***Mnemonic function.*** Writing enables exact words to be recorded. People developed writing as a mnemonic device to extend their memory, starting with tallies and lists, which in time were developed into texts requiring representation of verbs, and then more complex syntax. It is now possible for millions of people to read a writer's exact words – and there may be many thousand of them in a lengthy novel – through the invention of the printing press, whereas it would be impossible for one person to memorise them and recall them exactly for the rest of their lives.
2. ***Distancing function.*** The recipient can be distant in space and time, eg, thousands of miles or years away and still read the exact words of a text.
3. ***Reifying function.*** The written text takes on the qualities of an object as it is visible, tangible and unchanging, and the “meaning no longer resides in the speaker but in the text” (Coulmas 1989: 12-13). The reader is left to interpret the meaning of the text depending on context and what they assume the writer intended (Oakhill & Garnham 1988). “Writing provides the means of analyzing language because it turns language into an object” (ibid: 13), so representation of language is essential for any extensive explicit analysis of metalinguistic form.
4. ***Social control function.*** Writing is used to encode the law and for registering people for taxation, military draft and voting (ibid: 14), and after birth, marriage, and death. As well as becoming the standard written language, the dialect of the educated elite may become the standard spoken language on account of the code's prestige and permanence.
5. ***Interactional function.*** Writing enables a general readership who are unknown to the writer to act on or according to a text, such as an advertisement, letter, or recipe. The text influences, regulates, or co-ordinates their actions (ibid: 14).
6. ***Aesthetic function.*** Written texts can transmit verbal art, eg, literature, and poetry – though historically much poetry has been transmitted orally. Also, because writing is visible and tangible, it can be turned into art, eg, calligraphy turns a functional communication into a thing of beauty.

Three of these functions relate to the development of metalinguistic awareness: the reifying function, the mnemonic function, and the aesthetic function. The most

important of these with regard to the development of metalinguistic awareness is the reifying function of writing, which makes language visible and therefore analysable with regard to its grammatical structure, as well as to a host of other characteristics. The reifying function provides a physical text from which two possibilities arise for retaining the text: using the text as a reference work which avoids the necessity of memorising; and secondly, memorising texts word-for-word. Some language learners are heavily reliant on *visual* (or tactual) memory for script and text. The third function relating to metalinguistic awareness, the aesthetic function, often depends on the visible structure of the language, not just in formal texts such as poetry, but also on plays upon words such as puns and jokes, often metalinguistic in nature.

Literacy is vital for the development of metalinguistic awareness because it permits people to see language. As Olson (1991: 266) states:

Learning to read and write significantly increases metalinguistic awareness because fixed written text that is available for rescanning, comparison, commentary and analysis promotes the objectification of language.

Many studies compare literates to non-literates on metalinguistic tasks in order to examine the effects of literacy on metalinguistic awareness, particularly phonological awareness (eg, Morais, Cary, Alegria & Bertelson 1979; Bryant & Bradley 1990). Even living in a literate society can affect individuals' knowledge about language. All the groups in Scribner and Cole's (1981) study of the Vai in Liberia, including the non-literates, were "virtually perfect" at identifying ungrammatical phrases. However, when it came to explanations of their grammaticality judgements, the Vai literates outperformed the other groups (ibid: 152). Scribner and Cole (ibid: 158) put this down to Vai culture where men often disputed amongst themselves as to what was "correct Vai". As Gombert (1992) points out, people seem to develop the metalinguistic abilities that they need in order to function.

Literacy can have a considerable effect on the development of grammatical metalinguistic awareness, as turning language into a visual object increases cognition about language form (see Section 4.2.2 on literacy). If learning to be literate in one language increases learners' metalinguistic awareness (Karanth, Kudva & Vijayan 1995; Ricciardelli, Rump & Proske 1989), then being able to read and write in more than one language should increase it even further and perhaps in different ways. Biliteracy (literacy in two languages) is contingent on bilingualism, i.e. knowing two languages to some extent, however limited (see Spener 1994). Bilingualism has been shown to affect the development of young children's literacy concepts (Göncz & Kodzopeljic 1991) as the cognitive effort involved in using two different language systems leads to an awareness of the nature of a 'word' at a much younger age than in monolinguals and to an early awareness of the arbitrariness of names to referents (Ianco-Worrall 1972; Ben-Zeev 1977). These basic metalinguistic concepts resulting from their bilingualism give children a headstart in the acquisition of reading.

Although evidence from biliterate child bilinguals shows that the development of metalinguistic awareness is enhanced by bilingualism together with biliteracy, does a *very limited* amount of formal L2 learning help develop their metalinguistic abilities? Yelland, Pollard & Mercuri (1993) studied preparatory and grade 1 children in the United States to discover whether limited childhood bilingualism gives any metalinguistic benefits. After just six months of one hour of Italian instruction each week the limited bilinguals showed a significantly higher level of word awareness in English than their monolingual peers. This advantage then weakened through the later part of the year, and the researchers believe that both groups were then approaching ceiling levels of performance. They then asked whether this advantage might carry on into reading acquisition, and indeed, the limited bilinguals did display significantly greater word recognition skill than the monolinguals. They conclude that benefits do accrue to young children, probably because learning a second language develops the children's metalinguistic awareness even after a short period of learning a second language, and because this awareness is transferred to their literacy skills.

Bilingualism with literacy in two languages affects *adults'* metalinguistic abilities. This is supported by Scribner and Cole's (1981) survey of the metalinguistic abilities of the Vai people in Liberia, who developed their own syllabic script and taught it to their children in the home: it was not taught in school therefore Vai literacy effects are separated from schooling effects. The Vai-Arabic biliterate group outperformed both the group of Vai script monoliterates and the group of non-literates on an oral language task of being able to name a long word (rather than a long referent), with the results being "tied directly to reading ability in the two scripts" (1981: 145). When the survey was replicated, there was a "positive contribution linked to years of Qur'anic study, and knowledge of two or more tribal languages", confirming that bilingualism together with biliteracy develops learners' ability to look at the form of language, especially when learners know two different orthographic systems of representation.

If biliterate bilinguals show a greater degree of metalinguistic awareness than monoliterate bilinguals and monoliterate monolinguals (Thomas 1988), it would seem logical that multilinguals who are also multiliterate should develop an even higher degree of grammatical metalinguistic awareness, because they will have had even more experience at being literate in different languages. A person who is literate in three or more languages should exhibit considerable ability in manipulating the languages they know and explaining how they function.

Attending to the form of language rather than its meaning can have an effect on the learner's memory for the exact words used. For instance, Hildyard and Hidi (1985, cited in Olson 1991) found that when children wrote their texts down, afterwards they were able to recall more of the words they had used, whereas oral production resulted in a better memory for the gist but a poorer memory for the actual words. The children's improvement in memory for form over content in written texts is due to

their attention to the linguistic properties of the text, both its surface form and logical structure.

Much more research has been carried out on the relationship of metalinguistic awareness to reading than to writing. This is because reading inevitably precedes writing and also because most research has been carried out on children, whose writing abilities are relatively unsophisticated compared to adults'. Reading instruction is essentially metalinguistic in nature as learners are taught to attend to the form of the language. In the initial stages the learners' attention is on the physical shape of the letters or characters, then attention moves on to phonological form (how the phonemes link to the written form), then when decoding is more fluent more attention is paid to grammatical form. Often learners' attention is switching between all of these very quickly, though the automaticity developed by experienced readers means that they will only become aware of it if a mistake or error grabs their attention.

Reading and writing skills are interrelated, but Gombert (1992) states that writing requires a greater cognitive effort as reading requires analysis but writing requires synthesis. It simultaneously constitutes "an extended field for the knowledge gained in reading and a tool for the consolidation of this knowledge" (ibid: 173). Writing is classically described in three stages: planning, transcription, and revision. Planning requires the writer to select a theme, anticipate what is to be communicated to the reader, and select and organise the ideas that are to be put into words in such a way that they are coherent and are consistent with the prior knowledge expected of the reader (loc. cit.). Transcription requires the writer to put what has been planned into words, considering lexical choice, syntax, punctuation and orthography. Lastly, revision requires the writer to compare the produced text with what was planned, to correct and evaluate, and rewrite (loc. cit.). These stages do not occur consecutively, but it does not appear possible for the writer to be conscious of them all at the same

time (loc. cit.). The writing process places a heavy demand on writers' ability to 'synthesise' as well as their ability to 'analyse'.

To conclude by returning full circle, Saywitz and Wilkinson (1982: 236) also believe that language and metalinguistic awareness develop hand in hand and benefit each other reciprocally, as "Metalinguistic awareness functions to influence further language learning and, in return, is influenced by the ... pragmatic use of acquired linguistic knowledge". Literacy, particularly literacy in a number of languages, may play an important role in the development of grammatical metalinguistic awareness.

4.2.3 Maturation

Maturation is essential to the development of metalinguistic awareness. Children below the age of six or seven are unable to reflect on the form of language in the way that adults can, but they are often observed to 'play' with language from a very young age. For example, a child of two years five months can invent nonsense words such as the use of "sish" for 'butter' (van Kleeck & Bryant 1984, cited in Birdsong 1989: 16). At about the age of three, children also develop an awareness of rhyme (loc. cit.), which is recognised as being important for the acquisition of alphabetic literacy (Bryant & Bradley 1990). At the age of six or seven, at about the same time as they develop comprehension and production of more complicated syntactic constructions such as the passive, children begin to develop the ability to reflect on language. There may be a relationship between this basic metalinguistic awareness and the attainment of the stage of concrete operations proposed by Piaget, as both show that children have developed the ability to monitor their own thought (Hakes 1980).

In order to examine the development of metalinguistic awareness in children, Hakes (1980) tested a hundred children – twenty each at the age of 4, 5, 6, 7 and 8 on tasks such as synonymy, phonemic segmentation, and more relevantly for grammatical metalinguistic awareness, *acceptability*, i.e. a grammaticality judgement task. The

results proved very informative: on the acceptability tests, the children would judge what Hakes (1980: 51) understands as grammatically correct but meaningless sentences such as “The big fish was swimming in the sandbox” to be wrong. Hakes’ study shows that plausibility and truth-value are much more salient to children than grammaticality, understood solely as ‘agreement’. (This has also been shown to be the case with non-literate people, as described by Scribner & Cole 1981). Very young children naturally consider the content (meaning) rather than the structure of sentences even when asked to perform a metalinguistic task only paying attention to the grammar. However, Hakes (*loc. cit.*) found that from the age of four to eight, the children’s content-based reasons decreased from 30% to nearly 0% for Selectional Restriction Violations, from about 14% to 0% for Subcategorisation Rule Violations, and from about 5% to 0% for Word-order Changes (Birdsong 1989: 34), showing that children rapidly develop the ability to attend to the form of language rather than its meaning.

Hakes (1980) noticed during the course of these tests that some of the children, particularly the younger ones, showed an aversion to giving explanations. They had a tendency to judge a sentence as acceptable so that they would not have to explain it (*loc. cit.*). It would seem that they disliked the cognitive effort involved. This reaction is relevant to children who are brought up in a bilingual or multilingual environment from a very young age as they are not able to avoid the cognitive effort of having to process two or more languages but must do so in order to function in their environment.

Maturation can have significant effects on children’s metalinguistic awareness as well as their overall cognitive development. For instance, Balkan (1970, cited in Cummins 1987: 69) tested monolinguals matched for nonverbal intelligence with bilinguals who learned their language before the age of four (early bilinguals), and bilinguals who learned their L2 between the ages of four and eight (late bilinguals). One test involved restructuring a perceptual situation similar to an embedded figures test, and

the other test measured sensitivity to the different meanings of words. He found that the late bilinguals were better than the monolinguals on these tests, and the early bilinguals much better than both. While Hakes' conclusion that code switching from one language to another leads to a greater degree of cognitive flexibility is unlikely (Diaz & Klingler 1991) as code-switching may not take place in some bilinguals' particular social circumstances, it may be that having to learn two linguistic systems at the same time as the massive increase in cognitive development that occurs before the age of four, enhances the development of metalinguistic awareness.

At about the same age or soon after these cognitive developments take place, children in Western Europe, where schooling is the norm, begin to learn to read and write and to attend school. Literacy, as has been described (see Section 4.2.2), has important consequences for the development of a child's metalinguistic awareness, as does schooling (see Section 4.2.4). Nor does an individual's metalinguistic awareness stop developing when they finish attending school or once literacy is acquired, but it continues to develop throughout their lifetime (Bialystok 1991; Geer, Gleitman & Gleitman 1972; Dabrowska 1997) depending on how often it is used or 'exercised', and in what way. It appears that it is not merely the length of time that is spent using the ability, but the tasks for which it is used that develop metalinguistic awareness. For example, many language games are form-based – Thomas (1988) specifically mentions code-cracking and crosswords. And with advanced age, metalinguistic awareness begins to deteriorate along with cognitive abilities (Deakin 1995).

To sum up, everybody develops metalinguistic awareness to some extent but people vary enormously. Some children begin to play with language at a very young age – two or three – and others start much later, or may not demonstrate it much and never show much interest. Metalinguistic awareness not only develops through childhood but can also continue to develop in adulthood if it is used. Children's maturation appears to increase the effects of other background variables such as bilingualism, literacy, education, and formal language learning, so we can deduce that as adults

develop into full linguistic and cognitive maturity, these variables should show even greater effects, only decreasing with the advent of old age.

A further point of evidence for metalinguistic awareness developing as learners grow older is several researchers' have noted that their participants fall into three main groups: learners with level abilities on different parts of the MLAT; young learners with high memory (MLAT5) abilities but lower grammatical sensitivity (MLAT4); and older, educated adult learners with low memory abilities and high grammatical sensitivity (eg, Wesche 1981). This suggests that as learners get older, their ability to remember new information decreases, a frequent observation, and their metalinguistic awareness increases. It should be noted, however, that metalinguistic awareness in participants' native language has been shown to attrite with advanced age. For example, Deakin's (1995) study of verbal humour found that elderly adults' understanding of ambiguity, such as those in jokes, diminished with advanced age.

4.2.4 Schooling

The effects of schooling on metalinguistic awareness are very hard to separate from the effects of literacy, particularly in Western Europe where much schooling concentrates on learning and using literacy. Western European populations have a literacy rate of approximately 95% as basic schooling requires everyone to be literate to a certain degree of proficiency (which leaves a small but substantial percentage which does not seem to diminish of people who for many reasons, do not become literate, or only to a very limited extent). Because education is compulsory it is not possible to find normal non-literate children and adults, only normal preliterate children (Idrissi-Bouyahyaoui 1987) which means that much research on schooling effects concentrates on pre-school children, with a few studies on older non-Western children but little research on adults. Research concentrates on the task-control participants demonstrate, i.e. their ability to ignore information not contained in a task.

Donaldson (1978) believes metalinguistic awareness to be an effect of learning acquired at school, particularly learning to read, as explicit tuition requires children to become conscious of grammatical rules which they had previously respected automatically. She argues that schooling requires the child to look at the form of language rather than just its content, and to develop 'disembedded' thinking. She describes disembedded thinking as the ability to ignore "human sense" and attend only to the given information (Donaldson 1978: 76), an essential attribute for success at school. Following the same rationale, Bialystok (1986b) argues that the effect of schooling is to develop children's attentional control, and points out that the ability to solve syllogisms and to consider decontextualised information requires the child to objectify the task and not introduce extraneous information that is relevant to the real world, but not necessarily to the task as set by the researcher. In addition, schooling requires children to attend to the content of a lesson which may bear little relation to their lives outside school, or to other lessons. They also have to learn to switch between lessons.

Studies have been carried out in societies where schooling is not the norm so unschooled participants are not seen to be at a disadvantage. Syllogistic reasoning is said to be one of the main areas where unschooled people appear to have problems when performing metalinguistic tasks for experimenters. In the Scribner and Cole study (1981), propositions that contradicted unschooled participants' real-world knowledge caused them great difficulty and they based their response on 'empirical' rather than 'theoretical' responses in much the same way as the children did. However, Scribner and Cole replicated their survey (see the *New problem* below) to include syllogisms about the moon – almost everyone had heard that astronauts had been to the moon but they did not know what the moon was like – so the new syllogisms did not contradict their real-world knowledge. Examples asked by Scribner and Cole (1981: 155) include:

1. *(Old problem)* *All houses in Liberia are made of iron.
My friend has a house in Liberia.
Is my friend's house made of iron?*

2. *(New problem)* *All stones on the moon are blue.
The man who went to the moon saw a stone.
Was the stone he saw blue?*

This time everyone scored better and the gap between schooled and unschooled closed, showing that they could indeed perform logical syllogisms when their real world knowledge did not interfere with the task. Scribner and Cole also discovered that the participants performed better if this particular test was given at the end of the series of tests, showing that the discourse context affected their understanding of the task, i.e. they 'tuned in' to what the researchers wanted.

Schooled literates, in contrast, answered the problems using the information given in the propositions regardless of whether they were factually true or plausible (loc. cit.). Unschooled people's inability to give the reply expected by the researcher under certain conditions is not a sign that they are unable to reason logically, but is because they have not developed the 'control' to attend only to the form of the given information and ignore its meaning, and because they lack familiarity with the conventions of Western formal logic, which Western schooled people are exposed to from a young age.

The following study on adults goes as far as to suggest that different amounts of formal schooling may affect grammatical metalinguistic awareness. Geer, Gleitman and Gleitman (1972) compare adults' abilities at paraphrasing the meanings of nonsense three-term compound words. They chose two groups of participants: one group had all completed their school education and were working in offices and the other group were postgraduate students. The postgraduate students not only performed much better than the clerical workers at paraphrasing, but unlike the

clerical workers, their confidence in the correctness of their paraphrases related to how accurately they had responded. In order to make sure the differences between the two groups were not due to differing memory abilities, the researchers ignored all examples where the participant could not repeat the compound they had been asked to paraphrase after they had paraphrased it.

Nor was the difference between the two groups due to the clerical workers' inability to apply compound rules recursively, as even when the compounds were only two terms they were still less able to paraphrase. Most insisted that 'boot-green' was just another way of saying 'green-boot', despite the fact that all were quite sure that 'dog-house' and 'house-dog', and 'garden-flower' and 'flower-garden' were not equivalent (ibid: 355). Most of their errors were on this type of noun-adjective construction. This would seem to show an inability to attend to the grammatical form of the words they were asked to paraphrase. Geer, Gleitman and Gleitman (ibid: 355) conclude that either the clerical workers were lacking in their degree of grammatical competence, or that all the participants were equally competent but about different grammars. Dabrowska (1997) also found that comprehension of syntactically anomalous and deviant English sentences by unskilled workers, undergraduates, graduates, and university teachers was related to their level of education. Dabrowska's experiment provides evidence that education affects individuals' ability to process grammar when they are unable to resort to explicit analysis of grammatical structures, which affects comprehension. We can conclude that individuals differ as to the amount of metalinguistic awareness that they develop on account of the different amounts of education they have undertaken. Individuals with less education and less metalinguistic awareness are less able to switch from a focus on language content to a focus on language form and back again. The effects of education do appear to continue beyond school and university, and to be proportionate to the amount of education individuals have received.

4.2.5 Studying Languages

Formal language learning has been found to play an important role in developing metalinguistic *knowledge*, and therefore it seems likely that it plays a role in developing metalinguistic *awareness*. The following study by Thomas (1988) will be described at length as it is one of the few experiments that have been conducted to compare adult bilinguals who learned their L2 informally with those who had formal classroom training in both languages.

Thomas (1988) carried out a small study comparing 10 monolingual English college students learning a second language (French) with 16 English-Spanish bilingual college students learning a third language (French). She also compared the 10 bilinguals with a minimum of two years' formal classroom training in both languages (biliterate bilinguals) with the 6 who had acquired their other language informally (monoliterate bilinguals). She hypothesised that students' performances on vocabulary and grammar, but not comprehensibility of composition, would be facilitated by the higher level of metalinguistic awareness they had previously developed when they began to learn a foreign language.

The students were equal as regards socio-economic status, amount of exposure to French, teacher, teaching method, textbook, and there were no significant differences between their language 'aptitude' as measured by the Modern Language Aptitude Test or their motivation on a modified version of Gardner and Lambert's attitude and motivation questionnaire. The first test was translation of vocabulary from French to English, half of which had visual and semantic cognates in Spanish and half did not. Secondly, the grammar test consisted of partial sentences that were to be completed from a choice of three options, only one of which was grammatically correct. This test measured knowledge of word order, subject-verb agreement, adjectival agreement, and formation of negative sentences. Thirdly, the students were asked to write a composition roughly ten sentences long which native speakers of French then judged on a scale of I to V.

The students sat all three tests at the end of their first semester. The bilinguals performed better than the monolinguals on the vocabulary test ($p < .1$) and grammar tests ($p < .05$), with the biliterate bilinguals performing better than the monoliterate bilinguals on the grammar test ($p < .1$). In the composition test, Thomas found that the biliterate bilinguals made the least errors in all of the grammatical structures and also attempted more structures than either the monoliterate bilinguals or the monolinguals. Against her hypothesis, native speakers judged the biliterate bilinguals' compositions to have much greater communicative value than the other two groups. Surprisingly, the monoliterate bilinguals produced the highest percentages of errors and attempted the least number of structures, performing even worse than the monolinguals, however, it is not demonstrated whether this is statistically significant.

Thomas (1988) concludes that bilinguals who acquire two language systems in a natural setting and later acquire literacy in only one, do not necessarily develop the skills required in foreign language-learning classrooms.

Formal study of the Spanish language may help bilingual students to develop a grammatical sensitivity superior to that of students who acquire Spanish through informal exposure. Such conscious linguistic knowledge would seem to be independent of the linguistic system that is built up subconsciously as a learner acquires a second language (Thomas 1988: 240).

She suggests that explicit instruction may be necessary for students to be aware of language as a system before they can learn other languages in a classroom environment, and also to exploit the potential advantage of knowing a language typologically related to the target language. Unless they recognise typological similarities they may not be able to “develop metalinguistic awareness, exploit positive transfer, and avoid interference” (ibid: 240; see also Kellerman 1986; Epstein, Flynn & Martohardjono 1996). She also believes that students' conscious knowledge of the rules and forms of more than one language may “increase the potential use of

metalinguistic awareness as a monitor to create acceptable spoken or written utterances in a third language” (Thomas 1988: 236).

Thomas’s study indicates not just that bilinguals had learned more than monolinguals in the classroom, but that bilinguals who were biliterate and had received at least two years of classroom instruction in Spanish, their native language, had learned more than bilinguals who had not experienced schooling in two languages. Biliterate bilinguals’ increased proficiency also extended to written composition, not just knowledge of structure. Study using two languages appears to affect learners’ metalinguistic awareness, although the research does not separate the effects of instruction in two languages from the effects of biliteracy (cf. Scribner & Cole 1981).

4.2.6 Conclusions of Variables Known to Affect Metalinguistic Awareness

The variables discussed here – literacy, bilingualism, maturation, schooling, and language learning in a formal learning environment – are all important for the development of metalinguistic awareness because they necessitate the conscious knowledge and intentional control of many aspects of language and so play a trigger role in the appearance of metalinguistic abilities (Gombert 1992). Adult multilinguals may have experienced many of these variables or even all of them. They may be highly literate, cognitively mature, and have been educated for a considerable period of time. They may have been multilingual from a young age or have learned second languages later in life, but it would seem that multilinguals who have received formal education and who are literate in more than one language should show an advantage in their degree of metalinguistic awareness compared to those who are not because these skills are inherently related to the ability to focus on form.

4.3 Psycholinguistic Models of Metalinguistic Awareness

Few explanations have been proposed to characterise the development of metalinguistic awareness, considering the large amount of research that has been carried out on the relationship between metalinguistic awareness and bilingualism and literacy. Models of the development of metalinguistic awareness need to take into account the characteristics described in Section 4.1: that metalinguistic awareness has effects on both language and cognition, that awareness can be implicit or explicit, that general metalinguistic awareness is not unitary but a collection of skills so grammatical metalinguistic awareness may also not be unitary; together with the variables known to affect the development of metalinguistic awareness positively (see Section 4.2): learning languages, literacy, maturation, education, and language learning in a formal environment; and negatively: not being literate, and acquiring a language that is not held in sociocultural esteem by the learner.

Four different models that have been proposed for metalinguistic awareness will be evaluated in this section, namely, Marshall and Morton (1978), Karmiloff-Smith (1986), Bialystok (1991, 1994a; Bialystok & Ryan 1985a, 1985b) and Gombert's (1992) model. Of these four models, Marshall and Morton (1978), and Gombert (1992) refer only to first language acquisition not second language acquisition, while Karmiloff-Smith (1986) and Bialystok (1994a) are relevant for both. These models were developed in response to different problems regarding metalinguistic awareness, and so are very unlike one another. Each was developed to explain a part of the overall concept of metalinguistic awareness: Marshall and Morton's to explain on-line processing, and the other three to explain the development of metalinguistic awareness. There is another model by Bialystok (1994b) relevant to metalinguistic awareness, but I have included it in the literature review on multilingualism as she uses it to characterise her theory of multiple language representations (see Section 3.1.4).

4.3.1 Marshall and Morton (1978)

The first model is proposed by Marshall and Morton (1978) to explain on-line processing in first language acquisition (see Figure 4.2).

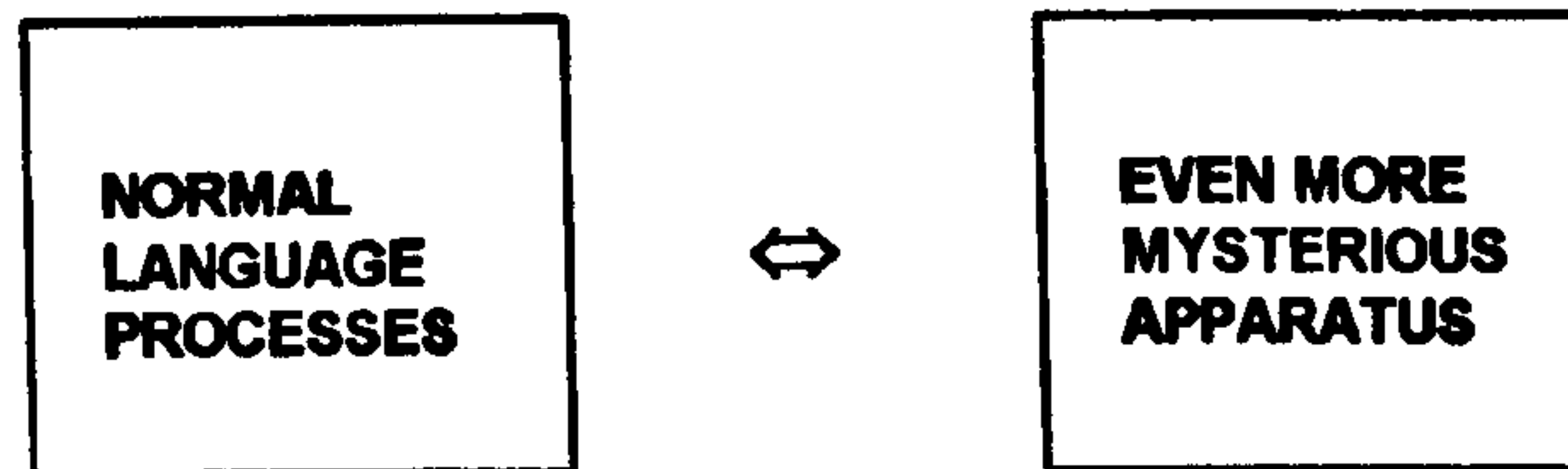


Figure 4.2 Marshall and Morton's (1978) model.

Birdsong (1989: 24-25) describes the model as follows.

Normal language processes (NLP) receive, compile, and interpret input and are capable of producing speech. The components of NLP are described as "mysterious apparati". Another mechanism called EMMA (Even More Mysterious Apparatus) carries out executive functions of monitoring and altering the operations of NLP. The defining feature of EMMA is metalinguistic awareness in the form of detecting and identifying malfunctions in NLP.

For instance, a child may ask what a particular word means, "What does residue mean?", which Marshall and Morton (1978: 233) point out is more efficient than having to wait for its gradual acquisition. But other feedback may occur less explicitly, for example, in the following exchange with a child of four years eleven months (Marshall & Morton 1978: 235):

Child: I brang it home from school.
 Adult: What?
 Child: I bringed it home.
 Adult: Eh?
 Child: I brung it home.
 Adult: Oh vay!
 Child: Brought!
 Adult: What d'you know – we finally made it!

As Marshall and Morton (1978) point out, 'Despite this vagueness of external feedback the child instantly homes in on the inflectional morphology of the verb', and from this they hypothesise the existence of a monitor which provides a confidence rating for words in order to identify which word was not understood. Alternatively, no monitor is required and the utterance is recirculated through a system of unstable rules, triggered by the adult's uninformative error-signal. The same phenomenon has been noted in adult second language learners (Pica, Holliday, Lewis & Morgenthaler 1989). Marshall and Morton argue

that 'awareness' corresponds to the operation of an error-detecting mechanism which has access to subparts of the primary linguistic comprehension and production systems. The child passes from error detection, to specific error location and then to error repair (cited in Karmiloff-Smith 1986: 97).

There are many problems with this model, indeed Karmiloff-Smith (1986: 97) could not resist renaming "EMMA" the "Eloquent Marshall Morton Aberration". There is no evidence that the child has any awareness of the structure of language, as the spontaneous corrections could be semantically-driven: for many researchers awareness must precede overt repair (Karmiloff-Smith 1986). Karmiloff-Smith (1986) points out that Marshall and Morton's model describes on-line processing, not development, so that interactions such as the parent-child one above do not necessarily indicate that the child's linguistic subsystems have been restructured, which might lead to explicit awareness. The model is only concerned with 'awareness' as far as correction and features nothing more explicit on the continuum, such as explanation; nor does it have a role in creating speech that is free of errors, only in correcting them (Birdsong 1989). The model is also failure-driven rather than success-driven, and as Pinker (1994) points out, in some cultures children are not spoken to until they have reached a certain level of competence, so it is not possible for them to learn from their mistakes. And Long, from the point of view of second language learning, argues that learners rarely use negative evidence and do not look

for negative evidence to falsify their hypotheses because “People like to discover they are right about things, not mistaken” (Long 1983: 462).

Marshall and Morton’s model is overtly underspecified: it does not describe development or implicit or explicit processes, nor the way in which individuals’ experience of language learning, literacy, maturation, education and studying languages affect their ‘EMMA’. Because the model only attempts to explain spontaneous corrections in first language acquisition and is not relevant to more explicit demonstrations of metalinguistic awareness, nor to experienced language learners, we will examine the next model.

4.3.2 Karmiloff-Smith (1986)

The second model consists of a three-phase model of language development, proposed by Karmiloff-Smith (1986, 1987). The description given here is simplified for the sake of brevity. In the first “Implicit” phase, children use positive and negative feedback until their output matches adults and they only receive positive feedback. This stability initiates the next phase “Explicit 1”, in which individual linguistic elements are organised into systems with explicit internal relationships. In the last phase “Explicit 2”, the child fine-tunes and consolidates the representations, balancing the reconsideration of surrounding adults’ input with the systems established in “Explicit 1”. The child’s output appears to be the same in the first and the last phase, but in the first no systematic mental representation has been formed. Each of these phases recurs as each successive linguistic subsystem develops, eg, the possessive, or the ditransitive verb. Karmiloff-Smith (1986) holds that metalinguistic awareness is an optional final stage and that linguistic knowledge that is “explicitly represented, consciously accessible, and applicable to metalinguistic tasks such as learners’ explanations for their choice of one word or linguistic form over another” is limited (Birdsong 1989: 29).

Karmiloff-Smith (1986) believes that in spite of the fact that metalinguistic awareness has almost no role to play in language acquisition apart for a minor role in on-line processing, it has an important role in cognitive development as a whole. She proposes that the prerequisite for restructuring representational relationships is success, rather than failure, as opposed to behavioural change, which is based on both negative and positive feedback. She points out that most researchers have concentrated on the development of metalinguistic awareness rather than its function, and believes that conscious metalinguistic statements could provide clues to the processes that are unconscious. Lastly, as detailed previously (Section 1.4.3), she maintains that metalinguistic awareness includes implicit cognition about language form (*loc. cit.*).

Karmiloff-Smith (1986) points out that learners are not always able to use or apply their metalinguistic knowledge, so that performance may not reflect underlying competence. Bohme (1983) and Bohme and Levelt (1979, both cited in Karmiloff-Smith 1986) studied the possible correlation between children's linguistic awareness and their actual performance. The study involved the German possessive and gender-marking systems and used elicitation procedures with children to obtain different levels of awareness via error detection, correction and explanation. The longitudinal, correlational measures showed that a high level of *awareness* at the time of the first test was predictive of high level of performance at the time of the second test five months later. However, results for linguistic performance did not predict either later linguistic performance or metalinguistic awareness. This would seem to show that metalinguistic awareness precedes linguistic development (Birdsong 1989: 30). However, Karmiloff-Smith points out that Bohme's results link metalinguistic performance to linguistic performance rather than learners' (inaccessible) competence, so that there is no way of knowing which phases of development are reflected in the results.

Karmiloff-Smith's model is developmental and can characterise the full continuum of metalinguistic awareness from implicit to explicit, and child to adult awareness, and her description of the process of representational redescription of knowledge accounts for developing explicitness in learners' representations. Representational redescription could also explain why learning languages, literacy, maturation, education, and studying languages are linked with development in metalinguistic awareness, but Karmiloff-Smith does not overtly make any link between language experience and metalinguistic development.

4.3.3 Gombert (1992)

Gombert (1992) uses the Karmiloff-Smith model as a basis for his own model but proposes that development occurs in four overall phases, not three recursive ones. The first phase corresponds to the acquisition of the first linguistic skills, the second to the acquisition of epilinguistic (i.e. unconsciously monitored) control, the third to the acquisition of metalinguistic awareness, and the last to the automation of the "metaprocesses" (i.e. metalinguistic processes) (ibid: 187). Gombert states that only the first two phases are obligatory.

The first phase, "acquisition of the first linguistic skills" is identical to Karmiloff-Smith's first "Implicit" phase, with children using positive and negative feedback until their output matches adults' and they only receive positive feedback. Gombert stresses that the acquisition of the first skills does not concern production only but the processing of both production and comprehension. In contrast to Karmiloff-Smith's model, the stability that this phase gains is cast into doubt by the "increased length and complexity of the models provided by the adult and the length of the child's own productions" (ibid: 187) which triggers the next phase, acquisition of epilinguistic control.

The second phase, just as in Karmiloff-Smith's model, corresponds to an organisation of the implicit knowledge gained in the first phase. However, Gombert states that the motor of development here is not just the control of the internal organisation of knowledge acquired previously, but also the possibility of linking the organised knowledge to new knowledge (ibid: 188). Also, the internal linking of the implicit knowledge leads to a functional and unreflected awareness of the system, so that the child is able to detect ungrammatical utterances. Detection may occur through the "dissonance" of the utterance – because it does not fit what has already been encountered by the child – or by the child's inability to understand it (ibid: 189). Explicit awareness of this system of rules is not gained automatically and requires metacognitive effort, which does not occur until it is both required and influenced by fresh stimulus. Gombert proposes that the metalinguistic competence that is necessary for written language corresponds to this "stable epilinguistic control" (ibid: 189) and also marks the end of this phase.

The third phase, the acquisition of metalinguistic awareness, requires intentional control of the "stability" of the previous stage. This phase develops gradually, and the participant only becomes aware of those aspects of language that have to be understood in order to accomplish any new linguistic task. For instance, reading and writing necessitate the conscious knowledge and intentional control of many aspects of language and so play a trigger role in the appearance of metalinguistic abilities. Gombert does not state the mechanisms for this, nor does he distinguish reading or writing activities that require considerable conscious control from those that do not (Carlisle 1993: 555). Gombert (1992: 190) states that, "Early metalinguistic awareness seems to facilitate the acquisition of abilities which, being necessary to this awareness, then stimulate it in their turn". The last phase, the automation of the metaprocesses, is linked to the fact that "'meta' functioning imposes a high cognitive burden" (ibid: 191). Unlike epiprocesses, which are also automated, metaprocesses are always available to conscious access.

Gombert's model is developmental, but because he has not adopted the cyclical phases of Karmiloff-Smith's model and instead proposes overall phases of development, the processes of development necessary for each additional construction or item to be learned and become more explicit are less clear. Gombert discusses at length the relationship between metalinguistic awareness and literacy, schooling, and children growing older: he does not discuss the effects of language learning, studying languages, or advanced education and maturation, as his research is on first language acquisition in children. His division of 'general' metalinguistic awareness into metaphonological, metasyntactic, metapragmatic, metatextual, metalexical and metasemantic assumes that awareness develops in different domains. The model is particularly useful in the way it characterises epilinguistic development as an intermediate phase between implicit and explicit awareness, as it accounts for data showing that correction requires a degree of awareness but less awareness than explanation.

4.3.4 Bialystok (1994a)

The purpose of Bialystok's framework for metalinguistic awareness is to explain aspects of processing that are "general and applicable to a number of symbolic representation systems, such as number, music and maps" (1994a: 158) as well as language. The framework, which is based on information-processing theory, is dedicated to the explanation of development, and assumes that mental representations evolve. It is relevant for both L1 and L2 development.

At the centre of Bialystok's framework are two cognitive processing components, the "process of analysis" and the "process of control" (1994a: 159), which she represents as two intersecting axes (see Figure 4.3). These two variables develop continually across an individual's lifetime and, to a certain extent, are governed by different factors. Analysis is the process by which mental representations that were loosely organised by meaning become rearranged into explicit representations organised

around formal structures (loc. cit.). Relatively unanalysed representations of language, such as phatic conversation, show little concern for how meaning and function are signified, but more analysed representations are based on symbolic relations. An example of this is beginning literacy: as analysis increases, a learner's initial whole-word recognition develops into the ability to map sounds to letters, and this develops into analysed whole-word recognition which becomes faster as the skill is automated. Bialystok (ibid: 160) states that reading requires more explicit, or more symbolic, representation of language than oral language. Increasing analysis leads to an increase in accessibility to knowledge, while "knowledge of language represented in a less analyzed form will limit the learner in the range of functions that can be achieved" (loc. cit.).

The second component is "control" which Bialystok describes as "the process of selective attention that is carried out in real time" (1994a: 160). Mental representations require there to be a means of focusing attention on a representation specific to a particular purpose, for example, to avoid ambiguity. Because control is constrained by time, a task that can be solved with less attention appears to be solved more fluently or automatically (ibid: 161). As control develops, learners become better at carrying out their intentions and directing their performance, which shows an observer that they have developed a higher level of control (loc. cit.). For Bialystok (1991), the learner's conscious attention is not necessary for analysis to take place. Automaticity has disappeared from recent descriptions of Bialystok's analysis/control framework as she now believes that automaticity is an accompanying phenomenon or secondary effect of specific forms of processing (Bialystok 1990). For instance, driving a car requires little attention in the later stages when the skill has become automated, but the motor processes still work in the same way (loc. cit.).

Bialystok (1994a) predicts that there should be systematic individual and group differences in the levels of analysis and control as a function of specific experiences. For example, as age and experience increase, there should be an increase in

competence in cognition. Of particular relevance to this thesis, Bialystok points out that other variables may also influence the development of analysis and control, such as literacy, bilingualism, schooling and formal language learning, though they may develop analysis or control to differing degrees. In a previous study, Bialystok (1991) argued that all three domains of language use – oral, literate and metalinguistic – are affected by the same cognitive processes so any development in processing skills will affect all three domains. This means that the variables listed above may develop analysis and control to differing degrees, and the development of one component through one variable (such as bilingualism) may influence another variable (such as literacy) if the degree of analysis or control necessary for one is also necessary for the other. Bialystok (1986a, 1986b; 1987; 1988a,b; 1991) associates the relationship between metalinguistic awareness and bilingualism with the development of control of attention, and the relationship between metalinguistic awareness and literacy with the development of analysis of knowledge.

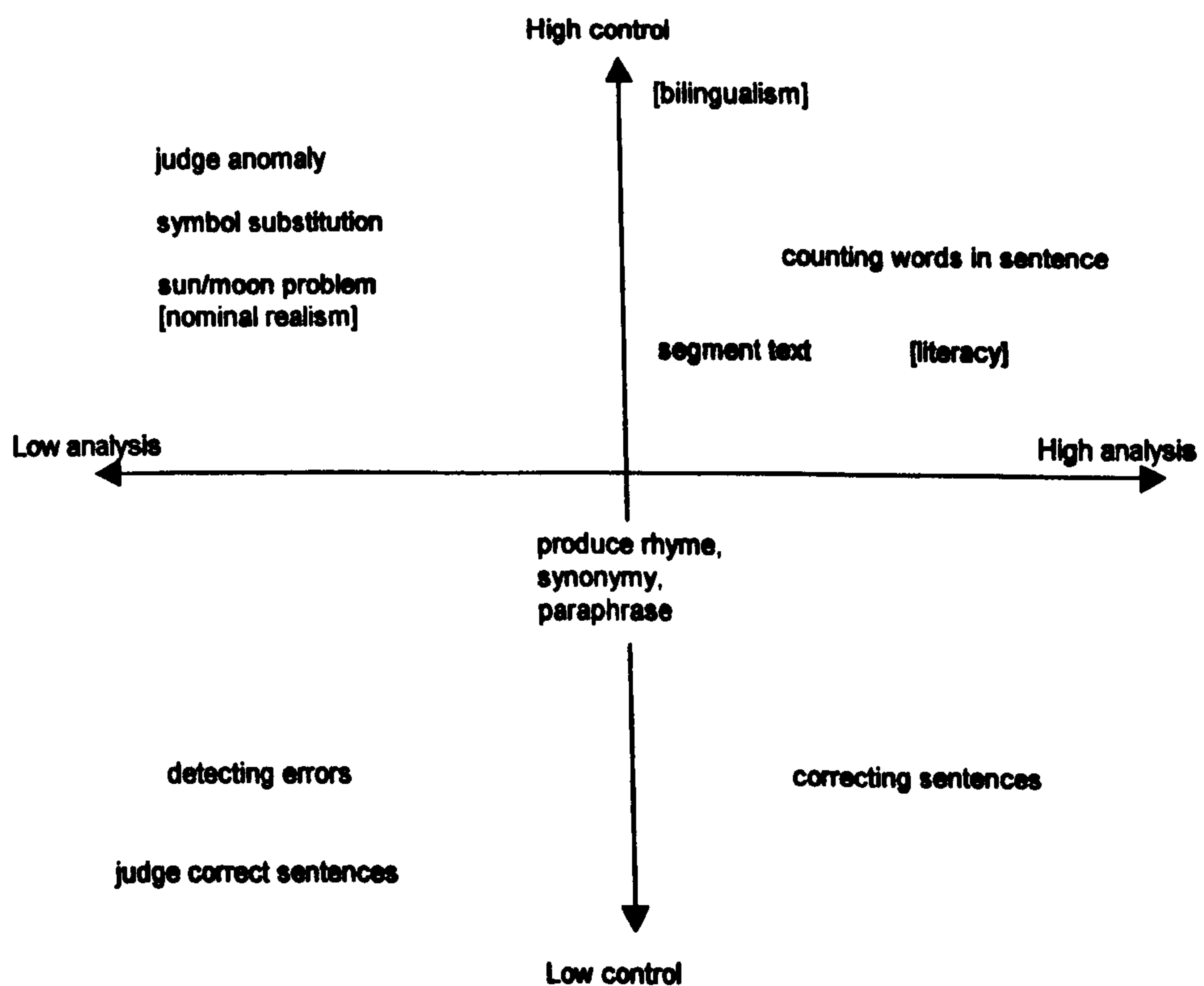


Figure 4.3 *Bialystok's representation of analysis and control for metalinguistic uses of language (Bialystok 1991: 131).*

Referring to Figure 4.3, bilingualism or second language learning develops control so it is characterised as developing along the high control axis, and literacy develops analysis so it is characterised as developing along the high analysis axis. Grammaticality judgement tasks devised as metalinguistic tasks are generally divisible into detection, location, correction, and explanation tasks. Detection, as shown in the diagram above, requires a low degree of both analysis and control, location (not shown) would be positioned between detection and correction as it requires low control and medium analysis, and correction requires a low degree of control but a higher degree of analysis. Explanation, which does not feature in Bialystok's diagram, would be positioned in the high analysis and high control quadrant.

Bialystok (1988b) examined eight year old children to assess whether her hypothesis regarding analysis and control had any construct validity. There were two tests. The first task assessed grammatical awareness by testing the children's judgements of the grammaticality of some sentences. The second task assessed word awareness: the children had to match words on the basis either of their sound or their meaning. Both of these tasks contained three sorts of questions: those that required low analysis and low control demands, those that required high analysis but low control demands, and finally those that required low analysis but high control demands. The results showed that the correlations for the parts of the tests that made similar processing demands were positive and significant, and the correlations for the parts of the tests that made different processing demands were very low. This would support Bialystok's hypothesis that analysis and control are two different skills, but it may be an artefact of the tests as there were also some positive and significant correlations between the parts that made high demands on analysis but low demands on control and *vice versa*, which suggests that they are not independent of one another.

A number of researchers have used the analysis/control model to examine metalinguistic development. For example, Ricciardelli (1993) tested children aged five to seven on eight metalinguistic tasks. Four tested 'analysis': symbol substitution,

word order correction, form-meaning judgements and grammar judgements; and four tested 'control': repetition of ungrammatical sentences, word renaming, symbol substitution and grammar judgements. The results show that there is a moderately high correlation between the two variables (0.614), consistent with previous studies; and that control of linguistic processing is supported more strongly than analysis of knowledge, as all the control tasks loaded significantly on it. However, it is possible that the results of the tests on analysis suffered interference from similar tests on control. Both of these experiments show that analysis and control may not be as independent in practice as they are in Bialystok's theory. Menyuk (1985: 256) points out that analysis of knowledge must develop before control because awareness of the structural characteristics of language is necessary for their deliberate integration into learners' control of linguistic processing.

With regard to the requirements of this thesis, the model proposes that metalinguistic awareness is an implicit and explicit cognitive attribute that develops with regard to the following factors that have been shown to affect the development of metalinguistic awareness: learning languages, literacy, maturation, education, and studying languages. The model inherently takes a non-unitary approach. However, there are a number of problems with the model (see Skehan 1998; Hulstijn 1990).

Bialystok's model characterises first language better than second language acquisition, as it only explains how unanalysed knowledge becomes more analysed. Second language acquisition does not always begin with unanalysed knowledge, in fact many languages learned in a formal environment such as the classroom are taught in a way that leads learners to analyse input explicitly from the first lesson, and adult learners can learn explicitly even in a communicative environment. Analysis and control are processes, and the model does not specify what knowledge base the processes work on (what exactly is controlled?), nor what the products of the processes are (Skehan 1998). High analysis is equated with greater complexity and greater explicitness, but there is no explanation of how growth in the size of the underlying system relates to

complexity or growth in complexity (loc. cit.). Also, unanalysed knowledge does not necessarily equate to implicit knowledge as implicitness concerns learners' ability to access the information and their level of attention, whereas analysis is a process. Bialystok's model is very useful in the context of researching metalinguistic awareness in multilingual children, but not comprehensive in its explanatory power for adult multilinguals.

4.3.5 Conclusions of Psycholinguistic Models of Metalinguistic Awareness

These four models (Marshall & Morton 1978; Karmiloff-Smith 1986; Gombert 1992; Bialystok 1994a) each approach the characterisation of metalinguistic awareness from different directions, and therefore have different strengths and weaknesses with regard to the development of metalinguistic awareness in multilinguals. All four are better at describing child than adult learning on account of their emphasis on implicit knowledge developing into explicit knowledge. Karmiloff-Smith's (1986) cyclical model contains the most overt description for the way in which the processes of metalinguistic development may take place, whereas Gombert's model's strength lies in its emphasis on an intermediate phase of development, when 'epilinguistic' processes take place. The strength of Bialystok's model is its emphasis on universal learning processes, but this also leads it to lack specific detail regarding processes of development. Marshall and Morton's (1978) model alone describes on-line processing rather than development.

None of the models discuss whether metalinguistic awareness is unitary or a collection of skills, but Karmiloff-Smith's, Gombert's, and Bialystok's models assume that development occurs in different domains. And none of the models include all of the factors that have been shown to affect the development of metalinguistic awareness – learning languages, literacy, maturation, education, and language learning in a formal environment.

4.4 Does Metalinguistic Awareness Help Language Learning?

A number of researchers have suggested that metalinguistic awareness assists learners to learn languages (Ramsay 1980; Thomas 1988; Klein 1995; Sanz 2000), and ‘good language learners’ have reported that they attend to form (see Naiman, Fröhlich, Stern & Todesco, 1975; Rubin 1975). However, research has concentrated on the association between target language grammar *knowledge* and target language proficiency: no research has yet set out to test participants’ grammatical metalinguistic awareness in order to examine empirically the relationship between metalinguistic awareness and attainment.

For example, Masny and d’Anglejan (1985) assess advanced students of English as a second language on a number of tests including L2 proficiency, L1 reading competence, and reasoning (nonverbal intelligence), and find that the three variables with the highest relationship with ability to correct ungrammatical target language sentences are a target language cloze test, an assessment of L2 achievement, and the MLAT4. The same problem besets evidence from research on consciousness raising (eg, Sharwood Smith 1981) and input enhancement (Sharwood Smith 1993). Target language grammatical knowledge is related to target language attainment.

I argue that there is a large amount of evidence (but all from the same experimental set-up) to support the hypothesis that metalinguistic awareness assists language learning, based on my argument that Part 4 of the Modern Language Aptitude Test (Carroll & Sapon 1959, 1997), Words in Sentences, is a metalinguistic test (see Section 6.5.2.4). The MLAT4 requires participants to find a grammatical construction in a parallel sentence whose function is analogous to a highlighted word or phrase in an exemplar, all in the participants’ native language. The test clearly requires participants to focus on grammatical form, and therefore does indeed assess grammatical metalinguistic awareness – in participants’ native language. Participants’ MLAT4 results usually correlate at approximately $r = .4$ with their subsequent

attainment in learning a language. The MLAT4 has generally been found to be the most highly predictive part of the MLAT (eg, Skehan 1989, Carroll 1981), so much so that experienced researchers often use it on its own, without the other MLAT subtests, or with just the MLAT5, which tests associative memory. The MLAT4's consistent ability to predict attainment is evidence that grammatical metalinguistic awareness is related to language learning attainment.

Little has been published on the consequences of metalinguistic awareness, but the fact that it appears to develop suggests that it must be a benefit to the individual otherwise there would be no advantage in developing it. This thesis proposes that multilinguals' highly developed grammatical metalinguistic awareness is one of the variables that helps them to learn languages more quickly than people who have less language learning experience. The rationale behind this is that the more individuals have had to expend cognitive effort focusing on grammatical structure the better they will be able to cope with further demands (see *The Practice Hypothesis*, Section 2.1.3). Metalinguistic awareness should affect language learning attainment because the ability to focus on and analyse grammatical form in the target language appears to speed up the learning process.

Finally, if experimental evidence shows that metalinguistic awareness is a cognitive attribute of the learner that has consequences for multilinguals' language learning ability and therefore their language learning attainment, then metalinguistic awareness should be regarded as an individual difference in language learning.

4.5 Conclusions of the Chapter

A number of psycholinguistic models have been proposed to capture metalinguistic awareness (Marshall & Morton 1978; Karmiloff-Smith 1986; Gombert 1992; Bialystok 1994a), but they are each limited in their capacity to characterise the development of metalinguistic awareness in adult multilinguals on account of the

complexity of development and the number of different factors that influence it, compared to child first language acquisition, for which they have much greater explanatory power.

Research has shown five variables to be conducive to the development of metalinguistic awareness: literacy, bilingualism, maturation, schooling, and studying languages. The effects of these factors are likely to be interactive as well as cumulative – research on the effects of age and schooling on metalinguistic awareness suggest that unschooled children’s metalinguistic skills increase with age whereas schooled children’s metalinguistic skills are enhanced by maturation and schooling together with literacy (Karanth, Kudva & Vijayan 1995). There are also two variables that appear to reduce the overall effect of these variables or cancel out any benefits of metalinguistic awareness, namely, lack of literacy, and learning languages not held in high sociocultural esteem by the learner or one of their speech communities.

The characteristics of metalinguistic awareness appear to be that it is not a unitary ability, it may be implicit or explicit, and is contingent on languages having a formal structure. If metalinguistic awareness is indeed a cognitive and experiential individual difference (as it develops through practice) then it is likely to increase over the duration of language learners’ lifetimes as they learn more languages and develop their literacy skills in these languages.

Chapter 5: The Relationship Between Multilingualism and Metalinguistic Awareness

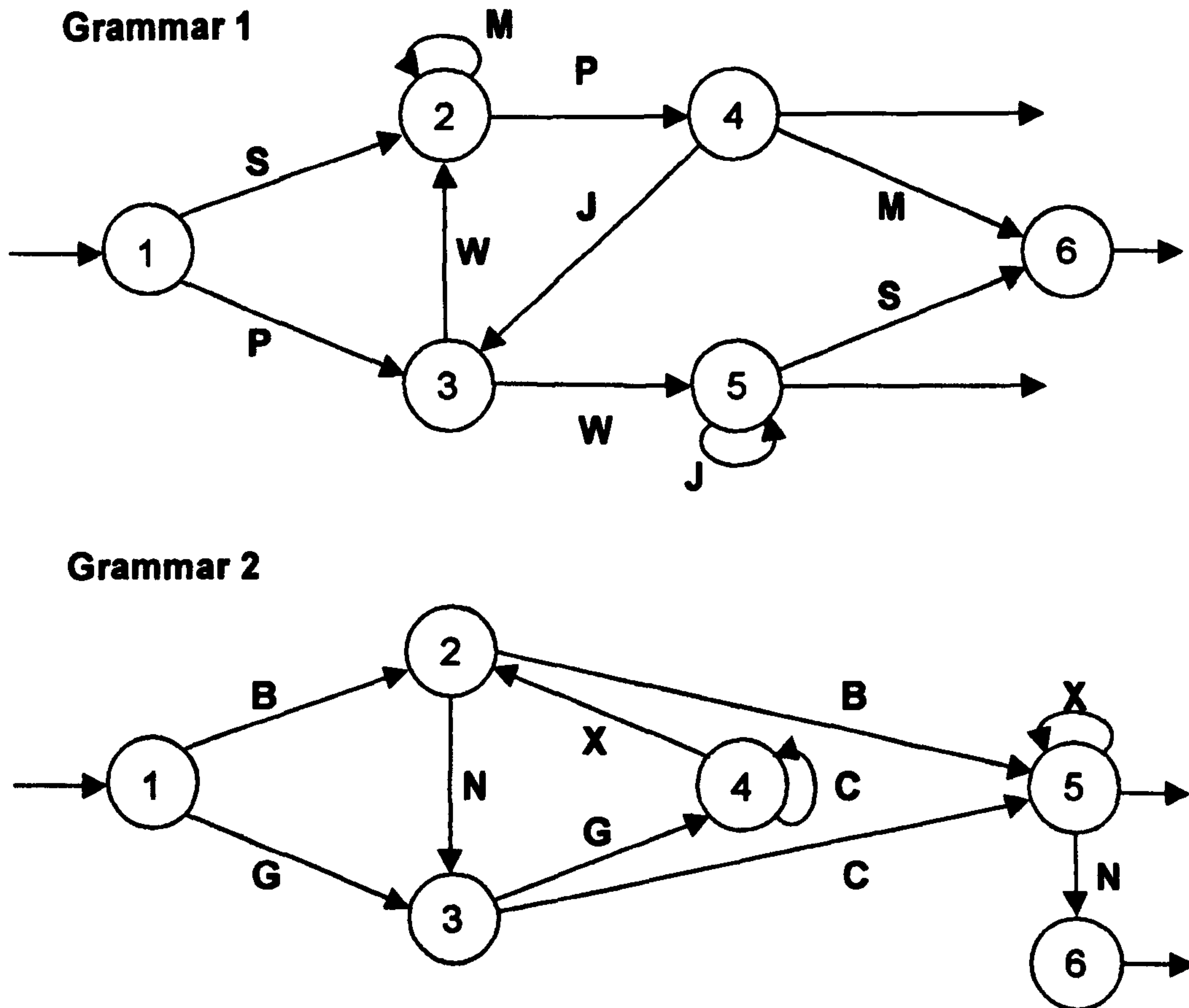
This chapter contains a short review of the evidence for multilinguals developing a high degree of metalinguistic awareness – more than monolinguals and bilinguals – and asks if metalinguistic awareness is one of the variables that helps multilinguals to learn languages.

5.1 Do Multilinguals Develop Metalinguistic Awareness to a High Degree?

Multilinguals may be characterised not only by the ability to communicate with different speech communities, but also by the social and affective consequences of becoming multilingual: openness to different communities and cultures, greater confidence in language learning and interacting with people from different language backgrounds, higher motivation, and greater communicative sensitivity. There are also cognitive consequences to becoming multilingual. In this section, I put forward the two experiments carried out in this area as evidence that multilinguals develop a high degree of grammatical metalinguistic awareness.

Nation (1983; Nation & McLaughlin 1986a, 1986b) designed the following experiment to test the hypothesis that learning strategies and techniques employed by multilinguals are different from those used by bilinguals and monolinguals. In fact, the experiment assesses participants' metalinguistic abilities, that is, their ability to focus on and recognise grammatical form through the written medium, though technically,

their test material – an artificial grammar – is not linguistic as it is meaningless. However, the test material is in logical and symbolic form, like language (Vygotsky 1978), and presented in standard Roman orthography.



An acceptable string of letters is generated by any sequence of state transitions from State 1 to any exit state. These grammars are structurally the same as those used by Reber and Allen (1978). Only the letters have changed.

Figure 5.1 Schematic diagrams of two Markov grammars (Nation & McLaughlin 1986a: 45).

Nation (loc. cit.) selected 14 monolingual, 14 bilingual, and 14 multilingual adolescent or young adult participants. The monolinguals did not even have an elementary proficiency in another language; the bilinguals' second language was advanced or native-like and they did not have even an elementary level of proficiency in a third

language; and the multilinguals were rated as native-like in four or more languages. No information is given as to whether the bilingual participants were also biliterate or the multilingual participants were also multiliterate. Nation exposed the participants to two miniature artificial grammars, i.e. finite-state Markov grammars, in order to test their pattern recognition abilities (see Figures 5.1 and 5.2). Although the grammars lack referential content, an essential part of natural language, this means that in the absence of semantic meaning participants are obliged to focus on 'grammatical' form, and allows the experimenters to control the input in the learning tasks.

The participants were tested on two tasks, firstly an implicit grammar-learning task and then 8 to 12 days later an explicit grammar-learning task. In the implicit learning task they were asked to pay close attention to the examples shown every seven seconds but not told why until afterwards, when they were asked to judge another 100 examples and told that half of these would be correct and half incorrect. In the explicit task the participants were first told that they would be shown a group of artificial "words" and that "it would be a great help if you could figure out what the rules are" (Nation & McLaughlin 1986a: 47).

Table 5.1 *Examples of artificial grammar stimuli.*
(Table abbreviated from Nation & McLaughlin 1986a: 46).

Grammar 1	Grammar 2
S(M)P	BB(X)
S(M)PM	BB(X)N
S(M)PJW(J)	BNC(X)N
S(M)PJW(M)PM	BNG(C)XNC(X)
PW(M)PJW(J) S	GC(X)
PW(M)PJW(M)P	GC(X)N
PW(M)PM	GG(C)XB(X)
PW(J)S	GG(C)XNC(X)N

Note: to form strings, letters enclosed in parentheses may be omitted or inserted with any frequency.

The results of Nation's (1983; Nation & McLaughlin 1986a, 1986b) experiment show that the multilinguals are significantly better than the monolinguals and bilinguals at learning the artificial grammar when the test is implicit and participants are asked to pay attention to the stimuli, but in the explicit task, where they are given instructions to work out rules, they perform at the same level as in the implicit test and the same level as the monolinguals and bilinguals.

There are therefore two findings relevant to the argument presented here. Firstly, the experiment confirms that multilinguals develop metalinguistic awareness to a higher degree than bilinguals and monolinguals, but only implicit metalinguistic awareness, not explicit. Secondly, it shows that multilinguals perform at the same level on the implicit and the explicit artificial grammar tasks.

The results of Nation's experiment are unexpected in the context of the argument of this thesis. Following the argument of this thesis, multilinguals should perform better than monolinguals and bilinguals on the explicit task, and at a higher level on the explicit than the implicit task because explicit processes are more trainable (Reber 1993). They should therefore be positively affected by language learning experience. The questions raised by Nation's (1983; Nation & McLaughlin 1986a, 1986b) study in the light of my argument are: -

- Why are Nation's multilinguals only better than monolinguals and bilinguals on an implicit and not an explicit artificial grammar learning task? When multilinguals are tested under explicit conditions on a different artificial grammar (Nayak, Hansen, Krueger & McLaughlin 1990, see below) they are indeed better, as they are when learning a natural language with meaningful content (Ramsay 1980).
- How does literacy affect the ability to perform on the tests? Nation does not state whether the multilingual participants are multiliterate or whether they had been supported in their other languages. As has been shown (see Sections 3.1.2 and 4.2.2), biliteracy has a significant effect on bilinguals' ability in explicit tasks and plays a large part in learners' ability to pick up languages in a classroom environment (Thomas 1988), as does learning languages in a formal learning environment. The effect may be supposed to be even greater

for multiliterates who may also have learned their languages or had them supported in an instructional setting.

- How would trilinguals perform on the implicit and explicit tests? Nation rated the multilinguals in his experiment as native-like in *four or more* languages. This is quite a jump from their bilinguals who were only native-like in two languages.
- Nation does not ask whether his results are due to multilinguals' increased ability to discriminate rule-obeying from rule-violating strings – he does not attempt to screen out the 'noise' using statistical methods advised in signal detection theory (see McNicol 1972), but simply uses the data in percentage form (correct/ incorrect response to grammatical stimulus and correct/ incorrect response to ungrammatical stimulus).
- Nation does not ask whether multilinguals are biased to accept ungrammatical items as has been hypothesised by Zobl (1992) and M. Thomas (1990).

If Gombert's (1992) theory is applied, that learners functionally develop the metalinguistic skills that they have need of, firstly, multilinguals should be better than bilinguals and monolinguals at explicit as well as implicit metalinguistic tasks as they will have had greater experience of language learning and therefore greater need to use all the learning processes available to them. Secondly, multilinguals should be better at responding to an artificial grammar presented explicitly than one presented implicitly because, again, they should have had greater need to develop explicit metalinguistic awareness in order to learn explicitly (a fast process) and so cope with the cognitive demands of learning a number of languages and language learning in a formal environment. The effect should be more pronounced if multilinguals are also multiliterate.

In short, I tentatively suggest that Nation's multilinguals may not have been multiliterate, and may not have had their other languages supported in their education. In Cummins' terms (eg, Cummins 1979), they may not have developed "common underlying proficiency".

Nation's finding that multilinguals perform at the same level as bilinguals and monolinguals on an explicit artificial grammar task also does not concur with the results of a further experiment on language learning strategies the same research group carried out (Nayak, Hansen, Krueger & McLaughlin 1990: 241). In this second experiment using artificial grammars with multilingual participants, the multilinguals respond more accurately than the monolinguals when tested on their ability to recognise correct syntactic rules when explicitly instructed that rules exist, but take longer than the monolinguals. Nayak *et al.*'s experiment is designed to compare monolinguals and multilinguals on both vocabulary and syntax acquisition under two conditions, rule-discovery and memory.

The 24 multilinguals in Nayak *et al.*'s (*loc. cit.*) study were required to rate themselves as at least 6 for three or more languages on a self-rated scale of 1-7, where 1 is 'No Ability' and 7 is 'Completely Fluent' (*ibid*: 226), and to be equally proficient in three or more languages. All 24 'monolingual' participants (self-rated at 3 or below in their other languages) are native speakers of English, whereas four of the multilinguals started learning English after the age of 12. Participants are aged 16 to 42. Again, no information is given as to whether the multilingual participants were also bi- or multiliterate.

The experimental set-up is slightly different in Nayak *et al.*'s study from Nation's in that half the participants were asked to memorise the stimuli, and half to search for rules, rather than all participants being asked to pay attention on the first task, and all being asked to search for rules the second time on a different grammar. However, in both experiments, multilinguals are required to search for rules: in Nayak *et al.*'s experiment they perform better than the monolinguals, and in Nation's experiment they perform at the same level as the monolinguals and bilinguals. This discrepancy requires investigation, but may be due to the second main difference between the two experiments, that in Nation's study there are no referents, but in Nayak *et al.*'s study the vocabulary have abstract shapes as referents (shown above the vocabulary in the

learning condition) although participants' attention was never drawn to them. These shapes are not meaningful in the conventional sense but may have assisted multilinguals to learn the grammar.

Nayak *et al.* (1990) not only find that multilinguals are better than monolinguals on an explicit artificial grammar, they find that multilinguals are slower. They presume that this is because multilinguals exert more processing effort to determine the rules, which supports the (obvious) point that learning is cognitively demanding. Nayak *et al.* also find that both monolinguals and multilinguals prefer to use structural and positional information for learning in the rule-discovery condition, but the result shows that multilinguals must be able to use the information better than the monolinguals. In comparison, multilinguals prefer to use mnemonic devices in the memory condition: monolinguals shown no preference.

Both the experiments reported, Nayak *et al.* (1990), and Nation (1983; Nation & McLaughlin 1986a, 1986b), demonstrate that multilinguals develop a high degree of grammatical metalinguistic awareness in the context of artificial grammars. Drawing on epigenetic theory and the Practice Hypothesis (Sections 2.1.3 and 2.1.4), it seems likely that multilinguals' language learning experiences continually interact with their heritable characteristics and their self-regulation, so that over time, multilinguals gradually develop the abilities required to cope with their environment successfully. In other words, multilinguals develop metalinguistic awareness to a high degree because the more they expend cognitive effort on focusing on grammatical structure, the better they are able to cope with further demands, i.e. there is a sequential and causal relationship between successive developmental stages.

I have reasoned from the available evidence, firstly, that multilinguals are likely to develop metalinguistic awareness to a high degree, and secondly, that multilingualism promotes the development of metalinguistic awareness. However, the co-occurrence of two phenomena does not in itself support a connection between them, unless when

one is varied the correspondent also varies systematically – demonstrated statistically, for example, by correlation and regression. Nor does evidence that multilinguals have highly developed metalinguistic awareness and that they are capable language learners specify which of the two is cause and which effect. There is an obvious academic distinction to be made between multiliterate multilingualism facilitating metalinguistic development, and metalinguistic development facilitating multiliterate multilingualism, but although the two relationships are separable from a theoretical and a conceptual point of view, in cognitive terms it seems likely that the two abilities interact and are so solubly intermeshed that it is not possible to separate them experimentally.

Nation's (1983; Nation & McLaughlin 1986a, 1986b) study using a miniature artificial grammar indicates that multilinguals can recognise an artificial grammar presented implicitly better than other learners, showing that multilinguals can develop implicit metalinguistic awareness to a high degree. Nayak *et al.*'s experiment using a different artificial grammar shows that multilinguals can recognise correct stimuli presented explicitly better than monolinguals. Nation's result that multilinguals perform at the same high level on implicit and explicit artificial grammars, when we would expect them to perform *better* on explicit than implicit tests, is unexpected and requires further research.

In conclusion, multilinguals do appear to develop metalinguistic awareness to a high degree, and it seems highly probable that multilingualism promotes the development of metalinguistic awareness. The possibility that the two are interrelated so that they develop hand in hand and benefit each other reciprocally gives rise to another question – does metalinguistic awareness help multilinguals to learn languages?

5.2 Does Metalinguistic Awareness Help Multilinguals to Learn Languages?

In Section 4.2.1, I put forward the experimental evidence supporting the observation that bilinguals develop metalinguistic awareness to a higher degree than monolinguals, for example in correcting ungrammatical sentences (Diaz 1985), detecting ambiguity (Cummins & Mulcahy 1978), and with regard to syntactic orientation in sentence processing (Galambos 1985). It seems likely that bilingualism enhances the development of metalinguistic awareness because greater cognitive effort is required to learn two communicative systems and their social implications, and to separate them functionally. I reasoned that if bilingualism positively affects the development of metalinguistic awareness, then multilingualism should also affect the development of metalinguistic awareness, and to an even greater extent, depending on how many languages a multilingual has learned. The relationship between multilingualism and grammatical metalinguistic awareness should be empirically demonstrable.

I have discussed a number of variables that have been shown to promote the development of metalinguistic awareness in order to show that an individual's experiences affect their development of metalinguistic awareness throughout their lifetime, particularly variables such as multilingualism and multiliteracy (see Section 4.2). I have also discussed the experimental evidence for multilinguals being better language learners than monolinguals (see Section 3.2), and evidence for metalinguistic awareness assisting learners to learn languages (Section 4.4). In the previous section (Section 5.1), I discussed the evidence that multilinguals can perform better than monolinguals and bilinguals on metalinguistic tasks and inferred that metalinguistic awareness develops to a high degree in multilinguals. Finally, there remains the question – are these two abilities linked? Does the high degree of metalinguistic awareness that multilinguals develop help them in learning additional languages?

So far there is no direct evidence that this is the case. It is possible that metalinguistic awareness is only a by-product of variables such as multilingualism and multiliteracy

and has no effect on language learning. Nation and McLaughlin (1986a) suggest that multilinguals' language learning ability is partly due to their ability to abstract structural information from linguistic stimuli without being formally instructed, and that when a task is formally brought to their attention they have the same ability as bilinguals or monolinguals. However, because neither Nation and McLaughlin nor Nayak *et al.* test their participants on a language learning task to find out if the multilinguals are better than the bilinguals and monolinguals at natural language learning, they do not demonstrate any empirical connection between anecdotal evidence (and evidence from Ramsay 1980) that multilinguals are better language learners than other learners and their result that multilinguals perform better on an implicit artificial grammar task than bilinguals and monolinguals.

There is an alternative possibility – that metalinguistic awareness may only aid language learning in a formal environment and not a communicative environment. This seems unlikely as there is some evidence to suggest that metalinguistic knowledge often has communicative functions (Odlin 1986), for example bilinguals who codeswitch are often aware of their lexical choices and use formal linguistic knowledge with a communicative purpose (Huerta 1978, cited in Thomas 1992), and Gass (1983) notes that conscious repairs can keep communication from failing completely when breakdowns occur in conversation. Awareness of the form of language should aid communication, as Gagné and Ostiguy (1989: 148) state:

The utility of conscious metalinguistic awareness on linguistic performance has been challenged by results of research on language development and criticism of the teaching of traditional grammar (Wesdorp 1983; Wilkinson 1971). However, if success in spontaneous performance does not seem to depend on metalinguistic consciousness, it does not mean that the development of such consciousness will not have a beneficial effect on the ability to choose verbal forms and on the adaptation of oral performance to the situation, particularly in the case of formal situations.

On the other hand, multiliteracy and learning at least one language formally appears to be necessary to develop metalinguistic awareness to any great degree, as the ability to focus on grammatical form, is developed through literacy and assisted by having had attention drawn to grammatical features. Assessment that encompasses both formal and communicative functions would be required to test multilinguals' language learning attainment comprehensively.

Based on the evidence given in the review of the literature, I propose that metalinguistic awareness, the ability to look at the form of language rather than its meaning, develops to a high degree in adult multiliterate multilinguals. The variables demonstrated to promote its development, such as literacy, bilingualism, maturation, schooling, and formal language learning, may all be experienced to a high degree by multiliterate multilinguals. I also suggest that highly developed metalinguistic awareness is one of the variables that help multilinguals to learn languages more easily than other learners, but empirical evidence is required to support this.

5.3 A Research Model for Metalinguistic Awareness in Multilinguals

Psycholinguistic models are useful as a demonstration of the current state of knowledge and as a basis for further research. I have constructed the model below to attempt to characterise the relationships between multilingualism, metalinguistic awareness, and language learning attainment while trying not to oversimplify the complex interrelationships that are involved in a developmental, interdependent, and epigenetic framework. The model is based on the relationships discussed in the literature review (Chapters 2-5), some of which are partly confirmed, but others require further research. The methodology for investigating the relationships between language experience, metalinguistic awareness, and attainment in educated adults will be given in Chapter 6.

A considerable number of specifications are required in order to describe both multilingualism and metalinguistic awareness in a single descriptive psycholinguistic model where the requirements are the same as for each individually (see Sections 3.1.4 and 4.3). In order to characterise the relationship between metalinguistic awareness and multilingualism adequately, it is necessary to describe the interactions between language learners' *Attributes*, *Processes* of language learning, and *Implicit and Explicit Language Knowledge* in their various languages, together with the resulting *Language Learning Ability* and *Language Learning Attainment*. All three functions – *Attributes*, *Processes*, and *Language Knowledge* – are sources of individual differences between learners. Language learning ability is sometimes known as language 'aptitude' by researchers into aptitude for foreign language learning. However, aptitude tests inherently test learners' education and literacy skills, frequently contain tests of learners' affective variables, and do not attempt to exclude or take account of learners' previous language learning experience (see also Section 2.2.1.1), therefore I call 'aptitude' 'language learning ability'.

The following complex model in the form of a schematic diagram (see Figure 5.2) represents the interactions between multilingualism, metalinguistic awareness, and attainment, taking into account learners' attributes, processes, and knowledge: the boxes are used to group related functions, and arrows indicate interaction between functions. In order to avoid a surfeit of arrows, I have only placed arrows between functions adjacent on the model, however, it should be understood that all functions and sub-functions are hypothesised to interact. The model is developmental and does not describe on-line processing or language production.

Metalinguistic Awareness (see inset) is represented as a cognitive attribute of multilinguals that has linguistic consequences. *Metalinguistic Knowledge* (on the right of the diagram) should be understood to be a result of metalinguistic awareness through the *Implicit and Explicit Language Learning Processes* of *Transfer*, *Learning*, and *Creativity* working on both *Language Knowledge* and its sub-function,

Metalinguistic Knowledge. Awareness and knowledge develop and are enhanced through continuous interaction. The model shows that metalinguistic awareness is not unitary but a collection of skills (see Section 4.1.3) – under *Cognitive Attributes*, metalinguistic awareness is divided into conceptual awareness, lexical awareness, grammatical awareness, phonological awareness, and semantic awareness. Nor is metalinguistic knowledge unitary, but it encompasses the corresponding conceptual knowledge, lexical knowledge, grammatical knowledge, phonological knowledge, and semantic knowledge. The model integrates both implicit and explicit language learning processes and implicit and explicit language knowledge with learners' attributes to characterise the development of metalinguistic awareness in multilinguals.

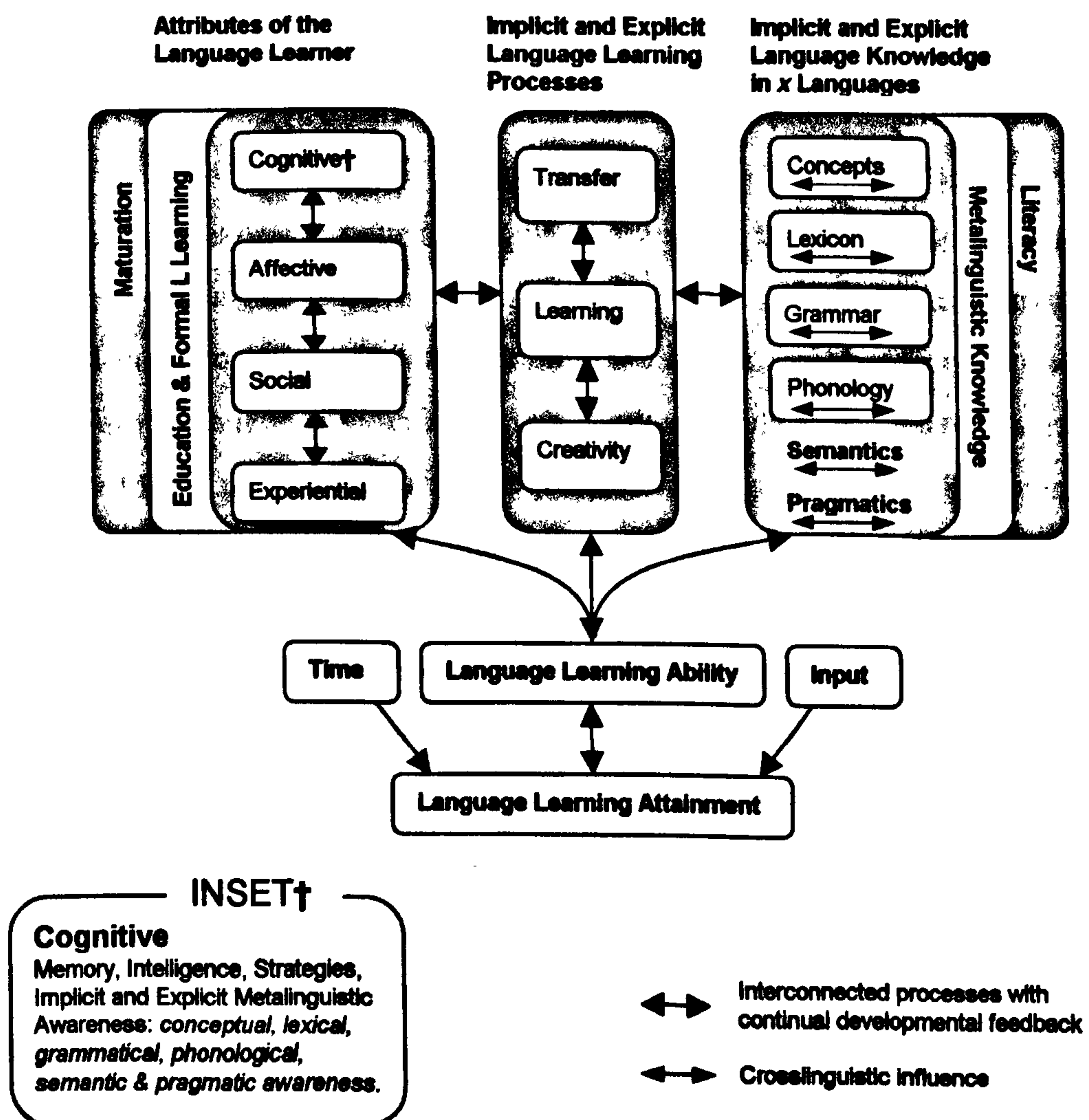


Figure 5.2 Research model for metalinguistic awareness in multilinguals.

Maturation, education, literacy, language learning, and language learning in a formal environment have all been found to promote the development of metalinguistic awareness. The model shows that maturation, and education (including language learning in a formal environment) are hypothesised to interact closely with each other and with multilinguals' other cognitive, affective, experiential, and social attributes, *and*, it should be understood, with literacy and metalinguistic knowledge. Multilingualism and multiliteracy can be considered to be *Experiential Attributes* of the language learner as well as being manifested as *Language Knowledge*, and are closely linked to other attributes within the individual, for example, multilingualism affects cognitive attributes (multilinguals may specialise in regard to language learning strategies), affective attributes (they may develop more positive attitudes to the target language community, and to speakers of other languages in general), and social attributes (they may develop greater communicative sensitivity).

There are three *Implicit and Explicit Language Learning Processes* that result in the acquisition of knowledge: *Transfer* of knowledge from other languages; *Learning*, i.e. internalising input; and *Creativity*, i.e. invention, usually based on previous knowledge in other languages. Within *Implicit and Explicit Language Knowledge* (the superordinate heading for both knowledge *of* language and knowledge *about* language) each of the language functions contains the multilinguals' knowledge in all their languages, for example, the lexicon encompasses multilinguals' knowledge of lexical items in all their languages (see de Bot 1992). Psycholinguistic research in each of these areas suggests that these functions may be at least partly shared in multilinguals (eg, for phonology, see Flege 1986). The small double-headed arrows represent the possibility of crosslinguistic influence between items from different languages within each of these sub-functions.

The extent to which functions interact depends on the psycholinguistic demands of the individual multilingual. Multilinguals who live in a mixed-language environment where codeswitching is the norm will codeswitch between languages and dialects,

which will be activated nearly simultaneously. In contrast, multilinguals who use different languages in separate domains or social situations will demonstrate greater separation between their languages, and may show less crosslinguistic influence. This does not mean that crosslinguistic influence does not occur at all – interdependence is systemic and largely beyond learners' conscious control. Multilinguals' proficiency also affects their cognitive organisation, for example lexical items in a language in which a multilingual is highly proficient may be associated with lexical items in a language known less well whereas two languages in which a multilingual is highly proficient will be associated conceptually (see de Groot & Hoeks 1995; de Groot 1993). Characteristics such as multilinguals' perception of psychotypological proximity between languages are also likely to promote connections between those languages. Learning in one language has psycholinguistic effects on multilinguals' other languages because an individual's mental representations for different languages develop into a single system. In particular, skills in one language that are cognitively demanding can be transferred with greater ease to other languages. (If multilinguals had totally separate subsystems for their languages, then they would take as long to learn the same concept, construction, or skill in each language as they had originally. This is clearly not the case.) The model does not show separate boxes for each language under each of the sub-functions of Implicit and Explicit Language Knowledge because each language is not envisaged to be a separate unit, but a part of a multilingual's entire language system. Links between constituents are strengthened by use, so links between constituents in the same language become strengthened in multilinguals who do not codeswitch, whereas in multilinguals who *do* codeswitch, links between constituents in different languages also become strengthened (Paradis 1987). The model is therefore compatible with codeswitching phenomena. Having a single integrated system also means that the model could technically describe an unlimited number of languages.

The model should also be understood to be able to characterise differences in multilinguals' proficiency between their various languages, which may be a result of

multilinguals using them only in specific domains, a lack of exposure to input, or lack of time.

The model is developmental, as interaction between the different functions takes place over time. With regard to the processes of development, Karmiloff-Smith's (1991, 1996) theory of representational redescription, and constructivist and connectionist models of development seek to provide realistic accounts of development based on observation of language learners' output, however, the precise neurolinguistic mechanisms for development are still unclear. It is proposed that short-term and long-term change occurs both from input being internalised in the system and through the process of redescription of this input within the system (see Karmiloff-Smith 1996). Development in learners' sub-systems subsequently has an effect on development of their whole system: implicit knowledge may become explicit, and implicit and explicit processes may function simultaneously.

The model therefore fulfils the following requirements: languages are interdependent within each multilingual's language system so that development in one affects development in others, so that languages can be used separately or mixed, and so that crosslinguistic influence between languages affects their mental representations especially with regard to languages which are perceived to be closely typologically related; the model can cope with differences of proficiency between languages and in different domains, individual differences in multilinguals' *Attributes* such as their language experiences and their cognitive skills, and in their *Language Learning Processes* result in differences in ability and attainment.

With regard to metalinguistic awareness, the model fulfils the requirements to show that metalinguistic awareness is an implicit and explicit cognitive attribute that develops with regard to the following factors that have been shown to affect the development of metalinguistic awareness – learning languages, literacy, maturation, education, and language learning in a formal environment – and that it is not unitary

but a collection of skills. The model will be used as a basis for examining the relationship between metalinguistic awareness, multilingualism and language learning attainment.

5.4 Conclusions

Previous research suggests that multilinguals are indeed faster at learning languages than less experienced language learners (see Chapter 3): bilinguals are 'better' than monolinguals (Valencia & Cenoz 1992: 445); multilinguals are better than monolinguals (Ramsay 1980; Klein 1995); and multilinguals are better than bilinguals at recognising grammatical stimuli on artificial grammars (Nation & McLaughlin 1986a, 1986b; Nayak *et al.* 1990). Research also shows that bilinguals are better learners than monolinguals if they are biliterate and have had educational support in both their languages (Swain, Lapkin, Rowen & Hart 1990; Cenoz & Valencia 1994; Sanz 2000) and that biliterate bilinguals may be better than monoliterate bilinguals (Thomas 1988). It has also been shown that if bilinguals are schooled in their L2 and have no literacy or educational support in their first language, they do not perform better than monolinguals (eg, Mägiste 1984; Wagner, Spratt & Ezzaki 1989). Experience of language learning, (bi/multi-)literacy, and learning language/s in a formal environment does appear to be connected with attainment in another language. But is it demonstrable that the more languages multilinguals have gained experience of, the quicker they are at learning another? In order to attempt to answer this question, I propose to test the hypothesis that multilinguals' attainment in learning another language is linked to their language experience, specifically, the number of languages they are literate in.

The evidence for grammatical metalinguistic awareness helping learners to learn additional languages is scanty (see Chapter 4), although there is considerable evidence from research into consciousness raising (eg, Sharwood Smith 1981), input enhancement (eg, Sharwood Smith 1993) and focus on form in addition to learners'

primary engagement with meaning (Long 1991) that target language metalinguistic knowledge is related to target language performance (see also Masny & d'Anglejan 1985). The best source of evidence for a link between non-target language metalinguistic awareness and target language attainment is the considerable number of studies that have found a relationship between the MLAT4 and subsequent language attainment: I argue that the MLAT4 is a test of grammatical metalinguistic awareness on the grounds that it assesses participants' ability to focus on grammatical form (in their native language). I therefore propose, secondly, to test the hypothesis that multilinguals' attainment in learning another language is connected with their grammatical metalinguistic awareness.

Thirdly, on the grounds that language experience and metalinguistic awareness should be relatively separate in their relationships with language learning attainment, I propose to test the hypothesis that metalinguistic awareness is connected to multilinguals' language learning ability over and above their language experience.

Fourthly, I propose to test the hypothesis that multilinguals' metalinguistic awareness is related to their language experience, as bilingualism and biliteracy have been shown to be connected to metalinguistic awareness in children (see Sections 4.2.1 and 4.2.2), and in adults (Scribner & Cole 1981). Limited evidence from experiments using artificial grammars also shows that multilinguals develop a higher degree of metalinguistic awareness than other learners (Nayak *et al.* 1990; Nation 1983, see Section 5.1). It therefore seems reasonable to investigate whether the relationship between language experience and metalinguistic awareness extends further, and whether multilinguals' number of languages, number of literacies, and number of languages studied have any relationship with their ability to focus on grammatical form.

I also propose to test the hypothesis that multilinguals are biased to accept ungrammatical items, as has been hypothesised by Zobl (1992) and M. Thomas

(1990), and lastly, the hypothesis that multilinguals are better at explicit than implicit grammar learning (cf. Nation 1983; Reber 1993).

To sum up, from all of the evidence amassed above, I conclude by suggesting that both language experience and metalinguistic awareness are related to multilinguals' ability to learn languages. For the methodology of the study, see Chapter 6.

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Chapter 6: The Study

6.1 The Research Question

In order to find out if metalinguistic awareness helps multilinguals to learn additional languages this study examines the relationships between educated adult multilinguals' language learning experience (language background), their grammatical metalinguistic awareness, and their language learning ability.

The first aim is to investigate the hypothesis that the more languages multilinguals know, the quicker they are at learning another language. This has not so far been empirically demonstrated by comparing multilinguals who know varying numbers of languages but is a logical progression from previous research showing that multilinguals are better language learners than bilinguals and monolinguals (for a summary, see Section 5.4). Specifically, it is the relationship between multilinguals' attainment in the initial stages of learning another language and their ability to read other languages, their experience of studying a number of languages, their knowledge of a number of languages, and their associative memory that is under investigation.

The second aim is to investigate the hypothesis that there is a relationship between multilinguals' grammatical metalinguistic awareness and their attainment on a test of learning another language. It has often been proposed that metalinguistic awareness assists language learning but researchers usually choose to investigate the relationship between metalinguistic knowledge in the target language and target language attainment: this study examines a number of assessments of metalinguistic awareness.

The third aim is to investigate the hypothesis that multilinguals' metalinguistic awareness relates to their attainment in learning another language over and above their language experience; and the fourth, to investigate the hypothesis that

multilinguals' language learning experience relates to their metalinguistic awareness. Fifth, the hypothesis that multilinguals are more biased to accept ungrammatical input the more languages they know is investigated, and lastly, that multilinguals perform better on tests of explicit rather than implicit metalinguistic awareness.

The language background variables under investigation are: participants' number of languages, the number of languages they claim to be literate in, the number of languages they claim to have studied, and their score on a test of associative memory (MLAT5). Language motivation, language attitudes and language anxiety are also assessed. The metalinguistic variables under investigation are implicit and explicit grammatical metalinguistic awareness. Multilinguals' language learning attainment is the third variable under investigation.

6.2 Premises

A number of premises lie behind the tests that make up the study. First is the assumption underlying all modern linguistics, that language is a formal system having grammatical i.e. syntactic and morphological form and semantic form: this premise is just as fundamental to the hypotheses and results of this study. These regularities of patterning enable language to be learned and not just memorised. In addition, language is formal in its orthographic representation, i.e. when written it is represented in a systematic, rule-governed manner that can be used productively whatever script or literacy is used. The next premise also underlies modern linguistics, that all languages and literacies are located in social practices and social relationships and therefore social context affects all language learning (Romaine 1995; Wald 1984).

The third premise is that grammatical metalinguistic awareness, which in this study refers to the ability to focus on grammatical form and to switch between grammatical form and semantic content, can be tested using metalinguistic tasks. This premise is

accepted by many researchers as being logical and reasonable (eg, Bialystok 1991). I argue that certain tasks used in the study: the MLAT4 (Words in Sentences), the literacy test (middle Egyptian), the grammaticality judgement task, the artificial grammar tests, and the test of Basque rule knowledge, do indeed test metalinguistic awareness.

The next presupposition is that the participants have been accurate about their personal histories and abilities in their Language Background Questionnaires. None had anything to gain by misinforming or dissimulating as the information was given on the condition that no names would be used in the thesis or any published material.

The fifth premise is that I can rely on the literature reviewed in the previous chapter to support the validity and reliability of other researchers' tests that were used in this study (i.e. the Motivation Questionnaire, MLAT4 and MLAT5, and the Artificial Grammar Tests). I also rely on other researchers' experimental observations that multilinguals are better language learners than bilinguals and monolinguals.

6.3 Hypotheses

6.3.1 The Null Hypothesis

The Null Hypothesis is that all participants will perform at the same level because multilinguals do not become progressively faster language learners. Multilinguals will show no improvement in their language learning attainment or in their metalinguistic awareness however much language learning experience they have gained, nor will their metalinguistic awareness relate to their language learning attainment.

6.3.2 Hypotheses of the Study

Hypothesis 1. Out of the language background variables (number of languages, number of literacies, number of languages studied, associative memory), the number

of languages multilinguals can read (i.e. literacies) has a positive relationship with their attainment in beginning to learn another language.

Hypothesis 2. Multilinguals' explicit grammatical metalinguistic awareness has a positive relationship with their attainment in beginning to learn another language.

Specifically:

- 2a.** Out of the tests of explicit metalinguistic awareness (the Literacy Test, a test of Basque Rule Knowledge, Discrimination on the Explicit Artificial Grammar Test, MLAT4, Grammaticality Judgement Explanation Task), the Literacy Test and test of target language Rule Knowledge have a positive relationship with multilinguals' attainment in beginning to learn another language.
- 2b.** When target language Rule Knowledge is excluded on the grounds that its high relationship with target language attainment is inevitable, out of the remaining tests of explicit metalinguistic awareness used in this study (the Literacy Test, Discrimination on the Explicit Artificial Grammar Test, MLAT4, Grammaticality Judgement Explanation Task), the Literacy Test has a positive relationship with multilinguals' attainment in beginning to learn another language.

Hypothesis 3. Multilinguals' grammatical metalinguistic awareness relates to their attainment in beginning to learn another language over and above their language experience.

- 3a.** Therefore, the metalinguistic test/s found to have a positive relationship with attainment in beginning to learn another language when Hypothesis 2a is tested significantly relate to attainment over and above the language

background variable/s found to have a positive relationship with attainment when Hypothesis 1 is tested, i.e. the results of Hypotheses 1+2a > Hypothesis 1.

- 3b.** When target language Rule Knowledge is excluded on the grounds that its high relationship with target language attainment is inevitable, out of the remaining tests of metalinguistic awareness used in this study, the relationship between the metalinguistic test/s found to have a positive relationship with attainment in beginning to learn another language when Hypothesis 2b is tested significantly relate to attainment over and above the language background variable/s found to have a positive relationship with attainment when Hypothesis 1 is tested, i.e. the results of Hypotheses 1+ 2b > Hypothesis 1.

Hypothesis 4. Multilinguals' highly developed metalinguistic awareness develops through their language learning experiences (assessed in this study by their number of languages, number of literacies, and number of languages studied), specifically:

- 4a.** Out of the language background variables, the number of languages in which multilinguals are able to read has a positive relationship with their performance on the Literacy Test (Middle Egyptian).
- 4b.** Out of the language background variables, the number of languages multilinguals have studied has a positive relationship with their performance on three of the metalinguistic tests: the test of Basque Rule Knowledge, the MLAT4, and the Grammaticality Judgement Task.

- 4c.** Out of the language background variables, the number of languages multilinguals have learned has a positive relationship with their performance on the Implicit and on the Explicit Artificial Grammar Tests.

Hypothesis 5. Multilinguals are more biased to accept ungrammatical items the more languages they know.

Hypothesis 6. Multilinguals perform better on explicit than implicit artificial grammar tasks.

6.4 Thesis

In this thesis I propose that educated adult multilinguals' grammatical metalinguistic awareness relates to their language learning attainment over and above their language learning experience. I suggest that metalinguistic awareness, particularly explicit metalinguistic awareness, is one of the variables that helps multilinguals to learn languages more quickly than people who have less language learning experience. Metalinguistic awareness may assist language learning because the ability to focus on and to analyse grammatical form promotes internalisation of the target language grammar and therefore speeds up the learning process. Multilinguals consequently develop an increased ability to learn languages through their highly developed metalinguistic awareness together with other cognitive, affective, experiential and social benefits they gain from learning languages as their developing abilities interact with language input and their external surroundings over time (see Section 2.1.4, on Epigenesis). Because a multilingual's languages are interdependent within the individual, capabilities developed in one language may be transferred for use in other languages, so that learning and metalinguistic development in one language leads to cognitive reorganisation within the system. Multilinguals develop metalinguistic awareness to a high degree because the more they expend cognitive effort on focusing

on grammatical structure the better they are able to cope with further demands (the Practice Hypothesis, see Section 2.1.3). Multilinguals' metalinguistic awareness is both implicit and explicit, and gives rise to both implicit and explicit metalinguistic knowledge. Multilinguals may focus on form to a considerable extent on account of their language learning experience, in particular as a result of becoming multiliterate and studying languages.

To investigate this thesis, the research data are examined for a relationship between language experience and attainment in beginning to learn another language under controlled conditions, and for a relationship between metalinguistic awareness and attainment. From this information, it is possible to find out whether metalinguistic awareness adds a significant increment to the relationship between experience and attainment.

6.5 Overall Design

To test the hypotheses listed above, 30 multilinguals were assessed on their language background, their metalinguistic abilities (using six different metalinguistic tasks), and their attainment in learning the initial stages of another language. The tasks were chosen for their predictive or evaluative power and because they are the best available assessors with the most coverage of the variables under hypothesis.

The effects of language background variables and metalinguistic awareness on language learning attainment is assessed using a within-participants design. The experiential background variables are: number of languages, number of literacies, and number of languages studied; the cognitive background variable is associative memory (MLAT5); and the affective background variables are language motivation, language attitudes, and language anxiety. Implicit metalinguistic awareness is assessed using an Implicit Artificial Grammar Test, and explicit metalinguistic awareness using: the Modern Language Aptitude Test Part 4 (MLAT4), a test of explaining why sentences

are unacceptable on a Grammaticality Judgement Task, a test of target language Rule Knowledge, a Literacy Test translating from Middle Egyptian (a script and language previously unknown to the participants) into English, and an Explicit Artificial Grammar Test. Language learning ability is assessed using a test of attainment in a language previously unknown to the participants (Basque).

The hypotheses (see Section 6.3.2) are that all relationships are positive therefore a one-tailed predictive design was used.

6.5.1 Order of Tasks

The order of the eight tasks was randomised so that the participants would take them in different succession. Any particularly beneficial or detrimental succession would only affect a limited number of participants and so would not skew the overall results.

Each session contained the same tasks arranged in a different order. The number of different orders was constrained by the number of rooms that the participants would have to take the tests in and the availability of the participants and the rooms.

In Session One, fifteen participants did the first order and fifteen did the second order.

In Session Two, ten did the first order, ten did the second and ten the third, and in Session Three, fifteen did the first order and fifteen the second order. Participants were randomly allocated across the various orders with no predetermined groupings and no particular succession of orders.

Table 6.1 *Session One: Order of tasks*

Order 1	Order 2
Language Background Questionnaire	Language Background Questionnaire
Motivation Questionnaire	Motivation Questionnaire
Literacy Task (Egyptian)	Language Learning Task Part 1
Language Learning Task Part 1	Literacy Task (Middle Egyptian)

Table 6.2 *Session Two: Order of tasks*

Order 1	Order 2	Order 3
Language Learning Task Part 2	Artificial Grammar Task Part 1 (Implicit)	Artificial Grammar Task Part 1 (Implicit)
Artificial Grammar Task Part 1 (Implicit)	Language Learning Task Part 2	MLAT4 and Associative Memory Test (MLAT5)
MLAT4 and Associative Memory Test (MLAT5)	MLAT4 and Associative Memory Test (MLAT5)	Language Learning Task Part 2

Table 6.3 *Session Three: Order of tasks*

Order 1	Order 2
Artificial Grammar Task Part 2	Grammaticality Judgement Task
Grammaticality Judgement Task	Artificial Grammar Task Part 2
Language Learning Task Part 3	Language Learning Task Part 3
Language Learning Written Test	Language Learning Written Test
Language Learning Oral Test	Language Learning Oral Test
Debriefing	Debriefing

6.5.2 Rationale and Test Design

The rationale for using each of the tests is described here together with the description of the test design process (for *Procedures*, see Section 6.6.3).

6.5.2.1 Language Background Questionnaire (see Appendix 1.1)

I chose to use a questionnaire because it was not possible to test all the participants in all four skills (speaking, listening, reading and writing) in all of their languages for the purposes of comparison: it would have been impossible to find testers for languages such as Aka, Sango, and Amdo³. In addition, the testers' marks would not be reliably

³ Aka's typology is Bangi, a subgroup of the North-Western Bantu group, in the Niger-Congo group. Sango is a Ubangi - Northern Central Niger-Congo language, also in the Niger-Congo group. Amdo is a Tibetan language, in the Tibeto-Burman group (Bradley 1994).

comparable as however precisely the test criteria were set down, the large number of testers required would increase the likelihood that they would differ in their interpretation of the criteria and so differ in marking the participants' abilities.

The Language Background Questionnaire was therefore designed to determine what languages the participants knew, how they had learned them, and under what circumstances. The Language Background Questionnaire was a quick and effective way of obtaining a potentially large amount of information in a short amount of time, and concentrated only on the parts of the multilinguals' lives most relevant to their language learning history.

I chose to use a written questionnaire rather than an interview in order to present and collect the information in a form that was comparable between participants, and to lessen the likelihood of influencing responses (see Ross 1998). In addition, because questions in a written questionnaire are standard and invariable they decrease the possibility of diversion. Participants filled in the blanks next to a series of questions. Open-ended questions allowed the participants to answer in their own manner. Participants were free to ask questions about the questionnaire throughout the time they were filling it in to ensure that they responded with the required information.

The Language Background Questionnaire was piloted extensively. The final questionnaire was five pages long and incorporated changes recommended by the participants in the pilot study, changes shown to be necessary by the pilot study, and changes recommended by an expert in language testing.

6.5.2.2 Motivation Questionnaire (see Appendix 1.2)

Motivation and 'aptitude' for foreign language learning have so far been found to be the two most powerful predictors of language learning ability (Skehan 1989) so it was necessary to assess participants' motivation for learning languages in order to

discover its effect on the Language Learning Test. The questionnaire also assessed participants' language attitudes and anxiety. The motivation questionnaire for multilinguals was based on work carried out by Gardner and his research associates because their research has a strong track record for predicting attainment in another language (Gardner 1980, 1985, 1990; Gardner & Lambert 1972; Gardner & MacIntyre 1992, 1993). Although predictions have not been exceptionally high, they have been shown to be stable over many years of experimentation at about 0.4, that is, approximately 16% of attainment in learning a language can be predicted by the test in a variety of social conditions. Considering the number of variables that may influence language learning this is a considerable achievement.

In spite of the predictive power of Gardner's Battery, it has been criticised for being simplistic and not assessing language learners' full range of motivations. The "focus in Gardner's model has not been on elaborating on the range of possible motivational antecedents but on determining whether motivation has been aroused and specifying the learning consequences of this arousal" Dornyei (1998: 125). In spite of the criticisms, which are valid and cogent, no other researchers have come up with a test with higher detective or predictive power, whatever the test's content or construct validity. Although the battery has been criticised, I propose to use an adapted version, firstly, because from inspecting the items, I believe that it does assess at least some aspects of motivation, attitudes, and anxiety, and secondly, because it has correlated with target language attainment in other contexts, so if there are motivational effects in this study, the battery has a good chance of showing them.

The test also had the advantage of already having been researched, designed, piloted, validated, and the system of coding for statistical analysis had already been worked out. This enabled the statements to be adapted for multilinguals while keeping the same format, number of questions and coding system. Gardner and his associates had not adapted the battery for multilinguals, but as the battery had been adapted for different situations in the past and had still retained approximately the same amount of

predictive power, Gardner considered that adapting it for multilinguals would not weaken its predictive power. "The AMTB is more of a concept in my opinion than it is a test. As such the various subtests can be used as required" (Gardner 1997, personal correspondence). Gardner kindly answered questions on coding the data, which ensured the methodology was the same.

The questionnaire also assessed participants' language attitudes, and their anxiety in foreign language situations and in foreign language classrooms. Questionnaires have been shown to be a valid means of assessing anxiety, as shown by Castagnaro (1992, cited in R. Ellis 1994: 524), who compared learners' questionnaires on anxiety with physiological measures of learners' classroom anxiety and found that they correlated positively and significantly.

Each questionnaire contained instructions and 78 statements (see Appendix 1.2) that were randomised so that each participant received the statements in a different order. This was to avoid any priming effect from a set order that would skew the results and so render them useless. There were seven groups of 10 statements and two groups of 4 statements. After each statement there was a seven-point Likert scale for participants to circle one of the numbers according to their agreement or disagreement.

The questionnaire was piloted on six volunteers whose responses to the questionnaire and feedback on its construction were analysed, and the questionnaire revised accordingly. The final version consisted of 78 statements divided into nine subgroups for different types of attitudes towards and motivation for language learning: these were grouped into three overall groups for the statistical analysis: Language Motivation, Language Attitudes, and Language Anxiety.

Language Motivation	Attitudes to Language Learning Desire to Learn Languages Motivational Intensity
Language Attitudes	Attitudes to Non-native Speakers Interest in Learning Languages Integrative Motivation (4 statements) Instrumental Motivation (4 statements)
Language Anxiety	Language Use Anxiety Language Class Anxiety.

6.5.2.3 Associative Memory Test – MLAT5

‘Aptitude’ and motivation have been found to be the two highest predictive background variables for language learning ability (Skehan 1989), but as we have seen, aptitude can be seen as a collection of abilities learners have developed, where the Modern Language Aptitude Test tests a range of them (see Section 2.2.1.1). The MLAT5 (Paired Associates) is a reliable test of verbal associative memory, which is an important variable in language learning (Cook 1977) and correlates with the other parts of the MLAT in previous studies (eg, Draycott 1997).

Overall, the MLAT, first published in 1959, has been thoroughly researched and validated, and has the advantage of having a well-documented history with which the results could be compared. The MLAT has shown consistently over the years that it is reliably predictive of language learning ability at approximately 0.4: that is, it can predict 16% of post-test language learning attainment under controlled conditions. No other test available to researchers outside military installations has a higher predictive power, though the MLAT is not good for discriminating at the top end of the scale.

Lastly, this was an appropriate test to use because the English version of the MLAT was specifically designed for native speakers of English: all the participants in this study were native English speakers. The republished version (1997) of the Modern

Language Aptitude Test (MLAT) was used. It is almost identical to the version first published in 1959, the only differences being the person speaking on the cassette has a British rather than an American accent and the spelling in the written instructions is British English rather than American English. This means that results using the republished test are comparable with those using the old test.

6.5.2.4 Grammatical Sensitivity – MLAT4

The study required a range of tests designed to assess metalinguistic awareness. Part 4 of the Modern Language Aptitude Test, Words in Sentences, is an excellent test of metalinguistic awareness because participants are required to compare, not the meaning, but the form of a pair of sentences and to detect which word in the second sentence achieves the same function as a particular word in the first sentence. The MLAT4 is a test of “language analytic ability” (Skehan 1998: 204), which has been shown to load as high as .80 on the factor ‘grammatical sensitivity’ (Carroll 1990). The literature on ‘aptitude’ does not state that the MLAT4 sub-test taps grammatical metalinguistic awareness, but as a form-based task that requires participants to think about sentence structure rather than meaning, I argue that this is indeed the case. It has often been noted that Grammatical Sensitivity (MLAT4) has the highest predictive power of language learning attainment of any of the subtests (eg, Skehan 1989: 27), an observation that I contend strengthens the argument of this thesis, that metalinguistic awareness is an important variable in language learning.

In this study, MLAT5 (Paired Associates) is used to test associative memory, and MLAT4 (Words in Sentences) is used to test grammatical metalinguistic awareness.

6.5.2.5 Literacy Test (see Appendix 1.3)

It is necessary to assess participants’ literacy skills because reading and writing have been found to affect metalinguistic awareness, both in the first language (Morais,

Cary, Alegria & Bertelson 1979; Scribner & Cole 1981; Karanth, Kudva, & Vijayan 1995) and in other languages (Scribner & Cole 1981). Literacy is also an integral part of learning a language for Western educated people such as the participants of my study because in addition to verbal production and comprehension skills, most learn to read and many learn to write in their other languages. This requires a considerable degree of literacy.

No available test was appropriate for gauging the literacy abilities of native speakers of English. A test of English literacy such as the Wide Range Achievement Test (Wilkinson 1993) was inappropriate because of the low amount of knowledge required to excel, and because it only tests reading and spelling in English, not writing, nor reading (or decoding) another language. Nearest to the requirements was a test developed by Davies (1971) translating from Swahili into English, but this was unsuitable because it used Roman script, and because any participant who knew Swahili would have to be excluded from the study.

It was necessary to have a short exercise in a non-Roman script that would take little testing time as the other tests in the study were already long, demanding and tiring. In order to assess participants' literacy skills, the exercise was required to examine their ability to transliterate, i.e. to translate phonemes from one script into another script, to interpret meaning from a foreign grammar, and to translate the text into grammatical English. These requirements are all form-based and so would demonstrate metalinguistic awareness.

In order to fulfil these functions, I chose to construct a test in Middle Egyptian, which is written in a non-Roman script, is a classical language no one was likely to know, and yet is notionally familiar from museum visits and popular culture. Using Watterson (1993), I invented a simple short story in Middle Egyptian which did not depend on knowledge of Egyptian culture: this was checked by an Egyptologist, Dr Barbara Watterson. The test was piloted on six volunteers who all completed the test

as the pilot was not timed, gave feedback on the pitfalls or problems they perceived, and the test was revised accordingly.

The final version of the text was graduated in difficulty in order that it would encourage the participants to keep going at the beginning while they were learning how it worked and it was relatively easy, but would also test them thoroughly in the skills required for literacy further on in the test. It began with the phonographic text of the main protagonist's name in a *cartouche* (a box containing a person's name) but continued in logographic script for the rest of the story except for another name (page 2) and the main protagonist's name given a second time (page 3).

Two sheets of instructions, which also contained the grammar, were constructed to be read before and kept during the test, and two sheets of vocabulary were given for reference during the test.

6.5.2.6 Grammaticality Judgement Task (see Appendix 1.4)

Grammaticality judgement tasks demonstrate what participants perceive to be well-formed sentences, and their intuitions about what is and what is not acceptable in the language. Although they are often used to assess foreign language proficiency, particularly as regards grammar, they can also be used to assess native speakers on what they consider to be acceptable.

Judging sentences' grammaticality is a linguistic activity unless participants focus on the structure of the sentence rather than its meaning, when it becomes a metalinguistic activity. Because *explaining* why a sentence is unacceptable requires participants to focus on grammatical form as well as meaning, explanation is a demonstration of metalinguistic awareness. A grammaticality judgement task can be designed as a metalinguistic task in order to assess participants' ability to explain why native language sentences that they do not consider to be perfectly formed are unacceptable.

Well-designed grammaticality judgement tasks are a valid and worthwhile means of obtaining data on participants' grammatical knowledge, even if it is impossible to be sure of excluding extragrammatical factors such as parsing difficulties, pragmatic considerations and participants' introspective state (Sorace 1996: 377-8).

No pre-existing grammaticality judgement task fulfilled the requirement of this study, which was to assess participants' awareness of their native language grammar at the most demanding level, i.e. the ability to explain why a sentence is unacceptable. Many researchers have used a 'correct/ incorrect' approach, which would be unsuitable for this study as it would not discriminate adequately between participants, who are all native English speakers with highly-developed metalinguistic awareness.

Five sets of four sentences were eventually chosen from different studies (Hawkins 1987; Bley-Vroman, Felix & Ioup 1988; Zobl 1992; Ringböm 1993), or invented. Each set of sentences used a different grammatical construction, namely: prepositional or 'for' verbs, singular and plural verbal agreement, comparatives and superlatives, empty category principle or 'that' trace effect sentences, and subjacency violations. Each set of four sentences contained a sentence that had generally been found to be acceptable, one that roughly a third of people would reject, one that two thirds of people would reject, and one that almost every native speaker would find unacceptable. The test was designed so that the sentences were randomised separately for each of the 30 participants in order that any particularly beneficial or detrimental order of sentences would not skew the overall results by priming the participants to respond in a particular way (see Appendix 1.4 for the list of 20 sentences and an exemplar).

The instructions were originally based on Bley-Vroman, Felix and Ioup (1988: 32) but were changed considerably in order to take account of problems such as the one recounted by Birdsong (1989) that when people know they will have to correct any sentence they reject, they tend to accept almost any sentence. The test was

administered in two parts to avoid this problem of evasion: the instructions for the two parts of the test were given on two separate sheets of paper. The first set of instructions only asked participants to rate the sentences and state how sure they were. The second set, given afterwards, asked them to locate, correct, and explain the sentences they did not consider perfect.

The final version of the task was composed of 20 sentences in English, each sentence on a separate A4 page. The task sentences were preceded by a short sentence in italics to help the participant understand the context of the sentence they had to judge (see Schütze 1996). The two blank lines underneath were for participants to rewrite the sentence the way they would have put it themselves, and the large blank space was for the participants to explain what they thought was wrong with the sentence they had corrected. At the bottom of each page were two boxes, one for how possible the participant thought the sentence was, and one for how sure they were about their decision.

Before participants started to judge the test sentences, I showed them three examples for them to judge, one uncontentiously 'perfect', one that different speakers would judge differently depending on their dialect of English, and one that most people would reject. The instructions stress that "There are no right or wrong answers: it is a matter of opinion" as to how possible the sentences are. A practice trial with representative sentences for either extreme of the scale is recommended by Schütze (1996).

6.5.2.7 Artificial Grammar Tasks

The artificial grammar tasks assess metalinguistic awareness of form without meaning, i.e. awareness of abstract systematic patterns of Roman letters that lack semantic content. The tests were designed to assess the multilinguals on their implicit and their explicit grammar-learning abilities in a tightly controlled environment where they

could not directly use their previous language learning experience. Artificial grammars of the type used in this study test grammar with the meaning taken out, so participants cannot use the semantic elements in a sentence to work out the syntax by 'climbing up' the meaning. Instead, they must focus on the form of the letters and the patterns that turn up. The second reason for using this task was that it complements the grammaticality judgement task, which tests syntax and semantics together as natural language. The third reason was to compare the results with Nation's (1983), who found that multilinguals (when compared with monolinguals and bilinguals) reached a performance ceiling on the implicit test and did not improve on this in the explicit test: the result does not mesh with the hypotheses laid out above.

The two artificial grammar tasks are a copy of Robert Nation's experiment and informed by his (1983) doctoral dissertation. Nation, in turn, copied the artificial grammar from Reber and Allen (1978) but added an alternative, structured, presentation for both the implicit and explicit tasks in order to render the tasks more like natural language learning and changed the letters. I worked out the possible stimuli from the two grammars Nation used and followed his methodology, except the period between the two sessions ranged from 7-14 days rather than Nation's 8-12 days, and my version is computerised. Using a computerised version has the advantage of ensuring that all the participants are given exactly the same amount of time for the learning condition, down to the nearest millisecond, and circumnavigated any researcher error that might have occurred. Each participant completed an introspective questionnaire afterwards (not analysed).

To pilot the test, the finished programme was run through eight volunteers to check that the computers and programmes would work and there were no errors or omissions in the administration procedure.

6.5.2.8 Language Learning Test (see Appendix 1.5)

It was essential to include a test of learning a language previously unknown to the participants in the study in order to assess the effects of language background variables and metalinguistic awareness on language learning attainment comparably. Figure 5.2 (Section 5.3) shows that if time and input are held constant, the only variable left to affect attainment is language learning ability, therefore assessment of variation in learning the initial stages of a language under controlled conditions will measure language learning ability.

The concept for this test is based on Ramsay's work (1980). She chose Basque as the test language for her multilingual participants because it is not related to any other language: some hypothesise Basque is in the superordinate Dene-Caucasian group (eg, Ruhlen 1991) but this is far from clear and still gives it a very distant relationship indeed to any other language now in existence. Because Basque is an isolate (Trask 1995, 1997; Ruhlen 1991), participants are unable to transfer their knowledge of vocabulary, syntax and morphology directly from the languages they know, but must use their grammar-learning ability. This makes the language learning task a fair and level ground for learning. Basque also has the advantage of being a European language (though not Indo-European by typology) which means it is relatively easy to find a native speaker to test the participants orally. The Basque native speaker and I designed the language learning materials and tests together using a Basque textbook, *Bakarka* by Letamendia (1995) and a video from the Basque language learning series *Bai Horixe* (1987). The publishers gave their permission to use the excerpts from their works on condition they are acknowledged.

The Basque Language Learning Test is designed to test participants' global ability to learn the initial stages of a language and so assessed both written and oral attainment. Each exercise in the written test is designed to assess a particular point of grammar. All but one of the five exercises in the written Basque test had subtasks asking participants whether they had used a rule when they were completing each exercise,

which acted as a prompt as they were then asked to state what rule they were using (Basque Rule Knowledge). If they responded that they had not been using a rule, they were asked to write down what they thought a possible rule might be. The sub-task was required in order to assess participants' explicit grammatical knowledge of the Basque and was treated as a metalinguistic task in the data analysis.

6.6 Methodology

6.6.1 Participants

The 30 multilingual participants were found through advertising and friends. All participants had to know three or more languages, inclusive of their native English, before they started the study. These could be modern or classical languages from anywhere in the world, learned under any conditions. Equal competence in all languages was not sought, as it is the breakthrough effect of learning languages that is under research. All participants had to be adult native speakers of English between the ages of 22 and 52. An even balance between men and women was required.

With regard to education, only multilinguals with 16 or more years of full time education, i.e. university students or graduates, were sought for the study. This was to avoid the massive disparity in metalinguistic awareness that other studies have shown to be caused by schooling (eg, Geer, Gleitman & Gleitman 1972; Scribner & Cole 1981; Dabrowska 1997, see Section 4.2.4). Secondly, literacy has such a great effect on metalinguistic ability that it is not meaningful to compare people of a high degree of education with people who have much less experience in literacy, or who are not literate. Western Europe is a literate and schooled society so there is little access to non-schooled non-literate participants: people without these skills may be disadvantaged by their lack of examination experience, and sociolinguistic factors may come into play. Having a high level of education meant that all the participants were literate and used to taking tests. Experience of test-taking was necessary in order that the participants would not be fazed by the tasks or the circumstances of taking them.

For example, the stress of knowing that there was a limited amount of time to do a task in, the concentration required to keep going, the knowledge that the timer would go off at the end of the test, and the presence of an invigilator in the room might unsettle or disturb people who had not experienced these conditions frequently in the past.

All the participants who volunteered had to be available for three sessions during their testing period. Volunteers who were not available within the two testing periods were unable to take part.

6.6.1.1 *Measures to Reduce Participants' Anxiety*

Anxiety is known to affect participants' performance and consequently their results (Horwitz & Young 1991; Oxford & Shearin 1994) so all possible measures were taken to reduce participants' anxiety. The participants were either met or contacted by telephone before the first session, however the hypotheses and methodology under research were not explained as this might have skewed the results – participants were told that they would be informed about the study after the last session. The tests were referred to as 'tasks' and at the top of each test they were asked to give their 'person number' rather than 'participant number'. Participants' names did not appear on any of the tests.

The location for Session One was flexible as the equipment required (a walkman) was portable. A few of the participants chose to take the first session at home (participants 1, 8, 19, 24, and 28) as it suited their personal arrangements better than coming into the university and this may have reduced anxiety.

I administered all of the tests. During the course of the tests, I chatted to the participants and did not try to hurry them in the tests that were not timed. It was important that the participants felt comfortable with the situation, which was

unfamiliar, and with what they were required to do. If the participants felt the tests were too examinatory or harsh they would feel more anxious and it was also possible that they would not come back for the next session. The Language Background Questionnaire and Motivation Questionnaire were given first, as the information they asked for was familiar to the participants.

Refreshments were given whenever required throughout all three sessions except during the Artificial Grammar Tasks and the Language Learning Task in Sessions Two and Three where the laboratory was used. This was to prevent the possibility of damage to the equipment.

6.6.2 Materials

The following materials were used in the course of the tests: -

1. Language Background Questionnaires.
2. Motivation Questionnaires, each uniquely randomised.
3. Parts 4 and 5 of The Modern Language Aptitude Test (Carroll & Sapon 1997), comprising a cassette, practice sheet, (and for marking, the test sheet, and marking transparency).
4. Literacy Tests, each comprising two instruction sheets stapled together, two vocabulary sheets stapled together, and a three page test (stapled together).
5. Grammaticality Judgement Tasks comprising a set of 20 randomised English sentences, each on a separate sheet of paper stapled in the top left hand corner, two separate instruction sheets, and three practice sentences stapled in the top left hand corner.
6. An Implicit and an Explicit Artificial Grammar Test comprising computer packages; computers, each with an electronic response-recording device (button box), ticks and crosses for the button box; and two sets of introspective questionnaires.
7. Language Learning Materials, each comprising a set of instructions, vocabulary sheets, exercise sheets corresponding to the cassette, an answer

sheet, grammar sheets, video dialogue sheets and video vocabulary, a cassette recorded with Basque exercises, and a video of seven minutes' duration. The Language Testing Materials comprised two sheets of 'fill-in-the-blanks' and questions on grammar rules for the Written Test, and for the Oral Test, four A4 cards with named cartoon pictures of a man, a woman, a boy, and a girl (enlarged from Letamendia 1995).

Location. Session One took place in an office except for the five participants who chose to do it at home as the only equipment needed was a walkman. For Sessions Two and Three, two locations were used in each session.

1. A language laboratory equipped with individual cassette players with headphones, individual video players with headphones; and a cassette player (for the MLAT).
2. An experiment room containing three booths with computers programmed with implicit random and structured tests for Session Two, and explicit random and structured artificial grammar tests for Session Three.

Language Learning Oral Tester. The Basque Oral Test was administered by Iraide Ibarretxe, a Basque speaker from the Basque Country, Spain.

6.6.3 Procedures

This section outlines the administration of the tests.

6.6.3.1 Language Background Questionnaire (see Appendix 1.1)

The questionnaire was administered to each of the 30 participants as the first task in Session One. This task was first because it acted as an introduction for the participants to give information about their personal circumstances and why they were multilingual or how they had become multilingual. Participants were free to ask questions about the questionnaire and to receive help filling it in. This was not a timed task. Participants took 15-40 minutes to complete the questionnaire, depending on how complicated their language history was.

6.6.3.2 Motivation Questionnaire (see Appendix 1.2)

The Motivation Questionnaire was given to each participant in the first session after the Language Background Questionnaire. Each questionnaire was randomised differently. Participants were given time to read the instructions at the top of the first page. Then each of the numbers on the Likert scale was described again orally so that it was clear what they signified, and participants were asked to circle their *first* response to each statement. Participants were free to ask questions at any point. This was not a timed test. Participants took approximately 20 minutes to complete the questionnaire.

6.6.3.3 Associative Memory Test – MLAT5

As Section 6.6.3.4 below.

6.6.3.4 Grammatical Sensitivity Test – MLAT4

The MLAT4 and MLAT5 were administered together, in that order.

Each participant was given a test booklet, a practice sheet, and an answer sheet. The first sentence of the instructions for MLAT4 on the cassette was played twice in order that participants could gauge whether the cassette was at an acceptable volume. Participants were told that all the instructions were on the tape, and were asked not to open the test booklet until the tape told them to do so, and to have the answer sheet ready for MLAT4 at the beginning of the test as the practice exercise sheet would only be needed for MLAT5.

6.6.3.5 Literacy Task (see Appendix 1.3)

Participants were given the instructions and allowed three minutes to read them. They were then asked if they had any questions, to which the relevant passage in the instructions was pointed out: participants kept the instructions for the duration of the test. Participants were then given the two sheets of vocabulary and the test paper face down, and the timer was set for 15 minutes. Participants were asked to do as much as

they could, and were told that their work would gain marks whether it was written as 'rough copy' or 'final copy' (as there were two different lines for participants to work on). When the participants were ready the timer was started and they began the test. At the end of the 15 minutes, the test papers were collected.

6.6.3.6 Grammaticality Judgement Task (see Appendix 1.4)

Participants were given instructions to go through a set of 20 sentences, each on a separate sheet of paper, and circle one number in each of the two boxes at the bottom of each page. The first box contained a scale of 1-10 for the participants to indicate how perfect or impossible they considered the sentence. The second box contained a scale of 1-10 for the participants to indicate how sure or unsure they were about their decision. The instructions were given again verbally to make sure participants understood that all they had to do was circle the numbers, judging only the main sentence on each page but using the context sentence to help understand the meaning.

Participants were asked not to judge the context sentence, nor how the context sentence fitted the main sentence. They were talked through a set of three examples that had been given with the instructions, then the set of 20 test sentences was given out and participants were given 5-10 minutes to work through them.

When participants had finished, their blue pens were exchanged for red pens so that they could not change the responses they had given in the first half of the test, and the second set of instructions was given out. The instructions asked them to go through the 20 sentences again, doing three things if they had given a sentence less than 10 ('Perfect') in the first box (perfect/impossible) on each page. Firstly, they had to locate the part of the sentence that they found unacceptable by underlining or circling it or by using arrows, or whatever other method they preferred. Secondly, they were asked to rewrite the sentence on the line underneath the way they would have put it themselves. Thirdly, they were asked to explain what they thought was wrong with the sentence, if possible using grammatical terminology. If they did not know any terms they were welcome to express their explanation in any way they wished. This

was so that participants with less experience in studying languages would not feel disadvantaged by not knowing 'official' words for grammatical concepts.

The timer was set for 20 minutes to act as a guide to the time passing. Any participant needing more time was given it because participants varied with regard to how acceptable they found the sentences, and therefore how much time was required.

Those who found more sentences unacceptable would take longer to do the test because of the time-consuming procedure for sentences given less than a '10'. Each set of 20 sentences was checked after the participant had finished to ensure that no pages had been missed and there were no glaring omissions. Participants who had obviously omitted parts were asked to write something in.

6.6.3.7 Artificial Grammar Tasks

All participants sat two artificial grammar tests: the first one tested implicit learning and the second explicit learning (see Nation & McLaughlin 1986b: 46-47). Each participant completed the implicit learning task first and the explicit learning task 7-14 days later in order to minimise deliberate rule searching during the implicit learning task. There were also two different types of presentation for each of the tests, participants being randomly assigned either a structured or a random order of test stimuli. Each participant performed both random tasks or both structured tasks: fifteen participants did the random condition and fifteen the structured condition. Each participant was exposed to each grammar once, using a different grammar in each task, and each grammar was used an equal number of times for each task and for both random and structured stimulus presentations. The random/structured presentations were used in order to replicate Nation's experiment, however, random/structured differences were not analysed.

Both artificial grammar tasks were administered on personal computers programmed with the artificial grammars, each wired to an electronic response-recording device. Right-handed participants had a tick attached to the right button and a cross attached

to the left button, and left-handed participants had the tick attached to the left button and the cross attached to the right button on the button box. This was in order that their handedness or dominance would not affect the results (Geschwind & Galaburda 1985). Each of the participants sat in front of a computer in a separate booth and followed the instructions on the screen.

The following procedures are adapted from Nation & McLaughlin (1986b: 46-47) and follow them as closely as possible. The set of 20 stimuli was shown to participants one stimulus at a time (the implicit random condition used Grammar 1 and the implicit structured condition Grammar 2). The random order was randomised differently for each participant in order not to skew the results. Each grammatical exemplar appeared in large letters on the computer screen, and was left on the screen for 7 seconds, after which it was replaced by the next stimulus. Participants were asked to pay close attention to the stimuli. In both conditions, participants were shown the set of stimuli three times, each set randomised differently.

A one minute break followed this learning phase, after which participants were informed that the stimuli they had seen followed a set of rules that determined the order in which the letters could occur. They were then told that they would be shown another set of 100 exemplars and that exactly half of these would follow the rules for letter order: the others would contain violations in letter order. The participants were asked to judge whether each exemplar could be considered to be "well-formed" or not according to the rules illustrated by the stimuli from the learning phase.

The 100 test stimuli consisted of 50 different exemplars, 25 grammatical and 25 ungrammatical, each presented twice. Five of the correct stimuli were the same as five of the stimuli presented in the learning condition but the participants had never seen the rest of the correct stimuli (i.e. 90%) before. These 20 correct stimuli were all possible outputs of the grammar they were being tested on. Of the 25 incorrect stimuli, 5 had errors in the first letter, 5 in the second letter, 5 in the last letter, 5 in

the penultimate letter, 2 in deep position (i.e. somewhere in the middle) and 3 were written backwards, this distribution ensuring that error position did not interact with participants' ability. All the incorrect letters in the incorrect stimuli used the same letters as those in the correct stimuli but they were in the wrong position. The stimuli appeared in large letters on the computer screen, and were left on the screen for a maximum of 5 seconds. Participants indicated their responses by pressing either the tick or the cross on the response-recording device. This brought on the next stimulus. The order of presentation was random and no feedback was given about the correctness of the responses. After participants had finished the computerised part of the test they filled in a questionnaire on the implicit task.

Participants sat the explicit artificial grammar task 7-14 days after the implicit task (the following procedure is also adapted from Nation & McLaughlin 1986: 46-47). The only differences were the instructions on the screen and that they were shown the other of the two artificial grammars, according to whether they were doing the random or structured condition. Participants were informed that they would be shown a group of artificial "words" derived from a complex set of rules governing letter order (loc. cit). They were also instructed that "it would be a great help if you could figure out what these rules are". Participants were shown all 20 of the grammatical stimuli on the computer screen at the same time and allowed to scan the display for 7 minutes. Each column in the structured display contained the exemplars generated from one stimulus type of the grammar. In the structured version, the stimuli from Grammar 1 were arranged in columns in a structured order. In the random version, the stimuli from Grammar 2 were arranged in columns in random order. At the end of the 7 minutes, they were told that they would be shown 100 artificial words and that exactly half of them would be considered "well-formed" according to the rules illustrated by the learning display. Their task was to indicate whether or not each was well-formed by pressing either the tick button or the cross button on their response-recording device. The 100 test stimuli consisted of 50 different exemplars, 25 grammatical and 25 ungrammatical, each presented twice.

The stimuli were presented in a random order without feedback, just as in the testing during the first session. Participants then filled in a questionnaire, just as they had after the implicit artificial grammar in Session Two.

6.6.3.8 Language Learning Task (see Appendix 1.5)

Participants were each given three separate 20 minute sessions to learn as much as they could from the materials listed below, then they were given a two page written test and an oral test with a native Basque speaker after the third session.

In each of the three sessions, participants were given an envelope containing a set of language learning materials. In the envelope were:

- A sheet of instructions
- A set of vocabulary ordered by exercise
- A set of vocabulary ordered alphabetically
- A set of grammar rules
- A set of exercises
- A written dialogue of the video
- A list of vocabulary for the video
- A cassette accompanying the exercises and a walkman to play it on
- An exercise answer sheet (Sessions Two and Three only)
- A video cassette (Session Three only).

In the first session, participants read the instruction sheet, the task instructions were explained again verbally, and any questions were answered. The rest of the sheets in the envelope were then shown and I explained that the sheets were in different colours so that the participants could distinguish between them and find the required sheets quickly. They could write on any of the sheets as they would get the same envelope back with their own materials at the next Session. They were told again that it was entirely up to them how they spent their 20 minutes with the materials, they were shown how to use the walkman, which was wound to the beginning, and the timer was set for 20 minutes. When the participant was ready the timer was started and they began to learn. When the 20 minutes were up, the participant was asked to put

the learning materials back into the envelope and they were kept for the next session.

If participants asked what the language was, they were told that for the purposes of the study it was called “Hartza” although this was not its real name, and that it was a natural language, i.e. not invented. They were told that they could only be informed of the real name of the language in Session Three, in order that no one could have an unfair advantage through being able to refer to dictionaries or textbooks between sessions.

In Session Two, participants were given their envelope of language learning materials back together with a copy of the cassette that had been rewound back to the beginning and the Exercise Answer Sheet. In Session Three participants were also given a video cassette and shown how to work the video player. When the timer sounded at the end of Session Three, I told the participants they would now have the written test.

Language Learning Written Test (Basque). Straight after Session Three, participants were given a fresh set of Vocabulary Sheets and the test paper face down on the table, and the timer was set to 15 minutes. When participants were ready they were asked to turn over the paper and the timer was started.

Participants were allowed to refer to their vocabulary sheets throughout the test. When the 15 minutes were up, the timer sounded, and the papers were gathered in.

Language Learning Oral Test (Basque). The Basque oral test was administered straight after the Basque written test. If there was more than one participant, a volunteer was asked to go first. Participants were given back their envelope of language learning materials together with a sheet of instructions for the oral test. The instructions asked them to ensure that they knew the vocabulary to Exercise 1 from the practice exercises in their language learning materials envelope, and eight other

vocabulary items (for full details, see Appendix 1.5.10). They also had to be sure they had learned 'Hello', 'Who are you?', 'How are you', 'Are you a student? Are you a teacher?', and 'Goodbye'. I checked that they knew these words and that they were ready to meet the Basque speaker. Four A4 cards with the cartoon faces of a man, a woman, a boy and a girl were placed around the room. The Basque native speaker and the single participant taking the test were the only people in the room during the oral in order to reduce participants' anxiety.

The participant and the Basque speaker introduced themselves to each other and then the Basque speaker asked questions about the people depicted on the cards, gradually building up to more complicated sentences to see how much the participant had learned. Although the test usually consisted of questions asked by the tester and answered by the participant some participants also asked the tester questions.

The Basque tester started the conversation with the greeting *Kaixo, zer moduz?* (Hello, how are you?), expecting a similar response from the participant. For instance, *Kaixo, ondo eta zu?* (Hello, well, and you?). In most of the cases, the participants introduced themselves immediately after the greeting and then asked the Basque tester her name. After the openings, the tester started with the set of questions (see Appendix 1.5.11) in order to test the grammatical constructions contained in the exercises, cassette, and video, ordered according to their degree of difficulty. The first set of questions was all in the third person singular and used the interrogative pronouns *nor* 'who' and *zer* 'what': these were followed by yes-no questions. The second set of questions was in the first person and second person singular, and followed the same pattern. The vocabulary of the questions was varied according to the age and sex of the participant.

Whenever the participant did not remember a vocabulary item, the tester provided them with the necessary word. If the participant did not understand a vocabulary item, the tester explained it with gestures or other examples, all in the target language.

The Basque tester did not speak in English at all, unless the participant was having serious problems: only in those cases (very rarely) when the participant really did not understand something did the tester give the translation equivalent in English.

Whenever the participant made a grammatical mistake, the tester corrected it by giving the right answer. Then the tester would ask a similar question to see whether the participant was receptive to feedback. If the participant answered it correctly, the tester would then move on to a different type of question; if the participant made the same mistake again, the tester would correct it again before moving on to a different type of question. Later in the test, the tester would see whether or not the participant understood the construction. All feedback was in Basque, and always consisted of the example repeated correctly: no explicit grammar points were made at all. In cases where the participant did not understand the meaning of the construction, the tester exemplified the sentence with some gestures. For example, if the participant used a third person instead of a first person verb, the tester would point at one of the cards to indicate that they had said something in the third person, and then point at herself to indicate that *she* was the first person. Every time the participants answered a question correctly, the tester nodded and said *Oso ondo* 'very good'.

At the end of the test the tester said *Hau da dena* 'This is all' and reinforced the utterance with a gesture, followed by the corresponding leave-taking, namely *agur* 'bye'. The oral test lasted approximately 15 minutes.

6.6.3.9 Debriefing

After the Basque written and the oral tests, I thanked participants for their participation and filled them in on the hypotheses of the study and what I hoped to find out from the research. They were told that after the study there would be a reception so they would have the opportunity of meeting the other people in the study. They were also told they would be sent the results of the study when these were ready.

6.7 Coding the Data

The questionnaire and test results were coded in order to obtain numerical data for inputting into a statistical package. The coding for each of the tests is outlined below.

6.7.1 Coding Outlines

6.7.1.1 Language Background Questionnaire (see Appendix 1.1)

The questionnaire was coded for the number of languages participants knew, the number of languages they could read, and the number of languages they had studied.

The number of languages known by each participant was assessed by counting all the languages in which they claimed they had any competence, with the stipulation that participants were required to have started learning the languages' grammar. Participants' languages have been counted even if their competence is very low as it is the breakthrough effect of beginning to learn another grammar system that is hypothesised to relate to participants' language learning ability and grammatical metalinguistic awareness. Dialects have been counted as languages as this is often a political rather than a linguistic distinction (Odlin 1989), eg, Mandarin and Cantonese are politically the same language (Chinese), but linguistically they are different languages as they are not mutually intelligible. Secondly, some degree of metalinguistic awareness must be required in order to keep different dialects separate from one another. Thirdly, neurolinguistic studies have shown that aphasic bilinguals can recover an L2 dialect without recovering much of their L1 dialect, which might be supposed to be the same language – this shows that different dialects of the same language may be represented separately in the brain (Fabbro 1999).

The 'Number of Literacies' participants knew was quantified by counting the number of languages they reported being able to read in with some understanding, however limited. The 'Number of Languages Studied' was assessed by counting the number of languages that participants reported that they had learned by studying in a class or in

an autonomous learning environment using materials such as textbooks, cassettes and videos, rather than acquiring the language solely communicatively in the target language environment. It should be noted that this is a sociolinguistic rather than a psycholinguistic distinction, as learners can acquire languages in the classroom and can learn and construct their own grammatical rules through learning communicatively: acquisition or learning depends on learners' psycholinguistic state at any given moment and not on learners' surroundings. These differences can, however, affect learners' explicit metalinguistic knowledge. Maturation and schooling/education were not used as variables in this study as all participants were educated adults aged 22-52.

6.7.1.2 Motivation Questionnaire (see Appendix 1.2)

The 78 randomised items for each Motivation Questionnaire were reassigned their original grouped order for coding. Responses to *positive* statements were coded as below, including the responses on anxiety in language use and language class (so high anxiety is coded as a high score just as high motivational intensity is coded as a high score).

-3	-2	-1	0	+1	+2	+3	
↓	↓	↓	↓	↓	↓	↓	
converted to	0	1	2	3	4	5	6

Responses to *negative* statements were coded as below:

-3	-2	-1	0	+1	+2	+3	
↓	↓	↓	↓	↓	↓	↓	
converted to	6	5	4	3	2	1	0

The scores given for the responses in each group of questions were then added together as follows to give the total score for each of the three assessed areas of motivation. The aggregate for Language Motivation was the sum of the scores for Attitudes to Language Learning, Desire to Learn Languages, and Motivational Intensity; the aggregate for Language Attitudes was the sum of Attitudes to Non-native Speakers, Interest in Learning Languages, Integrative Motivation, and Instrumental Motivation; and the aggregate for Language Anxiety was the sum of Language Use Anxiety, and Language Class Anxiety. This is the same methodology used by Gardner in his work (Gardner, Tremblay & Masgoret 1997; see also Gardner 1980; 1985; 1990), except that I use a 0 to 6 scale, rather than Gardner's 1-7 scale, in order to obtain ratio data to fulfil the assumptions required for parametric statistics.

One of the statements was repeated: no. 14 'There are a lot of languages that I would really like to learn' as no. 41 'There are a lot of languages I would really like to learn' so that each participant's responses for them could be compared to see if they varied.

When they were coded afterwards, the first of the two to appear on each questionnaire was coded as no. 14 and the second as no. 41 so that every participant's first response was comparable.

There was a coding problem with double responses in two of the questionnaires. For statement no. 22 'I keep up to date with my other languages by working on them almost every month', two participants circled two of the numbers on the Likert scale because they felt very differently about different languages that they knew and were unable to generalise. Participant no. 10 worked on Chinese almost every day but hardly ever on his other languages because he did not have the time or opportunity. Participant no. 27 regularly worked on his German but had not spent any time on his French for a long time. To get round this problem, these two responses were coded as zero, the response in the middle of the two extremes, as a generalisation that other participants had also had to make.

6.7.1.3 Associative Memory Test – MLAT5

Participants' responses to the multiple choice questions in Part 5 of the Modern Language Aptitude Test (Carroll & Sapon 1997) were marked using the transparencies supplied with the test. The maximum number of marks was 24. This test was used to assess participants' associative memory as a language background variable.

6.7.1.4 Grammatical Sensitivity Test – MLAT4

Participants' responses to the multiple choice questions in Part 4 of the Modern Language Aptitude Test (Carroll & Sapon 1997) were marked using the transparencies supplied with the test. The maximum number of marks was 45. The test was used as a test of metalinguistic awareness.

6.7.1.5 Literacy Task (see Appendix 1.3)

Each participant's test data were coded in three stages: transliteration, grammar, and interpretation. Marks for each of the three coding stages were allocated to each sentence of the Middle Egyptian short story so that there was a maximum number of marks that any participant could score for translating a certain number of sentences for each stage. The first stage of coding was for the participant's ability to transliterate the Middle Egyptian lexical items which were represented by logographic symbols into English and the lexical items which were represented by phonographic symbols into Roman script and then English. The second stage was for grammatical ability, which in effect tested both the participants' ability to translate the meaning of the Egyptian and their ability to translate it into grammatical English. The third stage of coding was for the participants' ability to interpret the Egyptian as meaningful and coherent English. This required the most metalinguistic skill and was highly dependent on the previous two stages, as there was a discovery procedure (participants had to transliterate before they could work on the grammar, and could only interpret this as meaningful English after they had understood the meaning)

therefore the interpretation coding alone was used for the final statistical analysis. The maximum number of marks was 50.

6.7.1.6 Grammaticality Judgement Task (see Appendix 1.4)

No prescriptive stance was taken regarding participants' judgements, i.e. as to whether they had accepted or rejected a sentence correctly, as all of the participants were well-educated native English speakers and the purpose of the task was to examine their metalinguistic awareness. This means that detection of errors was only assessed in order to find participants' detection rate.

All sentences that a participant thought perfect and gave a *10* in the *perfect/impossible* box were excluded from further analysis. For the Detection Score, each sentence participants had circled a number less than *10* in the *perfect/impossible* box on account of finding something unacceptable in the sentence was given a '1' indicating they had found an error. Then for the Explanation Score, the sentence was given a '1' if participants were able to explain why it was wrong, and a '0' if they did not attempt to explain the sentence or if their explanation was incomprehensible (a rogue response). Each participant's Explanation Score was summed, and then divided by their Detection Score.

6.7.1.7 Artificial Grammar Tasks

Participants' responses were categorised as one of correct acceptance, incorrect acceptance, correct rejection, incorrect rejection. Each individually-randomised test comprised 100 test stimuli: the items in the two sets of 50 stimuli were identical, but had been randomised differently for each participant. The electronic response-recording device recorded the following data for each participant's implicit and explicit tests (see Table 6.4).

Table 6.4 Coding information for the artificial grammar tasks.

Sub-category	
<ul style="list-style-type: none"> • Number of correct responses for the first set of 50 stimuli 	<ul style="list-style-type: none"> - Number of correct responses for the 25 grammatical items - Number of correct responses for the 25 ungrammatical items
	= 100 responses (i.e. 50 pairs)
<ul style="list-style-type: none"> • Number of correct responses for the second set of 50 stimuli 	<ul style="list-style-type: none"> - Number of correct responses for the 25 grammatical items - Number of correct responses for the 25 ungrammatical items

6.7.1.8 Language Learning Test (see Appendix 1.5)

Basque Language Learning Mark (Total Marks = 50). Each participant's marks were aggregated by normalising the Basque Exercises Mark (maximum 35) and the Basque Oral Test Mark (maximum 25) to give them equal weight for the overall Basque Language Learning Mark, i.e.:

$$\text{Basque Language Learning Mark} = (25/35) \times \text{Basque Exercises Mark} + \text{Oral Test Mark.}$$

Basque Exercises (Total Marks = 35). The Basque Written Test contained five exercises, each assessing participants' ability to complete items using a particular grammatical construction. One mark was given for each correct sentence in Exercises A, B, C and D, where there were five sentences in each exercise. In Exercise E, where each of the five item numbers contained three sentences, one mark was given for each correct sentence giving a maximum of 15 marks for the exercise.

Basque Oral Test (Total Marks = 25). Each oral test was marked for the following measures.

	<u>Maximum Marks</u>
Introduction	5
Verbs	5
Question comprehension	1
Response to Wh- questions	1
Response to Yes-No questions	2
Word order in response to Wh- questions	1
Word order in response to Yes questions	1
Word order in response to No questions	1
Communicative competence	2
Pronunciation of Basque 'h'	0.5
Pronunciation of Basque 'li'	0.5
Noun phrase grammar: demonstratives and endings	5

Basque Rule Knowledge (a metalinguistic task) (Total Marks = 7). Participants were asked at the end of each exercise in the Basque Written Test whether they had been using a rule to do the exercise. If participants responded positively, they were asked to state the rule they had been using to do the exercise. If they had responded negatively, they were asked if they could think of an appropriate rule and write it down. They were given one mark for each rule that would produce a correct answer: one exercise had two rules (i.e. for 'yes' responses and 'no' responses to a question) and therefore two marks, and the last exercise had three rules and therefore three marks. NB The rule did not have to be the one given in the grammar sheets but had to produce the same answer.

6.8 Data Description

This section contains a description of all data. Participants' language background is described, then their metalinguistic test data, and lastly their performance on the Basque Language Learning Test. These data are used as independent and dependent variables for the statistical analyses in Chapter 7.

6.8.1 Frequency Data for Participants' Language Background

Variables

The frequency data from the Language Background Questionnaire will be described first, followed by the Motivation Questionnaire, and Part 5 of the Modern Language Aptitude Test (MLAT5) testing Associative Memory.

The Language Background Questionnaire confirmed that all 30 participants were native speakers of English: 22 had British citizenship; 4 had joint citizenship, namely, British/Croatian, British/Turkish, New Zealand/British and Canadian/ British; 4 had other citizenship – American, Australian, Indian, and Irish. The participants were all aged between 22 and 52, being fairly evenly distributed over the range (see Figure 6.1). Half of the participants were male and half were female. These distributions ensured a representative sample of adult multilinguals was tested in the study.

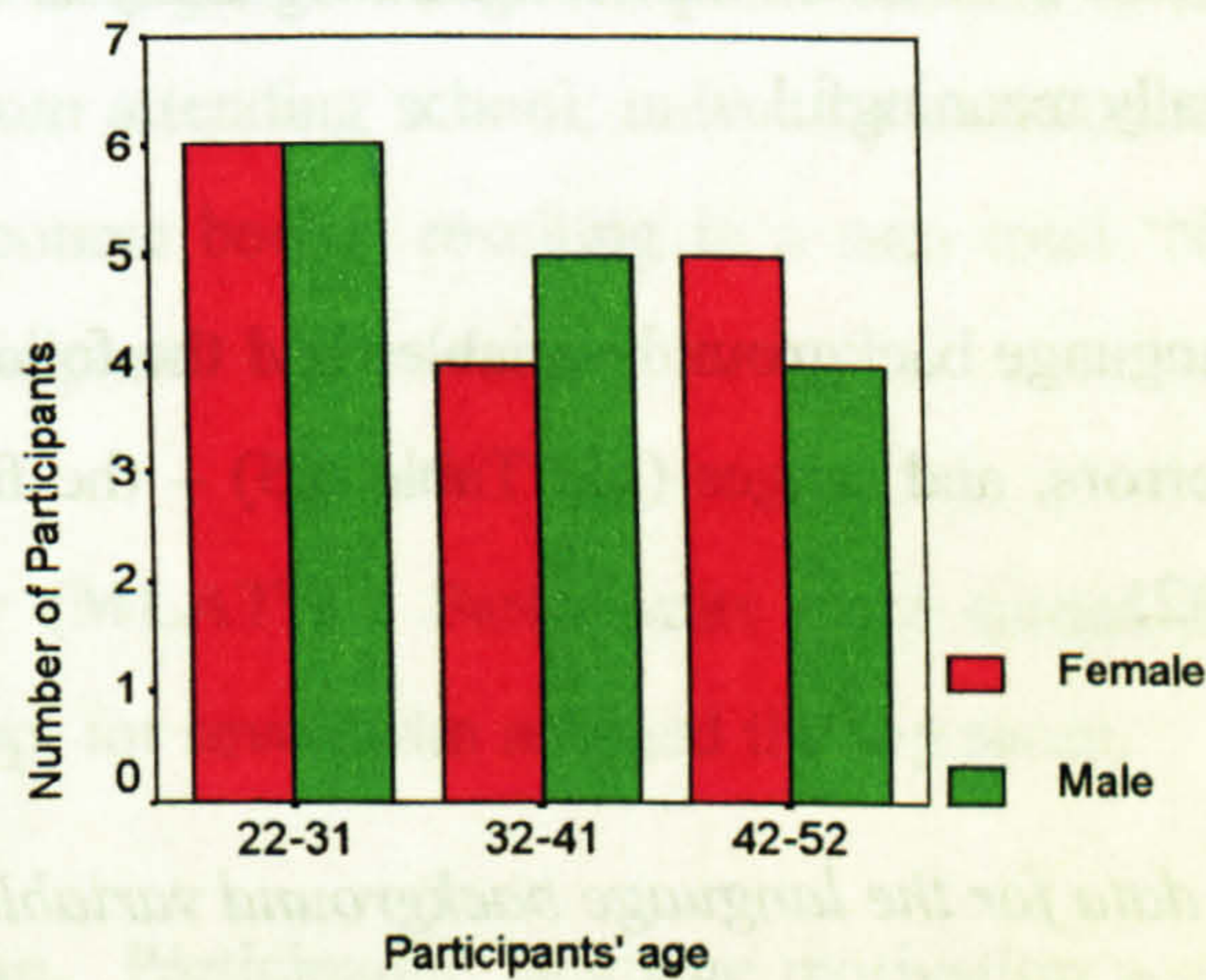


Figure 6.1 *Distribution of participants by age and sex.*

With regard to education, all the participants either had a degree or were studying for one. There were five participants in their second, third or final years of their first degree (a first degree takes four years in Scotland); five who had completed a degree by the time the research started (often a long time before); five who had an MSc (masters); five who were studying for a PhD (doctorate); five who had completed

their PhD; and five who were university teachers (all at the University of Edinburgh) who had each completed a PhD. This even spread ensured that although all the participants were of a high educational standard, there was still a considerable range of academic and educational experience in the sample. None of the participants was dyslexic.

With regard to early bilingualism and early multilingualism, an analysis of the language background data showed that six of the participants were early bilinguals and two were early multilinguals, 'early bilingual' being defined as acquisition of two languages and 'early multilingual' as acquisition of three or more languages before the age of 12. All eight early bilinguals and multilinguals had lived in different language communities before the age of 12 and had been learning the language, or had spoken it. Either they had moved country with their parents, and/or one or both of their parents had spoken a different language from their environment outside the home. However, the sample size is so small that comparative analysis with later multilinguals would not be statistically meaningful.

The seven assessed language background variables had the following means, standard deviations, standard errors, and ranges (see Table 6.5) – the frequency distributions are shown in Figure 6.2:

Table 6.5 *Frequency data for the language background variables.*

Language Background Variables	Mean	SD	SE	Min.	Max.
Number of Languages	7.10	2.84	.52	3.00	15.00
Number of Literacies	6.10	2.30	.42	3.00	11.00
Number of Languages Studied	3.77	1.63	.30	1.00	7.00
MLAT5 (Memory)	.77	.20	.04	.38	1.00
Language Motivation	.76	.11	.02	.56	.95
Language Attitudes	.84	.09	.02	.65	.99
Language Anxiety	.38	.18	.03	.04	.68

Languages. The number of languages each participant claimed to know ranged from three to fifteen (see Appendix 2). These were modern or classical languages from anywhere in the world. They had learned their languages in a variety of situations: at home, at school, at work, from partners, or from travelling. In general, it was noticeable that the fewer languages multilinguals knew, the better they knew them.

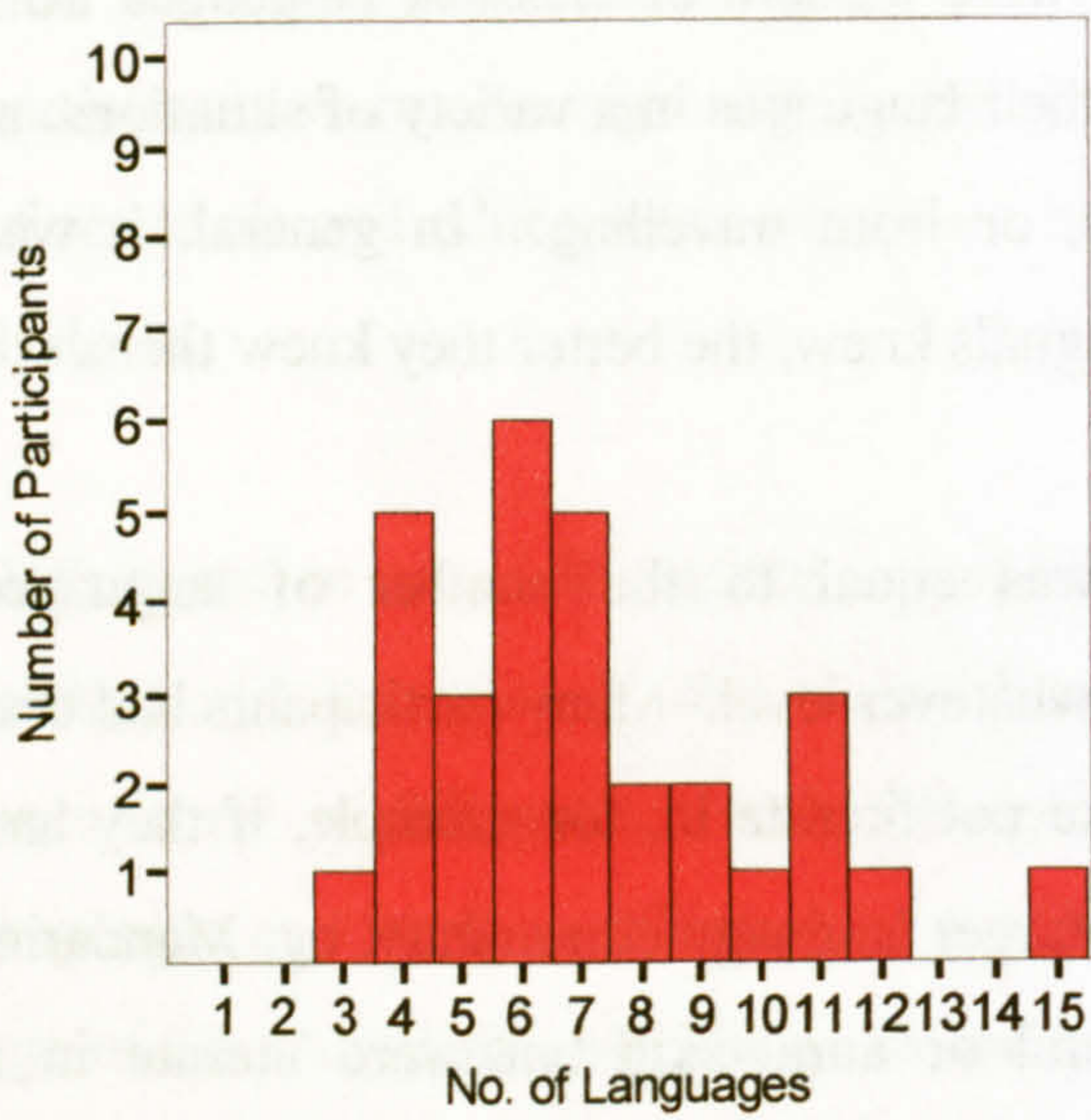
Literacies. The number of literacies was equal to the number of languages participants reported being able to read, at whatever level. Many participants had oral and aural skills in languages that they were not literate in, for example, if they had learned a language communicatively in the target language community, eg, Mandarin. Conversely, many participants had no oral or aural skill but were literate in a language, such as Latin or Ancient Greek.

Languages Studied. Participants' experience of studying languages was quantified by simply counting each language that participants claimed to have had some formal training in, such as from attending school, university or extramural classes, or using self-taught language course books, resulting in a sum total 'Number of Languages Studied' for each participant.

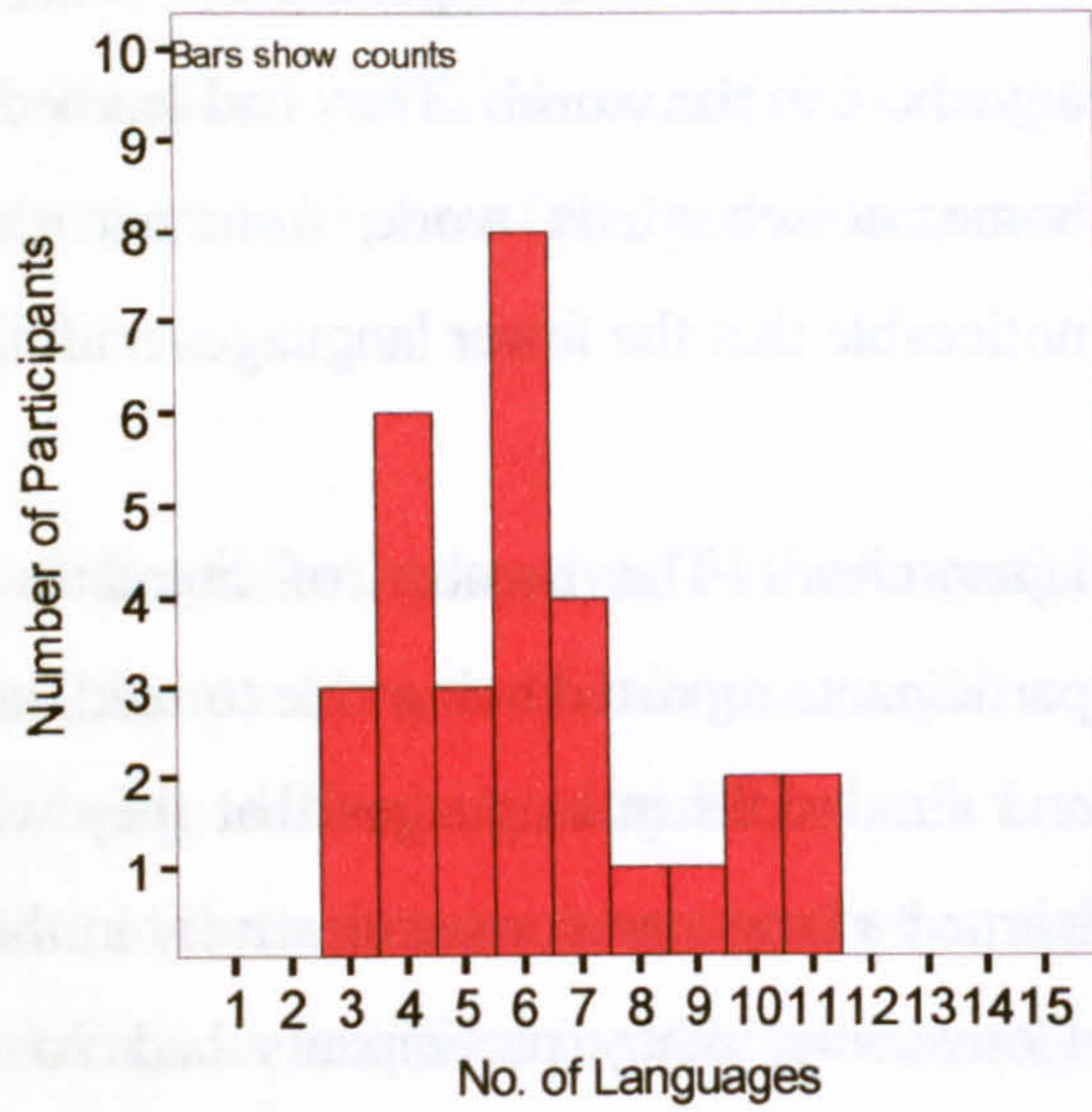
Associative Memory (MLAT5). Participants were spread fairly evenly over the range of the test, except for seven who attained the top score.

Language Motivation. Participants' language motivation was generally high being spread over the top half of the scale. This indicates that the participants were motivated to learn languages.

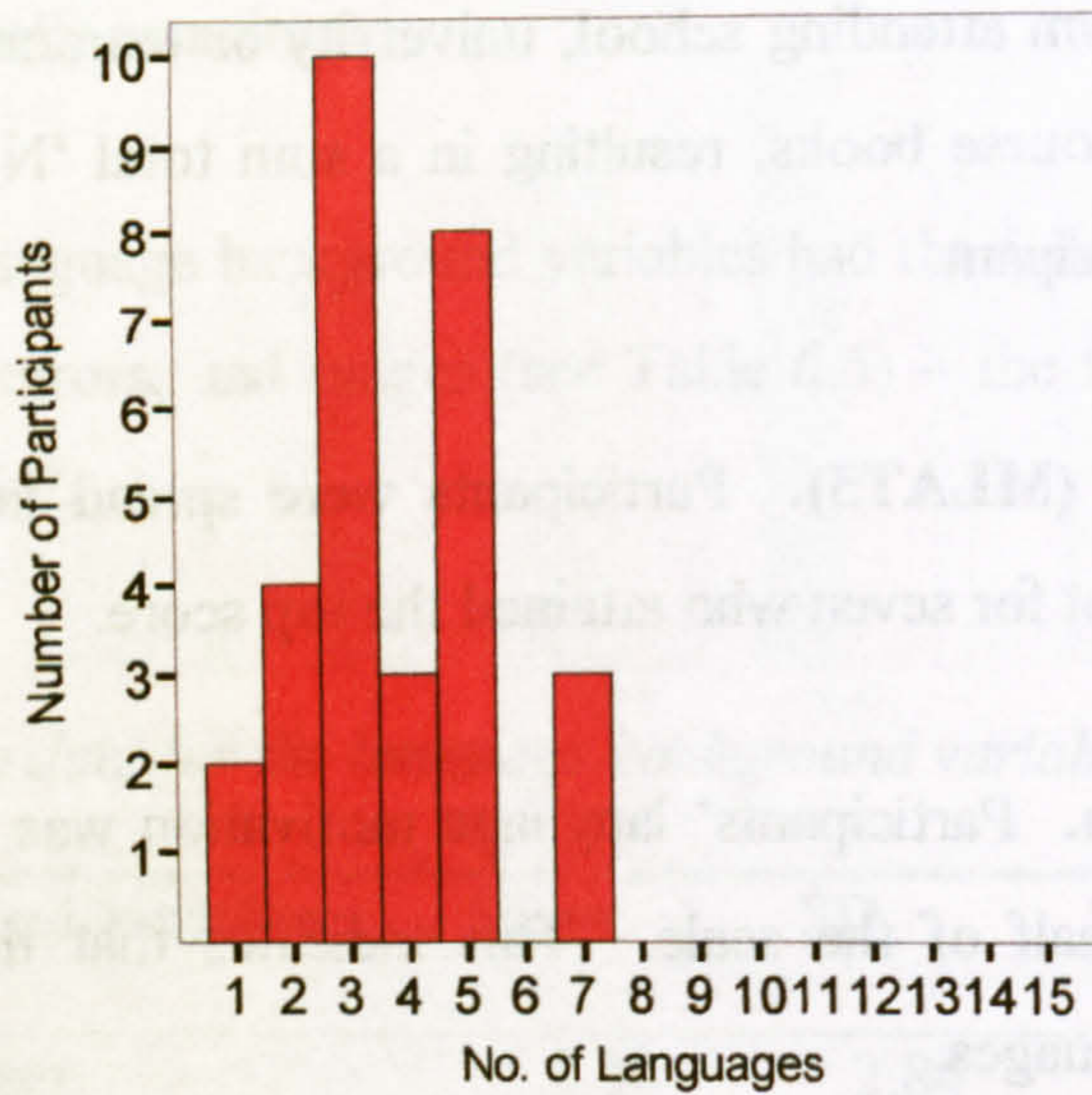
Language Attitudes. Participants' language attitudes are also spread over the high end of the range, demonstrating their positive attitudes to non-native speakers, their positive integrative and instrumental motivation, and their interest in language learning.



Number of Languages

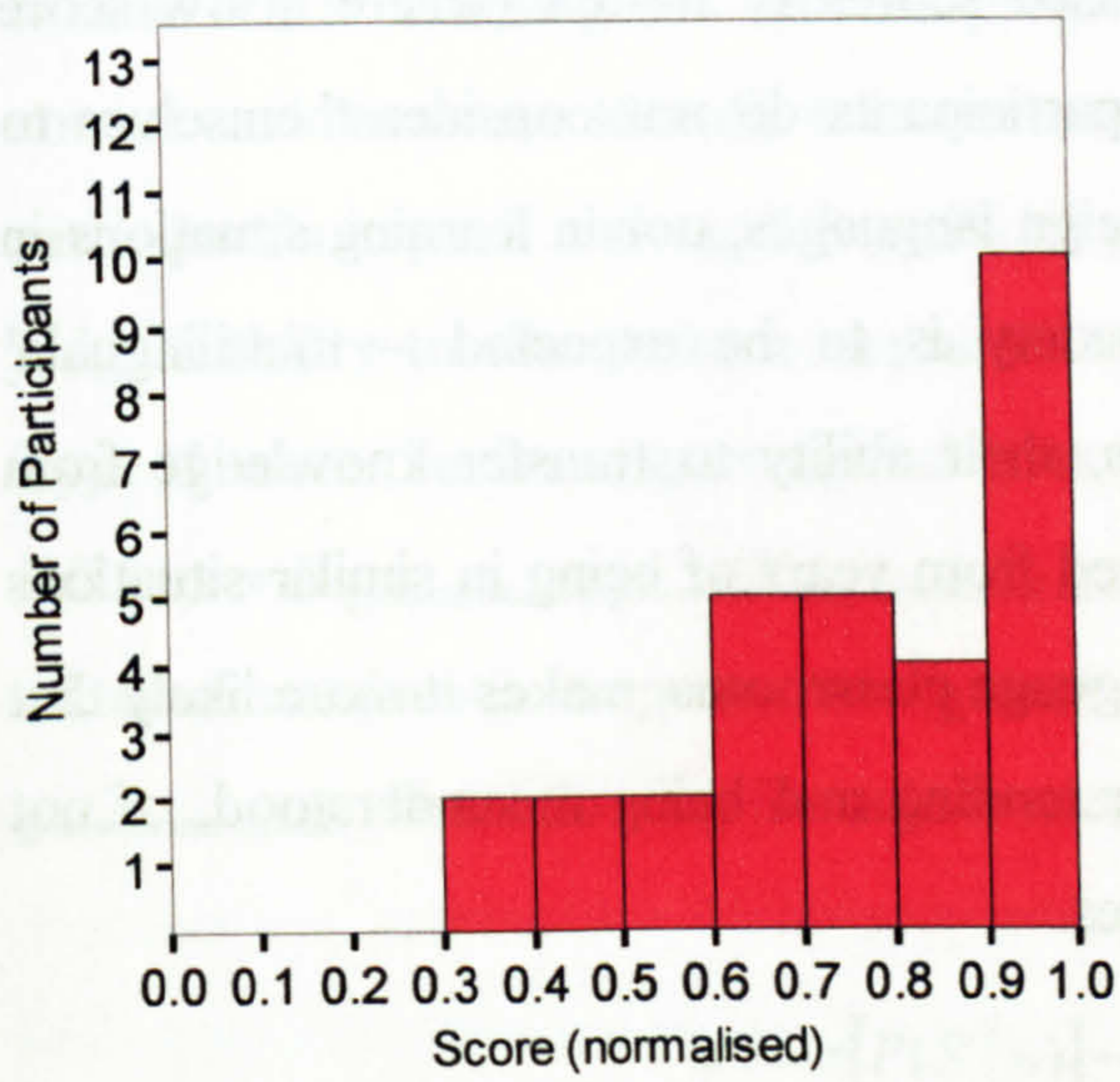


Number of Literacies

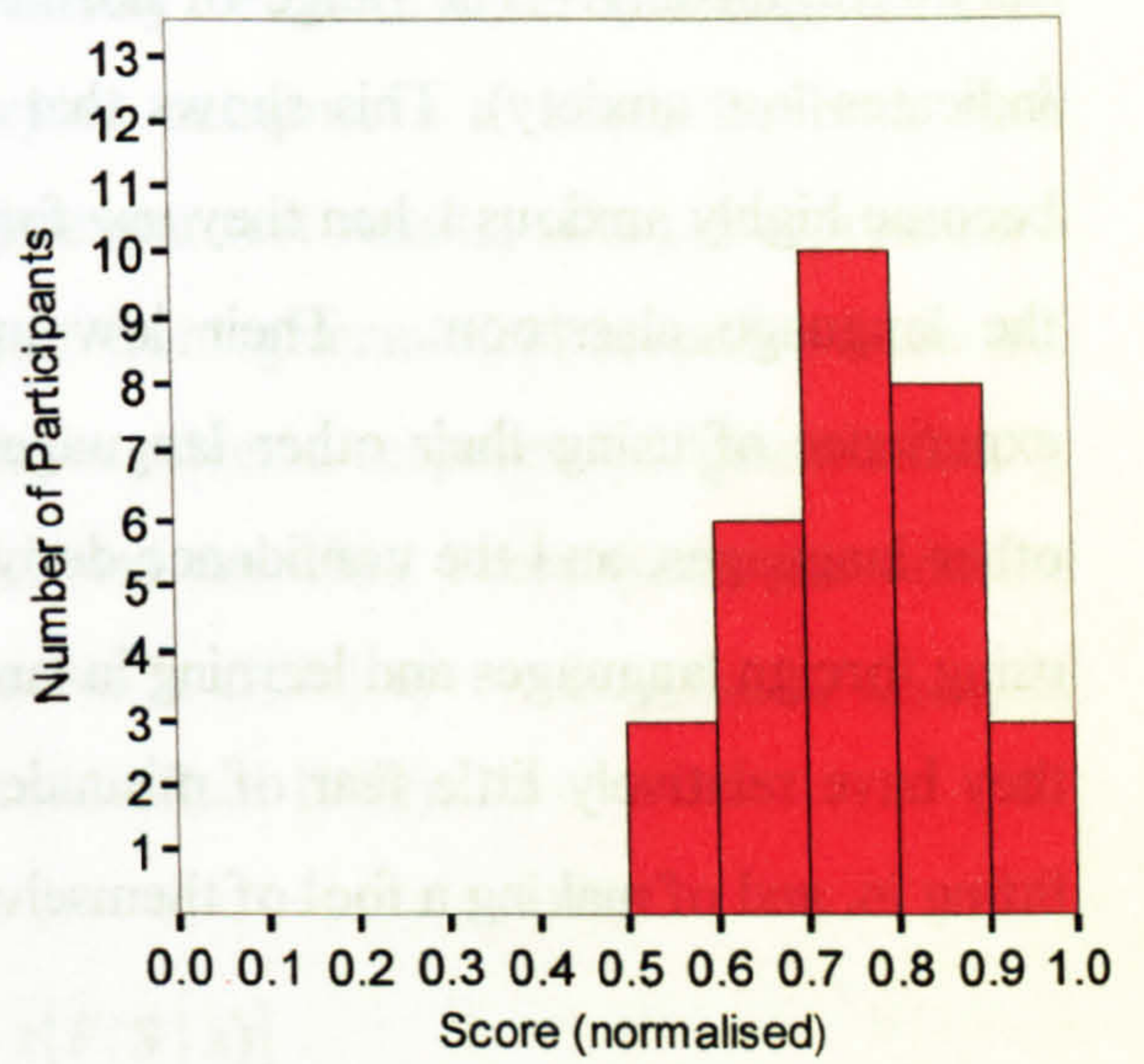


Number of Languages Studied

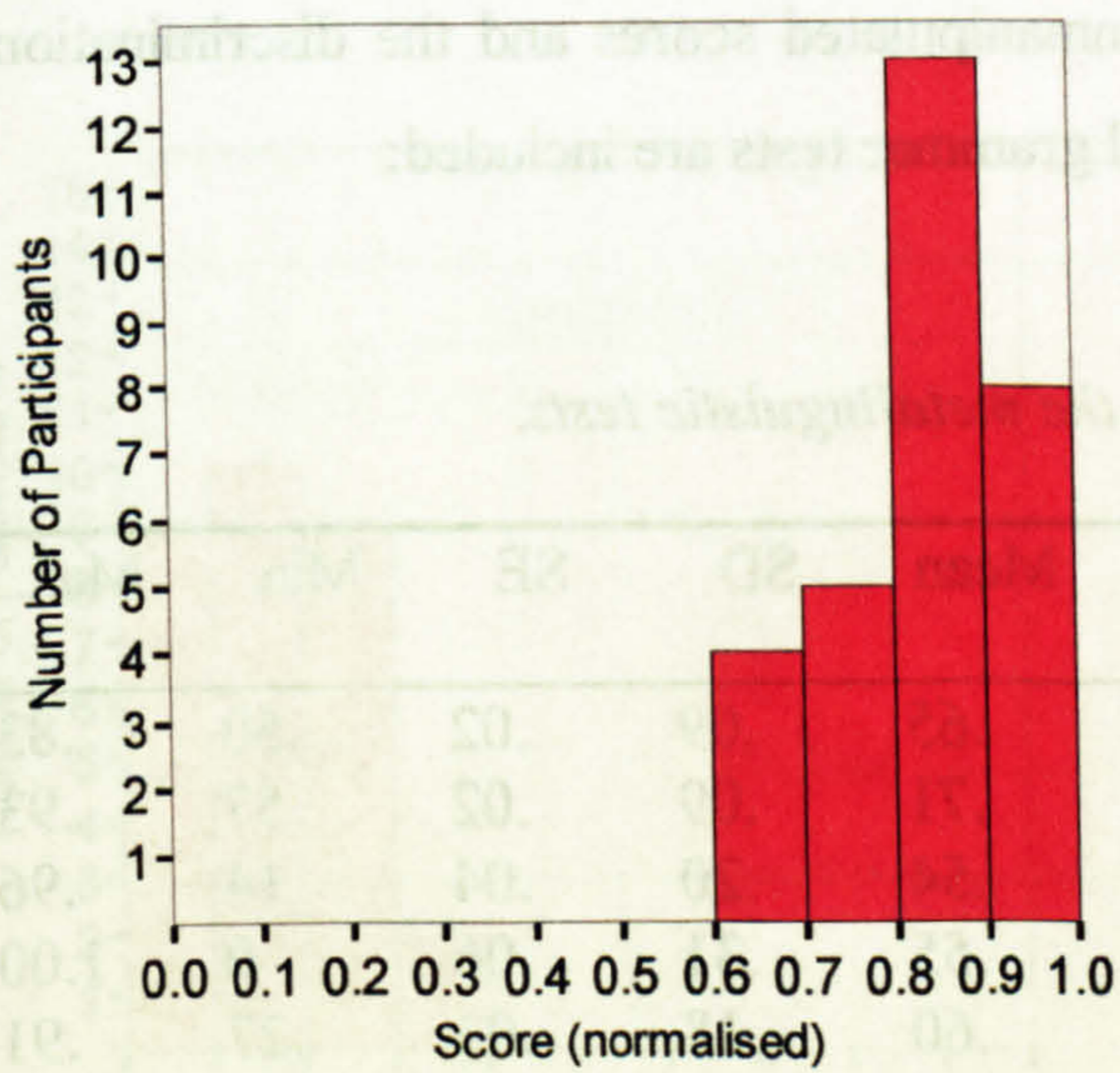
Figure 6.2 Distribution of participants' scores on the 7 language background variables.



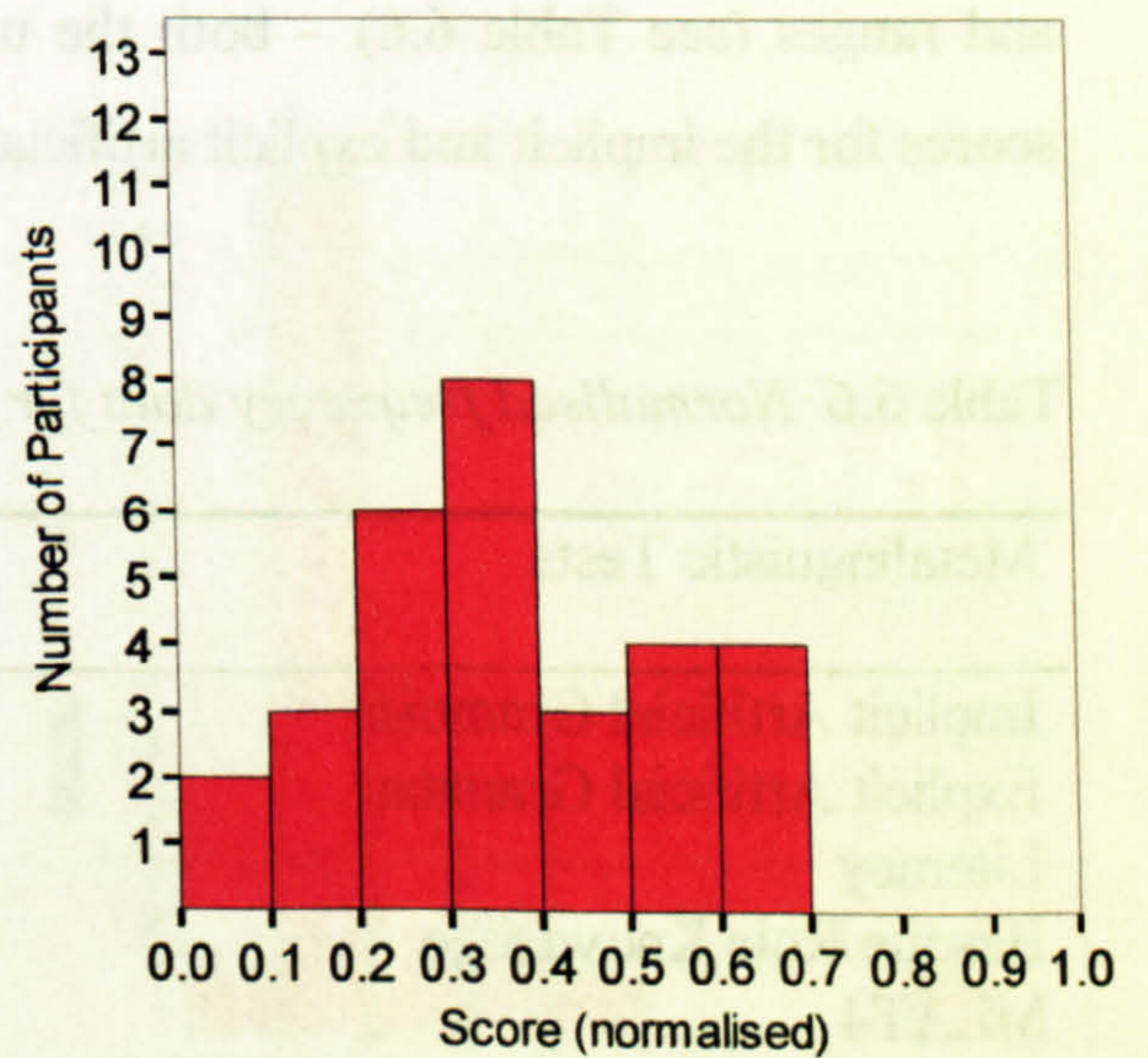
MLAT4



Language Motivation



Language Attitudes



Language Anxiety

Figure 6.2 (cont.) *Distribution of participants' scores on the 7 language background variables.*

Language Anxiety. The results indicate that these adult multilinguals experience very little anxiety. The range of normalised scores is .04-.68 (where a low score indicates low anxiety). This shows that participants do not consider themselves to become highly anxious when they use foreign languages, nor in learning situations in the language classroom. Their low anxiety is to be expected – multilinguals' experience of using their other languages, their ability to transfer knowledge from other languages, and the confidence derived from years of being in similar situations using foreign languages and learning in language classrooms, makes it more likely that they have relatively little fear of misunderstanding and being misunderstood, of not fitting in, and of making a fool of themselves.

6.8.2 Frequency Data for the Metalinguistic Tests

The frequency distributions for the metalinguistic tests are shown in Figure 6.4. The six metalinguistic tests had the following means, standard deviations, standard errors, and ranges (see Table 6.6) – both the unmanipulated scores and the discrimination scores for the implicit and explicit artificial grammar tests are included:

Table 6.6 *Normalised frequency data for the metalinguistic tests.*

Metalinguistic Tests	Mean	SD	SE	Min.	Max.
Implicit Artificial Grammar	.65	.09	.02	.50	.83
Explicit Artificial Grammar	.71	.09	.02	.57	.93
Literacy	.54	.20	.04	.14	.96
Basque Rule Knowledge	.55	.31	.06	0	1.00
MLAT4	.60	.18	.03	.27	.91
Grammaticality Judgement: Explanation	.58	.23	.04	.11	1.00
<i>d'</i> Implicit Artificial Grammar	.84	.48	.09	.00	.92
<i>d'</i> Explicit Artificial Grammar	1.23	.13	.72	.36	4.05

Discrimination on the Implicit and Explicit Artificial Grammar Tests. In order to find out if multilinguals become progressively better at *discriminating* between correct and incorrect stimuli, it is necessary to compute a d' score for both each participant's implicit and explicit artificial grammar test results, when d' represents a judge's ability to discriminate ungrammatical from grammatical stimuli, where the Type II score (i.e. an ungrammatical stimulus receives a response of "grammatical"), $P(S | n) = \Sigma_{\text{grammatical responses}} / \Sigma_{\text{ungrammatical stimuli}}$, and the 'Hits' Score (i.e. a grammatical stimulus receives a response of "grammatical"), $P(S | s) = \Sigma_{\text{grammatical responses}} / \Sigma_{\text{grammatical stimuli}}$. The following formula is used (McNicol 1972):

$$d' = z[P(S | n)] - z[P(S | s)]$$

By comparing the two graphs (see Figure 6.3) we can see that the participants appear to score better at discriminating on the explicit test.

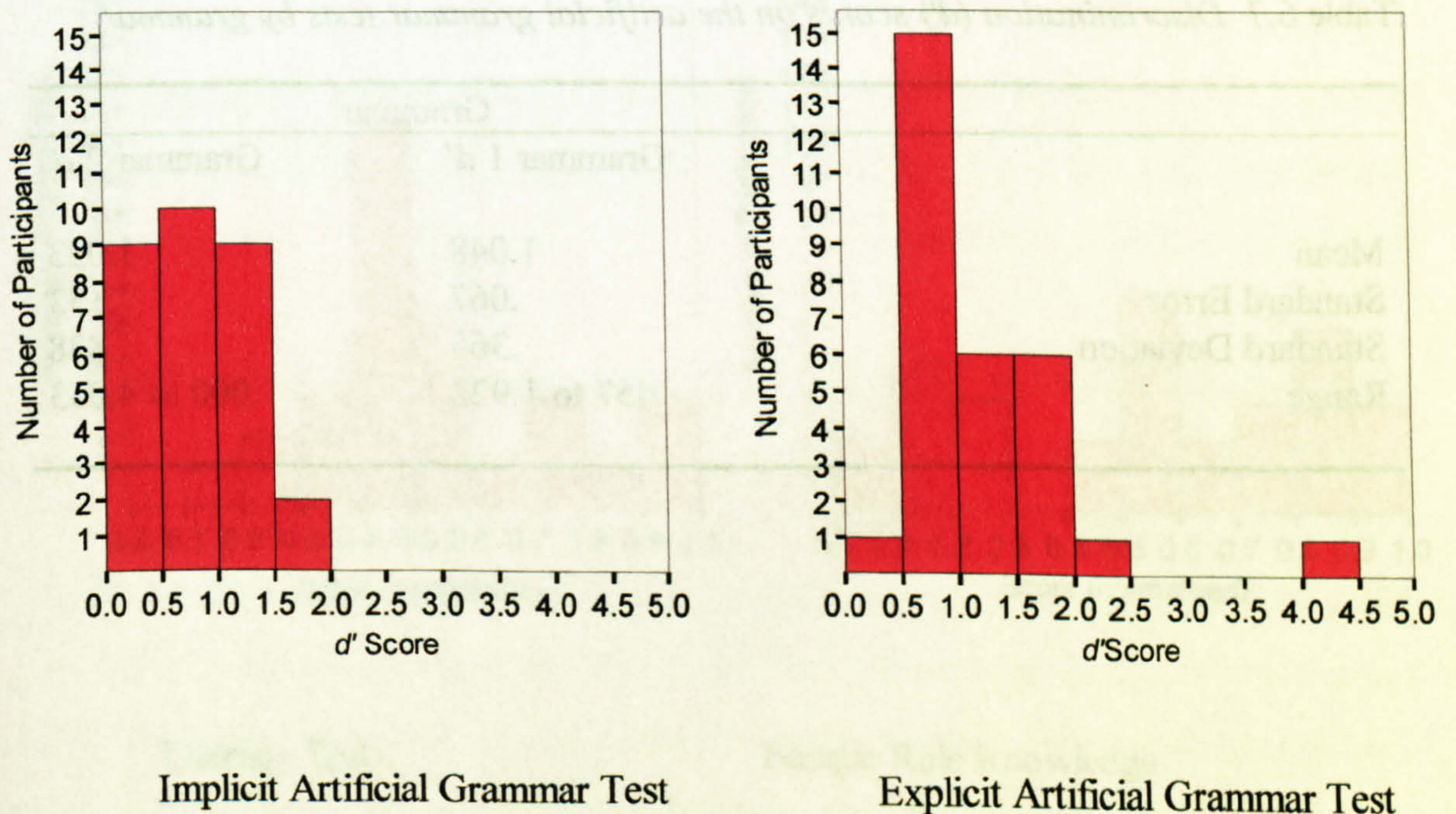
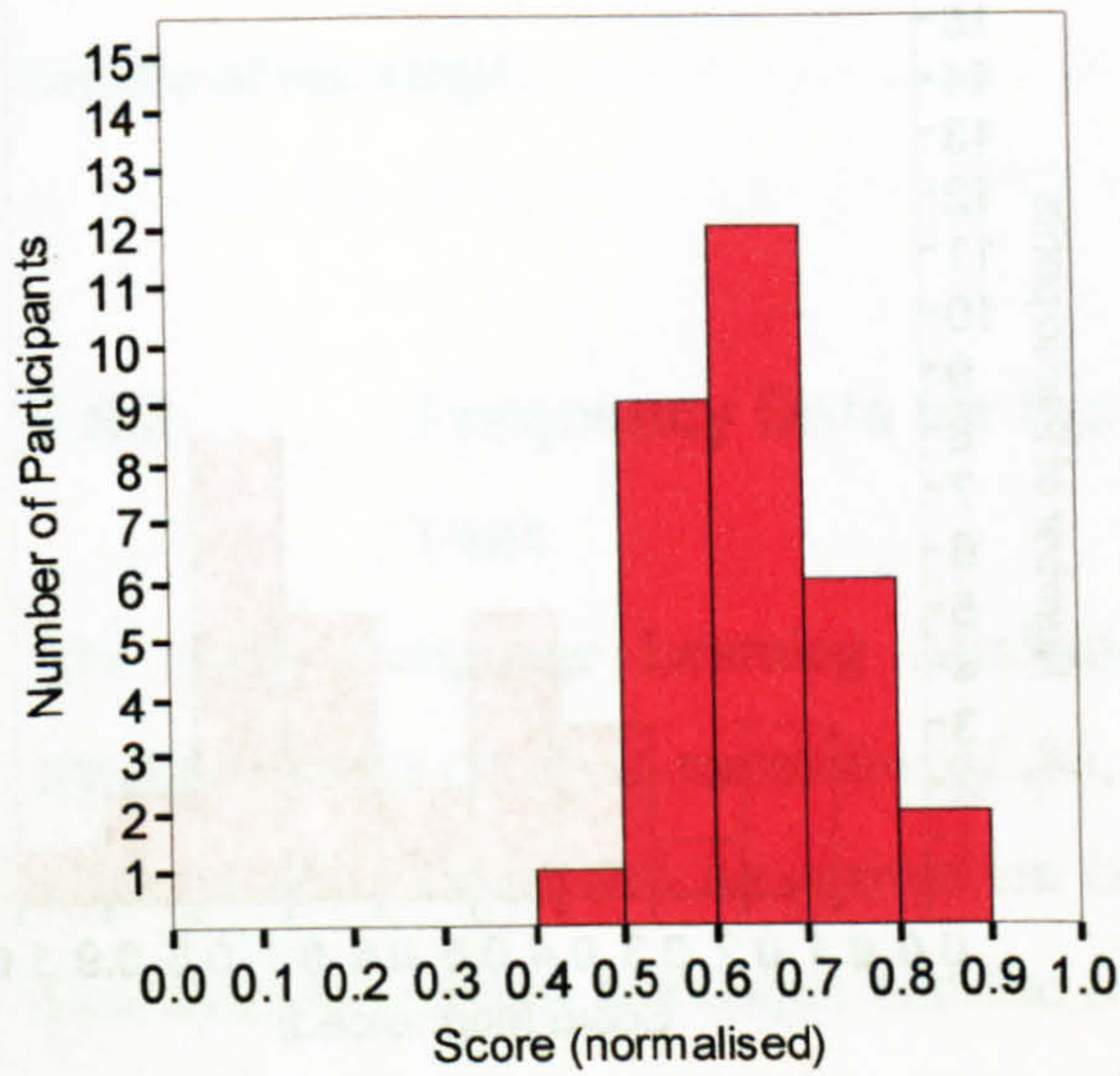


Figure 6.3 *Distribution of participants' discrimination (d') scores on the implicit and explicit artificial grammar tests.*

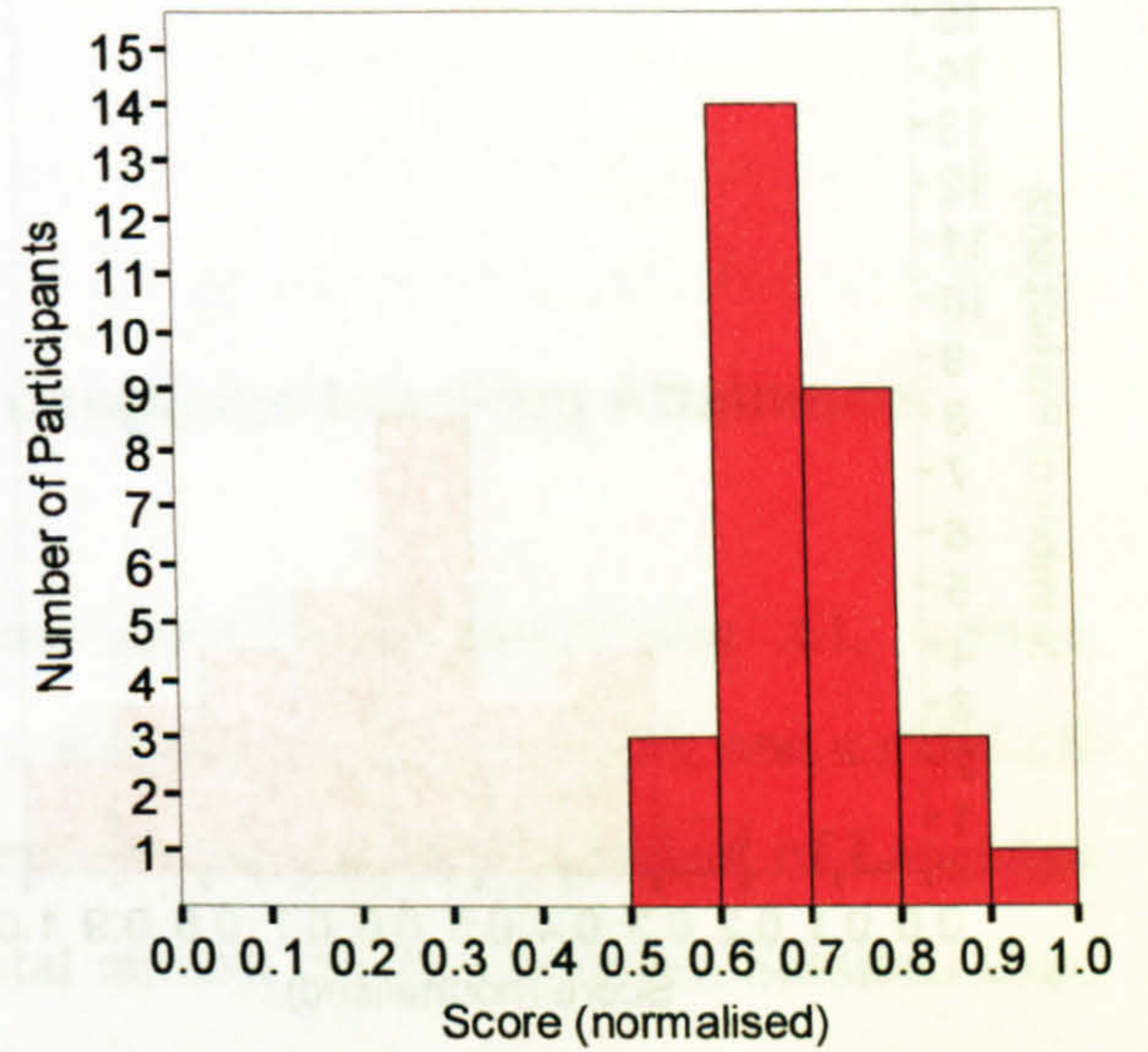
Before the hypotheses are tested, some basic details of the study's design are ruled out as sources of artefact. There is no correlation between the number of days between Sessions 2 and 3 and the d' scores on the Explicit Artificial Grammar Test (Pearson Product Moment correlation: $r = .179$, not significant) showing that the variation in the length of time between the two sessions (7-14 days) had no effect on participants' performance. The data are also checked for any differences in multilinguals' performance on the two artificial grammars used in the tests. Both grammars are used by all participants: half of the participants did Grammar 1 and half did Grammar 2 in the Implicit Test, they then did the other Grammar in the Explicit Test. The mean d' scores for the two grammars summed across tests are shown in Table 6.7. Analysis of variance with repeated measures on one factor was used to test the presumed equality of difficulty of the two grammars ($F(1,29) < 1$), therefore the grammars, which have an equal number of nodes and of letters, are assumed to be equivalent.

Table 6.7 *Discrimination (d') scores on the artificial grammar tests by grammar.*

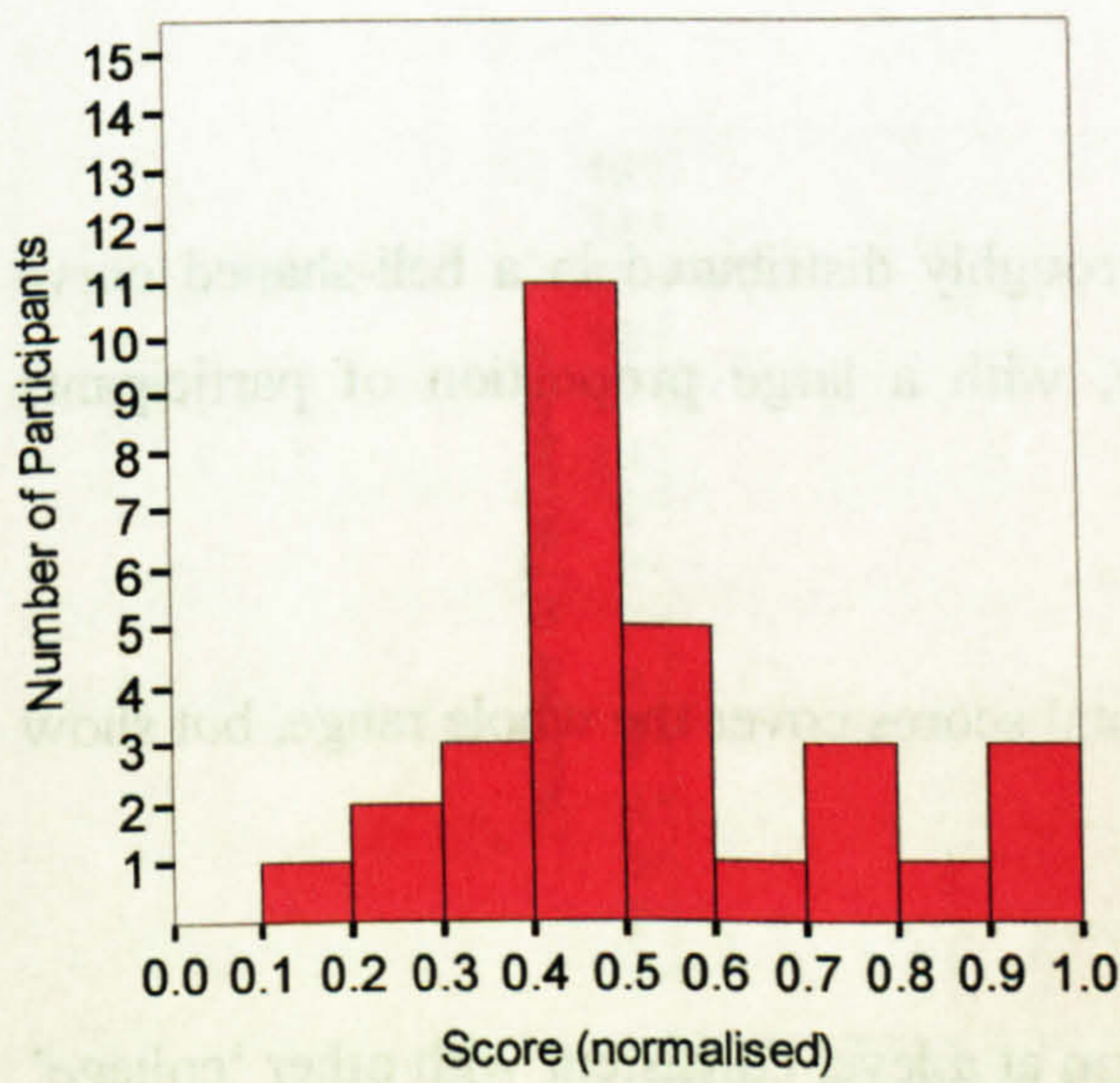
	Grammar	
	Grammar 1 d'	Grammar 2 d'
Mean	1.048	1.023
Standard Error	.067	.153
Standard Deviation	.365	.838
Range	.457 to 1.922	.000 to 4.053



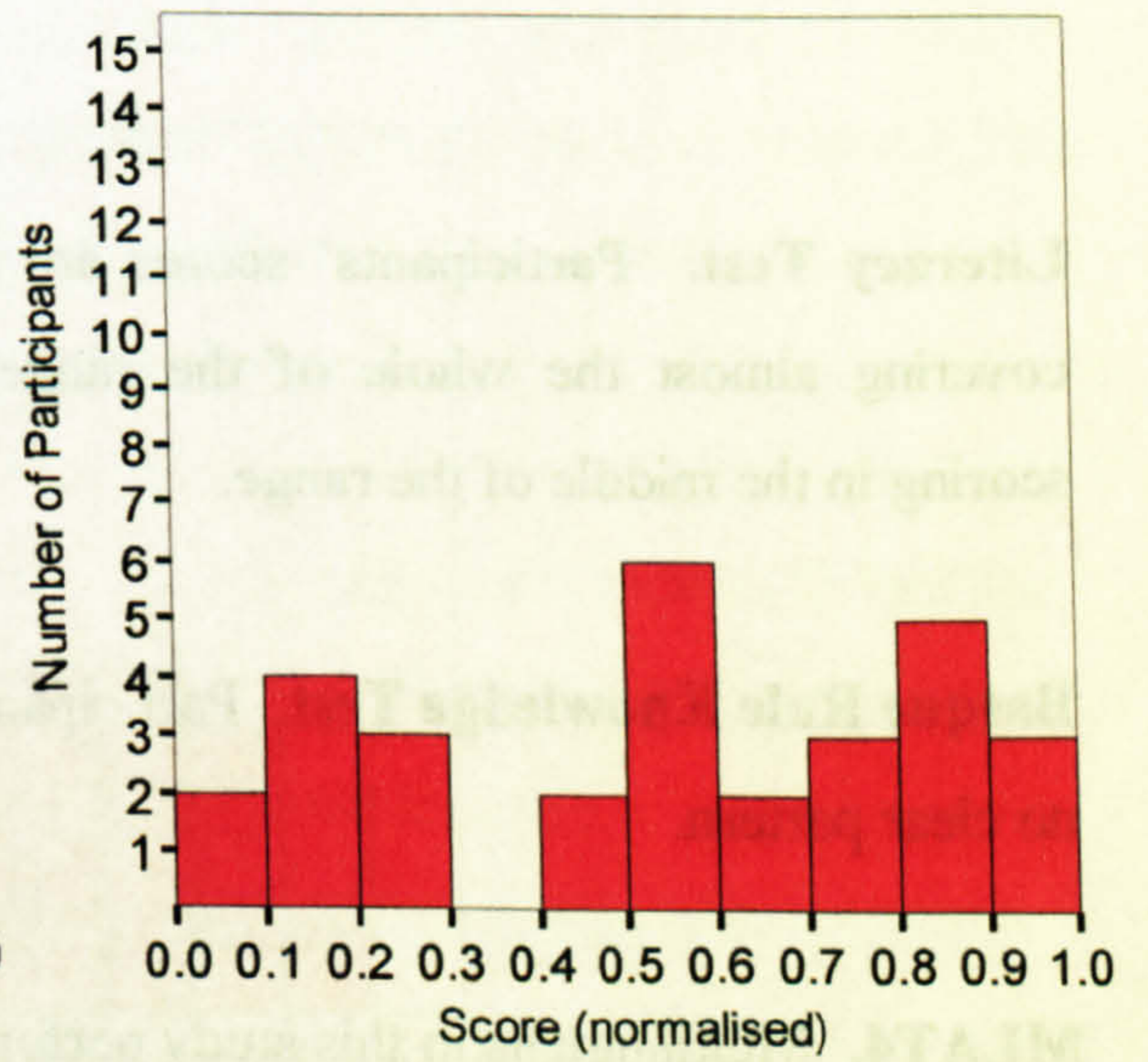
Implicit Artificial Grammar Test



Explicit Artificial Grammar Test



Literacy Test



Basque Rule Knowledge

Figure 6.4 Distribution of participants' scores on the six metalinguistic tasks.

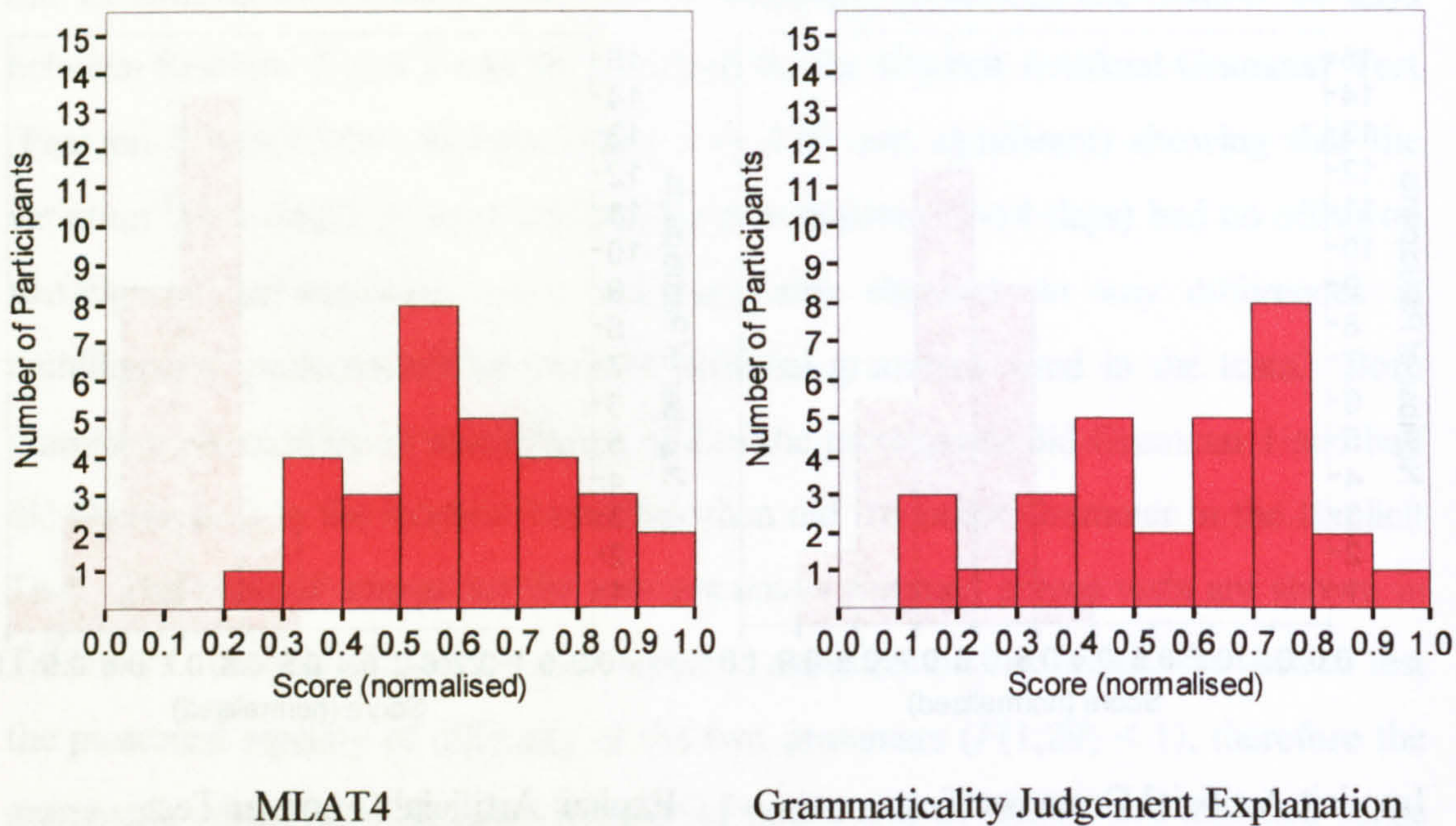


Figure 6.4 (cont.) *Distribution of participants' scores on the six metalinguistic tasks.*

Literacy Test. Participants' scores are roughly distributed in a bell-shaped curve covering almost the whole of the range, with a large proportion of participants scoring in the middle of the range.

Basque Rule Knowledge Test. Participants' scores cover the whole range, but show no clear pattern.

MLAT4. Multilinguals in this study perform at a level consistent with other 'college' participants reported in Carroll and Sapon (1959, cited in Draycott 1997). Participants' mean (unnormalised) score of 27.1 is comparable to Carroll and Sapon's mean score of 26.8 for 'college' men ($n = 136$) and 29.7 for 'college' women ($n = 101$).

Grammaticality Judgement Task: Explanation. Participants' scores are distributed across the range of possible scores with most participants scoring near the middle of the range.

6.8.3 Frequency Data for the Language Learning Attainment Test

The mean Language Learning Attainment score (normalised) was .61, with a minimum score of .31, a maximum of .86, a standard deviation of .16, and a standard error of .03. There was no correlation between the marks for the test of Language Learning Attainment in Basque and the total number of days between Sessions One, Two, and Three, showing that the small variation in the length of time between sessions had no effect on participants' final marks ($r = .012$). The distribution of the Basque Test results are shown as a graph of frequency distribution (see Figure 6.5):

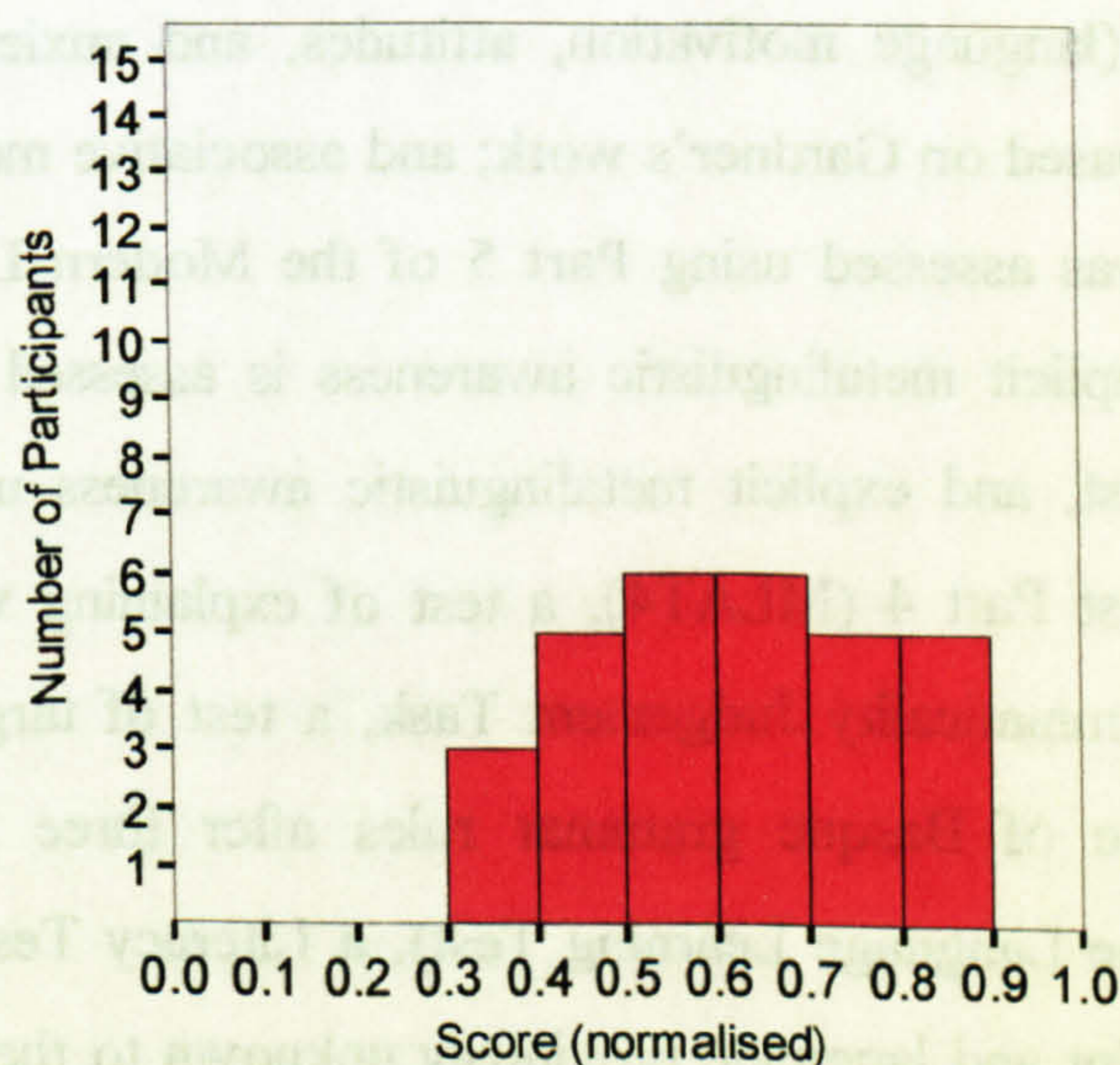


Figure 6.5 *Distribution of participants' scores on the test of Basque language learning attainment.*

The results are mainly distributed in the middle and towards the top end of the range – there are no scores in the lowest quartile – showing that in this test multilinguals are able to learn a considerable amount of a new language in the three sessions of 20 minutes, enough to be able to answer basic questions on its grammar, and answer an interlocutor in a basic conversation.

6.9 Summary of the Chapter

Thirty adult native English-speaking multilinguals were assessed on their language background variables, their metalinguistic awareness, and their attainment in a language previously unknown to them, in order to examine the relationships between the three and assess whether grammatical metalinguistic awareness is one of the variables that helps multilinguals to learn languages.

The experiential background variables (number of languages, number of literacies, number of languages studied) were assessed using a questionnaire; the affective background variables (language motivation, attitudes, and anxiety) were assessed using a questionnaire based on Gardner's work; and associative memory, a cognitive background variable was assessed using Part 5 of the Modern Language Aptitude Test. Participants' implicit metalinguistic awareness is assessed using an Implicit Artificial Grammar Test, and explicit metalinguistic awareness using: the Modern Language Aptitude Test Part 4 (MLAT4), a test of explaining why sentences are unacceptable on a Grammaticality Judgement Task, a test of target language Rule Knowledge (knowledge of Basque grammar rules after three language learning sessions, assessed in the Language Learning Test), a Literacy Test translating from Middle Egyptian (a script and language previously unknown to the participants) into English, and an Explicit Artificial Grammar Test. Language learning ability is assessed using a test of attainment in a language previously unknown to the participants (Basque) that they had started to learn under controlled conditions in three sessions of twenty minutes: they were tested on both their oral and written

knowledge. Every care was taken to randomise test orders and item orders and to assign participants to conditions randomly.

Chapter 7: Results

Regarding ‘...*the best available evidence and the best conceivable evidence. Experimental scientists, unlike pure mathematicians, have to be content with the former and avoid being paralyzed by the utopia of the latter.*’ (Piattelli-Palmarini 1980: 205).

The focus of this thesis is to investigate the relationships between multilinguals’ language learning experience, their highly developed grammatical metalinguistic awareness, and their language learning ability: it has often been noticed in passing that “the more languages you know the easier it is to add a new one” (Edwards 1994: 217). The ability to focus on grammatical form, to analyse and manipulate it, and to switch between grammatical form and semantic content is hypothesised to assist the process of language learning.

Multilinguals are hypothesised to become better language learners in proportion to the number of languages in which they are literate and the number of languages they have studied. Language learning experience is also hypothesised to enhance the development of metalinguistic awareness, which in turn helps language learning. Literacy experience is quantified as the number of languages multilinguals claim to be able to read and formal language learning experience as the number of languages they claim to have studied. I use these definitions because it is specifically the breakthrough effect that results from coming to grips with the writing system and grammar of each language, which I hypothesise relates to the development of metalinguistic awareness.

It follows that multilinguals’ performance on tests of metalinguistic awareness should

have a significant statistical relationship with their attainment in beginning to learn another language. However, the increase in multilinguals' language learning experience as they become multilingual is also likely to affect their language learning abilities positively. I would therefore anticipate finding independent statistical relationships between language learning experience and attainment in another language, and metalinguistic awareness and attainment in another language. In order to find out if metalinguistic awareness is related to language learning over and above language experience, it is necessary to compare the statistical relationship between multilinguals' language background and language learning attainment with the relationship when assessment of metalinguistic awareness is included in the analysis.

To look for these relationships, firstly, I examine the data for multicollinearity. Then in Section 7.2, I give the result of an exploratory factor analysis of the metalinguistic tests in order to investigate whether the metalinguistic awareness assessed by the tests used in this study is not unitary in nature and to characterise the factors that the metalinguistic tests load onto. Thirdly (Section 7.3), I give the results of the regression analyses of language learning attainment onto the language background variables, and then separately, onto the metalinguistic tests. Set-hierarchical multiple regression is used to compare the regression of language learning attainment onto both sets of variables with the regression of language learning attainment onto the background variables alone, in order to test the hypothesis that multilinguals' metalinguistic awareness relates to attainment over and above their language experience and associative memory. I give the results of the regression analyses of the metalinguistic test results onto the language background variables, in order to test the hypothesis that multilinguals' language learning experience is related to their metalinguistic awareness. The hypotheses are tested using regression analysis rather than analysis of variance because the study does not compare groups but 30 multilinguals whose quantified language experiences range over a wide distribution without being separable into distinct groups.

In Section 7.4, I attempt to characterise multilinguals' metalinguistic awareness by analysing the data from the artificial grammar tasks in order to find out whether multilinguals are biased to accept ungrammatical stimuli as has been suggested (M. Thomas 1990; Zobl 1992), and whether multilinguals are indeed better at explicit than implicit learning.

7.1 Resolution of Data Considerations

There are four general statistical considerations that bear on the data and hypotheses in this study. The first is the small sample size (30 participants). Tests with small sample sizes have low power, that is, less ability to find a hypothesised effect. In addition, statistical tests such as *F*-tests and *t*-tests are approximations (Allison 1999), i.e. the results are only completely accurate when all of the demanding distributional assumptions are met and in most social science research this is not possible: a small sample size exacerbates the problem. Studies using a small sample size require replication to confirm the findings.

Secondly, this study tests 14 hypotheses regarding multilinguals' metalinguistic awareness and their language learning ability. This is a considerable number. The conventional α , the probability below which we reject the null hypothesis about any effect, means that 1 in 20 tests will yield a (chance) significant result even if the null hypothesis is true. To avoid such Type I errors, planned Bonferroni adjustments are made to α (Cohen & Cohen 1983: 167). The overall α is divided into 14 equal parts and the significance of each hypothesis is adjusted accordingly, so $\alpha = .05/14 = .0036$. The adjusted significance level safeguards against rejecting null hypotheses that are in fact true.

Thirdly, the three affective variables, i.e. Language Motivation, Language Attitudes, and Language Anxiety, have very small correlations with Language Learning

Attainment in Basque (see the Table of Pearson Product-Moment Correlations in Appendix 3). For this reason, they are excluded from all analyses of the data.

The fourth problem with the data in this study is multicollinearity, i.e. the occurrence of highly correlating variables, which is to be expected in any study on human abilities that uses related measurements. When the independent variables in a regression correlate highly, none are likely to make an independent contribution to explaining the variance in the potential effect. Multicollinearity causes problems with regard to sampling stability, computational accuracy, and interpretation of results (Cohen & Cohen 1983). To diagnose which variables in this study are affected, each independent variable in turn is regressed onto the other independent variables. This is recommended as a more accurate means of assessing multicollinearity than examining the correlation matrix of all variables (Allison 1999). Table 7.1 shows the results of the series of regression analyses for the set of Language Background Variables. Multicollinearity is considered to be high when R^2 is above .6.

Table 7.1 *Assessment of multicollinearity: results of regression analyses of the other language background variables onto each language background variable.*

Language Background Variables as Independent Variables	Language Background Variables each as the Dependent Variable	R^2
All except Number of Languages	Number of Languages	.807
All except Number of Literacies	Number of Literacies	.793
All except Number of Languages Studied	Number of Languages Studied	.427
All except Associative Memory (MLAT5)	Associative Memory (MLAT5)	.296

When I examine the regression analyses, the only serious cause for concern regarding the language background independent variables is the close relationship between the number of languages and number of literacies: participants' tend to be literate in the languages they know. Multicollinearity is avoided by not entering these two variables into the same regression analysis.

The same process is carried out for the set of Metalinguistic Tests (see Table 7.2). There is also cause for concern among the metalinguistic variables because there is a close relationship between participants' scores on the MLAT4 and Explanation on the Grammaticality Judgement Task, (when MLAT4 is regressed onto the Grammaticality Judgement Task (Explanation) as the sole independent variable, $R^2 = .597$). In this case also, near-extreme multicollinearity can be avoided by not entering these two variables in the same regression. The d' Implicit Artificial Grammar Test is closely related to a combination of the other variables, mainly the d' Explicit Artificial Grammar Test together with the Literacy Test, therefore it will only be used as the sole metalinguistic test in a regression (i.e. to test Hypothesis 4c).

Table 7.2 *Assessment of multicollinearity: results of regression analyses of the other metalinguistic test variables onto each metalinguistic test.*

Metalinguistic Tests as Independent Variables	Metalinguistic Tests each as the Dependent Variable	R^2
All except d' Implicit Artificial Grammar Test	d' Implicit Artificial Grammar Test	.617
All except d' Explicit Artificial Grammar Test	d' Explicit Artificial Grammar Test	.503
All except Literacy Test	Literacy Test	.554
All except Basque Rule Knowledge	Basque Rule Knowledge	.528
All except MLAT4	MLAT4	.750
All except Grammaticality Judgement: Explain	Grammaticality Judgement: Explain	.619

Although high multicollinearity is to be avoided in regression analyses, a different method of statistical analysis, factor analysis, can use close relationships to good effect. Factor analysis can be used to gauge whether and to what extent tests are related to one another, on the grounds that a group of participants will perform in a similar manner on tasks demanding similar skills. Interdependent test characteristics constitute a 'factor'. If tests are constructed to assess particular abilities, then, in

representing groups of test results, factors also represent participants' abilities on them.

We know metalinguistic awareness is not unitary in adult multilinguals from the review of the literature (see Section 4.1.3), but it is possible that the tests chosen to assess metalinguistic awareness for this study may all assess the same ability. It is also possible that the metalinguistic tests most closely related to language learning ability assess a particular type of metalinguistic awareness. Factor analysis is a useful method of clarifying relationships between tests and therefore for specifying what sort of metalinguistic awareness multilinguals use in language learning.

7.2 Factor Analysis of Metalinguistic Tests

Factor analysis is a method of reducing a group of variables to a smaller number of dimensions using a linear simultaneous equations model where the independent variables are unobserved, i.e. latent factors, and each observed variable is the dependent variable in an equation (Allison 1999; Kline 1991). Test variables load onto the factors. Confirmatory factor analysis tests particular hypotheses about the way in which a set of variables loads onto factors, whereas exploratory factor analysis allows the data to come up with the most probable factor-analytic solution. Exploratory factor analysis is used in this study⁴ because there is very little basis for independent predictions.

Factor analysis describes the common variance shared by participants' test scores. In principal-axis factoring, only common variance is analysed, not tests' unique variance, a method which does not assume that tests are perfectly reliable and without error (Bryman & Cramer 1999). In order to achieve this, the unique variance (i.e. specific variance plus error variance) of each test varies between 0 and 1. The amount of

⁴ However, Higher Order Factor solutions are not examined as they do not give the required level of detail.

variance a factor accounts for is referred to as its eigenvalue: the proportion of variance a factor accounts for can be determined by dividing its eigenvalue by the sum of all the eigenvalues, which is then multiplied by 100 to convert it to a percentage.

Factor analysis takes place in two stages. Firstly a correlation matrix is computed for the tests to find out if they are related. The number of factors to retain is decided by selecting only factors with an eigenvalue greater than one, a method known as Kaiser's Criterion. This can be confirmed using Cattell's Scree Test, where the factors are plotted against each of their eigenvalues and the graph examined for where the degree of the slope changes from being steep to gentle, i.e. where 'scree' on the slope would stop falling.

To increase interpretability, in the second stage the factors are rotated to maximise the loadings (Child 1990; Bryman & Cramer 1999). Rotation positions axes near clusters of vectors to achieve simple structure. Oblique rotation, such as 'Direct Oblimin', is used in studies where factors are likely to be correlated and therefore usually used in studies of individual differences. Factor analysis simplifies complex datasets by assessing whether and to what extent test results are related to one another and therefore whether the tests are assessing the same ability and to what extent.

Factor analysis has been criticised for providing mathematical abstractions of test data that have no physical or psychological reality (Gould 1981). Researchers who use factor analysis have also been criticised for reifying the factors they find into physiological entities, for which no confirmatory evidence exists, "Factors are not material objects in the head, but principles of classification that order reality" (Gould 1981: 309). Nor are factors causes: factor analysis gives no information as to the cause of the positive relationship between tests that load on the same factor – what the factor signifies is a matter for interpretation. Interpretation is completely dependent on the construct and content validity of the tests, i.e. that the tests do measure what they are designed to measure, and on the test variables analysed having

a strong theoretical relationship as the factors found by factor analysis are artefacts of the tests chosen (Gould 1981) and different factors will appear when different tests are used unless the tests really do assess the same abilities. In short, factor analysis is only a descriptive tool.

But exploratory factor analysis does have a role:

Factor analysis is useful, especially in those domains where basic and fruitful concepts are essentially lacking and where crucial experiments have been difficult to conceive. The new methods have a humble role. They enable us to make only the crudest first map of a new domain. (Thurstone 1947: 56, cited in Gould 1991: 316).

In order to investigate the relationships between the six metalinguistic tasks, an exploratory factor analysis is carried out using principal axis factoring on the six measures, which yielded two factors with eigenvalues greater than 1.0. This was confirmed using Cattell's (1966) Scree Test. Factor I accounts for 50% of variance and Factor II for 23% of variance, however, because the factors correlate ($r = .312$) these cannot be added to give total variance. The correlation between the two factors suggests that they have an oblique rather than orthogonal relationship and the metalinguistic tests may partly be assessing the same ability, therefore the two factors were rotated using Direct Oblimin to produce simple structure. The structure matrix is shown below (see Table 7.3).

The factor analysis finds two distinct factors, with a perfect reverse loading on the two factors, indicating that the metalinguistic tests used in this study do not assess the same ability. Out of the six metalinguistic tests, MLAT4 and Explanation on the Grammaticality Judgement Task load on Factor I – the same two metalinguistic variables that show high multicollinearity in the previous section. The tests of Basque Rule Knowledge, and Literacy and possibly the Explicit Artificial Grammar Test also load on Factor I to a lesser extent, but their loadings are split across the two factors.

Table 7.3 *Structure matrix of factor analysis of the six metalinguistic tests.*

Metalinguistic Tests	Factor I	Factor II
MLAT4	.980	.159
Grammaticality Judgement Explanation	.759	.196
Basque Rule Knowledge	.701	.512
Literacy Test	.526	.516
Explicit Artificial Grammar	.375	.566
Implicit Artificial Grammar	.097	.970

I will refer to Factor I as ‘deductive grammar awareness’ because the tests that load on it require participants to deduce particular cases from general grammatical rules (however, Carroll refers to what appears to be the same factor as ‘Grammatical Sensitivity’ after the name of the MLAT4 test he invented, and has consistently found the MLAT4 to load heavily onto, see Carroll 1993). Deduction requires participants to infer a response by reasoning from their knowledge of grammar. In the MLAT4, participants are required to deduce parallel grammatical structure working from an example; in the Grammaticality Judgement Task, to deduce what is grammatically wrong with a sentence in order to explain it from their previous general grammar knowledge; in the test of Basque Rule Knowledge to deduce (if they had not already induced) particular grammatical rules from their knowledge of Basque (and/or by drawing on their memory of the general grammar rules given in the Basque language learning materials and applying them to the new context); in the Literacy Test, to work out a particular text from a given set of lexical items and grammatical rules; and in the Explicit Artificial Grammar Test, to deduce rules from a set of stimuli previously shown simultaneously.

The Implicit Artificial Grammar Test results load heavily on Factor II, as does the Explicit Artificial Grammar Test, though much less strongly. The Explicit Artificial Grammar, Literacy and Basque Rule Knowledge tests load on both of the two factors suggesting that they have characteristics in common with both the MLAT4

/Explanation on the Grammaticality Judgement Task and the Implicit /Explicit Artificial Grammar Tests.

I will refer to Factor II as ‘inductive grammar awareness’, after Carroll’s (1993) “inductive language learning”, as the tests that load on it require participants to induce grammar rules. Induction requires participants to internalise general rules from their experience of particular instances. The Implicit Artificial Grammar Test requires participants to induce grammar rules from stimuli shown individually; the Explicit Artificial Grammar Test to induce grammar rules from a set of example stimuli shown at the same time (induction and deduction can take place simultaneously as psycholinguistic processes); the Literacy Test to induce grammatical rules and orthographic conventions from examples in the instructions and cumulatively by working through the test; and the test of Basque Rule Knowledge to induce grammatical rules through exposure to the Basque in the language learning materials.

To sum up, that this factor analysis finds two distinct factors indicates that the six metalinguistic tests used in this study do not operate in a uniform manner. The analysis appears to exemplify two of the factors found by Carroll (1993) to describe foreign language learning ability, namely his “Grammatical Sensitivity” (Factor I) and “Inductive Language Learning” (Factor II). However, the study requires replication on equivalent populations of educated adult multilinguals using different metalinguistic tests to be able to conclude that tests of grammatical metalinguistic awareness consistently load onto (at least) two factors which I have characterised as ‘deductive grammar awareness’ and ‘inductive grammar awareness’. All that can be stated is that in this study, the metalinguistic tests load on two factors, and that the two factors found might be characterised as deductive and inductive grammar awareness.

In consequence of the discovery that the metalinguistic tests used in this study appear to load on two factors and therefore may be testing more than one type of

grammatical metalinguistic awareness, and that two of the tests – the Literacy Test and the test of Basque Rule Knowledge (and possibly the Explicit Artificial Grammar Test) – may each assess both types of metalinguistic awareness, Hypothesis 4 must be tested by using each of the metalinguistic tests in turn as dependent variables, rather than using just one representative metalinguistic test.

Previously, I argued that multilinguals are faster at language learning than other learners (Chapter 3.2), and that metalinguistic awareness helps language learning (Chapter 4.4). I therefore claim that multilinguals are better language learners the more languages they know because, among other reasons, they have developed an enhanced ability to focus on grammatical form and switch focus between grammatical form and semantic content (Chapter 5.2), and that this metalinguistic ability enables them to analyse, manipulate and learn grammatical structures with greater facility. With the discovery that there may be at least two distinct factors describing metalinguistic abilities, we need to know which of the two factors are loaded on by metalinguistic tests that have a strong statistical relationship with foreign language learning attainment.

In the following section, multiple regression analyses are used to examine the relationships between multilinguals' language background, their metalinguistic awareness, and their ability on a test of beginning to learn another language. The results given for Hypotheses 2a and 2b report the metalinguistic tests with strong relationships with attainment (and the factors that they load on).

7.3 Results of the Tested Hypotheses

Regression analysis is a statistical method of studying the relationship between a dependent variable and one or more independent variables. When a single presumed causal factor (*C*) and its effects on the dependent variable (*Y*) are varied while other potential factors are statistically held constant, the effect of *C* on *Y* can be examined

to assess whether there is a relationship and to estimate the magnitude of the effect. Multiple regression analysis is designed to reveal the unique contribution of each variable even when the independent variables correlate (Allison 1999). Although regression analysis, like any correlational method, does not test causation, it can demonstrate a relationship between the dependent variable and independent variables. Despite this stipulation, conventionally regression analysis is used to test hypotheses that specify the direction of the relationship. The evidence reviewed in the Literature Review (for an overview see Section 5.4) predicts that the relationships between the variables will be causal in the directions listed in the hypotheses (see the schematic diagram, Figure 7.1). As stated, the variables that have demonstrated high collinearity in Section 7.1 (Number of Languages and Number of Literacies; MLAT4 and Grammaticality Judgement Explanation) are not used in the same regression analyses.

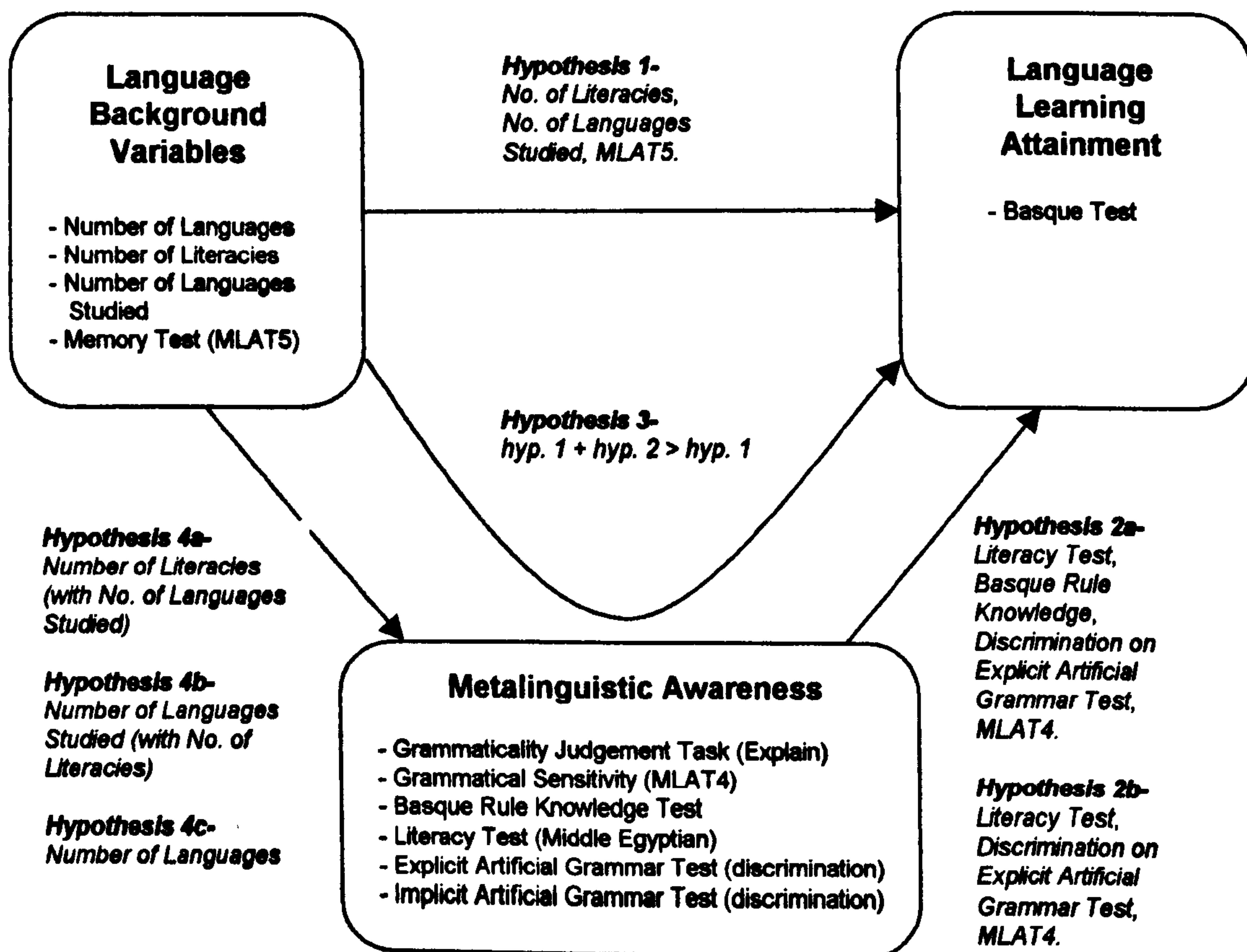


Figure 7.1 Schematic representation of Hypotheses 1-4.

I use three regression methods to test the hypotheses. Hierarchical regression analysis is used to test Hypotheses 1 and 2, set-hierarchical regression analysis to test Hypothesis 3 (see outline under Hypothesis 3), and simple regression analysis to test Hypotheses 4 and 5. A repeated measures *t*-test is used to test Hypothesis 6.

Hierarchical regression analysis is a statistical method of determining whether independent variables add to the degree to which a regression equation accounts for the variance of *Y*, a dependent variable. The hierarchy of independent variables to be entered is decided in advance according to their presumed causal priority, or on the basis of their theoretical importance if causal priority is unascertainable. Each stage of the hierarchy is computed from analysing the independent variables in the equation simultaneously, giving the increase in the variance of *Y* (here, Language Learning Attainment) accounted for at each stage as another independent variable is added. The following formula is used, where *Y* = the dependent variable, sr^2 = the increase in R^2 when all previously entered variables have been partialled, and *k* the number of variables (Cohen & Cohen 1983: 120):

$$R^2_{Y.123\dots k} = r^2_{Y1} + sr^2_{2.1} + sr^2_{3.12} + sr^2_{4.123} + \dots + sr^2_{k.123\dots k-1}.$$

The hierarchy of independent variables in this study is as follows for the Language Background Variables: Number of Literacies, Number of Languages Studied, (Number of Languages), Associative Memory (MLAT5); and for the metalinguistic tests: the Literacy Test, the test of Basque Rule Knowledge, the Explicit Artificial Grammar Test, and the MLAT4. (Implicit metalinguistic awareness, assessed by the Implicit Artificial Grammar Test, is not hypothesised to relate to attainment as exposure to the target language was brief and implicit metalinguistic awareness requires time for input to be internalised. See Hypothesis 6 for a comparison of participants' performance on the implicit and explicit artificial grammar tests.)

Taking the concepts behind Hypotheses 1 and 2a together, literacy is hypothesised to

have the greatest influence on language learning attainment of educated adult multilinguals because it increases the variety of input by adding another modality to auditory input. Literacy also promotes the development of metalinguistic awareness, firstly because language presented visually can be objectified and in consequence is analysable and manipulable, and secondly, because switching modality for both input and output is cognitively demanding and may lead to a greater tendency to focus on form. Therefore in Hypothesis 1, participants' Number of Literacies, and in Hypothesis 2, their performance on the Literacy Test, are hypothesised to have a positive relationship with Language Learning Attainment in Basque and consequently are entered first.

The second independent variable in the hierarchy is experience of studying languages because through it participants are hypothesised to gain experience of learning grammatical rules explicitly, therefore in Hypothesis 1, participants' Number of Languages Studied, and in Hypothesis 2a, the metalinguistic test of Basque Rule Knowledge, are entered as the second variables for each regression.

The third Language Background Variable to be entered in Hypothesis 1 is associative memory as it is hypothesised to enable participants to remember what they have learned. (Participants' Number of Languages is not entered because it is too closely related to the Number of Literacies, see Section 7.1).

In Hypothesis 2a and 2b, the next metalinguistic variables hypothesised to have (decreasing) relevance to multilinguals' language learning ability (after the Literacy Test and the test of Basque Rule Knowledge, the latter in Hypothesis 2a only) are discrimination on the Explicit Artificial Grammar Test, because if multilinguals are explicitly aware of grammatical structure and able to discriminate between grammatical and ungrammatical items then learning artificial grammar patterns should become progressively easier; and the MLAT4, on account of its small but consistent relationship with attainment across a large number of studies (see Section 2.2.1.1).

The hypotheses are an obvious simplification of complex and interacting real-life phenomena, which are characterised as dependent and independent variables in this study. In order to explore the relationships between the variables, it is, unfortunately, necessary to put the fuzzy edges of the phenomena to one side for future research.

7.3.1 The Tested Hypotheses: Hierarchical Regression Analyses

Hypothesis 1. *Out of the language background variables (number of languages, number of literacies, number of languages studied, associative memory), the number of languages multilinguals can read (i.e. literacies) has a positive relationship with their attainment in beginning to learn another language.*

To test the hypothesis, I use hierarchical regression analysis with the hierarchy of Language Background independent variables entered in an order based on their theoretical importance: Number of Literacies, Number of Languages Studied, and lastly, Associative Memory (MLAT5). The Number of Languages is excluded from the analysis on the grounds that it demonstrates near-extreme collinearity with the Number of Literacies (see 7.1).

The first independent variable to be entered is the Number of Literacies ($R^2_{Y.1} = r^2_{Y1} = .406$). When the second variable, Number of Languages Studied, is added, $R^2_{Y.12} = .438$ (the Number of Languages Studied partialling Number of Literacies), so the increment is $sr^2_{2.1} = R^2_{Y.12} - r^2_{Y1} = .438 - .406 = .032$. When the third and final variable, Associative Memory, is entered, $R^2_{Y.123} = .461$, it only adds a very small increment ($sr^2_{3.12} = R^2_{Y.123} - R^2_{Y.12} = .461 - .438 = .023$). Therefore:

$$\begin{aligned} R^2_{Y.123} &= r^2_{Y1} + sr^2_{2.1} + sr^2_{3.12} \\ &= .406 + .032 + .023 = .461 \end{aligned}$$

The total variance that the three variables account for together is 46% (see Table 7.4). The Number of Languages Studied and Associative Memory only account for an additional 3% and 2% respectively of the variance of the test of Language Learning Attainment after the Number of Literacies (41%) has been entered. However, if the Number of Languages Studied is entered as the sole independent variable, $R^2 = .269$ ($\beta = .518$), i.e. 27%, considerably more than the increment of 3% when the Number of Literacies is partialled first, signifying that there is a considerable overlap between participants' Number of Literacies and Number of Languages Studied when regressed onto Basque Attainment, in spite of multicollinearity being found to be low in Section 7.1. In this sample of participants, the Number of Literacies and the Number of Languages Studied overlap to such an extent that the two assessments are not practicably separable, even if they are separable conceptually. They will therefore be entered together to test the remaining hypotheses.

Table 7.4 *Results of hierarchical regression for Hypothesis 1.*

Stage	β -value Number of Literacies	β -value Number of Languages Studied	β -value MLAT5	sr^2	R^2	F of R^{2*}
1	.637				.406	19.14
2	.508	.221		.032	.438	10.52
3	.478	.154	.175	.023	.461	7.41

* where $k = 1$ in Stage 1, $k = 2$ in Stage 2, and $k = 3$ in Stage 3.

The significance of the regression of Number of Literacies and Number of Languages Studied onto Attainment in Basque (dependent variable) is found using the following formula (Cohen & Cohen 1983: 104), where the number of participants, $n = 30$, as throughout this study, and – in order to be rigorous and not risk making Type I experimental error – because three independent variables were originally entered in order to explore to what extent they accounted for variance in Language Learning Attainment, $k = 3$ (see Cohen & Cohen 1983: 107):

$$F = \frac{R^2(n-k-1)}{(1-R^2)k}$$

So that:

$$F = \frac{.438(30-3-1)}{(1-.438)3} = 6.754$$

The Number of Literacies together with the Number of Languages Studied account for 44% of the variance of the test of Language Learning Attainment in Basque ($F(3,26) = 6.754$, $p < .0036$). Although the increment of Associative Memory does not add significantly more to the relationship ($F(3,26) = 1.109$), we cannot reject Associative Memory as having no unique direct relationship with Attainment in Basque (see Cohen & Cohen 1983: 108): when regressed onto Attainment in Basque, Associative Memory as the sole independent variable gives ($R^2 = .190$, $\beta = .436$).

Hypothesis 2. *Multilinguals' explicit grammatical metalinguistic awareness has a positive relationship with their attainment in beginning to learn another language. Specifically:*

- 2a.** *Out of the tests of explicit metalinguistic awareness (the Literacy Test, a test of Basque Rule Knowledge, Discrimination on the Explicit Artificial Grammar Test, MLAT4, Grammaticality Judgement Explanation Task), the Literacy Test and test of target language Rule Knowledge have a positive relationship with multilinguals' attainment in beginning to learn another language.*

Language Learning Attainment (Basque) is again the dependent variable, and the order of predictors, based on their hypothesised importance (see beginning of Section 7.3), is: the Literacy Test, the test of Basque Rule Knowledge, Discrimination on the Explicit Artificial Grammar Test, and the MLAT4. The test of Grammaticality Judgement Explanation is excluded from the analysis on the grounds that it is closely

statistically related to the MLAT4 (see Section 7.1). The same procedure for hierarchical multiple regression is carried out as for Hypothesis 1, so that:

$$\begin{aligned} R^2_{Y12345} &= r^2_{Y1} + sr^2_{2.1} + sr^2_{3.12} + sr^2_{4.123} + sr^2_{5.1234} \\ &= .388 + .286 + .059 + .001 = .734 \end{aligned}$$

Together, the four independent variables account for 73% of the total variance of Language Learning Attainment. To find out if discrimination on the Explicit Artificial Grammar Test contributes significantly to Stage 3, the following formula is used (Cohen & Cohen 1983: 107):

$$F = \frac{sr_i^2(n-k-1)}{1-R^2}$$

$$F = \frac{.059(30-3-1)}{1-.733} = 5.745$$

Table 7.5 Results of hierarchical regression for Hypothesis 2a.

Stage	β -value Literacy Test	β -value Basque Rule Knowledge	β -value d' Explicit Artificial Grammar	β -value MLAT4	sr^2	R^2	F of R^{2*}
1	.623					.388	17.75
2	.267	.643			.286	.674	27.91
3	.285	.521	.267		.059	.733	23.79
4	.275	.497	.267	.050	.001	.734	17.25

* where $k = 1$ in Stage 1, $k = 2$ in Stage 2, and so on.

Discrimination on the Explicit Artificial Grammar does make a significant contribution ($F(3,26) = 5.745$, $p < .0036$), therefore the significance of the first three variables entered in the hierarchy will be computed ($R^2_{Y123} = .733$). However, because four

independent variables were originally entered in order to explore to what extent they accounted for variance in Language Learning Attainment, $k = 4$ (see Figure 7.5). The same formula is used as for testing the significance in Hypothesis 1, where the degrees of freedom are k and $n - k - 1$, and the number of participants, $n = 30$ (Cohen & Cohen 1983: 104):

$$F = \frac{.733(30 - 4 - 1)}{(1 - .733)4} = 17.158$$

The tests of Literacy, Basque Rule Knowledge, and discrimination on the Explicit Artificial Grammar Test account for 73% of the variance of the test of Language Learning Attainment in Basque ($R^2 = .733$, $F(4,25) = 17.158$, $p < .0000001$). From this we can conclude that multilinguals' performance on a test of foreign language literacy and a demonstration of their knowledge of target language rules have a strong relationship with their attainment in beginning to learn another language. That the Literacy Test alone accounts for 38.8% of the variance, and the addition of the test of Basque Rule Knowledge greatly increases this (by 28.6% to 67.4%) informs us that each of the two tests accounts for relatively different parts of the variance, i.e. they assess different metalinguistic abilities which each relate to foreign language learning attainment.

- 2b.** *When target language Rule Knowledge is excluded on the grounds that its high relationship with target language attainment is inevitable, out of the remaining tests of explicit metalinguistic awareness used in this study (the Literacy Test, Discrimination on the Explicit Artificial Grammar Test, MLAT4, Grammaticality Judgement Explanation Task), the Literacy Test has a positive relationship with multilinguals' attainment in beginning to learn another language.*

To test the hypothesis, the test of Language Learning Attainment (Basque) is regressed onto the Metalinguistic Test Variables, excluding the test of Basque Rule Knowledge, using multiple regression analysis (see Figure 7.6). Apart from Basque Rule Knowledge, the hierarchy of metalinguistic test variables to be entered is the

same as for testing Hypothesis 2a: the Literacy Test, Discrimination on the Explicit Artificial Grammar Test, and the MLAT4. Again, the test of Grammaticality Judgement Explanation is excluded from the analysis on the grounds that it demonstrates near-extreme multicollinearity with the MLAT4.

Table 7.6 Results of hierarchical regression for Hypothesis 2b.

Stage	β -value Literacy Test	β -value d' Explicit Artificial Grammar	β -value MLAT4	sr^2	R^2	F of R^{2*}
1	.623				.388	17.75
2	.543	.437		.185	.573	18.12
3	.437	.398	.238	.042	.615	13.84

* where $k = 1$ in Stage 1, $k = 2$ in Stage 2, and $k = 3$ in Stage 3.

$$\begin{aligned}
 R^2_{Y1234} &= r^2_{Y1} + sr^2_{2.1} + sr^2_{3.12} + sr^2_{4.123} \\
 &= .388 + .185 + .042 = .615
 \end{aligned}$$

Together, the three independent variables account for 61.5% of the total variance of Language Learning Attainment. To test the significance of the MLAT4 increment in Stage 3, the same formula is used as in Hypothesis 2a (Cohen & Cohen 1983: 107):

$$F = \frac{.042(30 - 3 - 1)}{1 - .615} = 2.836$$

The MLAT4 does not make a significant contribution ($F(3,26) = 2.836$), therefore only the significance of the Literacy Test and Discrimination on the Explicit Artificial Grammar Test will be computed ($R^2_{Y12} = .573$), but because three independent variables were originally entered in order to explore to what extent they accounted for variance in Language Learning Attainment, $k = 3$. The same formula is used as for

testing Hypotheses 1 and 2a, where the degrees of freedom = k and $n - k - 1$, and the number of participants, $n = 30$ (see Cohen & Cohen 1983: 104):

$$F = \frac{.573(30 - 3 - 1)}{(1 - .573)3} = 11.630$$

When the test of Basque Rule Knowledge is excluded from the analysis, the Literacy Test and Discrimination on the Explicit Artificial Grammar Test account for 57% of the variance of the test of Language Learning Attainment in Basque ($R^2 = .573$, $F(3,26) = 11.630$, $p < .0001$). From this we can conclude that multilinguals' performance on a test of foreign language literacy and a demonstration of their ability to discriminate between grammatical and ungrammatical stimuli have a strong relationship with their attainment in beginning to learn another language. That the Literacy Test alone accounts for 38.8% of the variance, and the addition of the d' Explicit Artificial Grammar Test greatly increases this (by 18.5% to 57.3%) informs us that, again, each of the two tests accounts for relatively different parts of the variance, i.e. they assess different metalinguistic abilities which each relate to foreign language learning attainment. Referring to the hypothesis, the Literacy Test does have a positive relationship with multilinguals' attainment, but the Explicit Artificial Grammar Test also has a positive relationship with attainment, when added to the equation.

To sum up the results of Hypotheses 2a and 2b, multilinguals' performance on the metalinguistic Literacy Test, the test of Basque Rule Knowledge, and Discrimination on the Explicit Artificial Grammar Test has a positive and significant relationship with their attainment in beginning to learn another language: when Basque Rule Knowledge is excluded, the relationship is not significant. From this we can conclude that the ability to focus on Basque and non-native grammatical and orthographic form and the ability to discriminate between grammatical and ungrammatical stimuli after exposure to a series of exemplars strongly relates to multilinguals' ability to learn

Basque. In addition, because both the Literacy Test and Explicit Artificial Grammar Test account for some unique variance, we can conclude that inducing grammatical structure relates to language learning differentially from translating grammatical and orthographic form.

All three tests of metalinguistic awareness with the strongest relationship with Language Learning Attainment in Hypothesis 2 load on more than one factor (see Section 7.2). Their ability to account for greater variance than other metalinguistic tests may be a function of them testing more than one type of metalinguistic ability. So not only do different metalinguistic tests account for some unique variance in Language Learning Attainment because they each test different metalinguistic abilities, individual tests may also test different metalinguistic abilities and therefore in themselves account for a large proportion of variance.

Hypothesis 3. *Multilinguals' grammatical metalinguistic awareness relates to their attainment in beginning to learn another language over and above their language experience.*

3a. *Therefore, the metalinguistic test/s found to have a positive relationship with attainment in beginning to learn another language when Hypothesis 2a is tested significantly relate to attainment over and above the language background variable/s found to have a positive relationship with attainment when Hypothesis 1 is tested, i.e. the results of Hypotheses 1+2a > Hypothesis 1.*

In order to discover whether the set of metalinguistic variables accounts for variance in language attainment when the set of language background variables is held constant, a set-hierarchical multiple regression is carried out. Set-hierarchical multiple regression compares the contribution of two sets of variables to a dependent variable (see Figure 7.2). In this case, it is used to find out if the metalinguistic test variables found in Hypothesis 2a add significantly to the language background variable found in Hypothesis 1's contribution to the variance of the dependent variable (the test of

Language Learning Attainment in Basque). The null hypothesis is that in the population from which the sample is drawn there is no increment in the variance in Language Learning Attainment accounted for when the Metalinguistic Test Variables are added to the Language Background Variables.

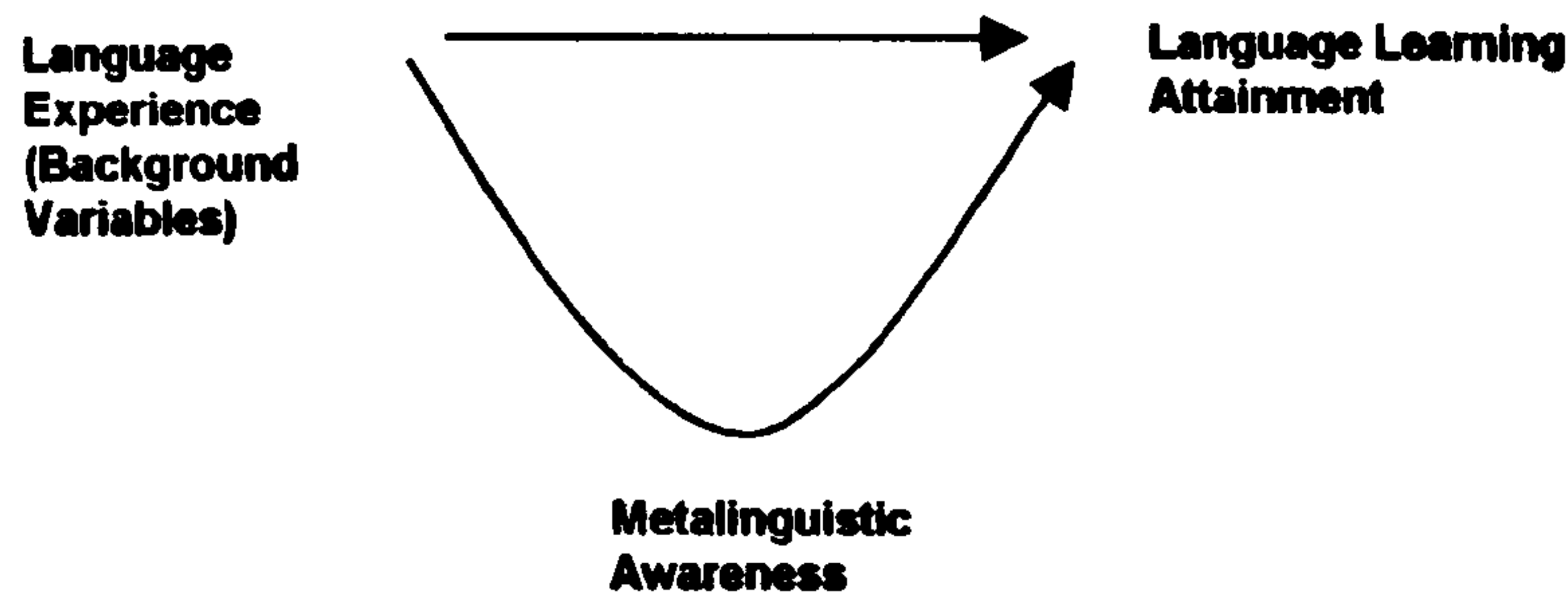


Figure 7.2 Schematic diagram of the influence of language background variables and metalinguistic awareness on language learning attainment.

The following formula is used (Cohen & Cohen 1983: 146), where Y = the dependent variable (Language Learning Attainment in Basque), A = the first set of variables (Language Background Variables: here, the Number of Literacies and Number of Languages Studied), B = the second set of variables (the Metalinguistic Test Variables, i.e. the Literacy Test, the test of Basque Rule Knowledge, and Discrimination on the Explicit Artificial Grammar Test); the source (numerator) $df = k_B$, and the error (denominator) $df = n - k_A - k_B - 1$:

$$F = \frac{R_{Y \cdot AB}^2 - R_{Y \cdot A}^2}{1 - R_{Y \cdot AB}^2} \times \frac{n - k_A - k_B - 1}{k_B}$$

The result of regressing Language Learning Attainment in Basque on Set A ($R_{Y \cdot A}^2 = .438$) is taken from the result of Hypothesis 1, and $R_{Y \cdot AB}^2$ is computed by regressing Language Learning Attainment onto both sets of independent variables ($R_{Y \cdot AB}^2 = .740$) (see Table 7.7).

Table 7.7 *Beta-values for simple regression of both sets of variables onto language learning attainment (Hypothesis 3a).*

Variable	β	R^2
Number of Literacies	.111	
Number of Languages Studied	-.080	
Literacy Test	.271	
Basque Rule Knowledge	.511	
<i>d'</i> Explicit Artificial Grammar	.257	
		.740

F is computed as:

$$F = \frac{.740 - .438}{1 - .740} \times \frac{30 - 3 - 4 - 1}{4} = 6.388$$

We can conclude that the metalinguistic tests (the Literacy Test, the test of Basque Rule Knowledge, and Discrimination on the Explicit Artificial Grammar Test) account for significant additional variance in multilinguals' Language Learning Attainment over and above their language experience (Number of Literacies and Number of Languages Studied), $F(4,22) = 6.388, p < .005$.

To check that the metalinguistic tests with the strongest relationship with language learning attainment are not merely the result of adventitious survival, the normalised standard errors of the six metalinguistic tests are compared (see Methodology Section, Table 6.6). The test of Basque Rule Knowledge has the greatest standard error, followed by the test of Explanation on the Grammaticality Judgement Task (excluded from the regression analyses above on the grounds that it is too closely collinear with the MLAT4), then the Literacy Test. The Explicit Artificial Grammar test has the second smallest standard deviation. It is therefore possible that the test of Basque Rule Knowledge gives high β -values in part because a measure with larger variance has an increased chance of accounting for variance in another measure. For an analysis of the data when Basque Rule Knowledge is excluded, see Hypothesis 3b.

- 3b.** *When target language Rule Knowledge is excluded on the grounds that its high relationship with target language attainment is inevitable, out of the remaining tests of metalinguistic awareness used in this study, the relationship between the metalinguistic test/s found to have a positive relationship with attainment in beginning to learn another language when Hypothesis 2b is tested significantly relate to attainment over and above the language background variable/s found to have a positive relationship with attainment when Hypothesis 1 is tested, i.e. the results of Hypotheses 1+2b-> Hypothesis 1.*

As the tests of Basque Rule Knowledge and Language Learning Attainment (Basque) are bound to be statistically related as they are both tests of the same language, it would be useful to find out whether assessments of metalinguistic awareness still have a greater relationship with attainment than background variables when assessment of target language grammar (here, Basque Rule Knowledge) is excluded, in order that the results can be examined for any predictive power. To achieve this, a set-hierarchical multiple regression analysis is carried out without the metalinguistic independent variable, Basque Rule Knowledge, using the same formula used to test Hypothesis 3a above:

Again, the result of regressing Language Learning Attainment on Set A ($R^2_{Y \cdot A} = .438$) is taken from the result of Hypothesis 1. Then $R^2_{Y \cdot A \cdot B}$ is computed by regressing the test of Language Learning Attainment in Basque onto both sets of independent variables ($R^2_{Y \cdot A \cdot B} = .610$), see Table 7.8.

Table 7.8 *Beta-values for simple regression of both sets of variables onto language learning attainment (Hypothesis 3b).*

Variable	β	R^2
Number of Literacies	.242	
Number of Languages Studied	.035	
Literacy Test	.399	
d' Explicit Artificial Grammar	.354	
		.610

Therefore, F is calculated as:

$$F = \frac{.610 - .438}{1 - .610} \times \frac{30 - 3 - 3 - 1}{3} = 3.381$$

When $F(3,23) = 3.381$, $p < .05$ (NB planned Bonferroni adjustment $\alpha = .05/14 = .0036$). Therefore, the metalinguistic tests (the Literacy Test and Discrimination on the Explicit Artificial Grammar Test) do not account for significantly more variance of Language Learning Attainment when added to the experiential variables than the Number of Literacies and Number of Languages Studied alone, therefore the null hypothesis is true. From this we can conclude that although participants' number of literacies and number of languages studied have a significant relationship with their attainment in beginning to learn another language (see Hypothesis 1), their metalinguistic awareness does not significantly enhance their ability to learn over and above this when assessment of target language rules is excluded from the analysis.

I have shown that the number of languages multilinguals are literate in and have studied relates to their attainment in beginning to learn another language (result of Hypothesis 1), as does their performance in tests of metalinguistic awareness, namely the Literacy Test together with the test of target language Rule Knowledge and test of the ability to discriminate on the Explicit Artificial Grammar (Hypotheses 2a). When Rule Knowledge is excluded, the Literacy Test together with Discrimination on the Explicit Artificial Grammar Test do still relate to attainment (Hypotheses 2b). I have also shown that adding the unique variance given by metalinguistic test variables (including Rule Knowledge) to the variance given by the language background variables significantly increases the statistical relationship with an assessment of multilinguals' target language attainment (Hypothesis 3a), but that the increase is not significant when Rule Knowledge is excluded from the analysis (Hypotheses 3b).

7.3.2 Variables that Promote the Development of Metalinguistic Awareness

In Hypothesis 4, I test the hypothesis that multilinguals' highly developed metalinguistic awareness develops through their language learning experience (see Figure 7.3).

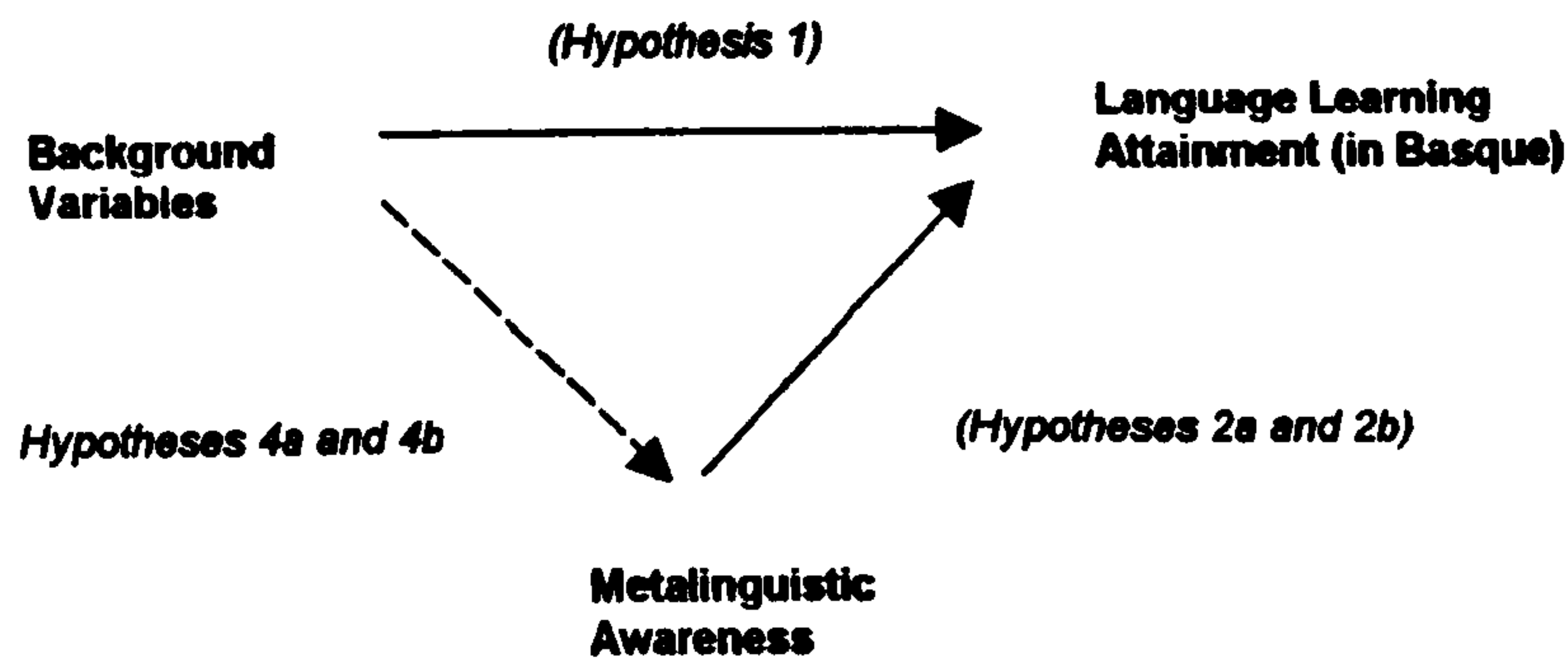


Figure 7.3 *Schematic diagram of the influence of language background variables on metalinguistic awareness.*

As discussed in the review of the literature (see Section 4.2), out of all the variables that have been shown to enhance the development of metalinguistic awareness in monolinguals and bilinguals, literacy and studying languages are inherently related to educated adult multilinguals' ability to focus on grammatical form, in the shape of the number of literacies they know and the number of languages they have studied. With regard to multiliteracy, the experience of processing visual representations of different languages is fundamentally important in developing adult educated multilinguals' ability to focus on and manipulate form; and studying languages, through reflection on and analysis of foreign language grammatical structures, is likely to develop their grammatical metalinguistic ability.

In line with the literature (Section 4.1.3) and the experimental evidence (Section 7.2) on the non-unitary nature of metalinguistic awareness, different metalinguistic tests are hypothesised to be related to different language learning experiences. The hypotheses tested below are theoretically motivated as follows: (4a) the amount of

experience gained in learning to read in different languages is hypothesised to have a strong positive statistical relationship with performance on the Literacy Test because multilinguals learn the skills required through their familiarity with the various stages of decoding and constructing meaningful texts, including understanding how meaning is represented visually, word order, and orthographic conventions (see Section 4.2.2); (4b) the number of languages multilinguals have studied is hypothesised to relate positively to their performance on the test of Basque Rule Knowledge, the MLAT4, and Explanation on the Grammaticality Judgement Task, tests which assess learning or understanding of grammatical rules, as multilinguals' experiences train them to reflect on and reason about grammatical form (see Section 4.2.5); (4c) the amount of language learning experience multilinguals have gained, whether partly formally or wholly communicatively, is hypothesised to relate positively to their ability to discriminate between grammatical and ungrammatical stimuli on the Implicit and Explicit Artificial Grammar Tests (see Section 4.2.1). Because in this sample of multilinguals the variables 'Number of Literacies' and 'Number of Languages Studied' overlap to such an extent that the two assessments are not separable from a practical point of view, they are entered together to test Hypotheses 4a and 4b. The role of associative memory (MLAT5) in the development of metalinguistic awareness is not tested.

Hypothesis 4. *Multilinguals' highly developed metalinguistic awareness develops through their language learning experiences (assessed in this study by their number of languages, number of literacies, and number of languages studied), specifically:*

4a. *Out of the language background variables, the number of languages in which multilinguals are able to read has a positive relationship with their performance on the Literacy Test (Middle Egyptian).*

A regression analysis was carried out with the Literacy Test as the dependent variable and the Number of Literacies together with the Number of Languages Studied as the independent variables. The two variables account for 40% of the variance of the

Literacy Test (see Table 7.9). The result is significant, showing that the more languages multilinguals are able to read and have studied, the better their performance on a test of literacy in a language and script previously unknown to them. This result confirms that there is a link between literacy/experience of studying languages and metalinguistic awareness, supporting the relationships found in Hypothesis 1, which found that the more languages multilinguals can read and have studied the higher their attainment on a language learning task, and Hypotheses 2a and 2b, which found that the better multilinguals' performance on the Literacy Test, again, the higher their attainment on the language learning task.

Table 7.9 Summary table of results for Hypothesis 4.

	Independent Variable/s	Dependent Variable	β^{*1}	β^{*2}	R^2	F	$p <^{**}$
4a	No. of Literacies & No. of Languages Studied	Literacy Test	.41	.30	.399	8.97	= .001
4b	No. of Literacies & No. of Languages Studied	Basque Rule K	.41	.33	.444	10.80	.0005
		MLAT4	.28	.37	.344	7.08	.0036
		GJ Explain	.23	.44	.336	7.78	.0036
4c	No. of Languages	d' Implicit AG	.47	.47	.217	7.77	.01
		d' Explicit AG	.52	.52	.272	10.48	.0036

* The first β -value refers to the first Independent Variable, the second to the second.

** $\alpha = .0036$ (i.e. .05/14, planned Bonferroni adjustment).

4b. *Out of the language background variables, the number of languages multilinguals have studied has a positive relationship with their performance on three of the metalinguistic tests: the test of Basque Rule Knowledge, the MLAT4, and the Grammaticality Judgement Task.*

Three separate regression analyses are carried out with each of the three metalinguistic tasks in turn as dependent variables and the Number of Languages

Studied together with the Number of Literacies as the independent variables. Results are given separately for each of the metalinguistic tests (see Table 7.9).

Basque Rule Knowledge. The Number of Languages Studied and Number of Literacies account for 44% of the variance of the test of Basque Rule Knowledge. The result is significant, showing that the more languages multilinguals have studied and are able to read, the better they perform on a test of learning target language grammar rules. This observation supports a connection between experience of studying a number of languages/knowing a number of literacies and metalinguistic awareness, and ties in with the finding for Hypothesis 2a, which links performance on the same test of target language rule knowledge with initial attainment in the target language, to show that experience of different literacies and studying different languages is related to the development of metalinguistic awareness, which assists language learning.

MLAT4. The Number of Languages Studied and Number of Literacies account for 34% of the variance of the MLAT4. The result is significant, showing that the more languages multilinguals claim to have studied and are able to read, the better they perform on the MLAT4, designed as a test of foreign language learning ‘aptitude’.

I interpret the causality in this relationship to be in the hypothesised direction on account of participants’ language background information. Twelve participants’ first degrees were mainly in languages (either classical or modern), and the other 18 (including 11 scientists) had chosen to study other subjects as their main degree. It seems likely that if reverse causality were the case and participants chose to learn languages because they had highly developed metalinguistic awareness then more of them would have chosen to study languages as their main degree – in the UK a first degree does not determine career options except in medicine, law, and engineering, and is mainly chosen for interest. But what is under consideration here is the number of languages studied, and not the depth of knowledge in a particular language. Most

participants had had to learn languages for work and to maintain relationships and had taken language classes in order to fulfil these requirements: only two were what might be termed 'language collectors'.

The result therefore suggests that performance on the MLAT4 is trainable, which has implications for using the MLAT4 as a test of 'aptitude', i.e. language learning ability (see Section 8.8 of the Discussion). If the MLAT4 can be described as assessing deductive grammar awareness (see the factor analysis of the metalinguistic tests, Section 7.2) then this finding suggests that the number of languages multilinguals have studied relates to their development of deductive grammar awareness.

Grammaticality Judgement Task. The Number of Languages Studied and Number of Literacies account for 37% of the variance of Explanation on the Grammaticality Judgement Task. The result is significant, showing that the more languages multilinguals claim to have studied and are able to read, the better they are able to explain why a sentence in their native language is unacceptable. If, like the MLAT4, Explanation on the Grammaticality Judgement Task can be described as assessing deductive grammar awareness (see the factor analysis of the metalinguistic tests, 7.2), then again, the result suggests that the number of languages multilinguals have studied and the number of literacies they have learned relate to their development of deductive grammar awareness.

4c. *Out of the language background variables, the number of languages multilinguals have learned has a positive relationship with their performance on the Implicit and on the Explicit Artificial Grammar Tests.*

Implicit Artificial Grammar. A regression analysis is carried out with the Implicit d' Score as the dependent variable (for an explanation of d' see Section 6.8.2) and the Number of Languages as the independent variable. The Number of Languages accounts for only 22% of the variance in participants' ability to discriminate grammatical from ungrammatical stimuli, and the result is not significant, indicating

that implicit grammar learning is not developed through multilinguals' language experience.

Explicit Artificial Grammar. A regression analysis is carried out with the Explicit d' Score as the dependent variable and the Number of Languages as the independent variable. The Number of Languages accounts for 27% of the variance in participants' ability to discriminate grammatical from ungrammatical stimuli: the more languages multilinguals know, the better they are able to discriminate on the Explicit Artificial Grammar Test.

In summary for Hypothesis 4, the five tasks that test explicit metalinguistic awareness enter into a significant positive relationship with a particular language background variable as shown by the series of linear regression analyses (see Table 7.9): the single test of implicit metalinguistic awareness does not. From the series of results, it can be concluded that multilinguals' highly developed explicit metalinguistic awareness develops through their language learning experiences.

7.4 Characteristics of Multilinguals' Metalinguistic Awareness

In Section 7.2, I showed that a factor analysis of the six metalinguistic tests supports a non-unitary view of grammatical metalinguistic awareness in multilinguals. In this section, I investigate other characteristics of grammatical metalinguistic awareness using just the artificial grammar tests. The Explicit Artificial Grammar Test is one of the tasks that accounts for a share of the variance in the test of Language Learning Attainment in Basque (see Hypotheses 2a and 2b, Section 7.3.1). If the Explicit Artificial Grammar Test exploits the sort of metalinguistic awareness that contributes to language learning ability then it would be useful to characterise this further.

A number of characteristics are attributed to multilinguals' metalinguistic awareness.

Firstly, it has been suggested that multilinguals' language learning ability may be connected to a tendency to overaccept, although neither of the experiments that I have found proposing this hypothesis – M. Thomas (1990) and Zobl (1992) – have obtained significant results. Acceptance is an indication that multilinguals are tolerant of different structures, require little positive evidence, and do not question input to a great extent, so a tendency to accept would be likely to speed their language acquisition. In other words, it is advantageous for language learners to accept all the input they are exposed to. On an artificial grammar designed so that of the 100 stimuli 50 are grammatical and 50 are ungrammatical, participants can make two types of error. They can reject a grammatical string (Type I error) or accept an ungrammatical string (Type II error). Multilinguals may be biased to overaccept, i.e. make more type II errors, because they have gained experience in learning natural languages, where accepting all the foreign language input they are exposed to should increase their rate of learning. In contradistinction to a tendency to accept, a tendency to reject would be restrictive and result in learners dismissing small amounts of positive evidence and waiting for additional positive evidence before accepting new structures.

Indeed, the multilinguals in Nation's (1983) experiment show a significantly higher mean proportion of Type II error (incorrect acceptance) than Type I error (incorrect rejection) on the Implicit (but not the Explicit) Artificial Grammar Test. However, they make *fewer* Type II errors in the implicit task than monolinguals and bilinguals, while all participants perform at the same level on the Explicit Artificial Grammar Test. Nation himself does not ask whether his results are due specifically to multilinguals' increased ability to discriminate rule-obeying from rule-violating strings, or whether multilinguals are biased to accept ungrammatical stimuli. I hypothesise that multilinguals are biased to accept ungrammatical stimuli on both the Implicit and Explicit Artificial Grammar Tests the more languages they know (in addition to becoming progressively better at discriminating between grammatical and ungrammatical stimuli the more languages they know, see Hypothesis 4c).

Secondly, Nation (1983), who uses the same artificial grammar tasks as those used in this study, finds that young adult multilinguals (aged 17-35, *ibid*: 46) perform equally well on the implicit and explicit artificial grammar tasks. Nation's result requires further investigation because it runs contrary to other evidence that multilinguals are better at learning natural language under what appear to be explicit conditions (eg, Ramsay 1980), although explicit learning in both cases depends on learners' state of mind rather than external task-related features. I hypothesise that educated adult multilinguals as a group are better at explicit learning than implicit learning on the grounds that they are able to use their highly developed explicit metalinguistic awareness to learn, a faster and more efficient process than implicit learning.

7.4.1 Bias for overacceptance

Hypothesis 5. *Multilinguals are more biased to accept ungrammatical items the more languages they know.*

Implicit Artificial Grammar Test. In order to find out if multilinguals become progressively more biased to accept, it is necessary to compute a β score for each participant, β being the representation of a judge's bias, where the 'Hits' Score (i.e. a grammatical stimulus receives a response of "grammatical"), $P(S | s) = \frac{\sum \text{grammatical responses}}{\sum \text{grammatical stimuli}}$ and the Type II Error score, $P(S | n) = \frac{\sum \text{grammatical responses}}{\sum \text{ungrammatical stimuli}}$. The following formula is used (McNicol 1972):

$$\beta = \frac{y[P(S | s)]}{y[P(S | n)]}$$

The implication of this formula is that the β score will be 1 if no bias is present, will approach 0 for a strong bias towards acceptance, and will approach infinity for a strong bias towards rejection. The nonlinear nature of the measure makes comparison

of β scores difficult, and so it is generally more useful to take the logarithm of β to obtain a linear measure. The values shown in Table 7.10 are therefore $\log_{10} \beta$.

Table 7.10 Mean proportion of \log_{10} Bias scores on the implicit and explicit artificial grammar tests.

	Implicit \log_{10} Bias (β)	Explicit \log_{10} Bias (β)
Mean	-.061	-.095
SE	.022	.039
SD	.122	.211
Range	-.408 to .125	-.666 to .354

A regression is carried out with the Number of Languages as the independent variable and the logarithmic transformation of participants' Implicit Bias Score as the dependent variable ($\beta = -.237$, $t = -1.293$, $R^2 = .056$, $F(1,28) = 1.672$). The Number of Languages accounts for very little (6%) of the variance of participants' ability to discriminate, and the result is not significant, disconfirming the hypothesis that multilinguals are better at discriminating correct from incorrect stimuli on the Implicit Artificial Grammar Test, the more languages they know.

Explicit Artificial Grammar Test. Using the same process, a regression is carried out with the Number of Languages as the independent variable and the logarithmic transformation of participants' Explicit Bias Score as the dependent variable ($\beta = -.281$, $t = -1.551$, $R^2 = .079$, $F(1,28) = 2.407$, not significant). Again, the Number of Languages accounts for very little (8%) of the variance of $\log_{10} \beta$ for the participants' score, and the result is not significant, disconfirming the hypothesis that multilinguals are biased to accept ungrammatical stimuli on the Explicit Artificial Grammar Test the more languages they know – they are not biased either to accept or to reject.

The results of Hypothesis 5 demonstrate that multilinguals do not become progressively more biased to accept ungrammatical stimuli the more languages they

know on either the implicit or the explicit artificial grammar tests, which suggests that they may not have any tendency to overaccept non-native language input. The result is congruent with the results of both Zobl (1992) and M. Thomas (1990), who found no statistical evidence to support the hypothesis that multilinguals overaccept items.

7.4.2 Implicit/ Explicit Metalinguistic Awareness

Hypothesis 6. *Multilinguals perform better on explicit than implicit artificial grammar tasks.*

Participants' discrimination (d') marks on the implicit and explicit artificial grammar marks in this study are compared using a repeated measures t -test ($t(29) = -3.569, p < .001$). The result is significant, supporting the hypothesis that multilinguals learn stimuli better when they have been instructed to work out the rules and are shown the stimuli together so they can compare them rather than when they are just told to pay attention and are shown stimuli individually. Learning grammar explicitly does appear to be faster and more efficient than learning implicitly, at least in the short term.

7.4.3 Conclusions: Characteristics of Multilinguals' Metalinguistic Awareness

Multilinguals do not progressively become more biased to overaccept ungrammatical stimuli (Hypothesis 5) but *are* progressively better able to discriminate between grammatical and ungrammatical stimuli the more languages they know (Hypothesis 4c), demonstrating that the more language experience multilinguals have gained, the more accurately they internalise the grammar pattern.

Educated adult multilinguals are better at discriminating between grammatical and ungrammatical stimuli on an *explicit* artificial grammar than an implicit artificial grammar (cf. Nation & McLaughlin 1986b) suggesting that their explicit

metalinguistic awareness is more effective, at least in the short term, as we would expect for any group of (at least biliterate) learners. Explicit metalinguistic awareness appears to allow multilinguals to induce grammatical form quickly and efficiently, and to make use of their highly developed explicit metalinguistic awareness. However, explicit and implicit awareness are not completely separable and the relationship between the two is complex. It is very probable that the explicit result is better not just because multilinguals are using their explicit metalinguistic awareness to learn, but because they are using both implicit and explicit metalinguistic awareness and have learned from their experience of being tested on the implicit artificial grammar what sort of learning and testing conditions to expect: they have learned to learn artificial grammars.

I conclude that multilinguals' highly developed metalinguistic awareness assists their language learning because it enables them to focus on grammatical form explicitly so they are able to induce a grammar quickly and efficiently from the input they have received, and subsequently able to distinguish patterns consistent with the grammar from patterns which are not.

7.5 Summary of the Chapter

The number of literacies multilinguals know and the number of languages they have studied are related to multilinguals' ability to learn languages: the more languages multilinguals are able to read and have studied, the better they perform on a test of learning the initial stages of another language (Basque). Metalinguistic awareness also has a significant relationship with language learning attainment: metalinguistic tests of literacy, target language rule knowledge and explicit artificial grammar discrimination together relate strongly to target language attainment.

Multilinguals' metalinguistic awareness helps them to learn languages over and above their previous language learning experience: when set-hierarchical multiple regression

is used to compare the regression of language learning attainment onto both language experience and metalinguistic variables with the regression of language learning attainment onto language experience alone, multilinguals' metalinguistic test performance has a stronger relationship with attainment than assessments of their language experience and associative memory. However, the result is not significant when target language rule knowledge is excluded from the analysis, possibly indicating that it is the speed with which multilinguals may learn new metalinguistic knowledge relevant to the target language, not their overall metalinguistic awareness, that assists their language learning ability. The non-unitary nature of metalinguistic awareness means that not all the metalinguistic skills multilinguals develop through their experience may be directly relevant to a particular learning situation.

Multilinguals' language background (specifically, the number of languages in which they are literate together with the number of languages they have studied, and the number of languages they have learned wholly communicatively as well as at least partially formally) relates to their performance on tests of explicit but not implicit metalinguistic awareness. The relationship suggests that language experience helps to develop multilinguals' explicit metalinguistic awareness, but that implicit metalinguistic awareness is less influenced by experience.

Confirming the evidence in the literature review that metalinguistic awareness is not unitary, the exploratory factor analysis found the metalinguistic tests loaded on two factors, interpreted as deductive grammar awareness and inductive grammar awareness. The best predictors of language learning attainment are metalinguistic tests that load on both factors.

Table 7.11 Summary table of results for Hypotheses 1-6.

	Independent Variable/s	Dependent Variable	β^{**}	R^2	F	p
1	Number of Literacies & Number of Languages Studied	Test of Basque Attainment	.51 .22	.438	6.75	< .005
2a	Literacy Test, Basque Rule Knowledge & d' Explicit Artificial Grammar	Test of Basque Attainment	.29 .52 .27	.733	17.16	< .0001
2b	(Excl. Basque Rule Knowledge) Literacy Test & d' Explicit Artificial Grammar	Test of Basque Attainment	.54 .44	.573	11.63	< .0001
3a	Set 1: Number of Literacies Set 2: Literacy Test & Basque Rule Knowledge	Test of Basque Attainment		1).438 < .733 (1&2)	6.39	Sig. of F change < .005
3b	(Excl. Basque Rule Knowledge) Set 1: Number of Literacies Set 2: d' Explicit Artificial Grammar & Literacy Test	Test of Basque Attainment		1).438 <.573 (1&2)	3.38	Sig. of F change < .05 (not sig.)
4a	Number of Literacies & Number of Languages Studied	Literacy Test	.41 .30	.399	8.97	= .001
4b	Number of Literacies & Number of Languages Studied	Basque Rule Knowledge	.41 .33	.444	10.80	< .0005
		MLAT4	.28 .37	.344	7.08	< .0036*
		GJ Explain	.23 .44	.336	7.78	< .0036*
4c	Number of Languages	d' Implicit Artificial Grammar	.47	.217	7.77	< .01 (not sig.)
		d' Explicit Artificial Grammar	.52	.272	10.48	< .0036*
5	Number of Languages	Implicit \log_{10} Bias	-.24	.056	1.67	(not sig.)
		Explicit \log_{10} Bias	-.28	.079	2.41	(not sig.)
6	Explicit discrimination > Implicit discrimination ($t(29) = -3.569, p < .001$).					

* $\alpha = .0036$ (i.e. .05/14, planned Bonferroni adjustment)** The first β figure refers to the first Independent Variable, the second to the second.

I investigated multilinguals' metalinguistic awareness for two characteristics, whether they overaccept (make Type II errors) and whether they are better on an explicit metalinguistic task than an implicit one the more languages they know. Multilinguals are not biased either implicitly or explicitly to accept ungrammatical stimuli the more languages they know. Multilinguals are found to be better at discriminating between grammatical and ungrammatical stimuli on an explicit than an implicit artificial grammar test, suggesting that they are better at learning grammar explicitly (which is also inevitably implicitly) than solely implicitly.

Replication is required to confirm the results found, particularly on account of the small sample size used and the relative lack of previous research in this area.

Chapter 8: Discussion

The main hypothesis, that metalinguistic awareness is positively related to participants' attainment over and above their language experience, was supported when the test of Basque Rule Knowledge was included in the set of metalinguistic tests, but not when it was excluded. The other hypotheses were supported, except for the hypothesised relationship between participants' No. of Languages and ability to discriminate between grammatical and ungrammatical items on the *implicit* artificial grammar tests; and participants' No. of Languages and a bias to overaccept ungrammatical items on either the implicit or explicit artificial grammar test.

The results do not distinguish between participants' No. of Literacies and their No. of Languages Studied. The two variables were analysed together as they were not practicably separable in the study's sample of multilinguals – for the most part, learners taught a language in the classroom are also taught to be literate in the language. The other results of the study were that:

- Participants' performance on the test of Basque attainment was positively related to the number of languages they had studied together with the number of languages they could read.
- Participants' performance on the test of Basque attainment was positively related to their performance on the explicit grammatical metalinguistic tests.
- Participants' performance on the Literacy Test, MLAT4, the Grammaticality Judgement Explanation task, and knowledge of Basque grammar rules was positively related to the number of languages they had studied/could read; and their performance discriminating between grammatical and ungrammatical stimuli on the *explicit* artificial grammar tests was positively related to the number of languages they knew.

- Participants were not more biased to accept ungrammatical stimuli the more languages they knew on either the implicit or the explicit artificial grammar tests.
- As a group, participants performed better on the explicit artificial grammar tests than they did on the implicit artificial grammar tests.
- In an exploratory factor analysis of the six metalinguistic tests, two factors were loaded on, interpreted as ‘inductive grammar awareness’ and ‘deductive grammar awareness’. The result suggests that grammatical metalinguistic awareness is not a unitary construct.

The results suggest that participants’ language experience and their ability to focus on grammatical form and to switch between grammatical form and semantic content are related to their attainment in the initial stages of another language. It is notable that all five tests of *explicit* grammatical metalinguistic awareness are related to participants’ previous language experience, but not the single implicit test (see Section 8.6 below).

On the basis of these results, I will propose that metalinguistic awareness develops through learners’ language experience continually interacting with their progressively increasing abilities, and results in faster language attainment. Practice in language learning not only improves proficiency in that particular target language, it also results in learners being better able to learn other languages (see Section 2.1.3, *the Practice Hypothesis*).

8.1 Language Experience and Language Learning Attainment

The more languages multilinguals have gained literacy experience in/studied, the faster they are able to learn Basque (see Hypothesis 1, Section 7.3.1). The result indicates that multilinguals are able to use the skills they have developed through their experience of learning a number of literacies and studying a number of languages

when they are tested at the initial stages of learning another language. The following discussion assumes that multilinguals' language learning and literacy skills develop interdependently and cumulatively.

If we consider whether other reasons are viable alternatives to the one suggested here, the only other obvious explanation of why multilinguals should be better at language learning the more literacies they know is the use of highly specialised language learning strategies. However rather than being an alternative explanation, I suggest that this is an additional explanation. It is a difficult explanation to assess, if individual multilinguals hone particular strategies that they find effective, as discussed in the review of the literature on multilinguals' use of language learning strategies (Section 2.2.1.4). It cannot be argued that participants may transfer lexical items or grammatical structures from their existing language knowledge because Basque is not typologically related to any other language in current use, and was specifically chosen for this reason.

Instead, I suggest that the best explanation for this result is that multilinguals are able to exploit the ability to internalise grammar that they have developed through practice. In other words, when learning another language they use their capacity to learn grammar gained through previous language learning rather than using their knowledge of individual grammatical structures. Language-learning ability is aided by the automaticity that educated adult multilinguals have previously developed in reading Roman script. This automaticity allows them to concentrate on internalising meaning and grammatical structure rather than decoding and interpreting. The fact that the materials for the language learning task were mainly written, even if they included a cassette and a video, and that when learning participants never had the opportunity to talk with a native speaker, make it substantially more likely that participants with more experience of reading and studying different languages would be able to learn more from the materials in the limited time available.

Yet we see the same sort of relationship when we look at the relationship between multilinguals' Number of Literacies/Number of Languages Studied and their performance on the metalinguistic Literacy Test in Middle Egyptian (see Hypothesis 4a, Section 7.3.2), which tests translation from *a script previously unknown* to the participants. The more languages multilinguals have gained literacy and study experience in the faster they are able to translate from a completely different script. Therefore it would be inaccurate to isolate multilinguals' automaticity in processing Roman script as the defining characteristic of their language learning ability, as in both cases multilinguals' grammar-learning abilities emerge as being related to their previous language experience. Again, it appears to be the ability to *learn* that is used rather than knowledge of a specific script: regardless of script, multilinguals are able to use their highly developed capacity to decode and interpret text proportionate to their previous literacy and language study experience. The result suggests that multilinguals are better at internalising grammatical structure the more literacies they know and languages they have studied because their experience at learning language through the visual medium as well as (in most cases) auditorily, enhances their ability to learn lexis and grammar in language tasks.

The empirical evidence that multilinguals are better at language learning the more languages they are literate in and the more languages they have studied confirms the anecdotal evidence given in Section 1.1, that people who know many languages find it easier to learn another. Reassessing the available evidence regarding multilinguals such as Mezzofanti, Burton and Murray, it is noticeable that all these individuals with a large number of languages worked in libraries, documentation centres, and domains where highly developed literacy skills were requisite. But despite the best-documented evidence in Western Europe being of literate multilinguals' ability to learn languages, it seems likely that non-literate multilinguals are faster learners than non-literate bilinguals and monolinguals on the grounds that they too have gained experience in internalising a number of different languages (and their grammars). On the other hand, comparison between the language learning abilities of literate and non-

literate multilinguals would be inappropriate as only communicative abilities would be comparable, and multilinguals with strong preferences to learn languages using literacy would be 'disabled' if they were not able to use their skill, and yet if they were allowed to use it, would be learning in a non-comparable domain. A pertinent subject for future research would be to obtain empirical evidence whether the more languages non-literate multilinguals know, the quicker they learn another language, in order to separate the effects of varied language experience from varied literacy/study experience.

8.2 Metalinguistic Awareness And Language Learning Attainment

I have proposed that metalinguistic awareness may assist language learning because focusing on and reflecting about language form and switching between grammatical form and semantic content speeds learning whether implicitly or explicitly. Focusing on form promotes the likelihood that information gained through experience will be internalised.

The empirical evidence from the result of Hypothesis 2, that multilinguals' performance in explicit metalinguistic tests is related to their attainment in the initial stages of learning Basque, appears to support the view that the high degree of explicit metalinguistic awareness that multilinguals develop helps them learn languages. The Literacy Test, test of target language Rule Knowledge (Basque) and test of discriminating on the Explicit Artificial Grammar together have a strong relationship with target language attainment. When Rule Knowledge is omitted from the analysis because target language rules are highly likely to relate to target language attainment (see Birdsong 1989), together the Literacy Test and Discrimination on the Explicit Artificial Grammar Test *still* relate to attainment.

The link between the test of Basque Rule Knowledge and Attainment in Basque

shows that participants' explicit knowledge of target language rules has a substantial association with their initial attainment in the same language. The extent to which Basque Rule Knowledge, a metalinguistic test assessing participants' knowledge of the target language rules, is related to the test of Basque Attainment is unsurprising, as both tests assess knowledge of the same language and so we expect them to be related. At the same time, from the convergent evidence that metalinguistic tasks totally unconnected in subject matter to the test of Language Learning attainment nevertheless have a statistical relationship with attainment (see Hypothesis 2b, Section 7.3.1), we can conclude that the ability to focus on grammatical form is an important skill for educated adult multilinguals learning languages.

When the metalinguistic tests are examined individually, the relationship between the Literacy Test (translation from Middle Egyptian script) and attainment in Basque suggests that decoding written text, understanding the basics of a new grammar, and the ability to translate text very quickly with good interpretation (i.e. to focus on form) may also play a part in foreign language attainment. For a test of translation from a language and script previously unknown to multilinguals to relate to a learning test from a totally different language (Basque), also previously unknown to the same group of multilinguals, indicates that participants show a degree of consistency in their learning abilities, even if the test of Basque attainment assesses both oral and written skills and the Literacy Test written translation only: multilinguals' ability at learning a 'new' language is not a one-off phenomenon.

The relationship between participants' performance at discriminating on the Explicit Artificial Grammar Test and their attainment in Basque shows that their pattern-learning ability is related to their attainment in a foreign language. Learners do not internalise natural grammar only through 'climbing up' semantics, i.e. using the meaning of a sentence to work out the syntax, but are able to internalise structure whether this is meaningful or devoid of meaning (see Reber's work, eg, Reber 1993). Because multilinguals' performance at explicitly discriminating between grammatical

and ungrammatical stimuli is related to their attainment at learning another language in the same way that the other natural language metalinguistic tests relate to attainment, I propose that the demands made on educated adult multilinguals by artificial grammar tests are met by at least some of the same cognitive processes as for natural language learning using written materials.

The empirical evidence supports one of the central arguments of this thesis, that explicit metalinguistic awareness is related to multilinguals' language learning ability.

8.3 The Contribution of Metalinguistic Awareness to Language Learning

The result for Hypothesis 1 suggests that participants' language experience is related to their attainment in the initial stages of learning another language, and Hypothesis 2 that their metalinguistic awareness is also related to their attainment. Now, as the crux of the thesis, the result for Hypothesis 3 suggests that metalinguistic awareness is related to multilinguals' language learning over and above their language experience: the set of metalinguistic tests (including a test of target language Rule Knowledge) account for significantly more variance of Language Learning Attainment when added to the set of experiential variables (Number of Literacies and Number of Languages Studied) than the set of experiential variables alone. The result demonstrates that although multilinguals' language learning experience is related to their attainment, the metalinguistic awareness that they have developed in the process of learning languages relates to attainment over and above their experience.

However, when the test of target language Rule Knowledge is excluded from the analysis, the result is not significant, suggesting that it is the speed with which multilinguals learn new metalinguistic knowledge relevant to the target language, that is related to their language learning ability over and above language experience. It also suggests that not all the metalinguistic skills multilinguals develop through their

experience are directly relevant to a particular learning situation (see Sections 4.1.3 and 7.2), on the non-unitary nature of metalinguistic awareness).

The methodology used to obtain this result gives precedence to the relationship between language experience and attainment, and adds the relationship between metalinguistic performance and attainment onto this. The method promotes theoretical simplicity rather than real-life complexity of interacting and cumulative phenomena, as of course multilinguals use their metalinguistic awareness in the test of Basque attainment, and their language learning skill in performing on the metalinguistic tasks: the phenomena are to some extent inseparable even if the focus of the two types of tests differs. What the statistical result shows is that assessment of metalinguistic awareness (including Basque Rule Knowledge) in addition to assessment of language experience (Number of Literacies together with Number of Languages Studied) is related to an assessment of performance in learning the initial stages of another language to a greater extent than assessment of language experience alone.

8.4 Language Experience and Metalinguistic Awareness

The relationships between participants' language experience and their performance on various metalinguistic tests appear to indicate that previous language experiences and skills relate to participants' development of grammatical metalinguistic awareness (see Hypothesis 4, Section 7.3.2).

8.4.1 No. of Literacies/Languages Studied and the Literacy Test

The result for Hypothesis 4a indicates that the more literacies participants know and languages they have studied, the better they perform on the Middle Egyptian Literacy Test, a metalinguistic task of translating foreign language text when the lexis,

grammar, script and orthographic conventions are previously unknown to the participants.

As we have seen in the literature review (Section 4.2.2), some researchers consider that metalinguistic awareness is necessary for literacy abilities to develop in children (particularly phonological metalinguistic awareness in the initial stages in addition to grammatical metalinguistic awareness) and others that metalinguistic awareness is a consequence of literacy. I have supported the view that metalinguistic awareness should be seen as both influencing and resulting from literacy, as they 'feed off' each other. The metalinguistic awareness that participants had previously developed in the process of learning their first and subsequent languages, appears itself to be enhanced and developed further through the process of studying and learning to read other languages. In the process of becoming multiliterate, language learners focus on the visual representation of the language, which once a certain level of automaticity is developed, can become a medium for analysing grammatical form. Automaticity arises through practice on account of the development of implicit processes (Paradis 1994) and prevents cognitive overload (Gombert 1992). Automaticity leaves learners more cognitive processing time to concentrate on other processes (Beech 1987), in this case text interpretation, which is heavily reliant on being able to switch between grammatical form and semantic content.

The result for Hypothesis 4a suggests that language experience is related to the development of metalinguistic awareness. Learning to be literate in another language appears to involve extensive transfer of literacy and language studying skills from other languages known to the individual⁵. For the Middle Egyptian of the Literacy Test this includes transliteration or decoding (visual recognition, phonological analysis), translation (depending on context: in an immersion environment

⁵ The process of learning to be literate in, say, a sixth language, is unlikely to follow the same progression as a first language. It may show the same stages but be speeded, it may by-pass certain stages altogether, or it may progress very differently, depending on learners' previous literacy experiences and knowledge.

multilinguals may not translate to the same extent and instead may form more links between the target language and their conceptual semantics), lexical knowledge (knowledge of cognates, roots, philology), morphology (knowledge of word affixes such as agreement of number and gender, conversion of a word from one word-class to another, understanding of how morphology interacts with syntax), and syntax (standard word order, topicalisation). Relatively little automaticity is likely to develop in such a short time frame of only 15 minutes, so the task is cognitively challenging as the demands must be met very quickly. However the slow and laborious process of starting to be literate in another orthography, all over again, is speeded by participants' previous literacy knowledge.

The task also measures skills related to literacy in a foreign language, many of which require participants to perform a number of operations simultaneously. For example, the task measures the ability to take in a large amount of information in a short space of time in reading the test instructions; the ability to keep this information in mind when translating the script using the reference sheets; the ability to refer to the reference sheets quickly and accurately; the ability to transcribe phonological and logographic hieroglyphs into English letters and words; the ability to learn the rudiments of a new grammar quickly not just from the instructions but from grappling with a text to make it make sense; the ability to keep different options open until a suitable interpretation further in the text clarifies previous ambiguities; the ability to interpret story schemata; the ability to produce a text that another person will find readable; the ability to work accurately and at speed under timed test conditions; the ability to remember a hieroglyph or series of hieroglyphs that have appeared in the text before; and use of world knowledge in order to recognise the name 'Cleopatra' from the Egyptian spelling.

This result also indicates that the Literacy Test, designed for this thesis, did assess what it was designed to assess, multilinguals' ability to focus on form by decoding and translating grammatically and with good interpretation from a language and script

previously unknown to them. There is another indication that the Literacy Test is an effective test of metalinguistic awareness. In the analysis used to test Hypothesis 2b (where performance on tests of explicit metalinguistic awareness was found to be associated with language learning attainment) the Literacy Test together with discrimination on the Explicit Artificial Grammar Test have a strong relationship with Attainment in Basque. This completes the triangle (see Figure 7.3) – participants' Number of Literacies/Languages Studied together have a strong relationship with Basque attainment, and also with the Literacy Test, which in turn is one of two metalinguistic tests that are related to Basque attainment.

The acquisition of additional literacies is likely to be enhanced not only by the transfer of literacy skills and experience of studying languages, but by multilinguals' cognitive skills and their vast world knowledge. Adults' wide-ranging world knowledge means that they can make sense of an enormous variety of texts as they can judge the feasibility of different contexts and impose meaning on texts out of context.

8.4.2 No. of Literacies/Languages Studied and Basque Rule Knowledge

The more languages participants have studied/are literate in, the better they perform on the test of Basque Rule Knowledge (see Hypothesis 4b, Section 7.3.2). The result suggests that participants' performance on a test of learning target language grammar rules is related to their previous experience in studying languages and learning to read in them, which is likely to have drawn their attention to language form. The result ties in with the finding for Hypothesis 2a (see Section 7.3.1), which links performance on the same test of Basque rule knowledge with initial attainment in learning Basque, to show that participants' No. of Literacies/Languages Studied is related to their highly developed metalinguistic awareness, which in turn appears to be related to their language learning attainment.

The result suggests that experience studying and learning to be literate in many different languages, and having to switch between content and structure, oral and written work, places demands on the learner which they are able to cope with proportionate to their language experience. Experience appears to result in them being able to learn rules in another language more quickly. Participants' metalinguistic performance at learning grammatical rules in the initial stages of learning another language appears to be partly a consequence of their previous experience in studying languages/learning to be literate in them, probably because being able to see sentence structure and practise language exercises encourages learners to think about grammatical form, even if this is not brought to their attention in the classroom – and many language teachers do bring grammatical structure to learners' attention, particularly at advanced levels of instruction, such as at university. Practice at focusing on language form develops learners' metalinguistic awareness.

8.4.3 No. of Literacies/Languages Studied and the MLAT4

The more languages participants have studied/learned to be literate in, the better they perform on Part 4 of the Modern Language Aptitude Test (MLAT4) (see Hypothesis 4b, Section 7.3.2). Again, participants' metalinguistic performance is related to their previous experience in studying languages/being literate in a number of languages. Because their language experience has trained them to focus on, reflect on and reason about grammatical form in foreign languages, they appear to be better able to cope with a task requiring them to infer parallel grammatical structure from a sample sentence in their native language. The MLAT4 is a demanding metalinguistic task that requires participants to reflect on grammatical structure in the written medium, and to switch between grammatical form and semantic content. The result appears to support the view that the ability assessed by this aptitude subtest may partly be the result of language experience (see Section 2.1.4 on *Epigenesis*).

For further discussion on the relationships between 'aptitude', metalinguistic awareness, and language learning, see Section 8.8.

8.4.4 No. of Literacies/Languages Studied and Explanation on the Grammaticality Judgement Task

The result of Hypothesis 4b indicates that participants are better at explaining grammar in their native language (English) the more languages they have studied/are literate in. This seems to suggest either that multilinguals reanalyse their native language as they learn other languages' grammars, or that they are able to apply the grammar knowledge they have gained in learning other languages to their native language under test conditions.

Participants' performance on the Grammaticality Judgement task and the MLAT4, the two native language metalinguistic tests, showed some striking similarities. Both tests are related to participants' No. of Literacies/Languages Studied, and on screening for multicollinearity, they were found to be closely related (see Section 7.1). This suggests that the two tests – of finding parallel structures, and explaining why sentences are unacceptable – may assess some of the same skills. This finding may be worth investigating further, as there is no directly comparable alternative form of the MLAT, which makes it difficult to design longitudinal studies of language learning ability. Although other aptitude tests exist, they are not so widely available, and have not been validated so extensively.

In the same way as for the previous result with the MLAT4, the result supports the view that metalinguistic awareness is interdependent between languages. Metalinguistic awareness is not confined separately to competence in each language, but the ability to focus on grammatical form can be transferred to any of a multilingual's languages, and therefore development of metalinguistic ability in any language will 'spill over' into the others in multiliterate multilinguals. Experience in learning languages in a formal environment and learning to read them may therefore have an important role to play in developing multilinguals' metalinguistic awareness, and consequently their language learning ability.

8.4.5 No. of Languages and the Artificial Grammar Tests

Consistent with the result of Hypothesis 6, that multilinguals perform better on the explicit than the implicit artificial grammars, the results of Hypothesis 4c indicate that the number of languages multilinguals have learned either partly formally or wholly communicatively is related to their ability to discriminate between grammatical and ungrammatical stimuli on the explicit but *not* the implicit artificial grammar test.

Implicit metalinguistic awareness appears to be less trainable than explicit metalinguistic awareness, as Reber (1993) suggests (see Section 8.6 below), as participants' language experience has no discernible effect on their implicit metalinguistic awareness. In contrast, all five tests of explicit metalinguistic awareness *do* relate to assessments of language experience, suggesting that multilinguals' highly developed explicit metalinguistic awareness develops through their language learning experiences.

8.5 No Bias to Overaccept

The results indicate that participants are not more biased to accept ungrammatical items the more languages they know either on the implicit or the explicit artificial grammar tests. The result confirms the results of Zobl (1992) and M. Thomas (1990), neither of whom found multilinguals to overaccept significantly more than other learners. Rather, multilinguals appear to become better at discriminating rule-obeying from rule-violating strings under explicit conditions the more languages they know (see the result for Hypothesis 4c), indicating that the more language experience they have gained the more accurately they are able to recognise items that are consistent with the grammar they have been exposed to from items that are not.

8.6 Implicit and Explicit Grammar Learning

I propose that explicit metalinguistic awareness helps multilinguals to learn languages

on the basis that multilinguals gain considerable experience of reflecting on language and that training attention to be directed on grammatical structure, is likely to result in greater uptake and the process being retained by the learner and subsequently used in relevant learning situations. The finding that participants perform better on Explicit Artificial Grammar Tests than Implicit Artificial Grammar Tests does suggest that they are better able to focus on grammatical form explicitly than implicitly. This result is completely inconsistent with Reber's findings (where participants are not grouped by or assessed for previous language experience); indeed the majority of Reber's experimental results on artificial grammars show that learners are worse at explicit than implicit learning (Reber 1993), which Reber ascribes to the explicit task overloading participants' "limited-capacity processing resources" (Birdsong 1989: 167). The overload results in learners being unable to internalise the stimuli, and therefore unable to retrieve it in the testing condition. Birdsong (1989: 167) suggests that learners would improve their performance on explicit artificial grammar tasks if they were able

to divide problems into manageable subparts and pursue small-scale solutions. Moreover, experts, upon examination of the material to be learned, may be able to switch strategically between more explicit and more implicit modes of learning, depending on their assessment of the complexity of the required information processing.

Birdsong's comment puts forward the possibility that multilinguals may switch between implicit and explicit learning according to task demands. But in contrast to Birdsong's proposal and Reber's results, Nation (1983) found that out of his (adolescent and young adult) monolingual, bilingual and multilingual participants *only* the group of multilingual participants performed at a high level on the implicit task, while the mean scores for all three groups reached the same high level on the explicit artificial grammar. In other words, his multilingual participants performed equally well on both tasks and did not switch strategically between modes of learning. Nation's multilingual participants may perform equally well on both tasks because

they are younger (aged 17 to 35; Nation 1983: 46) than those in this study (who are aged 22 to 52) and in consequence of being younger, had experienced fewer years of formal education (a mean of 15.6 years, compared to a mean of 19.1 years). Their explicit metalinguistic awareness is therefore likely to be less developed than the sample of multilinguals in this study.

In contrast to both these findings, the educated adult multilingual participants in this study perform better at the explicit than the implicit tasks. The complexity of the grammars and the large number of stimuli make internalising the information cognitively challenging, but the participants demonstrate that they are able to cope with the demands of the explicit task and learn better than they do on the implicit task. Their extensive experience of explicit natural language learning may have trained them in this ability, while their implicit language learning ability may be comparatively less trainable (see Reber 1993). This study therefore appears to complete the pattern across the three studies: the more language experience participants have gained the better they perform on explicit artificial grammar tasks relative to implicit artificial grammar tasks.

There is an additional explanation for the result – the implicit test can be seen as a mediating variable for the explicit test. All participants did the implicit artificial grammar test 7-14 days before doing the explicit artificial grammar test, so they all had had the same opportunity to learn from the experience even though different grammars were used. Of course, participants simultaneously use a variety of means to learn an implicit artificial grammar, and not all of these are implicit (Reber 1993), but the sheer quantity of stimuli shown individually in such a short space of time in the implicit task militates against explicit learning and memory being responsible for their performance. However, on the explicit test, participants may have been learning both implicitly and explicitly, so boosting their performance: it is impossible to limit or halt implicit learning from taking place. Indeed, it should be understood that all the tests of explicit metalinguistic awareness used in this study also assess implicit

metalinguistic awareness. Only the Implicit Artificial Grammar Test attempts to assess implicit metalinguistic awareness alone, and it still has an explicit knowledge component.

This finding ties in with Reber's arguments concerning the "primacy of the implicit", that implicit functions are more primitive and basic than explicit functions, and that "other things being equal, implicit learning is the default mode for the acquisition of complex information" (Reber 1993: 25). Reber (1993: 7) argues that implicit functions "show a tighter distribution in the population than the more recently emerging explicit and the conscious – we should expect to find fewer individual differences between people when implicit processes are in use than when explicit processes are". Reber argues that this is because, firstly, more primitive functions have taken a very long time to evolve and, as they are the "successful outcome of aeons of adaptation, display less variation from individual to individual" (Reber 1993: 7). They are also more robust and resilient to "disruption of function" (*loc. cit.*) than the more recent evolutionary development of explicit functions. Secondly, he argues that education concentrates on explicit learning, and this training leads to an increase in the population variance for explicit measures. On account of these causes, people show less variation in implicit learning, and therefore any measurement of implicit learning for the purpose of regressing it onto another variable will result in smaller variance than the corresponding explicit test. This result, that participants perform better on tests of explicit than implicit artificial grammar learning is consistent with Reber's theoretical line of reasoning, rather than his empirical findings using participants not grouped by language experience.

8.7 Metalinguistic Awareness is Not Unitary

In the review of the literature I present evidence for metalinguistic awareness being collection of abilities connected with awareness of form rather than a unitary entity (Section 4.1.3). The factor analysis carried out to investigate whether there are any

underlying groupings in the set of six metalinguistic tests (see Section 7.2) supports the evidence presented in the literature review that metalinguistic awareness is not unitary but a collection of abilities connected with awareness. Indeed, the factor indicates that grammatical metalinguistic awareness is not unitary either, but at least two skills, as two factors were found, interpreted as deductive grammar awareness and inductive grammar awareness. Explanation on the Grammaticality Judgement Task and the MLAT4 load heavily on 'deductive grammar awareness': the Implicit Artificial Grammar Test loads most strongly on 'inductive grammar awareness', and the Explicit Artificial Grammar Test less strongly – the Literacy Test and test of Basque Rule Knowledge are split across the two factors. The factors represent two metalinguistic abilities, which overlap by 10%. The finding for Hypothesis 2 that a combination of metalinguistic tests has a significant relationship with attainment is additional support, as it indicates that the tests assess different types of metalinguistic awareness. Grammatical metalinguistic awareness, the ability to focus on grammatical form, and to switch between form and content, appears to be a label for a number of different abilities.

Now I turn to the nature of the two factors found in factor analysing the six metalinguistic tests in this study. I propose that these two factors are comparable to two factors Carroll has previously found in his lifetime's work on human cognitive abilities. Factor I 'deductive grammar awareness' is comparable to the factor Carroll calls 'Grammatical Sensitivity', and Factor II 'inductive grammar awareness' to the factor Carroll found when constructing the Modern Language Aptitude Test (but did not use), which he calls 'inductive language learning'.

There is some evidence in support of 'deductive grammar awareness' being equivalent to Carroll's 'Grammatical Sensitivity'. In three researchers' work the inclusion of the MLAT4 leads to the emergence of a factor that is heavily loaded on by the test, that is the present study, Carroll's work, and Skehan (1980, cited in Carroll 1993). In all three lines of research, the other tests that load on the factor are tests of grammatical

knowledge. In his massive survey of factor-analytic studies relating to human cognitive abilities, Carroll (1993: 175-176) states that:

two factor-analytic studies (datasets CARR21-22) [i.e. Carroll 1958] appeared to support the conclusion that grammatical sensitivity constitutes a separate primary factor of language skill. In reanalyses of these datasets, Words in Sentences [i.e. MLAT4] had the highest loadings on a possible grammatical sensitivity factor, but these factors were weak because of a lack of other variables that could be expected to measure this factor well. In a follow-up study (dataset CARR42) [i.e. Carroll 1977], the factor was measured by a variety of grammatical tests [these are not described], but both the verbal and mathematical scores of the Scholastic Aptitude test also appeared on this factor – suggesting that grammatical sensitivity may be correlated with a general intelligence or reasoning factor.

Carroll believes that “persons high on MLAT-IV are likely to be above average in intelligence”, but qualifies the statement with “Nevertheless, there seem to be some individuals who get high scores on the test without having had formal training in grammar, and there are some highly intelligent persons who get low scores on the test” (Carroll 1990: 20). Carroll’s comments are highly suggestive that the MLAT4/ deductive grammar awareness describes participants’ ability to reason about grammar through the medium of literacy, literacy being an important contributory element in the development of metalinguistic awareness, and a result of education, not intelligence. Metalinguistic awareness is an individual difference that develops through experience, whereas intelligence is not supposed to be trainable (see Section 2.2.1.3).

In this study, the MLAT4 and test of Explanation on a Grammaticality Judgement Task both assess participants’ ability to reason about their native language grammar, and the two tests which load on the factor to a lesser extent, the tests of target language Rule Knowledge (Basque) and Literacy (Middle Egyptian), assess participants’ ability to reason about grammar in languages in which they previously had no experience.

Carroll (1993: 176) later continues:

...The study appeared to give good support for the existence of a grammatical sensitivity factor, but its separation from a more general factor of cognitive ability was not clear.

Deductive grammar awareness does appear to be cognitively demanding: evidence is given in the present study by the relationship between the number of languages participants have studied together with number of literacies and their scores on both the MLAT4 and explaining grammar on the Grammaticality Judgement Task. Studying/being literate in a number of languages is likely to increase both participants' explicit knowledge about grammar and their experience of using the knowledge to reason about grammar problems. Therefore, the evidence that the more literacies and the more languages multilinguals have studied the better they perform on tests which load on deductive grammar awareness, strengthens the argument that the factor describes participants' deductive abilities regarding grammar rather than a general cognitive ability. In addition, in this study we know both from testing for multicollinearity and from the factor analysis that the MLAT4 and Explanation on the Grammaticality Judgement Task are closely related with regard to participants' performance, demonstrating that participants have explicit knowledge regarding their native grammar which they are able to use for deductive purposes (see Carroll 1990).

Carroll's inability to separate deductive grammar awareness consistently from other factors may be due to a technical problem regarding the lack of metalinguistic tests to load on deductive grammar awareness, as at least three tests of an ability are required for a factor to emerge. The MLAT4 is Carroll's only test of deductive grammar awareness ('grammatical sensitivity') and unfortunately no other published, standardised test has been devised using the same format: there is no alternate form of the MLAT (Carroll 1990: 12). Further research is required as to whether the MLAT4

loads on the same factor as explaining unacceptable sentences on grammaticality judgement tasks with any degree of consistency.

From the evidence, I conclude that Carroll's 'Grammatical Sensitivity' and the 'deductive grammar awareness' found in this study are comparable factors, and that they describe the ability to reflect on and reason about grammar by inference from previous grammatical knowledge.

Turning to Factor II 'inductive grammar awareness', I contend that it is comparable to the factor that Carroll interprets as inductive language learning ability and defines as "the ability to examine language material and from this to notice and identify patterns of correspondence and relationships involving either meaning or syntactic form, i.e. to be able to infer from limited evidence" (Carroll 1973, cited in Skehan 1989: 27). Carroll (1981: 109) states that although he found a factor he interpreted as inductive language learning ability to affect attainment in a foreign language, it is only weakly represented in the Modern Language Aptitude Test. This is because the tests he developed to assess it "proved to be too long and difficult to administer to make it feasible to include them in the battery" (loc. cit.), and he is "unaware of any studies which have attempted to study this ability from an experimental point of view" (loc. cit.), which might have provided suitable tests.

Of the metalinguistic tests in this study found to load on what I propose is a comparable factor, the artificial grammar tests load most strongly. Artificial grammar tests require participants to infer rules from a series of exemplars of strings of letters and then reject or accept previously unseen exemplars that follow the same rules – in other words, inductive language learning devoid of meaning. To assess 'inductive language learning ability', Carroll used Sapon's (1955) Tem-Tem Learning test, which also uses an artificial language to simulate foreign language learning with both auditory and visual stimuli. The test assesses the ability "to induce rules governing

given stimulus material, especially those presented by materials in a foreign language” (Carroll 1990: 22): Carroll does not state whether the language was meaningful.

In this study, the metalinguistic tests that loaded on the factor less strongly were the Literacy Test and the test of Basque Rule Knowledge (the two tests loaded on both Factor I and Factor II – induction and deduction can take place simultaneously as psycholinguistic processes). The Literacy Test assesses participants’ ability to learn grammatical rules and orthographic conventions from examples in the instructions and cumulatively by working through the test, and the test of Basque Rule Knowledge assesses participants’ ability to learn grammatical rules through exposure to the Basque in the language learning materials. On the basis of these similarities, I argue that ‘inductive language learning ability’ is the same factor as the ‘inductive grammar awareness’ found in this study because in both cases participants are required to internalise general grammatical rules from their experience of particular instances.

I conclude from the evidence given above that the two factors found in this study’s factor analysis of six metalinguistic tests correspond to the two factors found by Carroll in various studies. That there is considerably more evidence for deductive grammar awareness (Carroll’s “Grammatical Sensitivity”) than inductive grammar awareness (Carroll’s “Inductive Language Learning”) is more a function of the strength of the MLAT4 in loading on ‘deductive grammar awareness’ than the amount of factor analytic research into either factor. Further research is required on a greater range of grammatical metalinguistic tests to discover if they load on *more* than two distinct factors.

8.8 Aptitude, Metalinguistic Awareness, and Language Learning

In the previous section we have seen that MLAT4 loads onto the factor ‘deductive grammar awareness’ (Carroll’s ‘Grammatical Sensitivity’). Here I continue the

argument from the review of the literature, firstly, that 'aptitude' is a collection of cognitive correlates of foreign language attainment and therefore not unitary and secondly, that aptitude is not stable across a learner's lifetime. I put forward on the basis of the result of the factor analysis and of Hypothesis 4b that the MLAT4 is an extremely effective test of deductive grammar awareness, a type of grammatical metalinguistic awareness that is demonstrably developmental in nature.

I discuss the consequences of this inference on the two main debates in aptitude research, namely regarding the 'origins' or causes of aptitude and the related debate as to whether aptitude is constant across an individual's lifetime. To add to the debate, I argue that aptitude is, like all human abilities including language and metalinguistic awareness, epigenetic, a result of the interaction between genetic endowment, self-regulation, and social and physical environment right up to the moment of assessment (see Section 2.1.4). Furthermore, I point out that empirical research does not support the theoretical definition of aptitude for learning foreign languages currently in use by some researchers (see below), and that an accurate definition of aptitude is crucial to an understanding of the relationships between aptitude, metalinguistic awareness, and language learning.

Carroll, a prolific researcher into language learning aptitude, defines aptitude as a cognitive ability that is "*relatively* fixed over long periods of an individual's life span, and relatively hard to modify in any significant way" (Carroll 1981: 86), and Skehan (1998: 187) that "language aptitude is stable in nature, is not susceptible to easy training or modification, and is not environmentally influenced, to any significant degree, at least after the early years". But as discussed in the literature review (see Section 2.2.1.1), there is no empirical longitudinal evidence that aptitude is stable, nor is there adequate evidence that it is untrainable, and there *is* some evidence that experienced language learners perform better on an 'aptitude' test.

To this evidence I add the result of Hypothesis 4b, that the more languages multilinguals have studied and are literate in the better they perform on the MLAT4. The result suggests that studying a number of languages/learning to read them affects experienced language learners' performance on the 'aptitude' sub-test. For this to be the case, multilinguals must have developed metalinguistic awareness applicable to their native language in the process of studying foreign languages. The result supports the view that languages are interdependent, and that metalinguistic awareness develops through use (see *The Practice Hypothesis*, Section 2.1.3) and is transferable for use in other languages.

My second piece of evidence in the following discussion is the test construction of the MLAT. The MLAT4, used as a test of metalinguistic awareness in this study, is designed to be a sub-component of a foreign language learning aptitude test. The MLAT was constructed by screening a large number of tests and retaining the ones that had the most predictive power for language learning, judged on the basis of participants' subsequent achievement. From the perspective of test construction, the MLAT4 can be shown to be a metalinguistic test. When examined, it requires participants to focus on the grammatical function of a word in a sentence in order to choose a functionally equivalent word in a parallel sentence. This focus on grammatical form obliges participants to draw on their metalinguistic awareness explicitly. In previous experiments, overall the MLAT4 sub-test has been found to be the best predictor of subsequent attainment (eg, Carroll's reanalysis of Gardner & Lambert's 1965 data, see Carroll 1981).

If aptitude theorists define aptitude as being essentially stable in nature, then they discount any development in ability as being aptitude *a priori* on the grounds that aptitude is not developmental. The disparity between theory and experiment leaves us in a position where stable theoretical 'aptitude' has little relation to empirical 'aptitude tests' such as the MLAT4, which is demonstrably affected by learners' previous language experience (see result of Hypothesis 4b, Section 7.3.2). The disparity is

untenable, as empirical research must be based on theoretical study and *vice versa*.

There are two logical alternatives: either the MLAT4 does not test aptitude or aptitude is not stable. In support of the first, there is the evidence from examination of the test items that the MLAT4 tests grammatical metalinguistic awareness, and from the tests' strong relationship with another test of metalinguistic awareness, explanation on the Grammaticality Judgement Task. In support of the second, we also know from many researchers' extensive testing using the MLAT4 that it is an effective correlate of subsequent language learning attainment. If performance in one of the parts of the MLAT is affected by participants' experience, the possibility opens up that the other parts may also be affected by differential experience. For example, phonetic coding ability, tested by the MLAT2, requires participants to identify relationship between sounds presented auditorily and a transcription that is unfamiliar to them: performance may relate to participants' language experience using different orthographies or scripts. There is an extensive literature showing that metalinguistic awareness develops through experience (see Section 4.2), in complete contradiction to the literature asserting that aptitude is stable. If foreign language learning aptitude is in fact developmental 'language learning ability' and is affected by learners' language experience then a reassessment is required of the definition of aptitude.

There is a third possibility, the best alternative supported by the evidence: that the MLAT4 tests metalinguistic awareness rather than 'stable' aptitude *and* that 'aptitude' is not stable. Metalinguistic awareness develops through the continual interaction of learners' heritable ability with their environment and experiences in education, literacy, learning languages, formal language learning and maturation and therefore is a strong correlate of attainment, but is not stable. Because 'aptitude' tests assess language learning ability at a particular point in time in order to predict subsequent attainment, they cannot take into account changes within the individual over time (without retesting). Tension between explanation and prediction in aptitude research (Skehan 1982, cited in Skehan 1998: 191) appears to be the cause of the

MLAT4, a metalinguistic test, being used to test aptitude.

Carroll (1993) does subsequently appear to have realised that the MLAT4 assesses grammatical metalinguistic awareness as he states:

although it may be assumed that the native speaker of a language implicitly learns or acquires a high degree of skill in using the grammatical structure of the language, it appears that there are wide differences in the degree to which individuals are aware of the details of that structure. These individual differences may arise partly through school learning, but it is also possible that there are basic differences in aptitude for learning information about grammatical structure even with exposure to instruction in such information. [Carroll's own italics] (1993: 174).

Just as instruction may help learners to look at language form, it appears to assist those who excel at it, giving them opportunities to practise structures and learn them. The importance of language education in developing this type of metalinguistic awareness is shown by the result that both the tests that load on this factor, MLAT4 and Explanation on the Grammaticality Judgement Task, have a strong relationship with the same language background variables, that is, the number of languages multilinguals have studied together with the number of languages they can read. And although Carroll designed the MLAT4 as part of an aptitude test, he states more recently that the “results still did not conclusively settle the question of whether grammatical sensitivity is merely a learned ability” (Carroll 1993: 176, on Carroll 1977). Suggesting that deductive grammar awareness (i.e. grammatical sensitivity) may be learned is against the rationale of a test for aptitude for foreign language learning.

I conclude that ‘aptitude’ is an overarching term to cover the collection of cognitive abilities that have been found to relate to language learning attainment, and that grammatical metalinguistic awareness is one of these cognitive abilities. Metalinguistic awareness is trainable: learners develop metalinguistic awareness

through gaining experience of literacy and language learning, especially in a formal environment, and when their experiences interact with natural abilities the effects are strengthened. As Skehan (1998: 195) ponders: "Whatever seems to be implicated in foreign language aptitude does not appear to be simply the product of experience, but instead connects with underlying capacities."

It is striking that the MLAT4, a sub-test of an 'aptitude' test, both assesses metalinguistic awareness and is the best predictor of language learning attainment known. This study suggests that other tests of metalinguistic awareness, particularly those that assess both of the metalinguistic abilities found in the factor analysis may be worth investigation as correlates of language learning attainment, i.e. empirical language learning ability.

8.9 Conclusion

In conclusion, language learning, particularly learning to be literate in other languages/studying languages is related to multilinguals' grammatical metalinguistic awareness, which in turn is related to their ability to learn additional languages. Multilinguals' language learning attainment has a significantly greater relationship with assessment of their language experience together with metalinguistic test data than with their language experience alone, when target language Rule Knowledge is included. However, when Rule Knowledge is excluded, metalinguistic tests do not relate to attainment over and above language experience, suggesting that target language rule knowledge develops according to language experience and that different metalinguistic abilities relate to attainment in different ways.

Participants' language experience appears to be an important indication of their language learning ability and a vital part of understanding how they develop metalinguistic awareness. In particular, participants' multiliteracy and experience studying languages appears to play a crucial part in the development of grammatical

metalinguistic awareness, the most likely reason being that it enables learners to objectify language, so enhancing their ability to focus on grammatical form.

Chapter 9: Conclusions

It is a fundamental assumption throughout this book that empirical facts are useful (and interesting) if they are systematic, because they must tell us something about the minds of the subjects who produce them. It remains a matter of analytical interpretation to decide what these facts tell us (Schutze 1996: 77).

In this thesis I set out to investigate the hypothesis that grammatical metalinguistic awareness is related to multilinguals' attainment in learning the initial stages of another language over and above their language experience. The hypothesis was based on anecdotal evidence that multiliterate multilinguals find it easier to learn another language the more they already know, and experimental evidence suggesting that learning languages is related to the development of metalinguistic awareness. The findings were that, with language experience held constant, participants' performance on a test of Basque attainment was positively related to their performance on a series of metalinguistic tasks when knowledge of Basque rules was included among the tests, but not when it was excluded.

Further findings were that:

- Participants' performance on the test of Basque attainment was positively related to the number of languages they had studied/could read.
- Participants' performance on the test of Basque attainment was positively related to their performance on explicit grammatical metalinguistic tests.
- Participants' performance on the Literacy Test, MLAT4, Explanation on a grammaticality judgement task, and knowledge of Basque grammar rules was positively related to the number of languages they had studied/could read; and

their performance discriminating between grammatical and ungrammatical stimuli on the implicit and explicit artificial grammar tests was positively related to the number of languages they knew.

- Participants were not more biased to accept ungrammatical stimuli the more languages they knew on either the implicit or the explicit artificial grammar tests.
- As a group, participants performed better on the explicit artificial grammar tests than they did on the implicit artificial grammar tests.
- In an exploratory factor analysis of the six metalinguistic tests, two factors were loaded on, interpreted as 'inductive grammar awareness' and 'deductive grammar awareness'. The result suggests that grammatical metalinguistic awareness is not a unitary construct.

From the evidence given in this thesis, it would seem that metalinguistic awareness, the ability to focus on the form of language in addition to its meaning, develops in proportion to the number of languages adult multiliterate multilinguals have studied/are able to read. The factors that research has shown over the years to promote the development of metalinguistic awareness, such as bi/multilingualism, literacy, studying languages (and – not investigated in this thesis – maturation and schooling), are all experienced to a high degree by educated adult multilinguals. Literacy may be necessary to develop metalinguistic awareness to any great degree, as visual or tactual representation of language allows language to be seen as an object, and may enable learners to realise that language is a formal system. Objectification is necessary for learners to focus on grammatical form, and for analysis, the ability to break down language into its constituent parts. Once learners have begun to develop metalinguistic awareness, it is then transferable to other languages. Study may be necessary in one or more learners' languages in order to develop their metalinguistic awareness so that they are able to focus on form in their other languages. Studying a number of languages appears to be beneficial for further development of their metalinguistic skills.

As multilinguals gain more experience of different languages they gain experience in an increased breadth of grammatical (syntactic and morphological) structures, in addition to increased lexicon, semantic scope, and pragmatic use, a wider range of contextual use, and greater world knowledge. Experience improves performance, because the more individuals have expended cognitive effort on learning languages and developing metalinguistic awareness the better they are able to cope with further demands.

On this basis, I have proposed a 'Practice Hypothesis' – that the more learners practise a skill, the greater their ability at it, all other considerations being equal. In this way, the more new languages multilinguals begin to learn, the faster they are able to learn additional ones, and the more they focus on form, the more they develop their metalinguistic skills. Metalinguistic awareness appears to enhance multilinguals' language learning ability, probably because focusing on grammatical structures promotes their internalisation. I do not propose that language learning is merely a skill, reducing it to the level of riding a bicycle or swimming, or that "practice makes perfect" as the adage goes, but suggest that at a functional level, multilinguals are better able to process language with increased efficiency, which positively affects their rate of learning and consequent attainment, the more experience they have gained.

The 'Practice Hypothesis' may help to explain why an increase in multilinguals' No. of Languages, No. of Literacies, and No. of Languages Studied is connected with an increase in metalinguistic awareness. Each of these experiences may lead to cognitive development in grammar representation. Becoming multiliterate results in learners developing experience in focusing on visual or tactual representation of language, through which they are able to focus on grammatical form and analyse structures. Studying languages promotes learners' ability to focus on form and (usually) develops reading proficiency. (And education and maturation give learners study skills, more experience of life, and more time in which to learn and develop.)

9.1 Implications

The findings of this study regarding the relationships in educated adult multilinguals between language experience, metalinguistic awareness, and attainment in learning another language have implications for research theory, testing, and teaching.

With regard to theoretical implications, the results of this thesis suggest that adult multilinguals' ability to learn languages and develop metalinguistic awareness do not remain static in adulthood, but develop according to the use they make of them. This would support an epigenetic view of language development in multilinguals – that individuals continue to develop throughout their lives according to the interactions between their heritable characteristics, the choices they make, and their social and physical environment.

The strong relationship found in this study between metalinguistic awareness and language attainment suggests that metalinguistic awareness might be considered one of the major influences on language learners' ability to learn another language and therefore be included among the major causes of individual differences between learners. Research currently concentrates on 'aptitude', motivation, and anxiety as being the major individual differences. The study's results also imply that adult learners' continued development of metalinguistic awareness is relevant not only for research into individual differences, but is an important consideration in all research that includes experienced language learners among participants, where their inclusion may affect the results.

There are also implications for empirical research and testing. Primarily, the finding that explicit awareness of grammar has a strong relationship with language learning attainment suggests that testing potential learners' metalinguistic awareness may prove to be an effective indicator of language learning ability. In addition, the results suggest that research into language learning needs to take account of learners' language experience and metalinguistic awareness, and in constructing research

models, to integrate development of metalinguistic awareness with development of language proficiency.

With regard to pedagogical implications, considerable discussion has taken place as to the value of learners raising their awareness of language, and instruction that draws learners' attention to form has been linked with learners' attainment compared to instruction that does not draw attention to form (Day & Shapson 1991; Doughty 1991; Fotos 1993; Harley 1993; Lightbown & Spada 1990). The results of this study support the view that metalinguistic awareness is related to learners' attainment: multilinguals' performance on the set of metalinguistic tests (when knowledge of target language rules is included) appears to have a strong relationship with their target language performance. Furthermore, the strong relationship between multilinguals' No. of Literacies/Languages Studied and target language rule knowledge suggests that metalinguistic awareness develops through studying/learning to read a number of languages. If this is the case, assisting learners to focus on target language form, exemplars and rules may help to optimise learner intake. Understanding that there may be a relationship between their metalinguistic awareness and language learning abilities could also encourage multilingual language learners learning autonomously to develop their metalinguistic awareness.

A second implication for teaching is that if languages are interdependent in the mind of the learner and previous and subsequent learning of language/s affects each language that they know, it may be beneficial to learners if language materials and teachers draw upon learners' knowledge of other languages to explain and exemplify the target language.

9.2 Significance of the Study

This study is an exploratory step in examining multilinguals' metalinguistic awareness. Because of the small participant sample size combined with the relatively large

number of tests that the sample size has to support, further research is required to confirm or disconfirm these findings. As far as I am aware, this is the only psycholinguistic study to be carried out comparing multilinguals with varying numbers of languages. Most research into multilingualism is sociolinguistic or concerned with language planning, but this study combines psycholinguistics, literacy studies, and the study of individual differences to explore the development of metalinguistic awareness and its effects on attainment.

In addition, this study is the only research so far to look specifically at both implicit and explicit metalinguistic awareness in educated adult multilinguals as assessed by tests based on both natural and artificial languages. Most of the studies that have been carried out to investigate metalinguistic awareness have been on first language acquisition in children; the second largest area of research has been bilingual children. In comparison to the considerable interest in these two fields, there has been little research carried out on the development of metalinguistic awareness in those who are not bilingual from a young age, even less on adults, and very little indeed on multilinguals. I hope that this study will add to researchers' body of knowledge on metalinguistic awareness and perhaps shed some more light on how and why metalinguistic awareness develops.

Potentially, this study also has implications for language policy-makers, as encouraging learners to focus on grammatical form and to develop their metalinguistic awareness may assist their current and future language learning.

9.3 Future Research

As with all quantitative research, to be able to assess the variables under research in order to test the experimental hypotheses, it has been necessary to simplify what are extremely complicated interdependent and interactive psycholinguistic phenomena. This means that there is a risk that the experiments, rather than reflecting real-life,

assess artefacts. Also, it is impossible to control for all the variables that might affect participants' language learning ability: they are too numerous and too complex. In using a quantitative experimental design, much is lost. Learners' real-life experiences have a considerable affect on their language learning and their opinions and observations can illuminate researchers' enquiries. In consequence, qualitative research into multilinguals, such as the study carried out by Naiman, Frohlich, Stern & Todesco (1975), would be a fertile source of information on multilinguals' language learning abilities.

This study requires replication using both native English-speaking participants learning Basque, and other native-speaker groups learning other languages, with a greater number of participants (see Clark 1973), as this is an exploratory study in a previously unresearched area. Our understanding of the relationships between multilinguals' metalinguistic awareness, language experience, and attainment in additional languages would benefit from further investigation.

In this thesis, multilinguals' explicit grammatical metalinguistic awareness is shown to relate to their attainment in learning the initial stages of another language over and above their language experience when a test of target language rules is included among the metalinguistic tests. The result suggests firstly, that multilinguals' language learning ability may be related to their development of explicit grammatical metalinguistic awareness, in addition to the other abilities they gain through their experience of language learning, and secondly, that metalinguistic awareness develops in relation to the number of languages multilinguals know or have studied/learned to read. It appears that in the course of language learning, multilinguals become more aware of grammar and better at internalising it. The results of this study lend support to the view that metalinguistic awareness assists learners to learn languages, and suggest that one of the reasons educated adult multilinguals are faster at learning languages the more languages they know is their development of metalinguistic awareness, which promotes the internalisation of grammatical form.

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Appendices

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Appendix 1

The Tests

- 1.1 **Language background questionnaire**
- 1.2 **Motivation questionnaire**
- 1.3 **Literacy test (translation from Middle Egyptian into English)**
- 1.4 **Grammaticality judgement task**
- 1.5 **Language learning materials and tests: written and oral**

LANGUAGE BACKGROUND QUESTIONNAIRE

Thank you for volunteering to help me with my research. All information in this study is confidential and will only be used only for the purposes of the study, which are to examine multilinguals' language abilities. Thank you for agreeing to participate.

Please could you fill in the following questions fully. If the questions do not fit your circumstances, please write on the back of any part of the questionnaire what your circumstances are. If you have any questions about filling in the questionnaire please ask the researcher, who will be pleased to help you.

NB If you speak different dialects of a language, please write down each dialect separately: eg, you speak both Cantonese and Mandarin Chinese, or Scots and standard English.

ABOUT YOU

- (1) NAME: _____
- (2) AGE: _____ (3) MALE/FEMALE: _____
- (4) NATIONALITY/IES (ie, passport holder):

- (5) NATIVE LANGUAGE/S (eg, British passport holders may speak Gaelic as their native language):

- (6) DEGREE TITLE (if known, in full): _____
- (7) Other degrees, if you have them: _____
- (8) Please describe the subjects you're studying/you studied for your 1st degree in full.

- (9) If you are not studying/did not study languages in particular, was/is there a language component to any of your courses?

- (10) Are you studying at university now? (State course and year) _____
- (11) If you are working, what work are you doing? (If not, leave blank).

(12) Please list your languages and how well you know them now, choosing from the list below. I am interested in how fluent and correct you are, **not** your accent. You might find it helpful to compare your languages to the one you speak best:

- 0. No skill (eg, speaking and listening in dead languages!)
- 1. Only a few words and set phrases
- 2. A fair number of words and set phrases
- 3. Basic ability, can usually get by somehow
- 4. A large number of words and phrases
- 5. Very large number of words and phrases/ Comfortable ability
- 6. Very comfortable ability
- 7. Good
- 8. Very good, rarely have any problems at all
- 9. Almost the same standard as native speakers
- 10. Native speaker

	LANGUAGE	LISTEN	SPEAK	READ	WRITE
eg	<i>French</i>	5	2	7	1
1)					
2)					
3)					
4)					
5)					
6)					
7)					
8)					
9)					
10)					

(13) What languages have you studied as subjects? eg, English, French, Latin, Swahili

	LANGUAGE	HOW MANY YEARS?	STARTING AT WHAT AGE?	TO WHAT LEVEL? 1. Very basic (less than O grade) 2. Basic (O grade/level equivalent) 3. Low intermediate (Higher equiv.) 4. Intermediate (A level equivalent) 5. Advanced (University level)
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				

(14) What language/s did the teachers use at school in non-language subjects?

At Primary _____

(15) At Secondary _____

(16) What language/s did you use with your school friends? _____

(17) Did someone outside school teach you a language? If so, what language/s did they teach you, and did they also teach you to read and write in it/them?

(18) Have you learned any languages by yourself? Which, and to what level? (Use scale given in Question (12).)

(19) Where have you lived?

	COUNTRY	REGION	STARTING AT WHAT AGE?	NO. OF YEARS /fraction of a year	LANGUAGE OF REGION	TICK (✓) if you spoke it, 'L' if you were learning it
1)						
2)						
3)						
4)						
5)						
6)						

(20) What language/s did these people speak to you when you were growing up? -

Mother _____ Father _____

Sister(s) _____ Brother(s) _____

Grandmother (maternal) _____ Grandmother (paternal) _____

Grandfather (maternal) _____ Grandfather (paternal) _____

Other (please specify) _____

(21) Please tick (✓) your answers above if you used the same language to reply back to the person. If you have no tick - what language did you use to whom?

(22) If you have a spouse/partner, what is their native language? Tick if you speak it.

(23) What was the highest level of education your parents had?

Mother _____ Father _____

(24) How many books have you read in the last 2 months (honestly!) _____

(25) What language/s were these books in? _____

(26) Have you ever been diagnosed as being dyslexic? _____

(27) If you watched TV as a child, what language/s did you watch it in?

(28) What language/s do you watch it in now? _____

Which language/s do you do the following things in if you are in a hurry, stressed out, or upset about something?

(29) Counting? _____

(30) Dreaming? _____

(31) Thinking? _____

(32) Swearing? _____

(33) Praying? _____

(34) Are there other things you do in particular languages? _____

(35) If you had to lose all your languages except one, which one would you keep, and why?

THANK YOU!

LIST OF STATEMENTS FOR MOTIVATION QUESTIONNAIRE

ATTITUDES TOWARDS LEARNING LANGUAGES

1. Languages are really great.
2. I really enjoy learning languages.
3. I love learning languages.
4. There are a number of languages I'm planning to learn.
5. In these days when global travel and communication are so important, people should try to be multilingual.

Negatively keyed

6. I hate languages.
7. I would rather spend my time on other things than learning or using my languages.
8. I find the study of languages very boring.
9. Learning languages is a waste of time.
10. I've given up trying to learn languages because I'm not really interested in it.

DESIRE TO LEARN LANGUAGES

11. I wish I had begun studying lots of languages at an earlier age than I did.
12. I wish I could spend a lot of time learning a language.
13. I want to learn languages so well that they will become second nature to me.
14. There are a lot of languages that I would really like to learn.
15. I wish I were fluent in lots of languages.

Negatively keyed

16. Knowing languages isn't really an important goal in my life.
17. I don't want to have to learn any more languages.
18. I find I'm losing any desire I ever had to know languages.
19. To be honest, I really have little desire to learn languages.
20. I haven't any great wish to learn more than the basics of languages.

MOTIVATIONAL INTENSITY

21. I make a point of trying to understand all the languages I see and hear.
22. I keep up to date with my other languages by working on them almost every month.
23. When I have a problem understanding a language I am learning, I always ask someone for help.
24. I really work hard at my languages.
25. When I am studying languages, I ignore distractions and stick to the job in hand.

Negatively keyed

26. I don't pay much attention to feedback I get on my languages.

27. If someone corrects something I've written, I don't bother checking it afterwards to see what they wrote.
28. I tend to approach any work I have to do in a language I don't know well, in a random and unplanned manner.
29. I have a tendency to give up if someone talks to me in a language I don't know well.
30. I can't be bothered trying to understand the more difficult things in other languages.

ATTITUDES TOWARDS NON-NATIVE SPEAKERS OF ENGLISH

31. If my country were to lose all the people who do not speak English as a native language together with their cultures, it would indeed be a great loss.
32. People in my country who are not native speakers of English enrich and enliven our culture and we are fortunate to have them.
33. People in my country who are not native speakers of English are as friendly and warm-hearted as anyone else.
34. I would like to know more people in my country who have a different language background from me.
35. The more I get to know people living in my country whose language I would like to learn, the more I want to be fluent in their language.

Negatively keyed

36. The more I learn about people in my country who are not native speakers of English the less I like them.
37. People from other language backgrounds who live in my country should not try to maintain their cultural identity.
38. People from other language backgrounds who live in my country should not encourage their children to speak their language because they should speak English.
39. People from other language backgrounds who live in my country threaten our national unity.
40. People from other language backgrounds who live in my country deserve no preferential treatment because of the way they treat minority groups themselves.

INTEREST IN LEARNING LANGUAGES

41. There are a lot of languages I would really like to learn.
42. There is a particular language I wish I could speak perfectly.
43. I often wish I could read newspapers and magazines in another language.
44. If I planned to stay in another country, I would make a great effort to learn the language, even if I could get along in my own language.
45. I enjoy meeting and listening to people who speak other languages.

Negatively keyed

46. Studying another language is not a pleasant experience.
47. I really have no interest in other languages.
48. Learning other languages is not important.

49. Most other languages sound crude and harsh.
50. I would rather see a film dubbed into my language than see the film in its original language with sub-titles in my language.

INTEGRATIVE MOTIVATION

51. Studying languages is important for me because it will allow me to meet and converse with more people from more varied backgrounds.
52. Studying languages is important because it will allow me to participate more freely in activities with people who speak other languages.
53. Studying languages is important because it will allow me to gain good friends more easily among people who speak other languages.
54. Studying languages is important because it will enable me to understand people from other cultures better.

INSTRUMENTAL MOTIVATION

55. Studying languages is important because it will make me better educated.
56. Studying languages is important because it will help me to perform better when working with others.
57. Studying languages is important to me because it is useful in getting a good job.
58. Studying languages is important for me because it will increase my ability to help others.

FOREIGN LANGUAGE CLASS ANXIETY

59. I would never feel quite sure of myself when speaking in a language class.
60. It would embarrass me to answer in a language class.
61. I would be embarrassed if I had to read aloud in a language class.
62. I would get nervous and confused if I had to speak in a language class.
63. I think I would sometimes be afraid that other people in my language class would laugh at me if I spoke in the language.

Negatively keyed

64. I wouldn't usually get anxious if I had to respond to a question in a language class.
65. I would feel confident in a language class if asked to participate.
66. I would not get anxious if I were asked for information in a language class.
67. I would not be nervous if I had to practise pronunciation in a language class.
68. I would feel confident in a language class if I had to take part in a dialogue.

FOREIGN LANGUAGE USE ANXIETY

69. I would be nervous if I had to speak a language I don't know well to someone in a shop.
70. Speaking a language I don't know well bothers me.

71. It would bother me if I had to speak a language I don't know well on the telephone.
72. I would feel uncomfortable under any circumstances if I had to speak a language I don't know well.
73. I feel anxious if someone asks me something in a language I don't know well.

Negatively keyed

74. I'm not worried when someone asks me to use a language I don't know well.
75. It doesn't bother me at all to speak a language I don't know well.
76. I would feel quite relaxed if I had to ask for directions in a language I don't know well.
77. I would feel comfortable speaking a language I don't know well in an informal gathering.
78. I would feel calm and sure of myself if I had to order a meal in a language I don't know well.

PERSON NO. _____

MOTIVATION QUESTIONNAIRE
TO WHAT EXTENT DO YOU AGREE OR DISAGREE
WITH THESE STATEMENTS?

The following statements are opinions which have often been expressed by people. They cover a wide range of topics and it has been found that many people agree with each statement and many disagree. There are no right or wrong answers. (Also, people feel differently about different languages they use - where statements refer to your languages please state what is true for you in general.) You are asked to mark each statement on the 7-point scale below each question according to your agreement or disagreement:

- | | |
|---------------------------------|---------------------------------------|
| +1: slight support, agreement | -1: slight opposition, disagreement |
| +2: moderate support, agreement | -2: moderate opposition, disagreement |
| +3: strong support, agreement | -3: strong opposition, disagreement |
| 0: no feelings | |

1. I'm not worried when someone asks me to use a language I don't know well.

-3...-2...-1...0...+1...+2...+3

2. I wish I had begun studying lots of languages at an earlier age than I did.

-3...-2...-1...0...+1...+2...+3

3. I would like to know more people in my country who have a different language background from me.

-3...-2...-1...0...+1...+2...+3

4. I feel anxious if someone asks me something in a language I don't know well.

-3...-2...-1...0...+1...+2...+3

5. I enjoy meeting and listening to people who speak other languages.

-3...-2...-1...0...+1...+2...+3

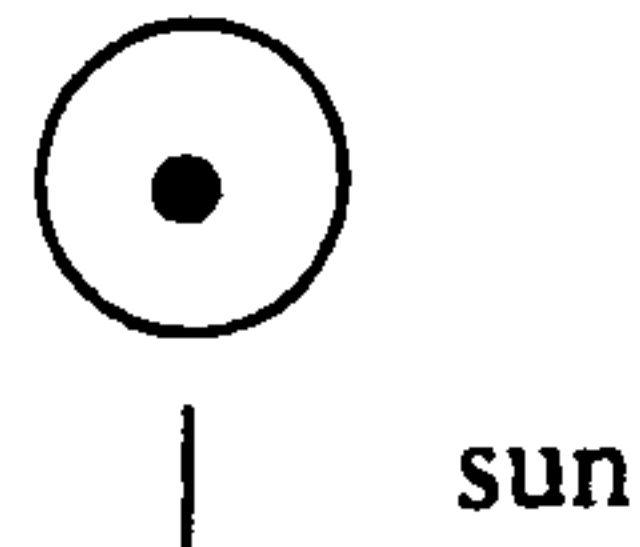
EGYPTIAN SCRIPT TASK

This is a short exercise (15 minutes) translating from Ancient Egyptian into English.

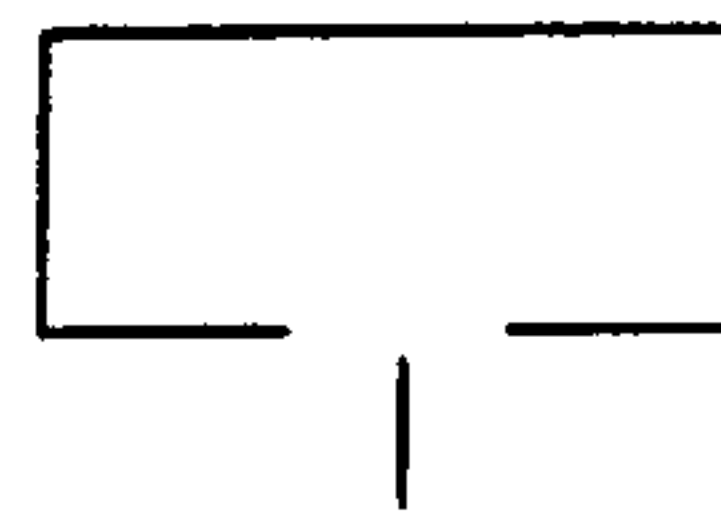
You have 3 minutes to read these two pages before you begin the exercise. When you have finished reading, you will be given vocabulary sheets and a short Egyptian text. Please translate it for someone else to read who does not have any of the information below available to them. It is not possible for anyone to finish the task, but you should try to do as much as you can.

Ancient Egyptian is based on two different ideas.

1. A picture of something stands for the word (the little line underneath shows that it represents itself).



sun



house (it looks like a groundplan)

2. A sign stands for a particular sound or combination of sounds. For example, in English the letters S-K-Y stand for 'sky'.



= p

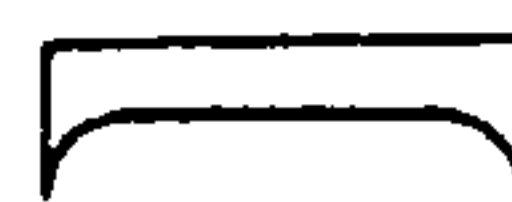



= pt

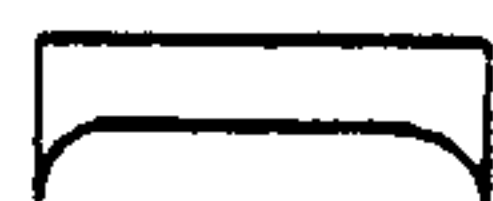
This is the Egyptian word for 'sky'.



= t



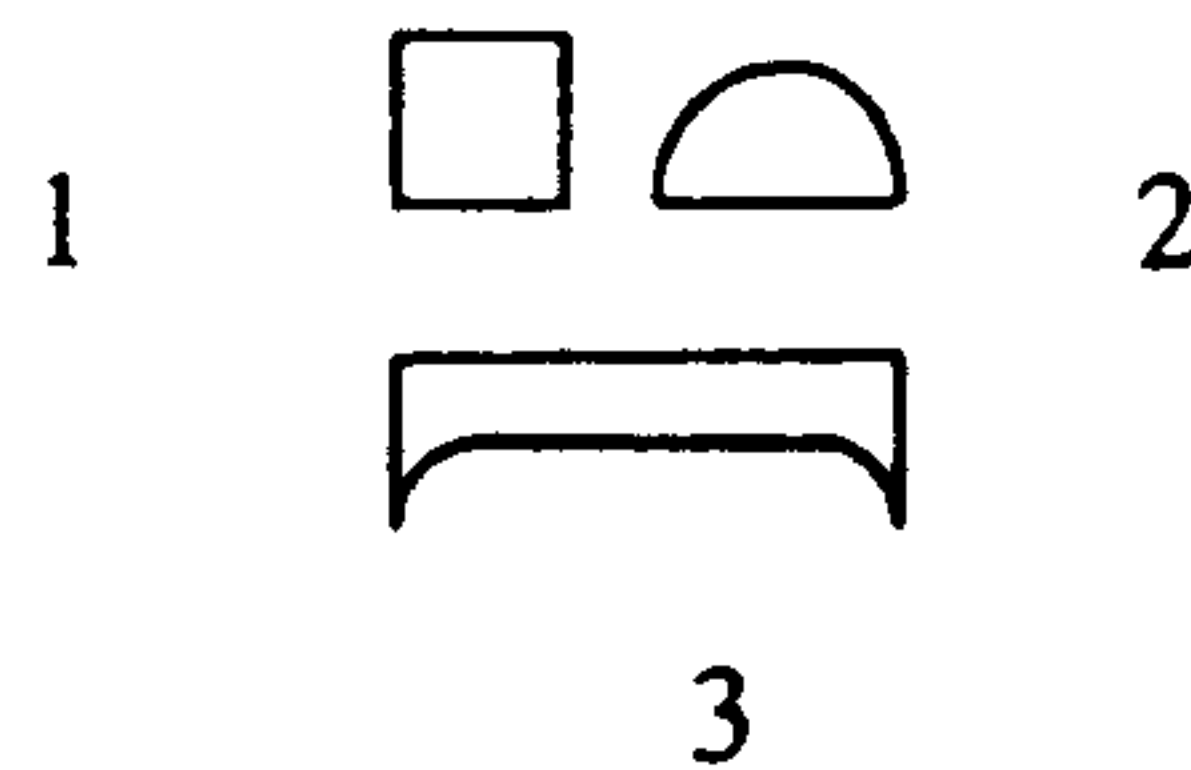
There is another sign under the letters p and t.  This is the sign for the idea 'sky' (it reaches over above you), and it is there so that the reader does not confuse this word for another word with the letters 'pt'. For example, in English we have the words *pat*, *pet*, *pit*, *pot*, *put* which all mean different things, but we have a vowel to help us decide. The Egyptians did not write vowels except for foreign names, like 'Cleopatra'. In order to be able to pronounce words like 'pt' we put an 'e' in between the letters: so the word for 'sky' is pronounced 'pet'.



We will call this sort of sign a 'decider' because it decides what a word means. Not all Egyptian words have a 'decider' but if there is one it always comes at the end of a word. Deciders give you a clue as to the idea or concept that the sounds represent. You have to be careful because many signs can either be deciders or stand for sounds, depending on their context.

THINGS YOU SHOULD KNOW

In the task, the order of letters in a word always starts at the top left and finishes at the bottom.



Many signs stand for a combination of sounds.

WORD ORDER

THE VERB (doing word) COMES FIRST IN THE SENTENCE, FOLLOWED BY THE SUBJECT (the person who is doing something), FOLLOWED BY THE OBJECT (the person or thing that is having something done to him/her/it). So the order in a sentence is VERB - SUBJECT - OBJECT.

Adjectives (eg beautiful) follow the noun they describe, so Ancient Egyptians would say '(a) city beautiful' where in English we would say 'a beautiful city'.

THE VERB

The Egyptian verbs used in this task do not show when something happened (no tense).

- You have to work out from the context whether it is happening now, has already happened, or will happen in the future!

I am going out/
I went out/ I will go out



You (female) are going out/
you went out/ you will go out



She is going out/
she went out/ she will go out



He is going out/
he went out/ he will go out



HELP

Egyptian is written with

- no vowels (so a, e, i, o, and u are not used), except for foreign names
- no punctuation (so . . : are not used). Sentence ends are there to help you.
- no words for 'the' or 'a'
- the verb 'to be: I am, you are, he is, she is' is often not used where we *would* use it in English.

VOCABULARY



In this task this sign encloses
the letters of a person's name
(in reality only the name of a king/queen)



sentence ending



DECIDER 'goddess'



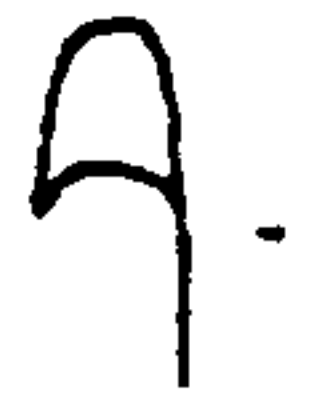
t or DECIDER 'female'



a



m



i



p



y



r



w



s



d



I, me



k



you (female)



l




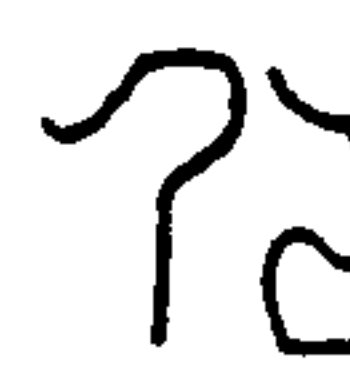



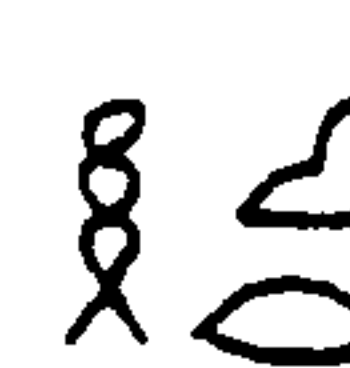
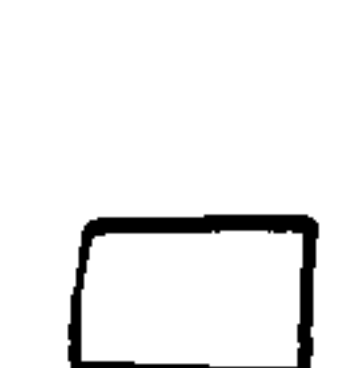
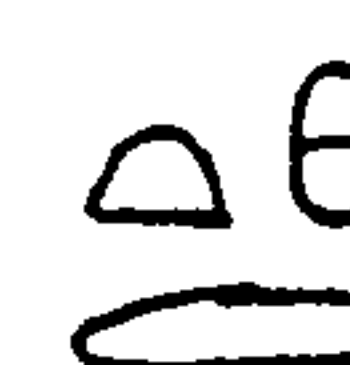




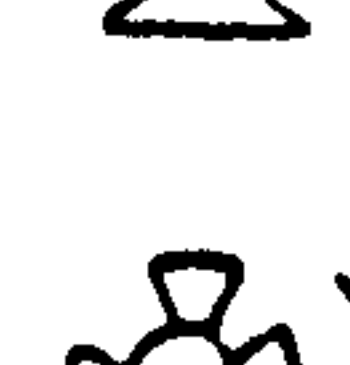












she




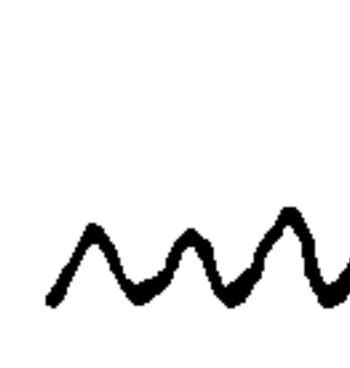

he. him. his

PRONOUNS

	house
	sun
	sky
	ruler
	(of) 2 lands ie, Egypt
	city
	woman
	(a) hungry man
	food
	bread
	beer
	name
	prince
	ox, oxen
	my sake

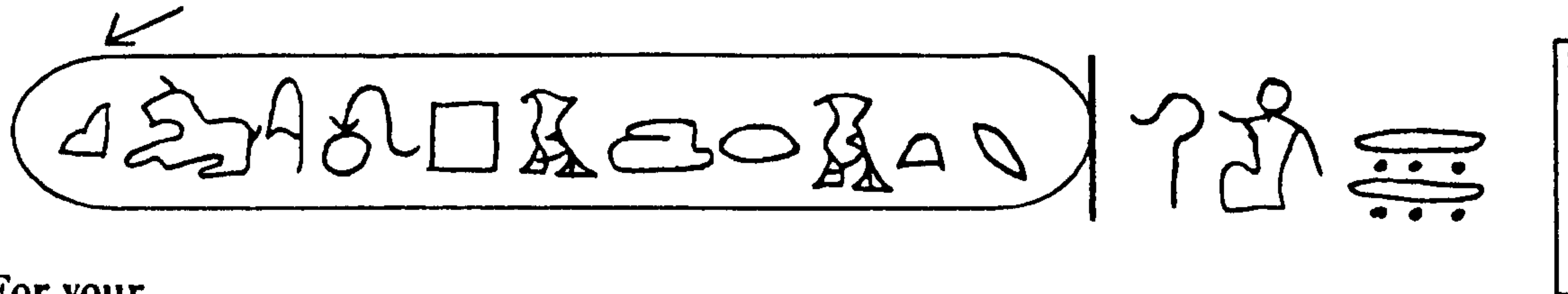
	see
	go out
	enter
	bring
	give
	say
	find
	sail downstream
	beautiful, good
	a hundred

PREPOSITIONS

	in <i>or</i> from
	to <i>or</i> for
	together with <i>or</i> and

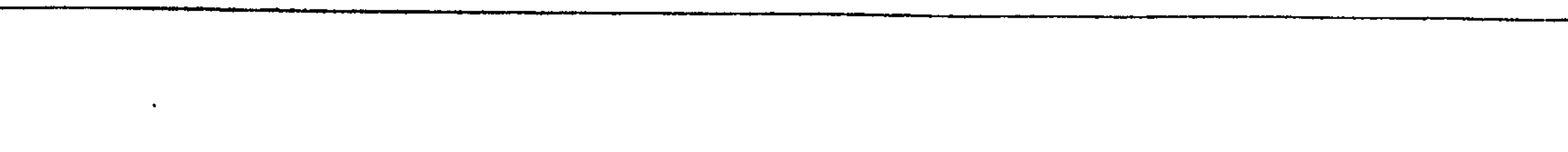
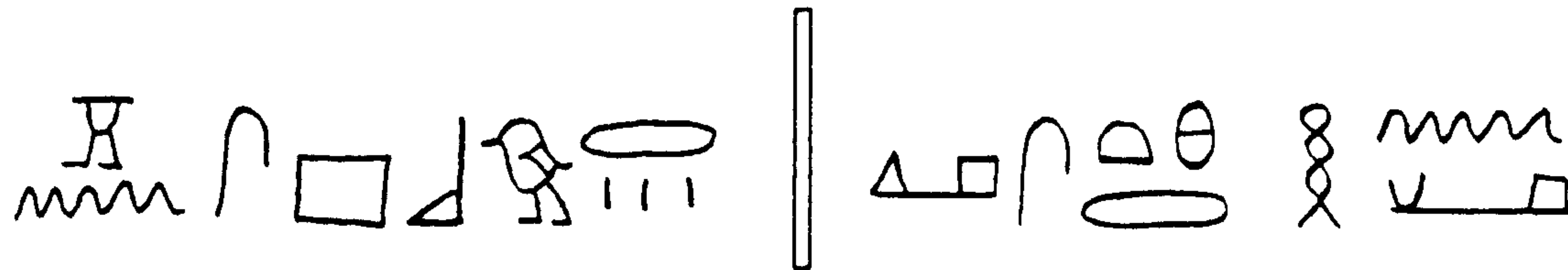
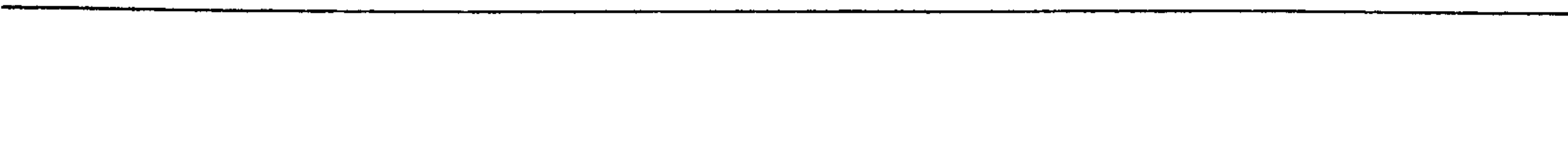
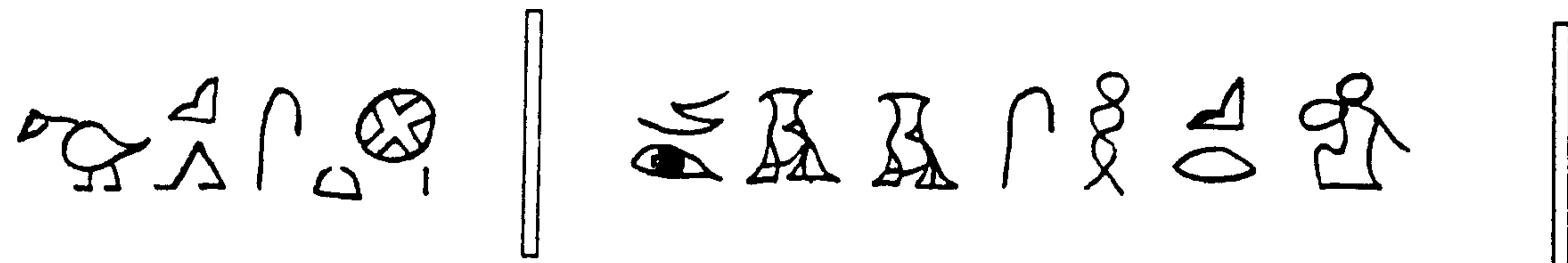
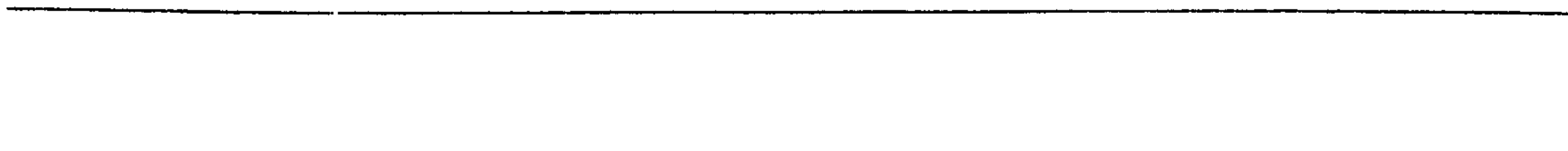
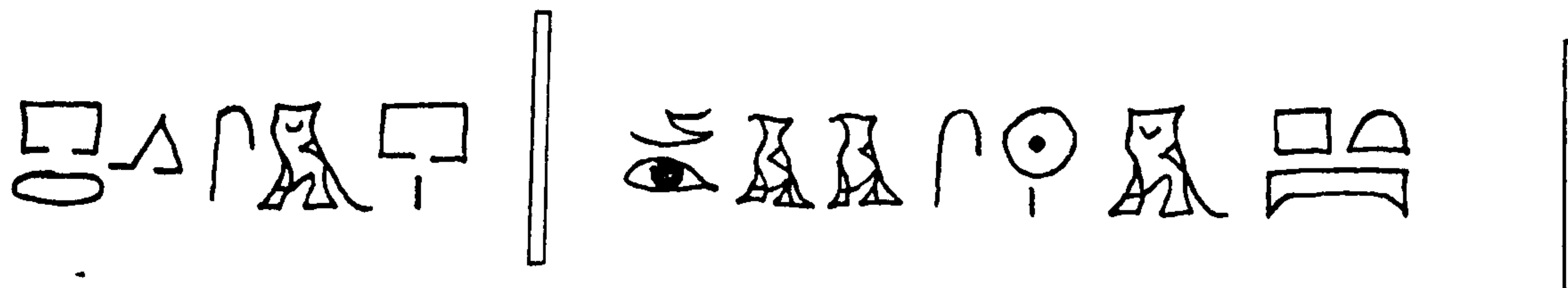
EGYPTIAN TASK

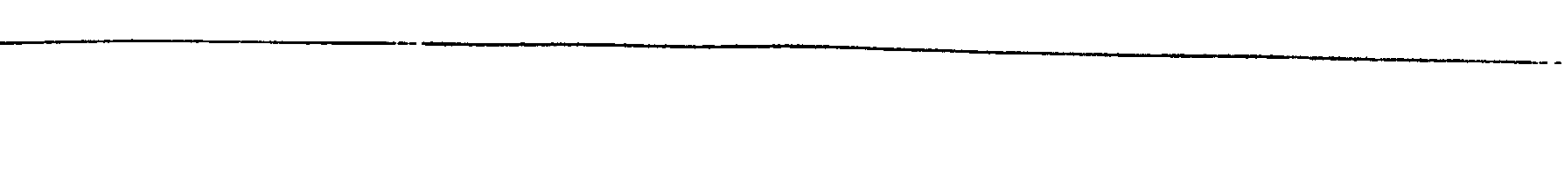
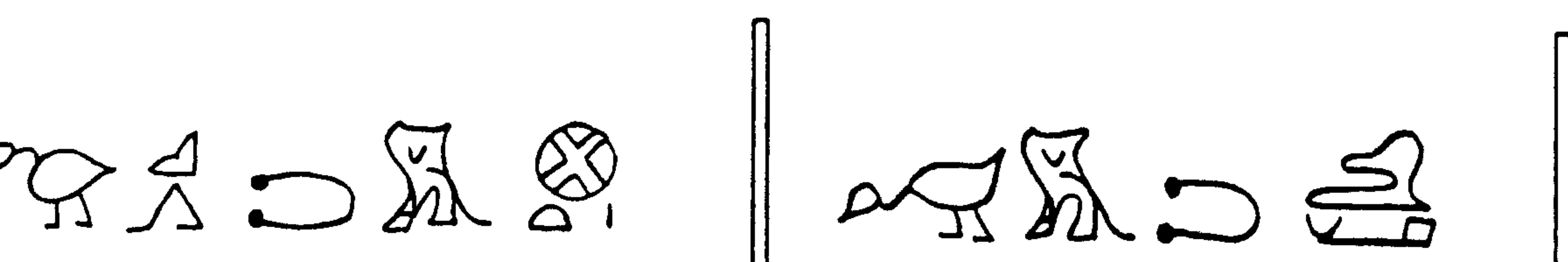
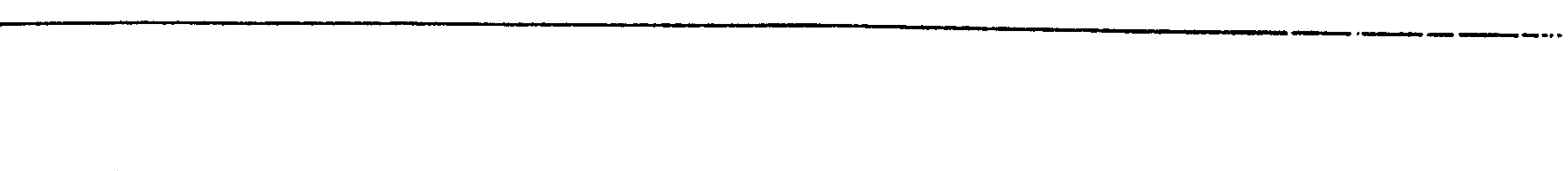
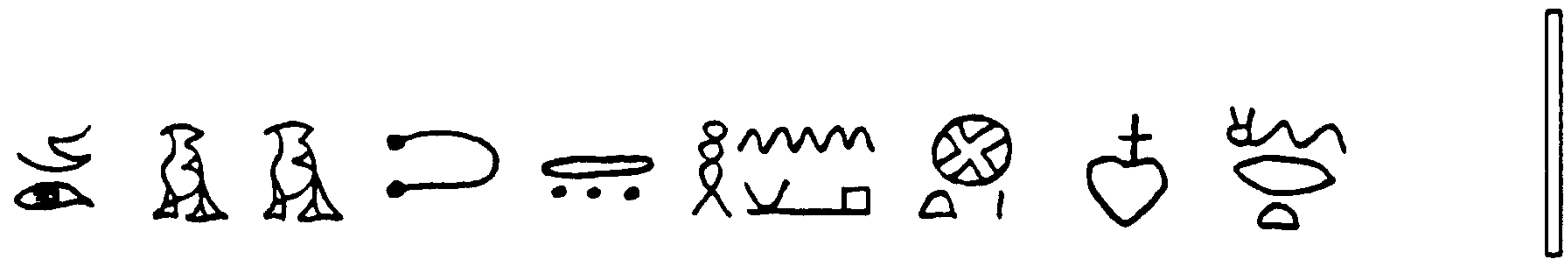
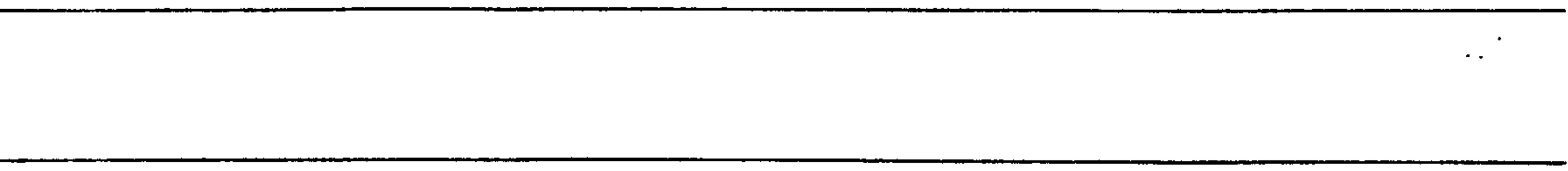
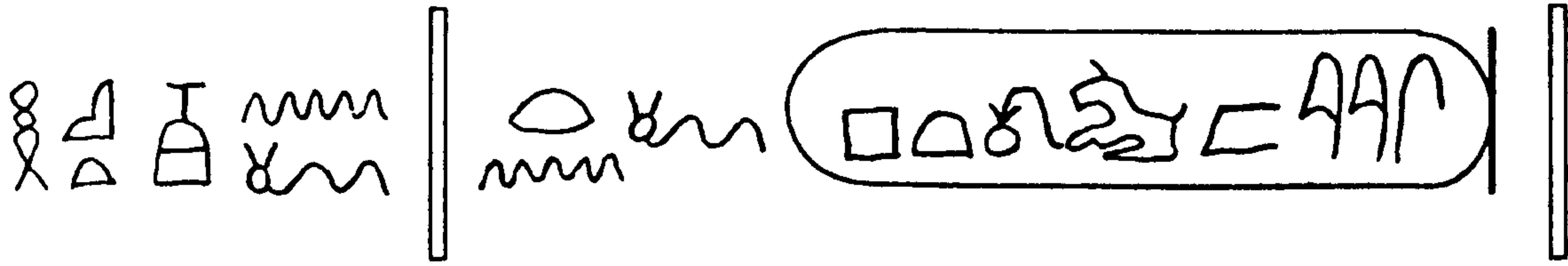
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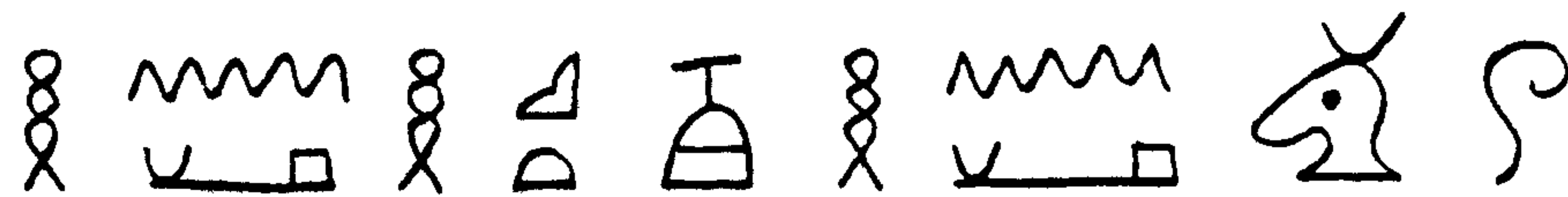
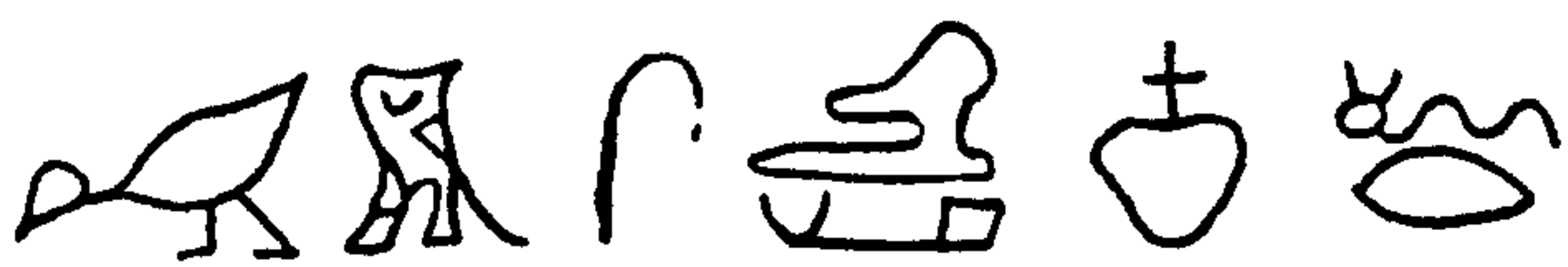
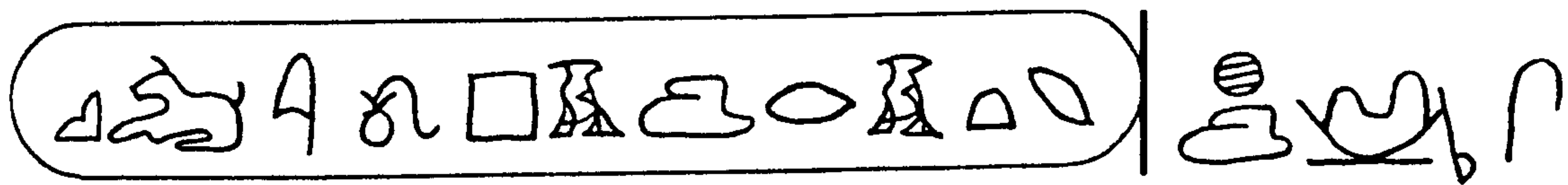


For your rough copy →

For your final copy →

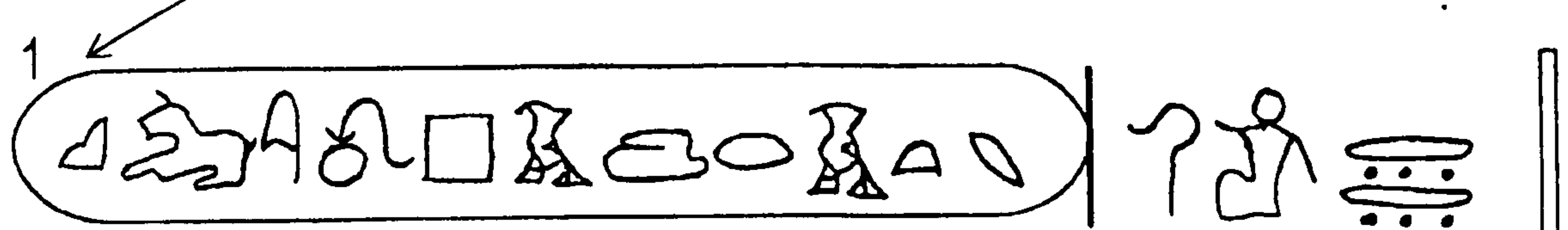






CODING THE EGYPTIAN TASK

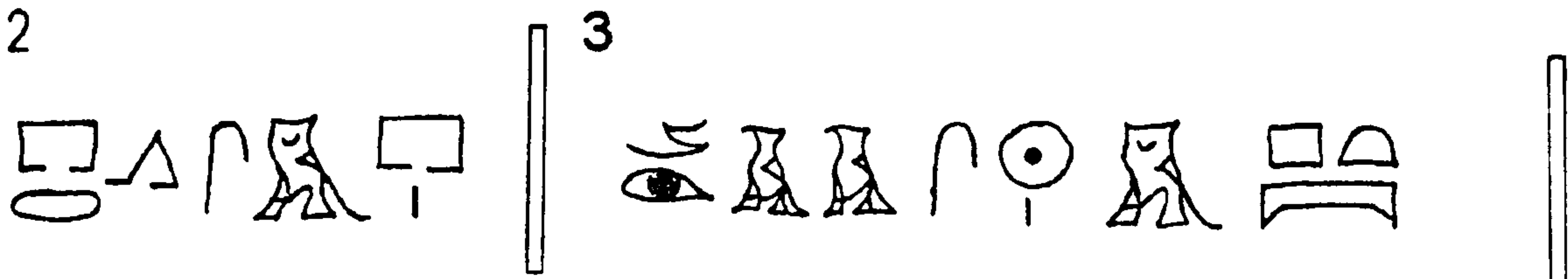
START HERE



For your rough copy → **kliwpadra** 9 *fem. goddess* 1 **ruler** 1 **of Egypt** 1

For your final copy → T 12 points G 3 points for inserting "is/was" T 12 G 3

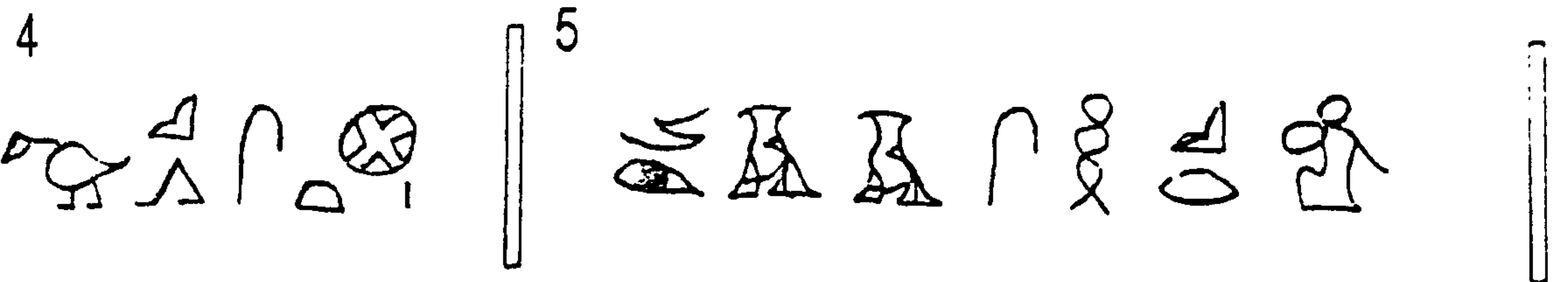
I The goddess Cleopatra was ruler of Egypt. [2 points for "Cleopatra"] I 4



go out 1 **s/she** 1 **from** 1 **house** 1 **see** 1 **she** 1 **sun** 1 **in/from** 1 **sky** 1

T 4 points transliterating T 5 points T 4 T 5
 G 3 points [initial]she = 1, [tensed verb] = 1, OF (not "from" in English) = 1 G 3 points [initial]she = 1, [tensed verb] = 1, in (not "from") = 1 G 3 G 3

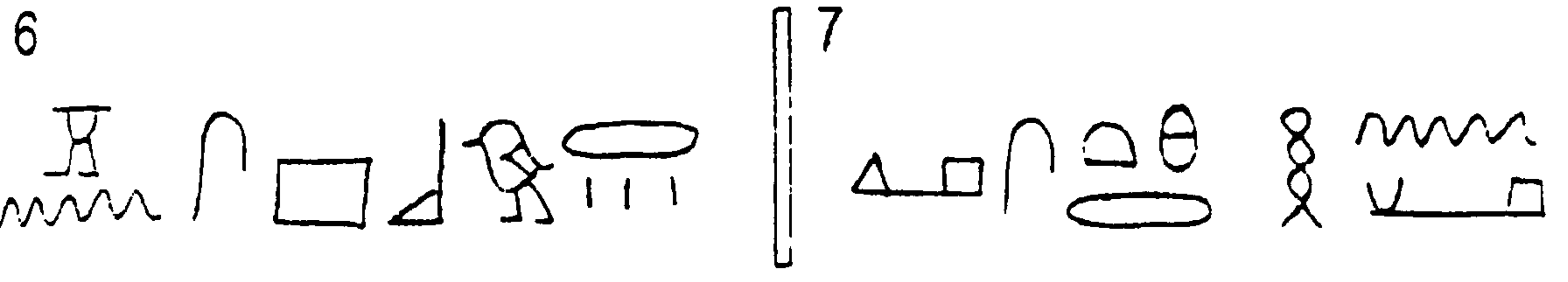
I She went out of the house. and / She saw the sun in the sky. I 4 -----



enter 1 **she** 1 **city** 1 **see** 1 **she** 1 **a hungry man** 1

T 3 points T 3 points T 3 T 3
 G 2 points [initial]she = 1, [tensed verb] = 1 G 2 points [initial]she = 1, [tensed verb] = 1 G 2 G 2

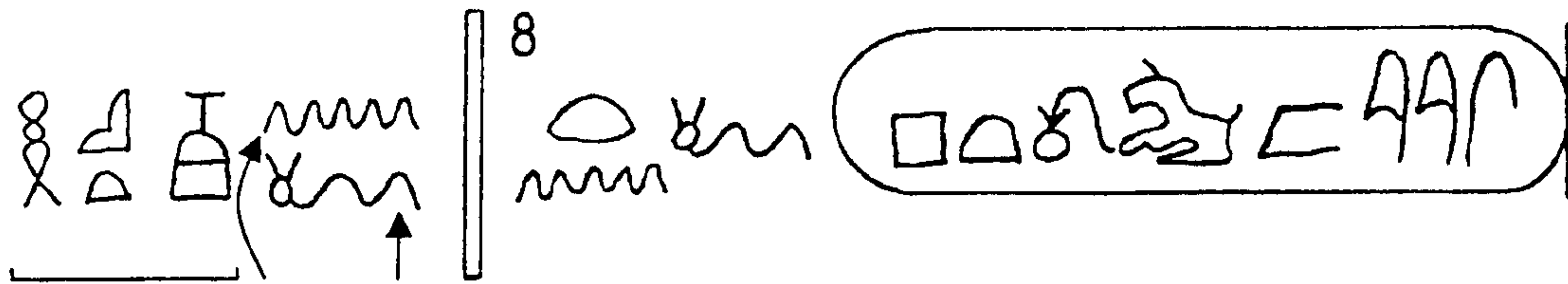
I She went into the city. and / She saw a hungry man. I 4 -----



bring 1 **she** 1 **food** 1 **give** 1 **she** 1 **bread** 1 **together with/and** 1

T 3 points T 7 points T 3 T 7
 G 2 points [initial]she = 1, [tensed verb] = 1 G 4 points [initial]she = 1, [tensed verb] = 1, to him = 1, she gives him = 2 G 2 G 4

I She brought food And / She gave him bread I 6 -----



beer 1 to 1 him 1 name 1 his/him/he 1 ptwlmys 7

T 9 points

G 4 points "his" = 1, insert verb "is/was" = 3

and beer.

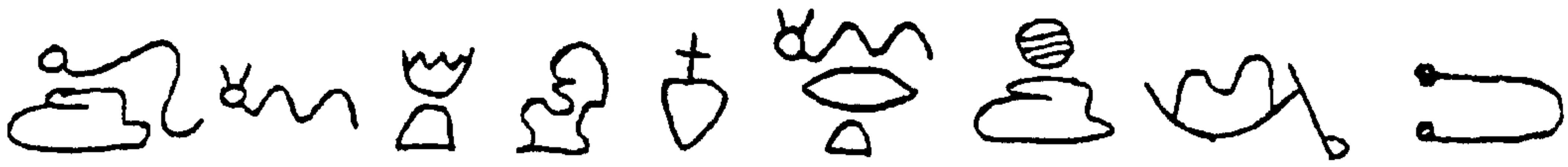
I His name was Ptwlmys.

T 9

G 4

I 2

9



say 1 he/him/his 1 woman 1 beautiful/good 1 sail downstream 1 you (fem.) 1

T 6 points

G 5 points [initial]he = 1, [tensed verb] = 1, b./good before "woman" = 1, [initial]you/imperative = 1, [tensed verb] = 1; -1 if inserted something not there; -1 if inserted dative

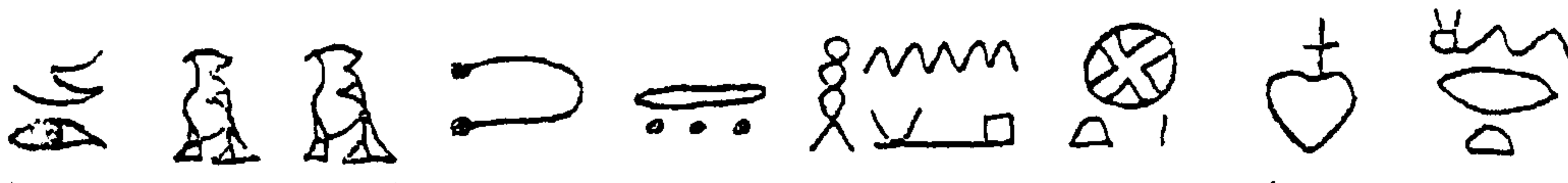
I He said "Good woman, sail downstream!"

T 6

G 5

I 6

10



see 1 you (fem.) 1 (a) land 2 together with/and 1 city 1 beautiful/good 1

T 7 points

G 3 points [initial] you(fem.) = 1, [tensed verb] = 1, "beautiful" (not "good") before "city" = 1

I "You will see a land with a beautiful city."

T 7

G 3

I 4

11



enter 1 you (fem.) 1 in/from 1 city 1

T 4 points

G 3 points [initial] you(fem.)/or conditional/or imperative = 1, [tensed verb] = 1, omit prep. in English or (go) "into" = 1

I [If you] go into the city

12



find 1 you (fem.) 1 prince 1

T 3 points

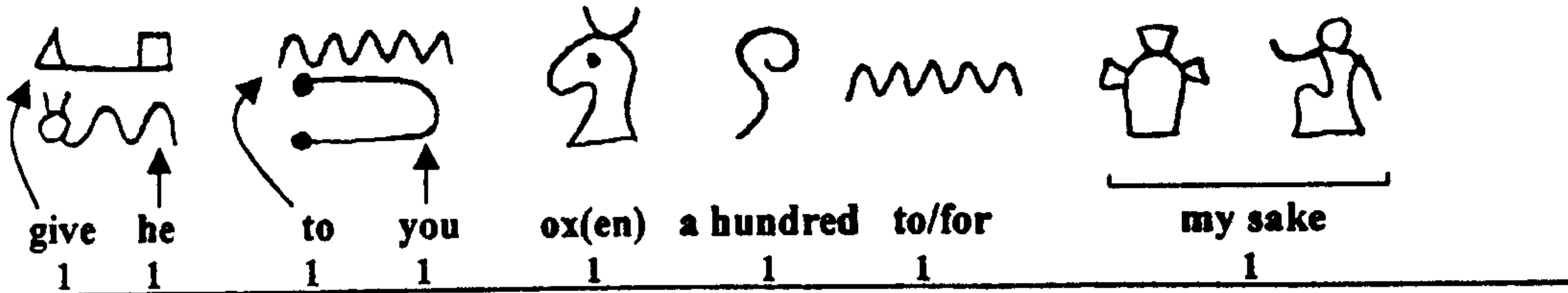
G 2 points [initial] you(fem.) = 1, [tensed verb] = 1

you will find a prince. [Find "THE prince" = 2] I 4 -----

T 4 T 3

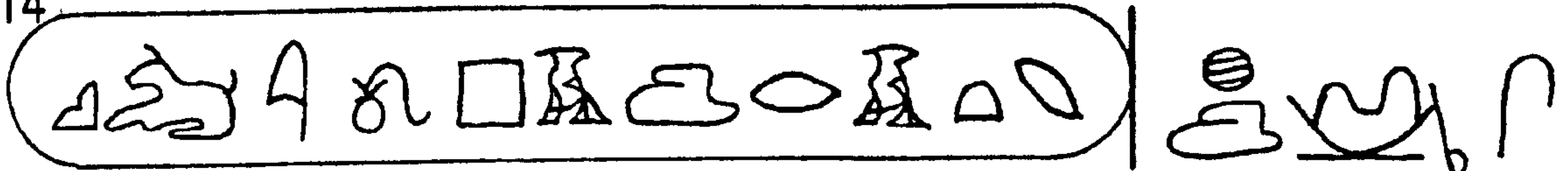
G 3 G 2

13



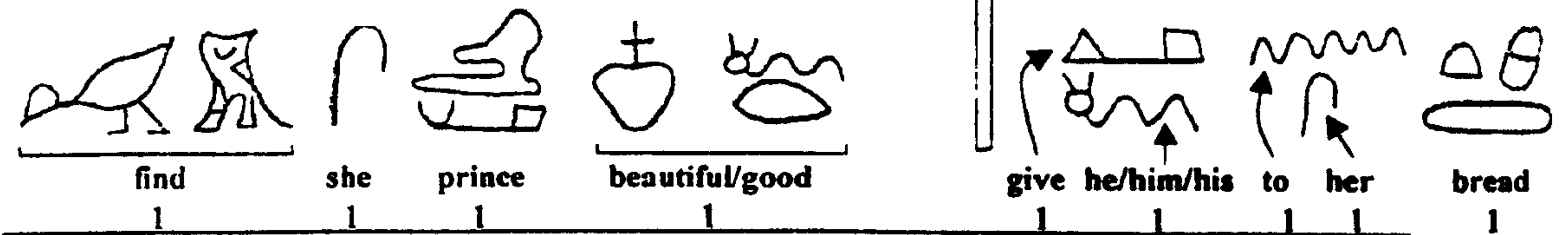
T 8 points
 G 5 points [initial]he = 1, [tensed verb] = 1, omit prep. (to) = 2, [initial]adj. = 1
 I "He will give you 100 oxen for my sake" [future = 4 points, present = 2 points]

14



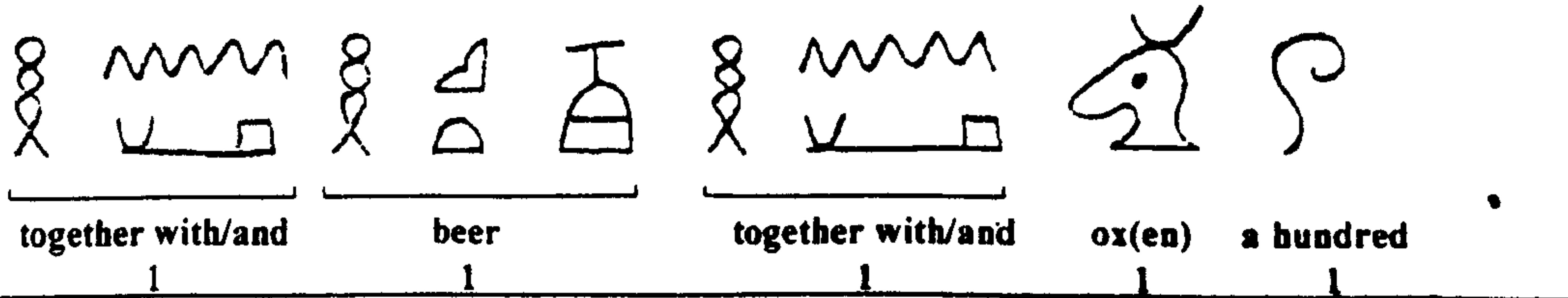
kliwpatra 9
 fem. goddess 1
 sail downstream 1
 she 1
 T 9 + 1 + 2 = 12 points [+ 4 = 16 points]
 G 5 points Omit "she" if K named = 1 / if connective used or K not named [initial]she = 1,
 [tensed verb] = 3, [initial] good/handsome (not "beautiful") = 1
 I The goddess Cleopatra sailed downstream [8 points] / She sailed downstream [3 points]

15



T 10 points
 G 4 points
 I He gave her bread

and found the good prince.



[initial]he = 1, [tensed verb] = 1, omit prep. = 1, [initial] a hundred = 1
 and beer together with a hundred oxen.

T = transliteration = 100 points
 G = grammar = 50 points
 I = interpretation = 50 points

SENTENCE JUDGEMENT TASK: INSTRUCTIONS

Speakers of a language seem to develop a 'feel' for what is a possible sentence, even in the many cases where they have never been taught any particular rule. For example, you might feel that the first sentence below sounds like it is a perfect English sentence, while the second one seems less than perfect, and the third one impossible.

1. **My new school is very different from my old one.**
2. **A red jumper is very different than a blue one.**
3. **The big commitment is very different with the small one.**

Please tell me to what degree you think the following sentences vary with regard to how perfect/ impossible they are. Each sentence in bold (like this!) is preceded by a context in italics (like this!) to help you understand it: you must judge only the main sentence, not the context or how the context fits the sentence.

You see that each page has two boxes with 10-point scales in them - feel free to use the whole range, but please circle only one number in each of the two boxes. The first box is for you to choose what you think about the sentence. The second box is for you to circle how sure you feel about your choice.

I would like to know what you think *personally*, not someone else who used to teach you, your parents or anyone else. The other people here have sentences in a different order, so there is no point in looking to see how they are responding because it will be a different sentence from yours.

Read each sentence carefully before you answer. I want your first impression so don't spend too long deciding. Do not turn back! There are no right or wrong answers: it is a matter of opinion. Lastly, please make sure you have answered all 20 questions.

PART 2: SENTENCE JUDGEMENT TASK: CHANGE COLOUR OF PENS

You've changed the colour of your pen so that you cannot go back to change any of your original responses to the sentences.

Now, if you gave a response less than 10 for the Perfect-Impossible scale, please could you:

1. **PINPOINT THE PROBLEM PART:** underline which words are wrong, or use arrows to indicate where you think there is a problem.
2. **REWRITE THE SENTENCE:** on the lines below, please could you rewrite the sentence so that it is a possible sentence for you.
3. **EXPLAIN WHAT YOU THINK IS WRONG:** in the blank space below, please could you explain what is wrong with the sentence. Please use any relevant grammatical or technical terms you know.

EXAMPLE 1

I've just moved school.

My new school is very different from my old one.

How possible do you find this sentence? Please circle one number below.

1 2 3 4 5 6 7 8 9 10
Impossible **Perfect**

How sure are you? Please circle one number below.

1 2 3 4 5 6 7 8 9 10
Unsure **Sure**

EXAMPLE 2

*I like some colours
far more than others.*

A red jumper is very different than a blue one.

How possible do you find this sentence? Please circle one number below.

1 2 3 4 5 6 7 8 9 10
Impossible **Perfect**

How sure are you? Please circle one number below.

1 2 3 4 5 6 7 8 9 10
Unsure **Sure**

I've got my hands full.

Could you open me the door?

How possible do you find this sentence? Please circle one number below.

1 2 3 4 5 6 7 8 9 10
Impossible **Perfect**

How sure are you? Please circle one number below.

1 2 3 4 5 6 7 8 9 10
Unsure **Sure**

GRAMMATICALITY JUDGEMENT TASK SENTENCES

Context

I'm really thirsty.

I don't have time to do any gardening today.

I've got my hands full.

My video has broken.

'For' Verbs (Hawkins 1987)

Could you pour me a cup of coffee?

Could you sow me some lettuces?

Could you open me the door?

Could you watch me a television programme?

Which is the most common car?

Which is the commonest cow?

Which is a commoner cat?

Which is a most common cap?

Comparatives and Superlatives

The most common car is the Toyota.

(Ringböm 1993, with 'the' inserted)

The commonest cow is the Friesian.

A commoner cat is the tabby.

A most common cap is the beret.

Singular and Plural Verbs (Ringböm 1993)

Sarah, Lily and Pat go to a competition.

9. Each of the children wins a prize.

Louise, Emma and Francis go to a party.

10. Each of the children win a prize.

Years ago, their father had crashed the car.

11. None of the children were able to remember it.

A long time ago, a plane had crashed nearby.

12. None of the children was able to remember it.

ECP – That-trace Effect (Bley-Vroman *et al.* 1988: 19)

I'm going to the bookshop to choose some books.

13. What did Frank say that Judy would like to read?

That philosophy test seems to be very difficult.

14. Who did Ellen say Max thought would pass the test?

They've got a lot of antiques in here so don't rush around.

15. What did John say that would fall on the floor, if we're not careful?

I thought his aunt was coming for the funeral.

16. Who do you think that arrived yesterday? (White & Genessee 1996)

Subjacency Violations (Zobl 1992: 190, items 27-30)

I've just seen the artist selling a picture.

17. Who did the artist sell a picture of?

Those art critics don't usually say anything positive.

18. Who do they admire the artist's painting of?

I want to find some pictures that would scare children.

19. What do pictures of scare children?

I want to find some pictures that would scare children.

20. What do stories about frighten children?

Don't you want to tell some stories that would frighten children?

INSTRUCTIONS: LANGUAGE LEARNING TASK

You are going to begin to learn a new language called Hartzza. You will have 3 sessions (20 minutes each) with all the materials you see before you now: you have to teach yourself the language with these as your only source of information. These are your own materials which will be kept for your next session so you may write on them if you wish.

- 1. Vocabulary sheets**
- 2. Grammar sheets**
- 3. Exercises**
- 4. A cassette**
- 5. A written dialogue (the transcript of the video in Session 3)**
- 6. An answer sheet to the Exercises (Sessions 2 and 3)**

You will also be able to use the videotape of the dialogue in the third session.

- 7. A video**

Your target is to learn as much as you can in the three sessions as you will have a small written test after the third session. You will also meet a native speaker who will ask you some questions in the language. However, you have been given a lot of information about the language and you will not be able to learn and remember all of it, so do not feel overwhelmed! Just do your best.

Within these materials, it is up to you what you want to study and in which order. For instance you do not have to do the Exercises but it might be a good idea. They are there to help you and will not be marked. The grammar starts with the easier parts and moves on to more difficult parts. The lesson numbers correspond so vocabulary for Exercise 1 and Grammar 1 is on the sheet Vocabulary 1. There is also an Alphabetised Vocabulary list for you to find words easily - it contains exactly the same words as the Vocabulary.

You do not have to learn all the vocabulary as you will be given fresh vocabulary sheets for the written test. However, it will speed you up. You will also be told what vocabulary you need to know before meeting the native speaker and given a few minutes to prepare.

This is not an easy language and you only have a very limited amount of time. However you already have a lot of good experience in learning languages so put it into practice and do your best!

Good luck!

VOCABULARY BY EXERCISE

Most of the letters are pronounced the way they look, except:

'h' is not pronounced at all

'g' is always hard like in 'get' (not 'gem')

'j' is pronounced like a Scottish 'ch', as in 'loch'

'tx' is pronounced like 'ch' as in 'chin'

'x' is pronounced like 'sh' as in 'shoe'.

VOCABULARY 1

ZER MODUZ?

How are you?

EGUNON

good morning

ONDO

well

ONDO ESAN BEHARKO

we'll have to say well

ETA ZU

and you

NAHIKO ONDO NI ERE

quite well too

NOR?

who?

SEMEA

son

MUTIL

boy

GIZON

man

HANDI

big

TXIKI

small

OSO

very

GAUZA

thing

BAT

one, a

BAI

yes

EZ

no

VOCABULARY 2

KAIXO

hello

GAIZKI

bad

ESKERRIK ASKO

thanks

AGUR

bye

GERO ARTE

see you later

VOCABULARY 3

HAU	this
HORI	that
HURA	that over there
ZER?	what?
GAUZA	thing
GIZON	man
EMAKUME	woman
MUTIL	boy
NESKA	girl
BURU	head
BEGI	eye
ESKU	hand
LIBURU	book
HERRI	village, city, country
BIDE	path
MENDI	mountain
AUTO	car
ETXE	house
SEME	son

FOR VOCABULARY 4 (see Exercise 3)

PEOPLE'S NAMES

IZASKUN	(Female)
BEGOÑA	(Female)
ITZIAR	(Female)
MARTIN	(Male)
JON	(Male)
JOXE	(Male)
MIKEL	(Male)
KOLDO	(Male)

PLACE NAMES

IRUN	(Place name of a town)
HONDARRIBIA	(Place name of a village)
HENDAIA	(Place name of a village)
JAIZKIBEL	(Place name of a mountain)

VOCABULARY 5 (for Exercise 5 see also VOCABULARY 3)

GAZTE	young
ZAHAR (changes to ZAHARRA)	old
BERRI	new
POLIT	beautiful, pretty
ITSUSI	ugly
HANDI	big
TXIKI	small
LUZE	long

VOCABULARY 6 and 7

EMAKUME	woman
GIZON	man
ETA	and
BESTE	(an) other

VOCABULARY 8

BAINA	but
ERE	also

VOCABULARY IN ALPHABETICAL ORDER

Most of the letters are pronounced the way they look, except:

'h' is not pronounced at all

'g' is always hard like in 'get' (not 'gem')

'j' is pronounced like a Scottish 'ch', as in 'loch'

'tx' is pronounced like 'ch' as in 'chin'

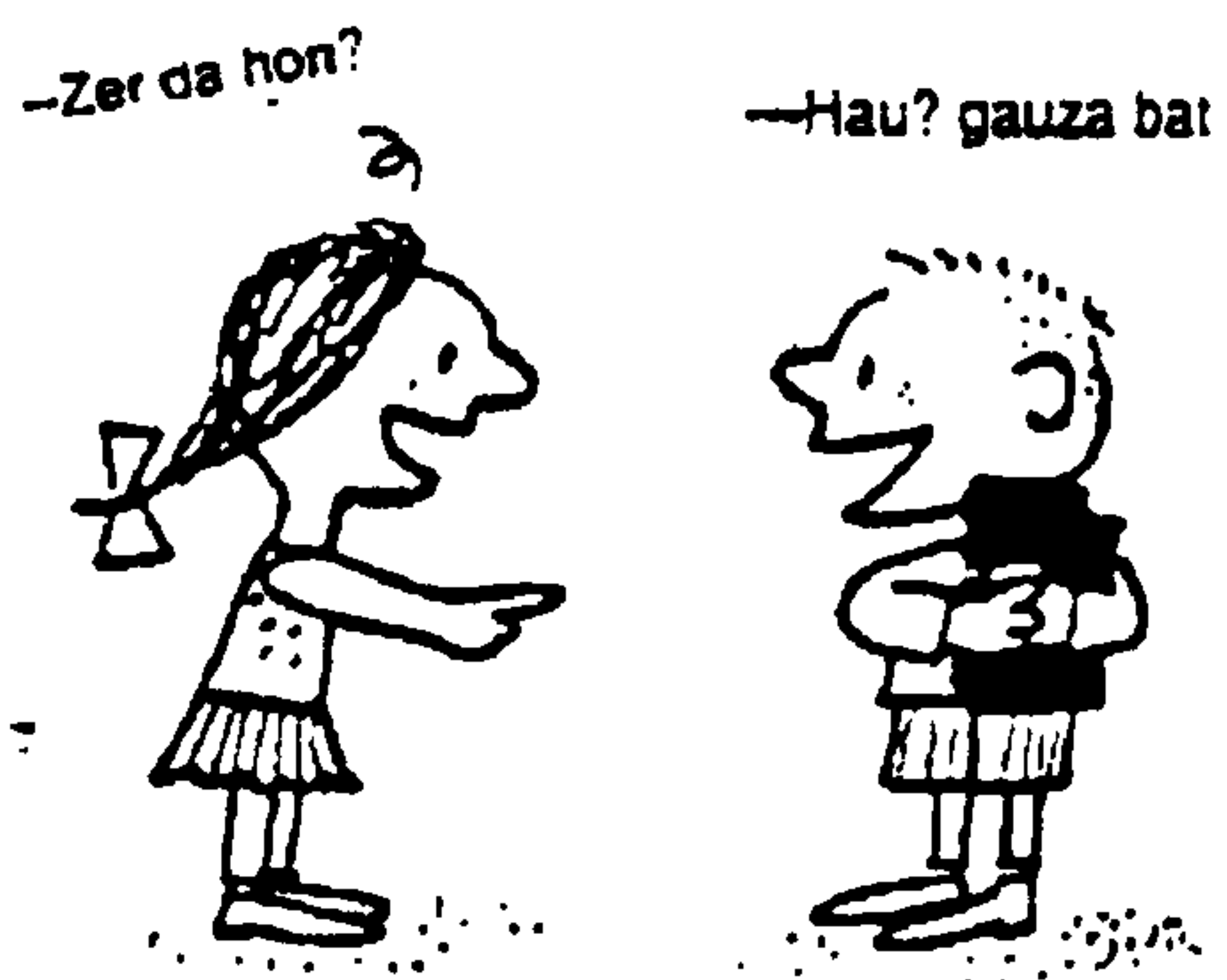
'x' is pronounced like 'sh' as in 'shoe'.

AGUR	bye
AUPA!	hi!
AUTO	car
BAI	yes
BAINA	but
BAT	one, a
BEGI	eye
BEGQÑA	(Female name)
BERRI	new
BESTE	(an) other
BI	two
BIDE	path
BIGARREN	second
BURU	head
DEITURA	surname
EGUNON	good morning
EMAKUME	woman
ERE	also
ESERI	sit down
ESKU	hand
ESKERRIK ASKO	thanks
ETA	and
ETA ZU	and you
ETXE	house
EUSKALTEGI	'Hartza' language school
EZ	no
EZTA?	isn't it?
GAIZKI	bad
GAUZA	thing
GAZTE	young
GERO ARTE	see you later
GIZON	man
HANDI	big
HAU	this

HELBIDE	address
HENDAIA	(Place name of a village)
HERRI	village, city, country
HIRU	three
HONDARRIBIA	(Place name of a village)
HORI	that
HURA	that over there
IDAZKARI	secretary
IKASLE	student
IRAKASLE	teacher
IRUN	(Place name of a town)
ITSUSI	ugly
ITZIAR	(Female name)
IZASKUN	(Female name)
IZEN	name
JAIZKIBEL	(Place name of a mountain)
JON	(Male name)
JOXE	(Male name)
KAIXO	hello
KALE	street
KOLDO	(Male name)
LIBURU	book
LUZE	long
MARTIN	(Male name)
MAILA	level
MATRIKULA	registration
MENDI	mountain
MIKEL	(Male name)
MUTIL	boy
NAHIKO ONDO NI ERE	quite well too
NESKA	girl
NOR?	who?
ONDO	well
ONDO ESAN BEHARKO	we'll have to say well
ONGI	well
OSO	very
POLIT	beautiful
SEMEA	son
TXIKI	small
ZAHAR (changes to ZAHARRA)	old
ZENBAKI	number
ZER?	what?
ZER MODUZ?	How are you?
ZIGARRO	cigarette

GRAMMAR 1: THIS and THAT, and the verb TO BE

HAU	=	this
HORI	=	that
HURA	=	that over there



hau usually indicates something
close to the speaker

hori usually indicates something
close to the listener

hura something that is far from
both the speaker and the
listener

- **IZAN** (The verb 'TO BE': present tense)

NI ... NAIZ	=	I am
ZU ... ZARA	=	You are
HURA ... DA	=	He, she, it is

- **SUBJECTS, OBJECTS and VERBS** Eg Jane hit Mary.

NB A subject is the 'doer' of an action: in this case 'Jane'.

 An object is the person/thing that has something done to it: in this case 'Mary'

 A verb is the 'doing word': in this case 'hit'.

GRAMMAR 2 and 3: WHO, WHAT and WHICH, and the ORDER OF WORDS IN STATEMENTS and QUESTIONS

- WHO, WHAT, WHICH

NOR?	=	who?
ZER?	=	what?
ZEIN?	=	which?

- WORD ORDER IN STATEMENTS AND QUESTIONS

The order for **statements** is:

SUBJECT + OBJECT(S) + VERB

eg -Hau Jon da
 This is John

The order for 'who / which / what' **questions** changes to:

WHO / WHICH / WHAT + VERB + SUBJECT ?

eg -Nor da hau?
 Who is this?

When you answer a question it is very important to notice that the answer (the word or phrase) is always placed immediately before the verb because it is a statement.

eg -Zer da hori? -Hori, etxea da.
 What is that? That is a house.

2. *Orrialdea*

GRAMMAR 4 (useful for Ex. 3): YES/ NO QUESTIONS

Another type of question is the kind that must be answered with 'yes' or 'no'.

The word order for these questions is the same as for statements, ie:

(SUBJECT*) + OBJECT + VERB ?

** The subject is not necessary; you can always drop it if it doesn't give any new information.*

eg -Hau Jon da?
 Is this John?

If the answer is **positive**, then it will be the same order as for statements, ie:

***BAI*, + (SUBJECT) + OBJECT + VERB**

eg -Bai, hau Jon da
 Yes, this is John

But, if the answer is **negative**, then it changes:

***EZ*, + (SUBJECT) + *EZ* + VERB + OBJECT**

eg -Ez, hau ez da Jon.
 No, this is not John.

GRAMMAR 5: NOUNS and WORD ORDER

You have seen that nouns take an **-a** at the end. This could mean 'the' or 'a' depending on the context.

eg	-Jon gizona da	=	John is a man
	-Hori begia da	=	That is the eye
	-Hura mendia da	=	That over there is a/the mountain

If the word itself already finishes with an **-a**, you don't need to add another one, just leave it as it is.

eg	-Begoña neska da	=	Begoña is a girl
----	------------------	---	------------------

- **WORD ORDER: For adjectives (eg, big) describing nouns (eg, girl)**

<p>NOUN + ADJECTIVE +</p>	<p>-A (the / a) HAU / HORI / HURA (this/that/that over there) BAT (a / one)</p>
----------------------------------	--

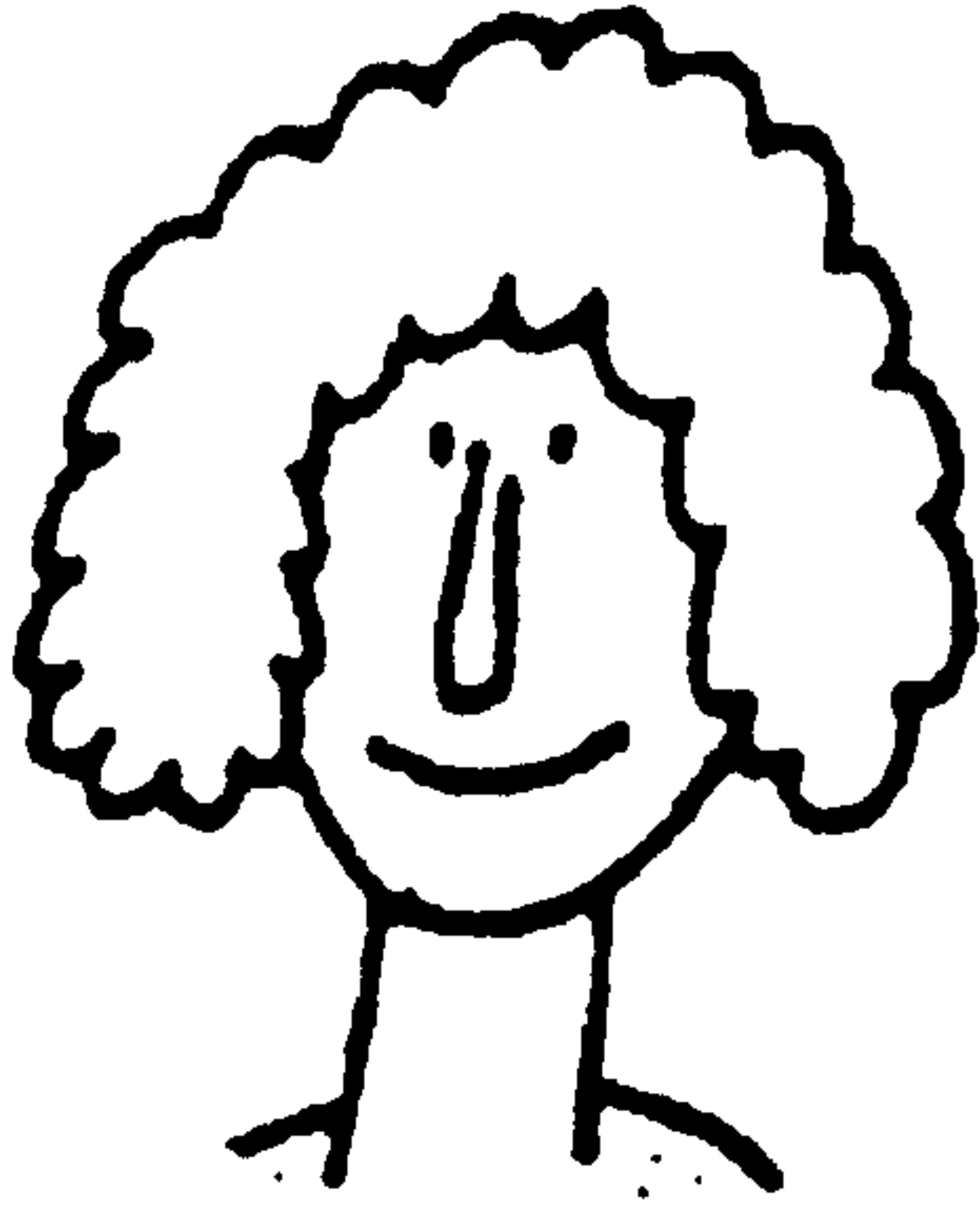
gizona	=	the/a man	emakumea	=	the/a woman
gizon hau	=	this man	emakume hori	=	that woman
gizon txikia	=	the small man*	neska handia	=	the/a big girl*
gizon txiki hau	=	this small man	mutil gazte bat	=	a/one young boy

*You should notice something very curious – when a noun only has an adjective after it, the adjective takes the **-a** ending instead of the noun!

You may also have noticed that in Exercise 1: 'Eta zu oso gizon txikia!' = 'and you are a very small man!' – 'oso' (very) comes *before* the noun 'gizon' (man).

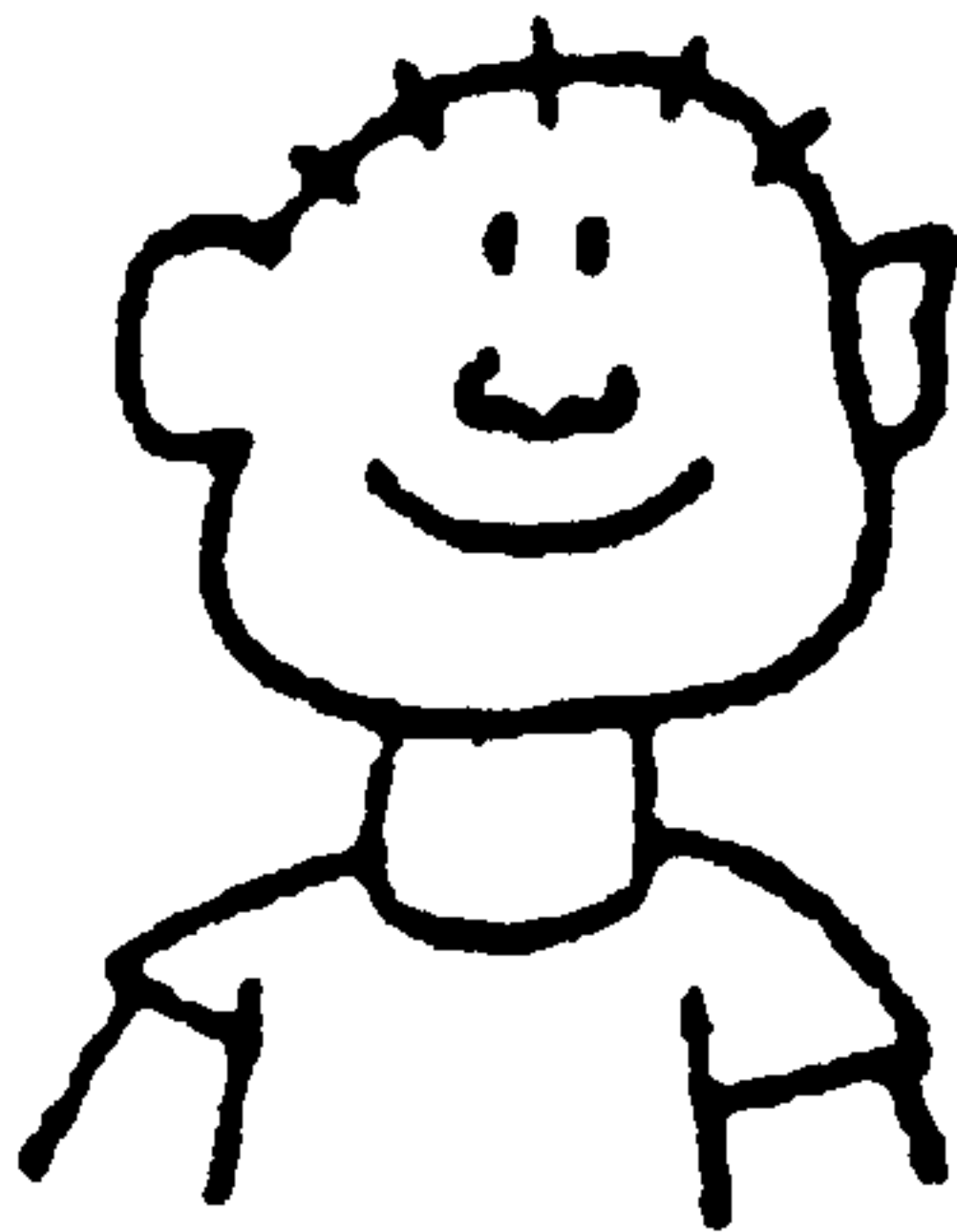
4. Orrialdea

INTRODUCTION: WHO ARE YOU?



Ni Izaskun naiz.

I'm Izaskun



Ni Mikel naiz.

I'm Mikel

NOR ZARA ZU?

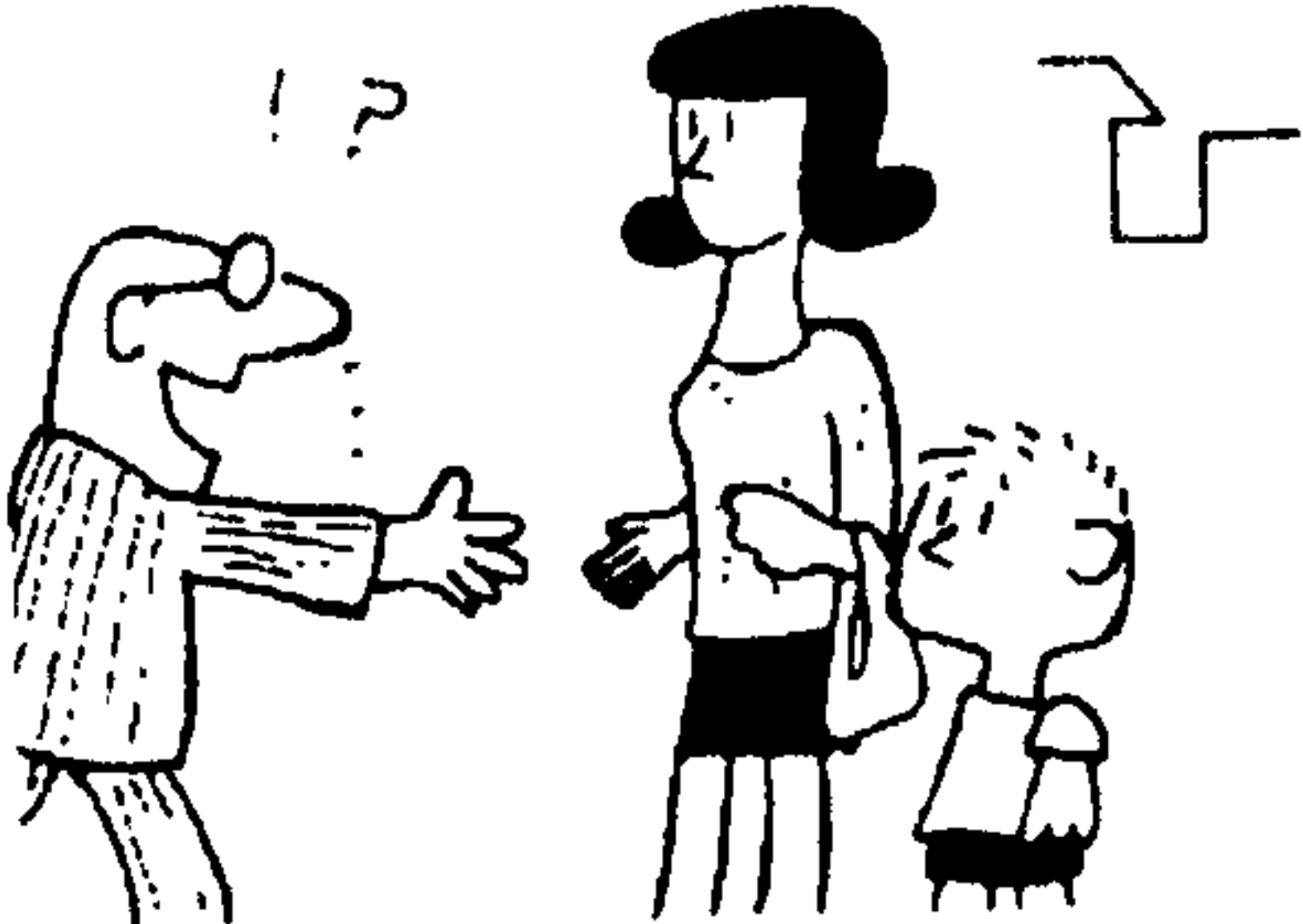
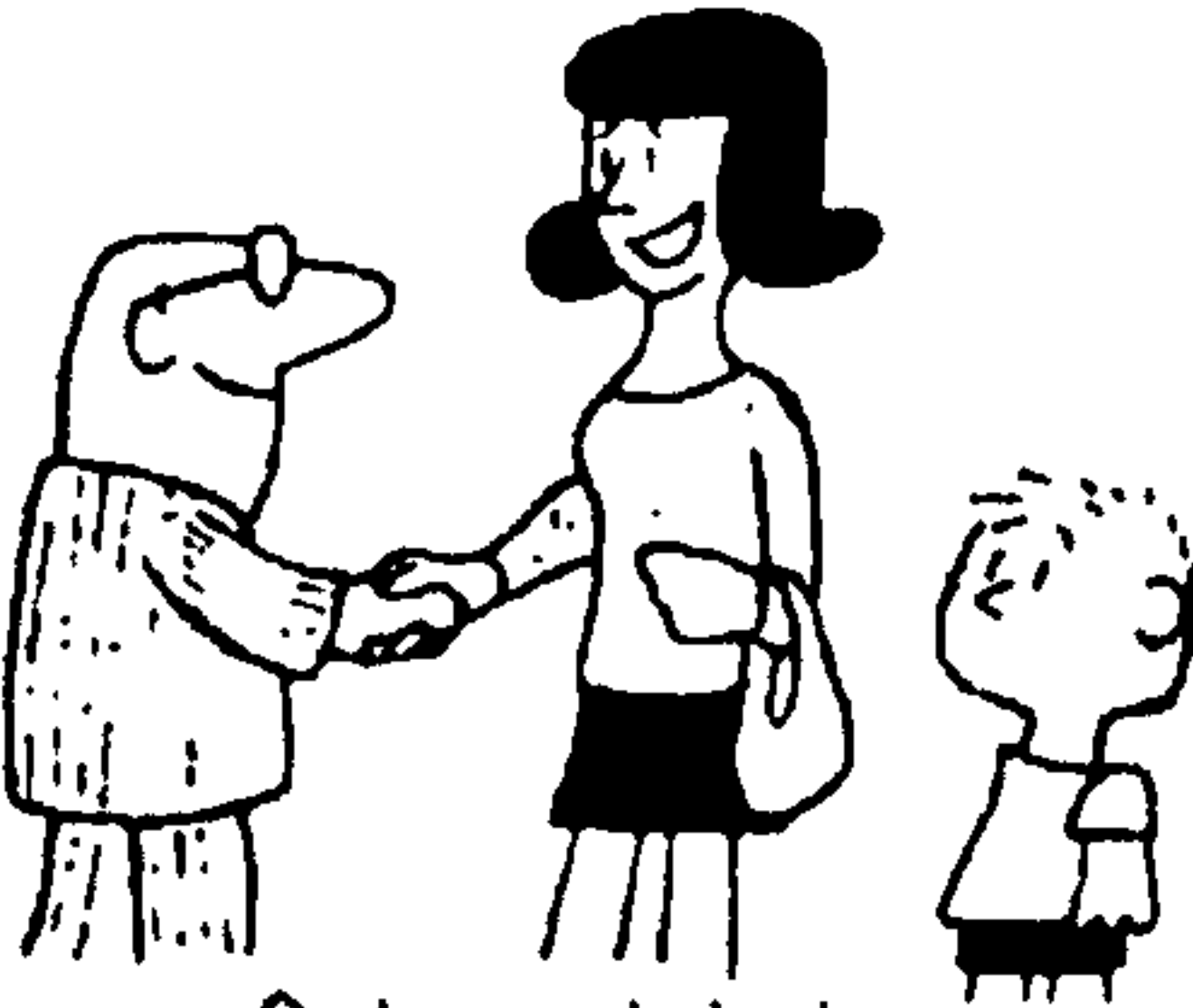
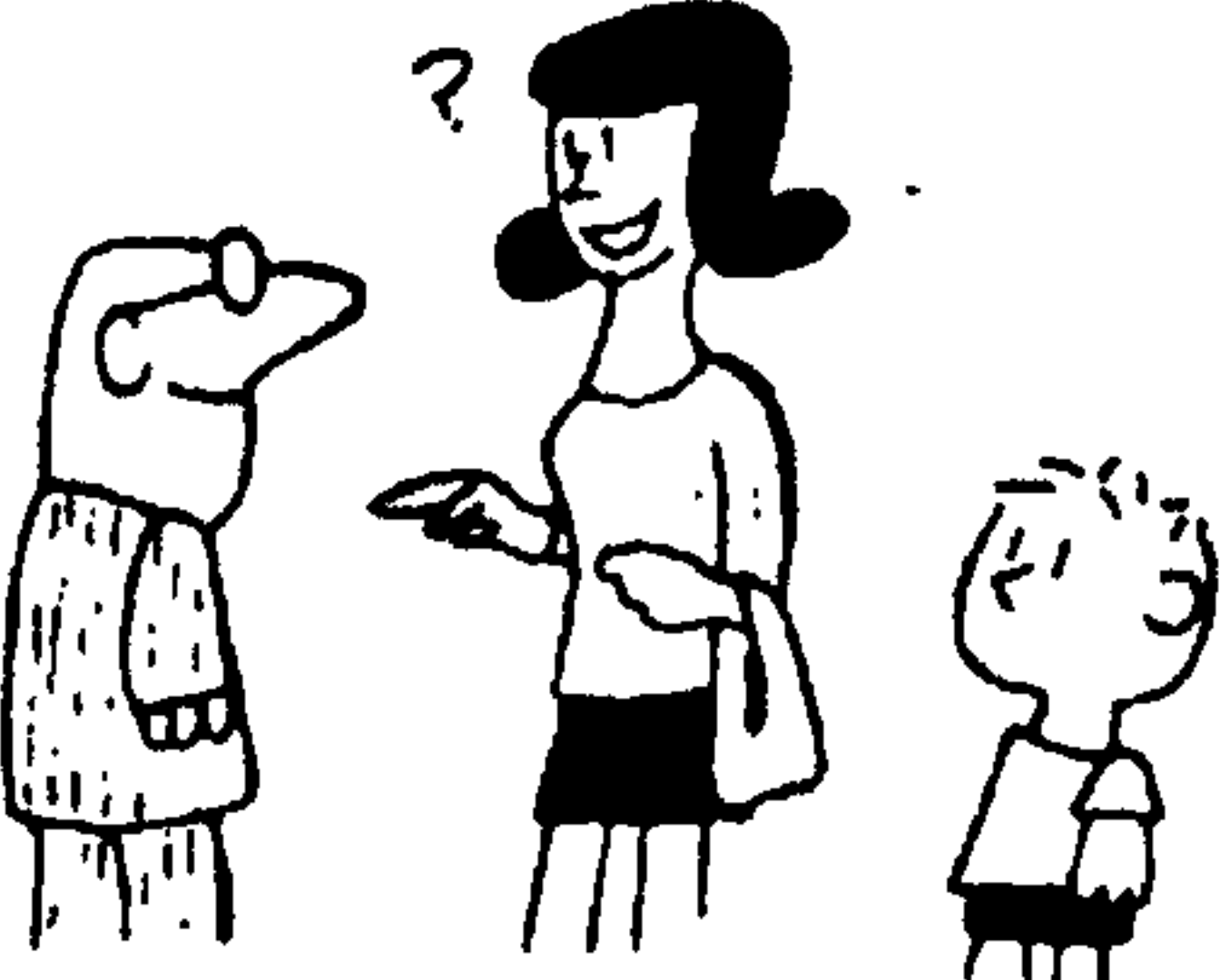
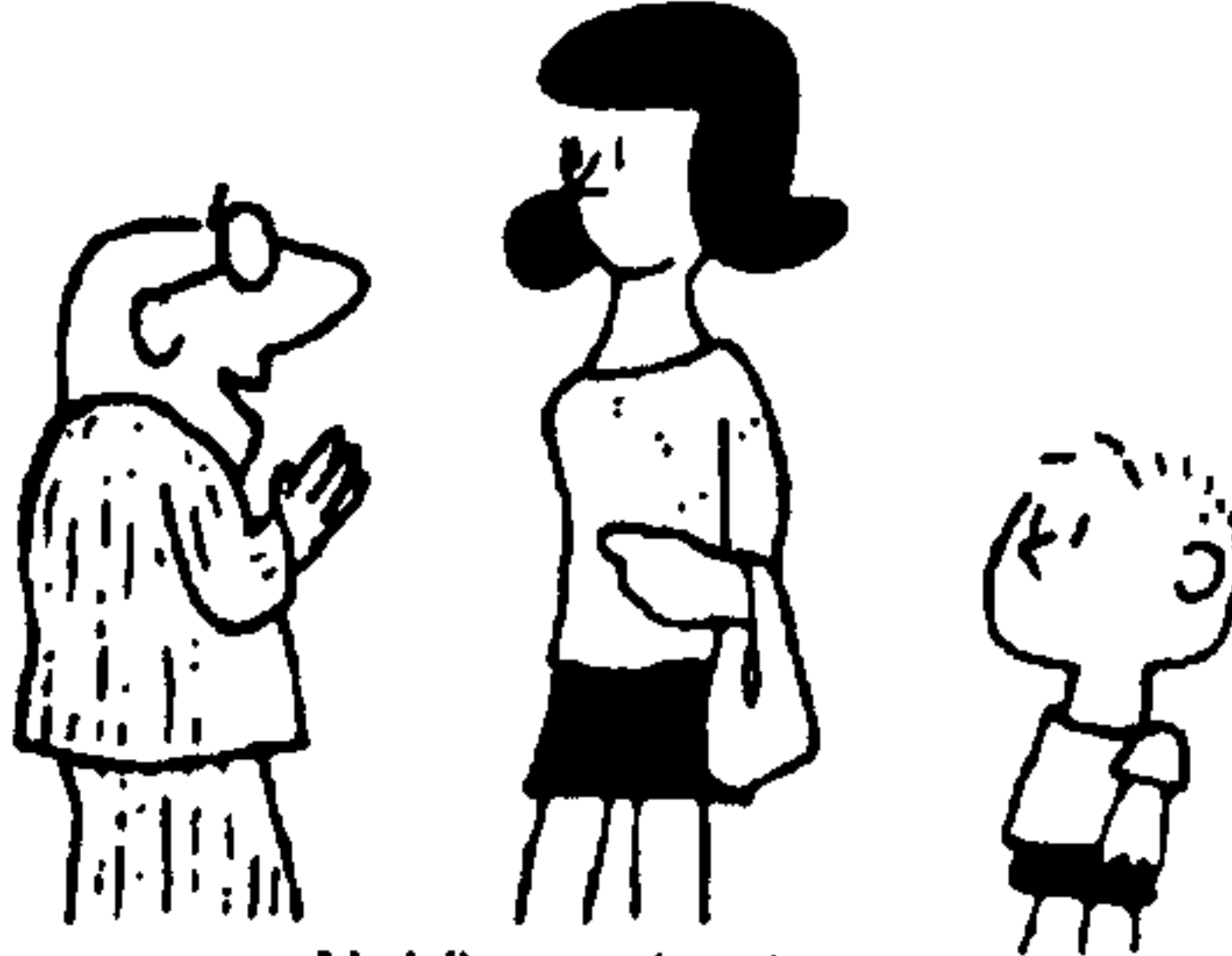
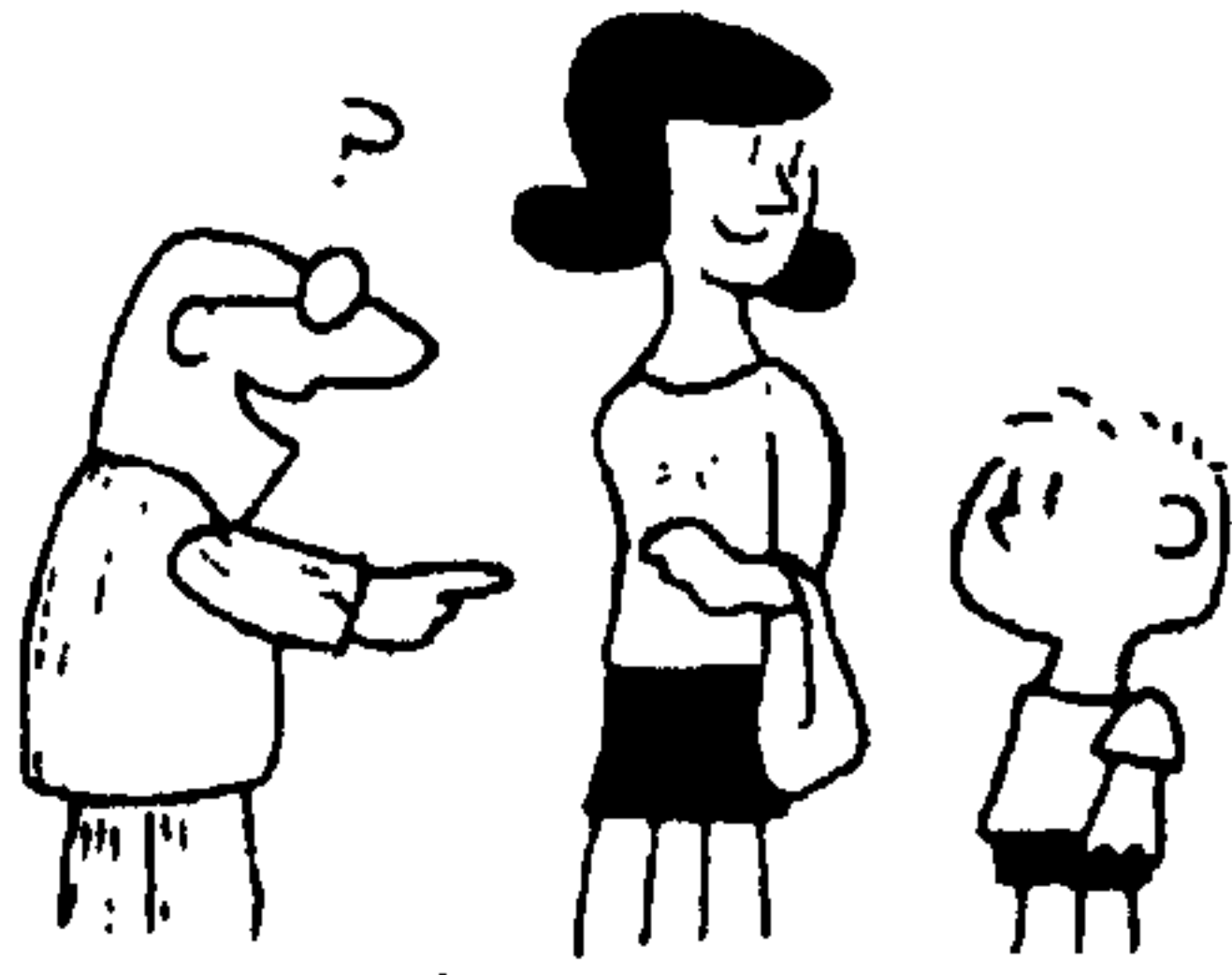
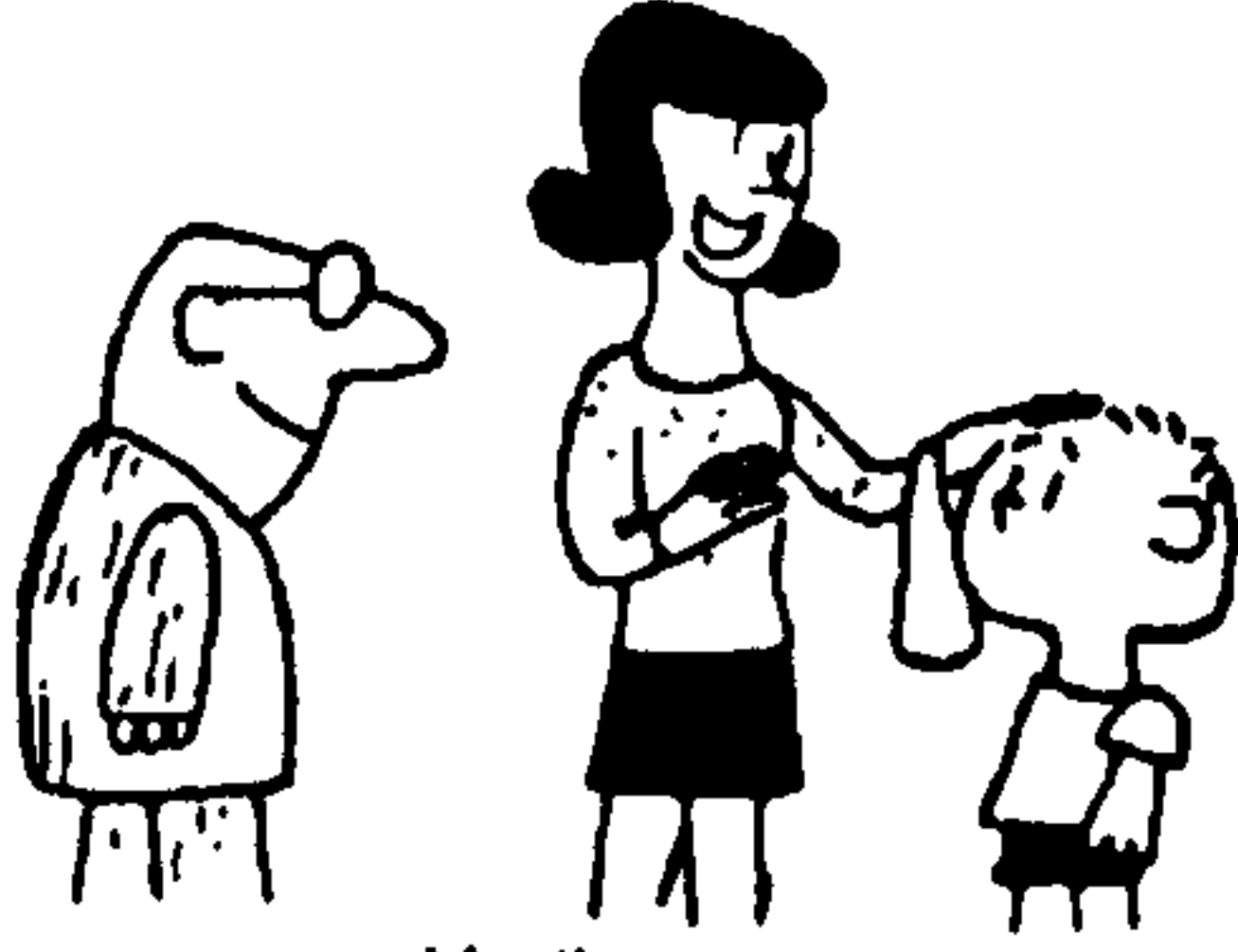

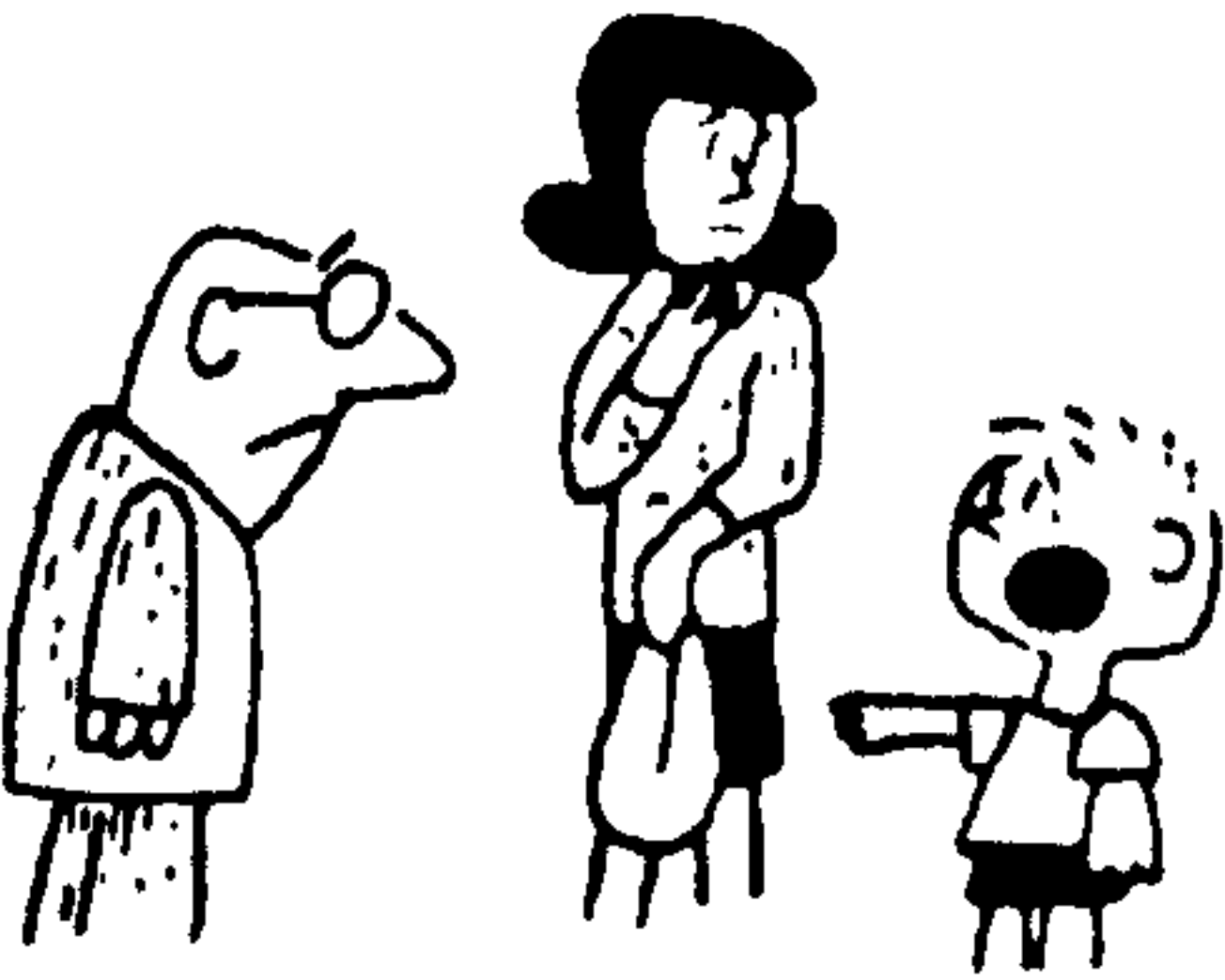
Who are you?

?

Ni _____ naiz.

1. *Orrialdea*

EXERCISE 1: LISTEN TO THE TAPE (see Vocabulary 1)

<p>1</p>  <p>Zer moduz? Egunon! Zer moduz?</p> <p>Good morning! How are you?</p>	<p>2</p>  <p>- Ondo esan beharko</p> <p>We'll have to say wel!</p>
<p>3</p>  <p>- Eta zu?</p> <p>And you!</p>	<p>4</p>  <p>- Nahiko ondo ni ere.</p> <p>Quite well too</p>
<p>5</p>  <p>- Nor da hau?</p> <p>Who is this?</p>	<p>6</p>  <p>Martin, semea.</p> <p>Martin, (my) son</p>
<p>7</p>  <p>- Mutil handia zara. Martin!</p> <p>Martin, you are a big boy</p>	<p>8</p>  <p>- Eta zu oso gizon txikia!</p> <p>And you are a very small man!</p>

2. Orrialdea

EXERCISE 2: GREETINGS

Study and learn the following words:

KAIXO	hello
EGUNON	good morning
ZER MODUZ?	how are you?
ONDO	well
OSO ONDO	very well
GAIZKI	bad
ESKERRIK ASKO	thank you very much
ETA ZU?	and you?
AGUR	bye
GERO ARTE	see you later

**You meet a friend of yours in the street. What would you say to her / him?
(Use the vocabulary above and the dialogue on the tape for Ex. 1 to help you).**

A- _____

B- _____

A- _____


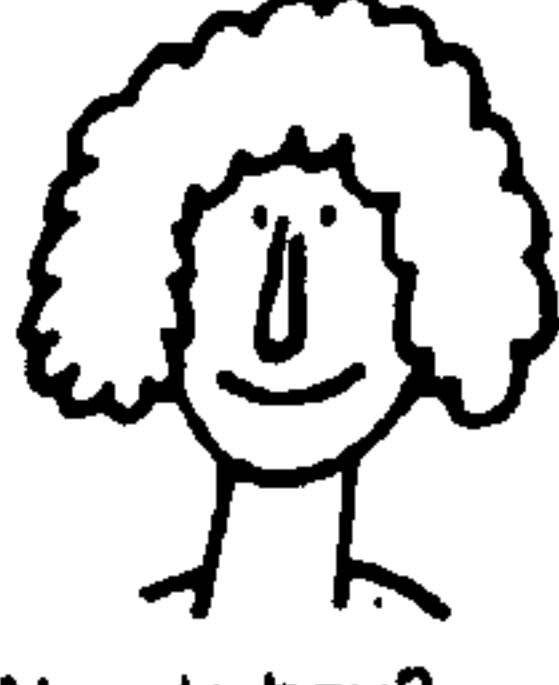











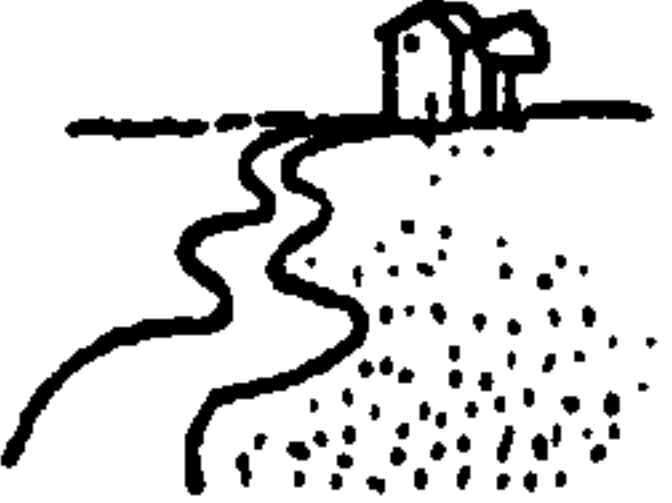


B- _____

A- _____









B- _____

3. Orrialdea



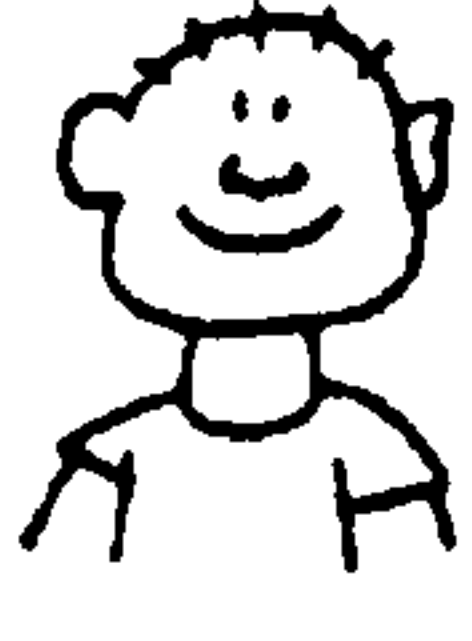






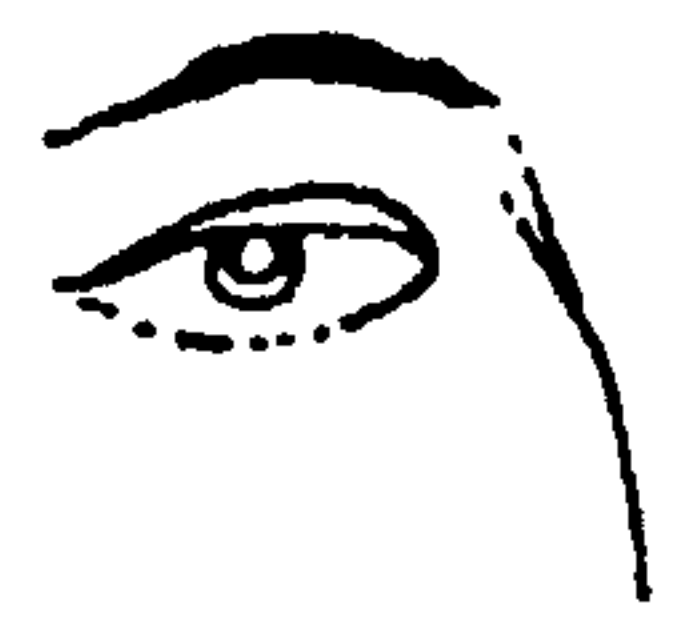
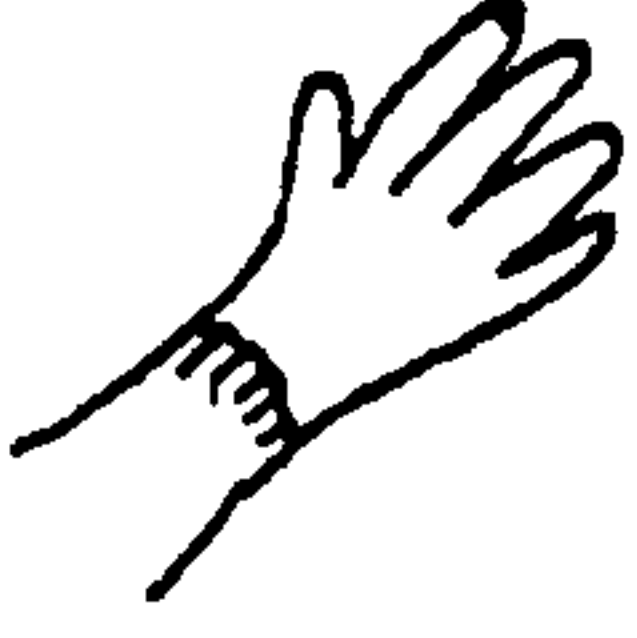






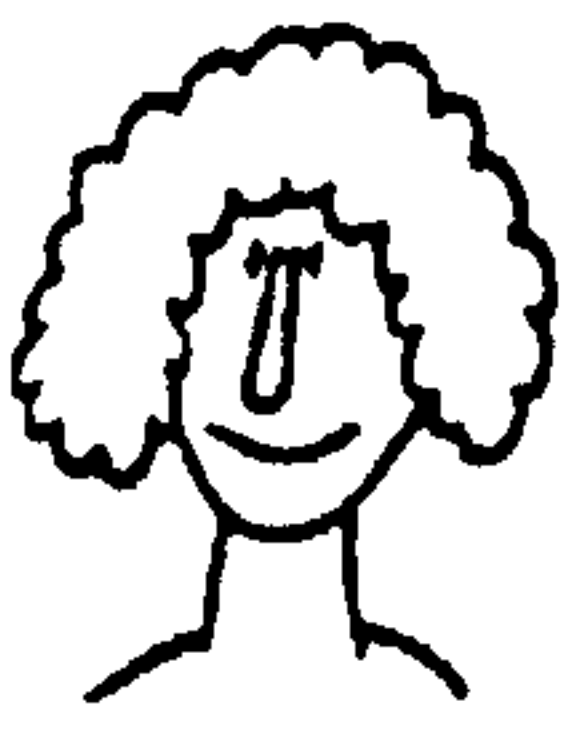
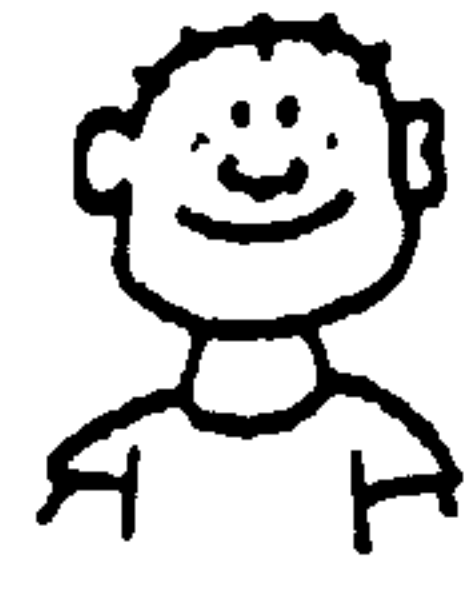





EXERCISE 3: READ, LISTEN, AND STUDY THE PICTURES

<p>KOLDO</p>  <p>- Nor da hau? - Hau, Koldo da.</p>	<p>IZASKUN</p>  <p>- Nor da hau? - Hau, Izaskun da.</p>	<p>MIKEL</p>  <p>- Nor da hau? - Hau, Mikel da.</p>	<p>BEGOÑA</p>  <p>- Nor da hau? - Hau, Begoña da.</p>
<p>Who is this? This is Koldo</p>	<p>Who is this? This is Izaskun</p>	<p>Who is this? This is Mikel</p>	<p>Who is this? This is Begoña</p>
 <p>- Zer da Koldo? - Koldo, gizona da.</p>	 <p>- Zer da Izaskun? - Izaskun, emakumea da.</p>	 <p>- Zer da Mikel? - Mikel, mutila da.</p>	 <p>- Zer da Begoña? - Begoña, neska da.</p>
<p>What is Koldo? Koldo is a man</p>	<p>What is Izaskun? Izaskun is a woman</p>	<p>What is Mikel? Mikel is a boy</p>	<p>What is Begoña? Begoña is a girl</p>
 <p>- Zer da hori? - Hori, burua da.</p>	 <p>- Zer da hori? - Hori, begia da.</p>	 <p>- Zer da hori? - Hori, eskua da.</p>	 <p>- Zer da hori? - Hori, liburua da.</p>
<p>What is that? That is a head</p>	<p>What is that? That is an eye</p>	<p>What is that? That is a hand</p>	<p>What is that? That is a book</p>
 <p>- Zer da hura? - Hura, herria da.</p>	 <p>- Zer da hau? - Hau, bidea da.</p>	 <p>- Zer da hura? - Hura, mendia da.</p>	 <p>- Zer da hori? - Hori, autoa da.</p>
<p>What is that over there? That over there is a village</p>	<p>What is this? This is a path</p>	<p>What is that over there? That over there is a mountain</p>	<p>What is that? That is a car</p>

EXERCISE 3 (continued)

 <p>- Hau, Koldo da? - Bai, hau Koldo da</p>	 <p>- Hau, emakumea da? - Bai, hau emakumea da</p>	 <p>- Hau, neska da? - Ez, hau ez da neska. hau mutila da</p>	 <p>Hau, gizona da? - Ez, hau ez da gizona, hau neska da.</p>
<p>Is this Koldo? Yes, this is Koldo</p>	<p>Is this a woman? Yes, this is a woman</p>	<p>Is this a girl? No, this is not a girl, this is a boy</p>	<p>Is this a man? No, this is not a man, this is a girl!</p>
 <p>- Hura herria da? - Bai, hura herria da</p>	 <p>- Hau, autoa da? - Ez, hau ez da autoa: hau etxea da</p>	 <p>- Hau, mendia da? - Ez, hau ez da mendia, hau bidea da.</p>	 <p>- Hura etxea da? - Ez, hura ez da etxea: hura mendia da</p>
<p>Is that over there a village? Yes, that over there is a village</p>	<p>Is this a car? No, this is not a car, this is a house</p>	<p>Is this a mountain? No, this is not a mountain, this is a path</p>	<p>Is that over there a house? No, that over there is not a house, that over there is a mountain.</p>

EXERCISE 4: ANSWER THE FOLLOWING QUESTIONS

KOLDO	IZASKUN	MIKEL	BEGONA
 1 - Nor da nau?	 2 - Nor da hau?	 3 - Nor da nau?	 4 - Nor da hau?
 5 - Zer da Koldo?	 6 - Zer da Izaskun?	 7 - Zer da Mikel?	 8 - Zer da Begoña?
 9 - Zer da hori?	 10 - Zer da hori?	 11 - Zer da hori?	 12 - Zer da hori?
 13 - Zer da hura?	 14 - Zer da hau?	 15 - Zer da hura?	 16 - Zer da hori?
 17 - Hau, Koldo da?	 18 - Hau, emakumea da?	 19 - Hau, neska da?	 20 - Hau, gizona da?
 21 - Hura nerna da?	 22 - Hau, autoa da?	 23 - Hau, merdia da?	 24 - Hura etxea da?

EXERCISE 4: (ANSWERSHEET FOR QUESTIONS)

- 1.- _____
- 2.- _____
- 3.- _____
- 4.- _____
- 5.- _____
- 6.- _____
- 7.- _____
- 8.- _____
- 9.- _____
- 10.- _____
- 11.- _____
- 12.- _____
- 13.- _____
- 14.- _____
- 15.- _____
- 16.- _____
- 17.- _____
- 18.- _____
- 19.- _____
- 20.- _____
- 21.- _____
- 22.- _____
- 23.- _____
- 24.- _____

7. Orrialdea

EXERCISE 5: TRANSLATION

Translate the following sentences:

eg- The mountain. The small mountain. This small mountain.

- *Mendia. Mendi txikia. Mendi txiki hau.* _____

1.- The book. The small book. That small book.

- _____

2.- The girl. That girl. That young girl.

- _____

3.- The boy. This boy. This ugly boy.

- _____

4.- The man. The old man. That old man over there.

- _____

5.- The house. This house. This new house.

- _____

6.- A village. A beautiful village. That beautiful village.

- _____

7.- A thing. A big thing. That big thing over there.

- _____

8.- A path. A long path. This long path.

- _____

9.- A car. A new car. That new car.

- _____

EXERCISE 8: LISTEN TO THE TAPE

AND FILL IN THE BLANKS

Herri _____ Irun da.

Irun handia _____ .

Herri _____ hori Hondarribia da.

Hondarribia _____ txiki baina polita da.

B _____ herri hura Hendaia da.

Hendaia ere oso _____ da.

Ez _____ itsusia.

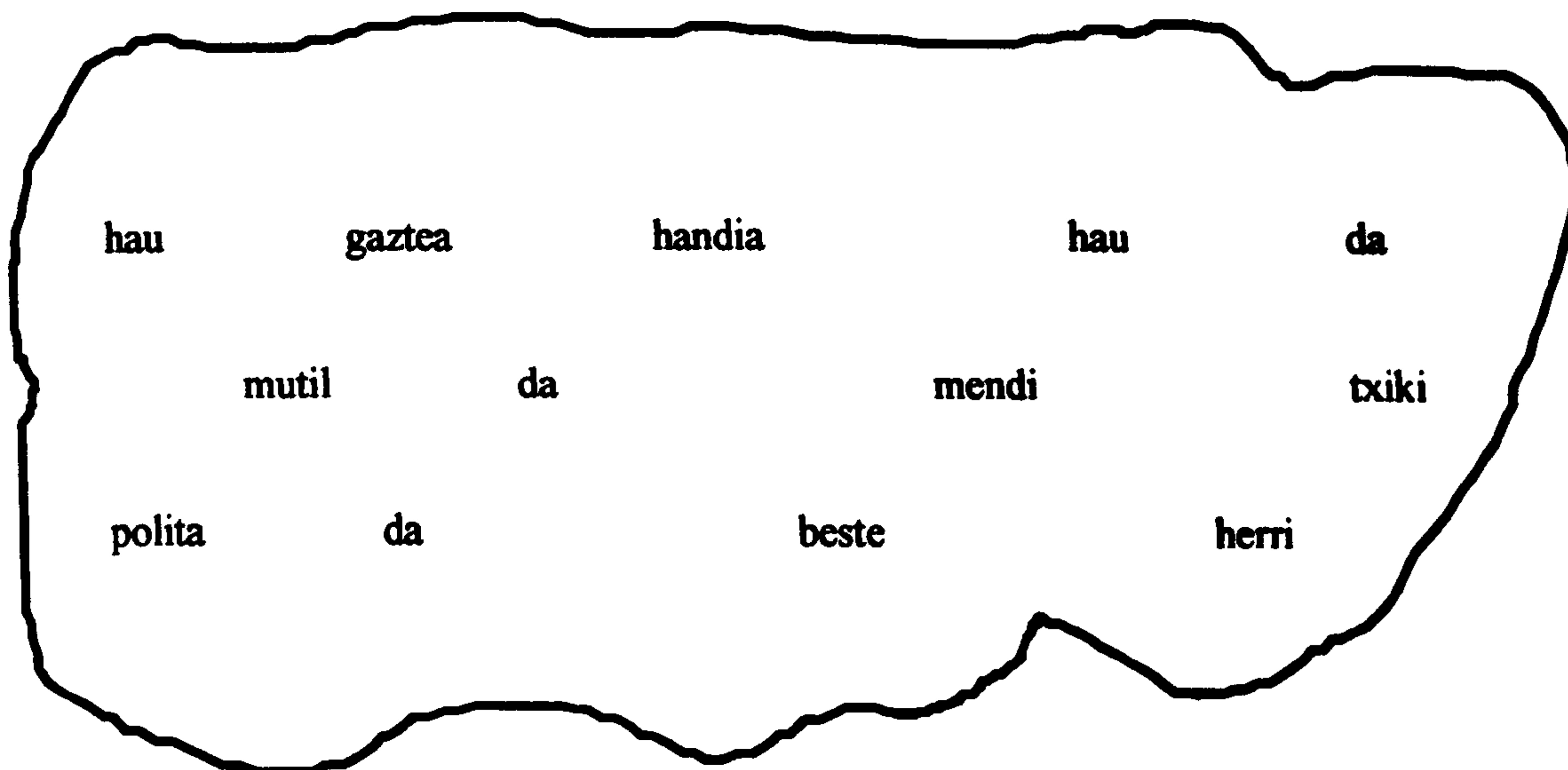
_____ hura Jaizkibel da.

Jaizkibel ez da mendi _____ .

Neska _____ Begoña da eta mutil hori Mikel _____ .

Begoña neska _____ da baina Mikel _____ txikia.

Each blank should be filled by one of the words below.



10. Orrialdea

EXERCISE 9: LISTEN TO THE TAPE AGAIN, AND READ

Herri hau Irun da. Irun handia da. Herri txiki hori Hondarribia da. Hondarribia herri txiki baina polita da. Beste herri hura Hendaia da. Hendaia ere oso polita da. Ez da itsusia. Mendi hura Jaizkibel da. Jaizkibel ez da mendi handia. Neska hau Begoña da eta mutil hori Mikel da. Begoña neska gaztea da baina Mikel mutil txikia.

EXERCISE 10: ANSWER QUESTIONS ON THE TEXT ABOVE

1-. Zein da herri hau?

- _____

2-. Irun txikia da?

- _____

3-. Zer da handia?

- _____

4-. Zein da herri txiki hori?

- _____

5-. Zer da Hondarribia?

- _____

6-. Zein da beste herri hura?

- _____

7-. Zein da Hendaia?

- _____

8-. Hendaia, itsusia da?

- _____

9-. Zein da mendi hura?

- _____

10-. Jaizkibel, mendi handia da?

- _____

11-. Zein da mendi txikia?

- _____

12-. Nor da neska hau?

- _____

13-. Nor da mutil hori?

- _____

14-. Zein da Begoña?

- _____

15-. Zein da Mikel?

- _____

16-. Zer da Begoña?

- _____

17-. Mikel mutil handia da?

- _____

18-. Nor da mutil txikia?

- _____

DIALOGUE FOR VIDEO: EUSKALTEGIAN
(In the Hartzza Language School)

* *this is grammatical (the emphasis changes the word order)*

Izaskun -	HAU DA EUSKALTEGIA?* Is this the Hartzza language school?	Karmelo -	KALE NAGUSIA... Nagusia street...
Neska -	BAI, HORI DA. Yes, it is that	Idazkari -	ZENBAKIA? Number?
Izaskun -	EGUNON. Good morning. ZU ZARA IDAZKARIA? Are you the secretary?	Karmelo -	HIRU Three
Idazkari -	BAI, NI NAIZ. Yes, I am. ZER? MATRIKULA? What? Registration?	Izaskun -	ZIGARRO BAT? One cigarette?
Karmelo -	BAI Yes	Idazkari -	EZ. ESKERRIK ASKO. No. Thank you very much. HERRIA? City?
Idazkari -	ESERI, ESERI. Sit down, sit down ZEIN MAILA? Which level?	Karmelo -	BALMASEDA Balmaseda
Karmelo -	BI. BIGARRENA. Two. Second.	Idazkari -	BIZKAIA, EZTA? Biscay, isn't it?
Idazkari -	IZENA? Name?	Karmelo -	BAI Yes
Karmelo -	KARMELO Karmelo	Idazkari -	ONGI DA. Ok. ZU ERE BAI? You too?
Idazkari -	DEITURAK? Surnames?	Izaskun -	BAI, NI ERE BAI. Yes, me too
Karmelo -	ELIZONDO MARTINEZ Elizondo Martinez	Idazkari -	IZENA? Name?
Idazkari -	HELBIDEA? Address?	Izaskun -	IZASKUN Izaskun
		Idazkari -	DEITURAK? Surnames

1. *Orrialdea*

Izaskun -	RUIZ Ruiz	Izaskun -	BILBO Bilbao
Idazkari -	ETA BIGARRENA? And the second one?	Idazkari -	IZENA... Name... ONGI... Ok...
Izaskun -	SANCHEZ Sanchez	Izaskun -	AGUR ETA ESKERRIK ASKO. Bye and thank you very much.
Idazkari -	HELBIDEA? Address?	Idazkari -	AGUR, BAI. Bye, yes.
Izaskun -	CARACAS KALEA, 2 2 Caracas Street	Idazkari -	HAU DA HAU! This is it!
Idazkari -	KAIXO, XABIER. Hello, Xabier.	Karmelo -	BAT, BI... HIRU! One, two... three! BAT, BI... HIRU! One, two... three! BAT, BI... HIRU! One, two... three!
Xabier -	KAIXO, IKASLE BERRIAK? Hello, new students?	Karmelo -	AUPA! Hi!
Idazkari -	BAI, IKASLE BERRIAK. Yes, new students	Xabier -	KAIXO. Hello.
Xabier -	ZER MODUZ? How are you?	Karmelo -	
Izaskun -	ONDO Well		
Karmelo -	ONDO, ETA ZU? Well, and you?		
Xabier -	ONDO Well		
Xabier -	GERO ARTE. See you later		
Idazkari -	AGUR Bye		
Karmelo -	BAI, GERO ARTE. Yes, see you later.		
Idazkari -	HERRIA? City?		

2. Orrialdea

VOCABULARY FOR THE DIALOGUE/ VIDEO

EUSKALTEGI	'Hartza' language school
EGUN ON	Good morning
IDAZKARI	secretary
MATRIKULA	registration
ESERI	sit down
MAILA	level
BIGARREN	second
IZEN	name
DEITURA	surname
HELBIDE	address
KALE	street
ZENBAKI	number
ZIGARRO	cigarette
EZTA?	Isn't it?
IRAKASLE	teacher
IKASLE	student
ONGI	well
BAT	one
BI	two
HIRU	three
AUPA!	Hi!

ANSWERS

EXERCISE 4: See Exercise 3 for the answers

EXERCISE 5: TRANSLATION

- 1.- Liburua. Liburu txikia. Liburu txiki hori.
- 2.- Neska. Neska hori. Neska gazte hori.
- 3.- Mutila. Mutil hau. Mutil itsusi hau.
- 4.- Gizona. Gizon zaharra. Gizon zahar hura.
- 5.- Etxea. Etxe hau. Etxe berri hau.
- 6.- Herria. Herri polita. Herri polit hori.
- 7.- Gauza. Gauza handia. Gauza handi hura.
- 8.- Bidea. Bide luzea. Bide luze hau.
- 9.- Autoa. Auto berria. Auto berri hori.

EXERCISE 6: See Exercise 7 for the answers (in the box)

EXERCISE 8: See Exercise 9 for the answers (in the box)

EXERCISE 10:

- | | | |
|----------------------------------|---|--|
| 1.- Zein da herri hau? | - | Herri hau Irun da. |
| 2.- Irun txikia da? | - | Ez, Irun ez da txikia. |
| 3.- Zer da handia? | - | Handia, Irun da. |
| 4.- Zein da herri txiki hori? | - | Herri txiki hori Hondarribia da. |
| 5.- Zer da Hondarribia? | - | Hondarribia herri txiki baina polita da. |
| 6.- Zein da beste herri hura? | - | Beste herri hura Hendaia da. |
| 7.- Zein da Hendaia? | - | Hendaia hura da. |
| 8.- Hendaia, itsusia da? | - | Ez, Hendaia ez da itsusia. |
| 9.- Zein da mendi hura? | - | Mendi hura Jaizkibel da. |
| 10.- Jaizkibel, mendi handia da? | - | Ez, Jaizkibel ez da mendi handia. |
| 11.- Zein da mendi txikia? | - | Mendi txikia, Jaizkibel da. |
| 12.- Nor da neska hau? | - | Neska hau Begoña da. |
| 13.- Nor da mutil hori? | - | Mutil hori Mikel da. |
| 14.- Zein da Begoña? | - | Begoña neska gaztea da. |
| 15.- Zein da Mikel? | - | Mikel mutil txikia da. |
| 16.- Zer da Begoña? | - | Begoña neska da. |
| 17.- Mikel mutil handia da? | - | Ez, Mikel ez da handia. |
| 18.- Nor da mutil txikia? | - | Mutil txikia Mikel da. |

1.Orrialdea

DO AS MUCH AS YOU CAN!

A. Translate

PERSON NUMBER:

1. Egunon. _____
2. Zer moduz? _____
3. Oso ondo _____
4. Eta zu? _____
5. Gaizki; agur. _____

B. Fill in the blanks with appropriate words

1. _____ Begoña naiz.
2. Martin semea _____
3. Ni emakumea _____
4. Zu gizona _____
5. Hau _____ da.

Have you been using a rule for the position of the verb in a sentence? Circle YES / NO
If you have, please write it below. If not, can you see what it is now? If so write it below.

C. The words in the following questions have been mixed up. Can you put them in order?

- | | |
|--------------------------------|-----------------------------------|
| 1. da / nor / hau ? | 3. zara / zer / zu / ? |
| - _____ | - _____ |
| 2. hori / zer / da ? | 4. emakumea / da / nor ? |
| - _____ | - _____ |
| | 5. txikia / gizon / da / zein ? |
| | - _____ |

Have you been using a rule for word order for *who, which, what* questions? Circle YES/NO
If you have, please write it below. If not, can you see what it is now? If so write it below.

D. Invent answers for these questions (Expand on yes / no!)

1. Begonia, gaztea da? (Yes...) _____
2. Jon, zaharra da? (No...) _____
3. Martin, semea da? (Yes...) _____
4. Zu neska zara? (No...) _____
5. Ni Begonia naiz? (No...) _____

Have you been using rules for word order for replying to yes/no questions? Circle YES/NO
If you have, please write them below. If not, can you see what they are now? If so please write them below.

E. Translate

1. A woman. This woman. The woman.

- _____

2. Son. That son over there. The young son.

- _____

3. A mountain. A beautiful mountain. That beautiful mountain.

- _____

4. The man. The old man. That old man over there.

- _____

5. A page. The long page. One page.

- _____

Have you been using a rule for word order 1. for 'a/ the/ (nothing)'? Circle YES / NO
2. for 'this/ that/ that over there'? Circle YES/NO
3. for adjectives describing nouns? Circle YES/NO

If you have, please write them below. If not, can you see what they are now? If so write them below.

1. _____

2. _____

3. _____

MEETING SOMEONE

You are going to meet someone who is a native speaker of the language you have been learning. Don't worry that you can't say much – they are very happy that you know even a few words of their language and that you are *trying* to speak to them.

Say hello when you meet them, and introduce yourself. The other person will lead the conversation from then on.

You should be prepared to ask this person the following questions:

- **Who are you?**
- **How are you?**
- **Are you a student? Are you a teacher?**

The person will ask you some questions too.

You need to know the vocabulary to **Exercise 1** and

man/woman

boy/girl

big/small

student/teacher

Don't forget to say '**hello**' at the beginning when you meet the person and '**good-bye**' at the end!

BASQUE ORAL TEST: EXAMPLE QUESTIONS

NB Cartoon pictures of Begoña, Izaskun, Koldo, and Mikel are displayed around the room (A4-sized) for the tester and participant to refer to.

Set 1: Third person singular, Yes-no questions

1. *Greetings*
2. Nor da hau?
3. Nor da hori?
4. Nor da hura?
5. Zer da Begoña?
6. Zer da Koldo?
7. Zer da Mikel?
8. Zer da Izaskun?
9. Begoña neska da? Bai
10. Koldo gizona da? Bai
11. Mikel neska da? Ez
12. Izaskun gizona da? Ez
13. Mikel txikia da? Bai
14. Koldo handia da? Bai
15. Izaskun txikia da? Ez
16. Mikel handia da? Ez
17. Begoña neska da, eta zu? Bai
18. Koldo handia da eta zu? Bai
19. Mikel mutila da eta zu? Ez
20. Mikel txikia da eta zu? Ez

Set 2: First person and Second person singular, Yes-No questions

1. Zu emakumea / gizona zara eta ni? Bai / Ez
2. Zu handia zara eta ni? Bai
3. Ni gizona naiz? Ez
4. Zu ikaslea zara? Bai
5. Eta ni? Ez
6. Zer naiz ni?
7. *Leave-taking*

Appendix 2

Participants' Language Data

Participant No.	Female/ Male	Age	LANGUAGES: English~ and ... LITERACIES: '~' marks a language that the subject is literate in. All subjects are literate in English. Different Chinese languages, e.g. Mandarin and Cantonese, all have the same literacy.
1	F	22	Croatian~, German~, Italian, French, Scots.
2	F	24	Danish~, Norwegian, Swedish, French~, German~, Latin~, Old Norse~, Scots.
3	F	26	French~, German~, Spanish~, Latin~, Ancient Greek~, Portuguese~.
4	F	26	Mandarin~, French~, Latin~, German~, Spanish~.
5	F	27	French~, Latin~, German~.
6	M	22	French~, German~, Spanish~.
7	M	23	French~, German~, Rheinpletz dialect (German).
8	M	25	Turkish~, German~, French~, Welsh~, Russian~, Italian~, Scottish Gaelic~, Spanish~, Dutch~, Hungarian~.
9	M	27	Latin~, Ancient Greek~, French~.
10	M	28	Mandarin~, French~, Latin~, Scots.
11	F	29	Italian~, Hindi~, Spanish~, Kannada~, Tamil.
12	F	34	German~, Italian~.
13	F	34	Latin~, Ancient Greek~, Modern Greek~, French~, German~, Italian~, Urdu, Turkish.
14	F	35	French~, Russian~, Italian~, Spanish~, Polish~, German~, Japanese~, Cambodian, Mandarin~, Cantonese.
15	F	35	French~, German~, Modern Greek~, Ancient Greek~, Latin~.
16	M	29	Portuguese~, Spanish~, Latin~, French~, German~.
17	M	32	Irish~, French~, Mandarin~, Qinghai dialect (Chinese), Korean~, Dutch~, Portuguese~, German~, Spanish~, Italian~, Amdo (Tibetan), Vietnamese, Arabic, Urdu.
18	M	35	Sango~, French~, Aka~, Cameroonian Pidgin~, Sudanese Arabic, Swahili, Latin~.
19	M	37	German~, French~, Modern Greek~, Italian~, Swahili~, Latin~.
20	M	39	Scottish Gaelic~, Thai~, Italian~, Spanish~, Portuguese~, Vietnamese~, Lao~, German~, French~, Latin~, Burmese.
21	F	42	French~, Spanish~, German~, Polish~, Italian~, Bulgarian~, Latin~.
22	F	43	Latin~, Ancient Greek~, New Testament Greek~, French~, Spanish~, German, Italian, Mandarin, Hebrew.
23	F	43	French~, Russian~, Latin~, German~.
24	F	51	Polish~, French~, German~.
25	F	52	French~, Italian~, German~, Spanish~, Latin~.
26	M	41	Latin~, Ancient Greek~, French~, Spanish~, German~, Afrikaans~.
27	M	44	German~, French~, Latin~, Swiss-German.
28	M	44	Spanish~, Sinhalese~, French~, Italian~, German, Russian.
29	M	51	German~, French~, Italian~, Spanish~, Latin~, Scots.
30	M	52	French~, Latin~, Ancient Greek~, Italian~, Spanish~, Catalan~, German~, Dutch~, Romanian~, Swedish~.

Appendix 3

Table of Pearson Product-Moment Correlations

	Languages	Literacies	Studied †	MLAT5	Motivation	Attitudes	Anxiety
Languages							
Literacies	.886						
Studied †	.599	.586					
MLAT5	.475	.390	.480				
Motivation	.240	.203	.231	.173			
Attitudes	.163	.168	.217	.225	.644		
Anxiety	-.467	-.417	-.130	-.189	-.367	-.174	
Implicit AG	.443	.360	.287	.070	.115	-.174	-.242
Explicit AG	.458	.378	.393	.313	.069	-.076	-.116
Literacy Test	.440	.583	.540	.392	.069	-.018	-.238
Basque Rules	.541	.609	.577	.626	.455	.265	-.394
MLAT4	.494	.502	.540	.547	-.035	-.066	-.069
Grammar Explanation	.526	.487	.576	.485	.081	.096	-.112
Attainment in Basque	.538	.637	.518	.436	.210	.090	-.301

† Number of Languages Studied

AG = Artificial Grammar

	Implicit Artificial Grammar	Explicit Artificial Grammar	Literacy Test	Basque Rules	MLAT4	Grammar Explanation
Languages						
Literacies						
Studied †						
MLAT5						
Motivation						
Attitudes						
Anxiety						
Implicit AG						
Explicit AG	.527					
Literacy Test	.437	.285				
Basque Rules	.323	.445	.555			
MLAT4	-.052	.298	.476	.598		
Grammar Explanation	.046	.285	.333	.511	.773	
Attainment in Basque	.442	.577	.623	.790	.544	.488

† Number of Languages Studied

AG = Artificial Grammar

Appendix 3. Pearson Product-Moment Correlation Table of Language Background Variables, Metalinguistic Test Variables, and Attainment in Basque.