Do morphological awareness and language status predict vocabulary knowledge?

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Abstract

This study explored the within and cross-language contributions of English and French morphological awareness to English and French vocabulary in pupils learning French as a modern foreign language (MFL) in England. Approximately half of the learners were English native speakers (EL1) acquiring French as a second language whilst half were pupils with English as an Additional Language (EAL) who were acquiring at least a third language. Whilst morphological awareness has been shown to have a positive relationship with vocabulary knowledge both in the native language and in an additional language, this relationship had not been measured while controlling for important covariates. Furthermore, the relationship between morphological awareness and vocabulary knowledge in a taught foreign language at secondary school level had not been investigated. Finally, there are few empirical studies that compare the relative contributions of morphological awareness to vocabulary for EL1 and EAL speakers.

Consequently, this thesis adopted a cross-sectional 2x2 between-subjects factorial design with between-participant factors of language status (EL1 vs EAL) and year group (year 8 vs year 10). The results of this study reinforced the importance of morphological awareness to native and additional language receptive vocabulary, whilst extending its importance to foreign language vocabulary for older pupils. With regard to cross-language effects, the contribution of English morphological awareness to French receptive vocabulary was replicated. Additionally, the contribution of English and French morphological awareness to English and French vocabulary were found to be similar for EL1 and EAL pupils. This suggested that morphological awareness played a similar role in vocabulary acquisition for EL1 and EAL pupils.

The implications of these results were threefold. Firstly, the study suggested the usefulness of a morphology-based approach to vocabulary instruction in the MFL context for older pupils. Secondly, this study indicated the need for a new theoretical model as the basis for investigating predictions of morphological awareness to vocabulary. Lastly, it was demonstrated that EAL pupils learn similar amounts of modern foreign language vocabulary to their EL1 peers. Considering this finding, it was suggested that EAL pupils with a variety of language backgrounds may reasonably benefit from the same foreign language instruction as their EL1 peers.

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1 Introduction

This thesis is a cross-sectional study which investigates the within and cross-language contributions of morphological awareness in English and French to English and French vocabulary, for pupils with English as an Additional Language (EAL) and English native (EL1) speakers learning French in the modern foreign language (MFL) classroom in England. The contribution of vocabulary to overall language proficiency is widely considered to be important (Schmitt, 2010; Lewis, 1993), whilst the role of a particular aspect of vocabulary knowledge, morphological awareness, has been shown as beneficial to overall receptive vocabulary size in the native language (e.g. McBride-Chang, Wagner, Muse, Chow, & Shu, 2005; Sparks & Deacon, 2013), and in an additional language (e.g. Ramírez et al., 2013), by helping pupils to discover the meanings of new words via the analysis of component morphemes (Nagy & Anderson, 1982).

However, the nature of the relationship between morphological awareness and vocabulary knowledge still requires further research. Firstly, such relationships have often been established in the absence of important covariates such as expressive vocabulary knowledge and phonological awareness. Additionally, studies with EAL pupils present an ambiguous picture (e.g. McBride-Chang et al., 2006; Kieffer & Lesaux 2012a). Furthermore, due to the lack of exposure to multimorphemic words in the MFL classroom at secondary school, the effects of morphological awareness on vocabulary in the foreign language context are unknown. Crucially, it is noted that secondary school teachers in England are facing increasing numbers of pupils with EAL (National Association for Language Development in the Curriculum (NALDIC), 2013) who may present different linguistic challenges during both foreign language and English language instruction. Therefore, it is argued that more research is required into morphological awareness and pupils with EAL in England, in order to establish the importance of morphological awareness to vocabulary acquisition, both in

English and the French MFL context, the possibility of differential vocabulary learning outcomes between EL1 pupils and their EAL peers, and finally the prospect that EAL pupils may use morphological awareness to a differing degree than their EL1 peers.

Consequently, this thesis aims to investigate both the within and cross-language contributions of English and French morphological awareness to vocabulary in English and French in the MFL classroom, for both EL1 and EAL pupils, where vocabulary knowledge is measured both receptively and expressively. Table 1 summarises the relationships under investigation:

Table 1: Relationships between morphological awareness and vocabulary knowledge under investigation

			Morphological awareness	
			French	**English**
Vocabulary knowledge	**Receptive**	**French**	Within-language associations	Cross-language associations
		English	Cross-language associations	Within-language associations
	Expressive	**English**	Cross-language associations	Within-language associations
		French	Within-language associations	Cross-language associations

As Table 1 shows, there are 8 possible relationships between English and French morphological awareness, and English and French vocabulary measured both receptively and expressively. Due to the reasons outlined above, all of these relationships are empirically interesting. However, due to the limited time afforded to MFL in the curriculum, and as a result of minimal opportunities to use a foreign language outside of the classroom in England, it is reasonable to expect at least a partial floor effect on any measure of French expressive vocabulary in the MFL classroom in England, especially in the lower years. Therefore, both within and cross-language associations of morphological awareness to French expressive vocabulary were not investigated. Hence, the remaining 2 relationships (greyed-out) are not the focus of this thesis. The rest of the introduction explores more deeply the rationale behind the study, defines key concepts, and gives the structure of the rest of the thesis.

1.1 Morphological awareness

1.1.1 What is morphological awareness?

In this study, morphological awareness is defined as the ability to use word-formation rules, and to manipulate and to reflect upon morphemes, the smallest meaning-bearing unit of a word. This definition has been chosen in order to focus on the ability of language learners to understand word structure, which is considered to be the foundation of morphological awareness (Carlisle, 1995).

Morphemes can be categorised as either free morphemes or bound morphemes. Free morphemes, also referred to as base or root morphemes, are units which can stand alone as single words. For example, in the word 'teaching', the free morpheme is *teach*. Conversely, bound morphemes, which are also called affixes, cannot function alone but instead need to be part of a word. In the above example, the bound morpheme is the suffix *ing*.

Furthermore, morphemes can exist alongside one another in different combinations which make up different morphological relationships. These relationships fall into three categories, the first of which is inflectional. Inflectional morphology establishes the grammatical function of a word, links words in a larger syntactic unit such as a sentence, and are mainly associated with features such as tense, person, and number (Lee, 2011). For example, as Goodwin (2010) notes, adding the morpheme *s* to the base morpheme *dog* creates a change in meaning from singular to plural. Consequently, English inflectional morphology consists of a base word followed by a suffix morpheme which does not change the word class or cause a significant change in meaning (Bybee, 1985). This is also true of French. As a result, for the purposes of this study inflectional morphology is considered a relatively simple form of morphological relationship, especially when compared to the second category of morphological relationship, derivational morphology.

Derivational morphology consists of both suffixes and prefixes which may change the meaning and the grammatical class of a word (Goodwin, 2010). Moreover, derivational formation may involve the simultaneous combination of more than two bound morphemes to a root morpheme to form complex words. For example, as Lee (2011) notes, the word 'unbelievable' is formed by the bound prefix *un*, and the bound suffix *able*, in combination to the free morpheme *believe*. As a result, derivational morphology can be regarded as more complex than inflectional morphology due to the greater number of variations of bound morphemes to root morphemes which are possible, and also as derivational morphology leads to greater changes in meaning compared to inflectional morphology (Verhoeven & Perfetti, 2003). Lastly, compound awareness involves the combination of two or more free morphemes, as in the word 'passport', although it should be noted that this process is far more prevalent in Germanic languages than Romance languages (Bauer, 2003).

In addition, knowledge of derivational relationships can be divided into three categories. Relational knowledge involves recognising that words have complex internal structure and that two or more words may share a common morpheme. For example, it is the knowledge that *create* is related to *creator* in a way that *me* is not related to *meter* (Tyler & Nagy, 1989). Syntactic knowledge is based on knowing that syntactic categories are marked by derivational suffixes. For example, it is the knowledge that *regularize* is a verb because it is comprised of the suffix *ize* (*ibid*.). Distributional knowledge concerns limits on combining roots and affixes. For example, *ness* can attach to adjectives but not to verbs such that *quietness* is a legal English word, but *playness** is not (*ibid*.).

The present study focusses on relational knowledge of derivational relationships due to empirical evidence that individuals with greater morphological awareness have greater vocabulary, especially when morphological awareness is measured by root identification (Freyd & Baron, 1982). Such a finding is reasonable given the realisation that both distributional knowledge and syntactic knowledge include and extend relational knowledge. In other words, relational knowledge seems to be the most basic form of derivational awareness.

1.1.2 Influence of morphological awareness on vocabulary: What is morphemic analysis?

The purported mechanism by which morphological awareness contributes to receptive vocabulary is morphemic analysis whereby knowledge of individual morphemes aids in the elicitation of the meaning of an unfamiliar, multimorphemic word (Wysocki & Jenkins, 1987). For example, although the multimorphemic adjective '*unforgiveable*' may be unknown to the reader, the reader may still be able to decompose the word into its component morphemes, the meanings of which are known. In this case, the target word can be decomposed to give the morphemes *un* (prefix meaning not) – *forgive* (base meaning to pardon) – *able* (adjective-forming suffix). By amalgamating the meanings of the component morphemes, the reader may then be able to deduce the meaning of the whole multimorphemic target word. As this mechanism is based on the recognition of familiar parts of a morphologically complex word, it is argued that relational knowledge may offer the strongest predictor of vocabulary knowledge out of any type of morphological awareness.

The implications of morphemic analysis are twofold. Firstly, it is recognised that there should be a significant association between measures of morphological awareness and measures of vocabulary. Secondly, measures of morphological awareness may be used to predict variance in measures of vocabulary. In other words, the mechanism of morphemic analysis can be understood in terms of exploring a possible influence of morphological awareness on vocabulary.

1.1.3 The morphology of English and French

As this study investigates both English and French morphological awareness, a brief outline of the morphological structure of these two languages is warranted. Firstly, with regard to inflectional morphology, French exhibits a richer inflectional system than English where verbs are organised into three basic morphological classes, or conjugations. Moreover, French irregular verbs, unlike English verbs, are decomposable into root plus suffix (Meunier & Marslen-Wilson, 2000). For example, English irregular forms such as ‘drove’ or ‘gave’ cannot be decomposed further. As a result, they must be learnt and remain unanalysed. On the other hand, in French irregular forms such as ‘buvait’ still undergo a regular suffixation procedure, meaning that ‘ait’ is the regular affix for the imperfect third person form. Consequently, irregular verb forms in French are composed of a changed stem plus a regular affix (*ibid.*).

Secondly, with regard to derivational and compound awareness, French vocabulary is far more productive in terms of derived words compared to compound words due to the fact that over 80 per cent of French vocabulary comes from Latin origins. As a result, it has been estimated that over 170 suffixes exist in French (Duncan, Casalis, & Colé, 2009). In contrast, English is a language of Germanic origins which therefore relies more heavily on compounding in place of derivation. As a result, it has been estimated that approximately only 50 suffixes exist in the English lexicon, although English does possess a large number of affixes due to the influence of French and Greek on the language (Crystal, 2003). Moreover, it has also been argued that stressed syllables are perceived to be more salient by the listener in speech (Vihman, Nakai, DePaolis, & Hallé, 2004). Consequently, as Duncan *et al*. argue, the fact that there exists a fixed pattern of final stress in French words may enhance the salience of derivational suffixes, whereas in English the stress pattern may serve to deemphasise suffixes because final stress is comparatively rare.

Lastly, French and English can be compared in terms of the extent to which phonological and orthographical information represent morphological information. According to Jaffré (2006), French orthography systematically encodes morphological information even though it is not often heard in speech. For example, the ‘t’ at the end of the word ‘lait’ (milk) is not pronounced in spoken French, but it is found and heard in derived words such as ‘laitier’ (milkman), ‘laitage’ (dairy product), and ‘laiteux’ (milky) (Duncan et al., 2009).

Consequently, even though there may be graphophonological inconsistencies in French, at a morphological level consistency can be found which may be useful for young learners. However, relative to French, English possesses a deeper orthography with higher levels of inconsistency in the correspondence between spelling and sound. Whilst this situation can be explained by the linguistic history of English which has privileged spelling consistency across words, despite the influence of both Germanic and Latinate languages (Goodwin, 2010), this often results in less transparent morphological relationships in words, due to the conflating factors of orthography and phonology.

1.2 Vocabulary knowledge

As vocabulary knowledge is a multifaceted concept, it is imperative that this concept is defined precisely. Firstly, one could argue that vocabulary knowledge is equated to the lexicon, or the entire word store of human language (Mitchell & Myles, 2004). In turn, the lexicon can be separated into several categories according to the type of knowledge that is known about a particular word, such as phonological, morphological, orthographic, syntactic, semantic, or pragmatic characteristics of words. Moreover, word knowledge can range from being more implicit, for example word recognition, or more explicit, for example being able to provide a word definition (Macaro, Vanderplank, & Murphy, 2010). Consequently, any definition of vocabulary knowledge will have to take into account the specific subtleties of word knowledge.

The aspect of word knowledge that will be analysed in this study is vocabulary breadth which is defined as quantity of words which a language learner knows (David, 2008). Vocabulary breadth is an important aspect of vocabulary knowledge due to the sheer number of words that learners must acquire in order to become proficient in a language (Nagy & Herman, 1987). Moreover, vocabulary breadth can be split into two distinct categories: receptive and expressive vocabulary. Receptive vocabulary is larger than productive vocabulary, but easier to measure and analyse (*ibid*.). For example, Milton (2006) estimated that pupils taking the General Certificate of Secondary Education (GCSE) in French when aged 16 years old have a receptive knowledge of approximately 850 words. Moreover, as receptive vocabulary is likely to play a role in recognising morphologically complex words whilst reading or listening (Kieffer & Lesaux, 2012a), it is theoretically interesting to explore the link between morphological awareness and receptive vocabulary.

Furthermore, it is theoretically interesting to measure the link between morphological awareness and expressive vocabulary, as we know that expressive vocabulary discriminates between English native speakers and pupils with EAL (Murphy, 2014). Although the reasons behind this observation are unclear, it is reasonable to investigate the link between a significant predictor of receptive vocabulary, and expressive vocabulary, due to the strong and significant correlation between the two types of vocabulary knowledge (Bolnick, 2008).

Due to these reasons, and the arguments established above (c.f. Table 1), this study will investigate vocabulary knowledge in the form of English receptive vocabulary, English expressive vocabulary, and French receptive vocabulary.

1.3 The French foreign language context in England

French is the most frequently taught MFL in England (Rodeiro, 2009) however the perception of the amount of French vocabulary acquired by British learners is a stereotypically negative one (Richards, Malvern, & Graham, 2008). Unfortunately, this view is borne out by empirical studies. For example, the performance of pupils in England was rated bottom in reading, writing, and listening in French (European Commission, 2012) in the last European Survey on Language Competencies, whilst Gruber and Tonkyn (2013) report on a mixed methods study where they find that compared to German pupils of a similar age, pupils in England had a significantly smaller vocabulary size in French and learnt French vocabulary at a slower rate than pupils in Germany.

This study reports on several factors that may lie behind the poor learning outcomes in the French MFL classroom in England. Firstly, in terms of intrinsic factors there seems to be an input deficit in French textbooks in England with vocabulary loadings being too light coupled with insufficient recycling of vocabulary to encourage vocabulary acquisition (*ibid.*).

Moreover, teacher expectations of vocabulary learning seem to be low in England which leads to pupils doing relatively little reading outside of class (*ibid*.). Lastly, with regard to extrinsic factors, there are little to no opportunities to receive authentic input and engage in authentic communication in French outside of the classroom.

Perhaps most poignantly for the purposes of this study, it seems that the Key Stage 3 and Key Stage 4 assessment material in England may encourage pupils to pursue rote memorisation of large chunks of language, rather than analysis of syntax or words (Häcker, 2008). As a result, it could be argued that morphological awareness and therefore vocabulary acquisition are being suppressed by the demands of the MFL examination system in England. As mentioned above, morphological awareness is defined as the ability to reflect upon component morphemes (Carlisle, 1995). Moreover, the mechanism by which morphological awareness leads to vocabulary acquisition is via the analysis of component morphemes (Nagy & Anderson, 1982). However, when pupils are asked to pursue rote memorisation of language, there is by definition little time spent reflecting on component morphemes. This may lead to poor knowledge of morphemes. In turn, not only are pupils unable to identify component morphemes in morphologically complex words, they are not encouraged to do so. This may mean that the mechanism by which morphological awareness leads to vocabulary acquisition is undermined. In other words, morphological awareness may not be a significant predictor of vocabulary knowledge in an MFL setting, even for those pupils with good morphological awareness. Nevertheless, such reasoning is purely conjectural and consequently empirical studies are needed in the MFL context in order to uncover the development of morphological awareness in pupils in England, and how this impacts on vocabulary acquisition.

1.4 Language status

1.4.1 Pupils with English as an Additional Language (EAL)

In this study language status is categorised as either i) English native speakers (EL1) or ii) Pupils with English as an Additional Language (EAL). However, as there is an abundant and inconsistent use of terms which exist currently in the field of second language acquisition (SLA) to label learners who do not possess English as an L1, this has created confusion for both researchers and teaching practice (Webster & Lu, 2012). Moreover, different definitions reflect distinct values, assumptions and attitudes which can all have consequences on the language learner, their academic success, and political power relations (Cummins, 1986, 1997).

As such, Webster and Lu (2012) propose that any definition has to overcome two challenges which they identified from a literature review of current definitions in the field. Firstly, the use of deficit-based language to describe learners who do not possess English as a L1 when it is the majority language is to be avoided, as it does not respect the competencies that such learners bring to the classroom. Consequently, the term *Limited English Proficient* is to be avoided, precisely due to the pejorative undertones which it emits (Schon, Shaftel, & Markham, 2009; Peregoy, Boyle, & Cadiero-Kaplan, 2013).

Secondly, any definition should not highlight only the process of English acquisition, as again this view ignores other language competencies that the learner might possess. As a result, the term *English Language Learner (ELL)* is to be avoided, as it does not recognise other language(s) that a learner might also be simultaneously acquiring (Gates, 2010), just as the term *English as a Second Language (ESL)* learner should be eschewed, as it ignores the language(s) that a learner may have learnt prior to their current language acquisition experiences (Peregoy et al., 2013). Consequently, the label of English as an Additional

Language (EAL) will be used in this study. Moreover, this term has the added advantage that it is commonly used to describe learners who do not have English as a native language, specifically in England.

1.4.2 Influence of language status on vocabulary

There is an urgent need for research into the influence of language status on vocabulary outcomes, in the first instance due to an unprecedented rise in the number of pupils with EAL. Taking into consideration a backdrop of worldwide migration in which there has been a 96 per cent increase in EAL pupils at secondary school in England between 1997 and 2013 (National Association for Language Development in the Curriculum (NALDIC), 2013), research into pupils with EAL would be welcomed so that policy makers, and teachers are in a better position to provide for them. Specifically, with regard to vocabulary there is limited empirical data which compares the outcomes of EL1 and EAL pupils on measures of English receptive and English expressive vocabulary, whilst controlling for important covariates. Furthermore, data which compares the outcomes of EL1 and EAL pupils on measures of foreign language receptive vocabulary is sparser. Consequently, the present study seeks to explore the influence of language status on vocabulary outcomes.

1.4.3 Influence of interaction between language status and morphological awareness on vocabulary

As mentioned above, there is much research into the positive effects of morphological awareness on receptive vocabulary size for EL1 pupils (e.g. Carlisle, 2000), and some research with EAL pupils (e.g. Kieffer & Lesaux, 2012a). However, there is a dearth of research which explicitly compares the extent to which learners with different language backgrounds use morphological awareness to acquire vocabulary knowledge. It is argued here that there is good reason to pursue this gap in the field. In terms of pedagogy the rising numbers of EAL pupils in secondary schools in England (NALDIC, 2013) has meant that all secondary teachers, including MFL teachers, must adapt to the demands of pupils with heterogenous language backgrounds. Whilst the EAL label may itself refer to a very heterogenous group of language learners, it is accepted that a reasonable distinction which may help to predict vocabulary acquisition, may be found in the categorisation of language learner as either EL1 or EAL. Therefore, any evidence which shows how pupils of different language status acquire vocabulary is welcomed. Specifically, as pupils with EAL have likely had more experience in applying the principle of morphemic analysis to acquire vocabulary, there may be good reason to expect that the strength of association between morphological awareness and vocabulary knowledge is stronger for EAL pupils compared to their EL1 counterparts. However, as this argument is purely conjectural, there is a need for empirical investigation.

1.5 The present study

The focus of this study is threefold. Firstly, the influence of morphological awareness on vocabulary knowledge, in English and in French, is explored. In other words, is there a direct influence (main effect) of morphological awareness on vocabulary? Secondly, English and French vocabulary levels in groups of EL1 and EAL pupils, are compared. In other words, is there a direct influence (main effect) of language status on vocabulary? Lastly, the extent to which morphological awareness is associated to vocabulary knowledge in groups of EL1 and EAL pupils, is compared. In other words, does language status influence the effect of morphological awareness on vocabulary (moderator effect)?

The thesis is divided into six chapters. Chapter 2 outlines the theoretical underpinnings of the link between morphological awareness and vocabulary, presents a systematic review into studies which have investigated the relationship between morphological awareness and vocabulary, as well as a selective review of studies which have investigated the link between language status and vocabulary. This chapter culminates in six research questions that guided the empirical work. In Chapter 3 the research design, sampling and participants, instruments, and data collection procedure are described. Chapter 4 presents an initial exploration of the data including descriptive statistics, bivariate correlations, and preliminary inferential statistics. Chapter 5 is the main results chapter and presents the findings of the study. This consists of a series of multiple regression models to assess the unique contribution of measures of morphological awareness to measures of vocabulary knowledge, whilst controlling for several covariates. Chapter 6 is a discussion of the findings in the light of previous literature.

2 Literature review

This literature review is divided into five sections. Firstly, theoretical issues concerning the model of language learning envisaged in this study, language learning motivation, and third language learning, are described. Secondly, a systematic review identified 66 studies which quantitatively investigated the relationship between vocabulary and morphological awareness. Next, these studies were analysed to identify useful gaps in the literature. Subsequently, studies were critiqued in order to inform the research design and analytical approach for this study. Then, studies and theoretical models were analysed to form the basis of research questions and hypotheses. Lastly, a summary of the chapter is presented.

2.1 Theoretical issues

2.1.1 A cognitive linguistic model of language

This thesis considers language from a cognitive linguistic perspective in two ways. Firstly, language can be viewed as a reflection of general cognitive processes. General cognitive processes have been investigated extensively in the form of the Cattell-Horn-Carroll (CHC) model. The CHC model has been chosen as the framework to represent general cognitive processes in this study as it is the most comprehensive and empirically supported psychometric theory of the structure of cognitive abilities (Flanagan & Dixon, 2013). In addition, the CHC is extensively used in the literature as the basis for interpreting tests of intelligence and cognitive abilities (Flanagan, Ortiz, & Alfonso, 2013). As the interpretation of such tests is central to this thesis, the CHC model is considered an appropriate framework on which to base an understanding of language.

A brief introduction of the CHC is offered here. As Figure 2.1 shows, the latest version of the CHC model (*ibid.*) presents a hierarchical schematic of intelligence which groups different cognitive abilities into three strata by number and relatedness, such that a general factor, *g* (stratum III), subsumes 16 broad abilities (stratum II) which in turn subsume 81 narrow abilities (stratum I). Abilities within each stratum are positively correlated with one another.

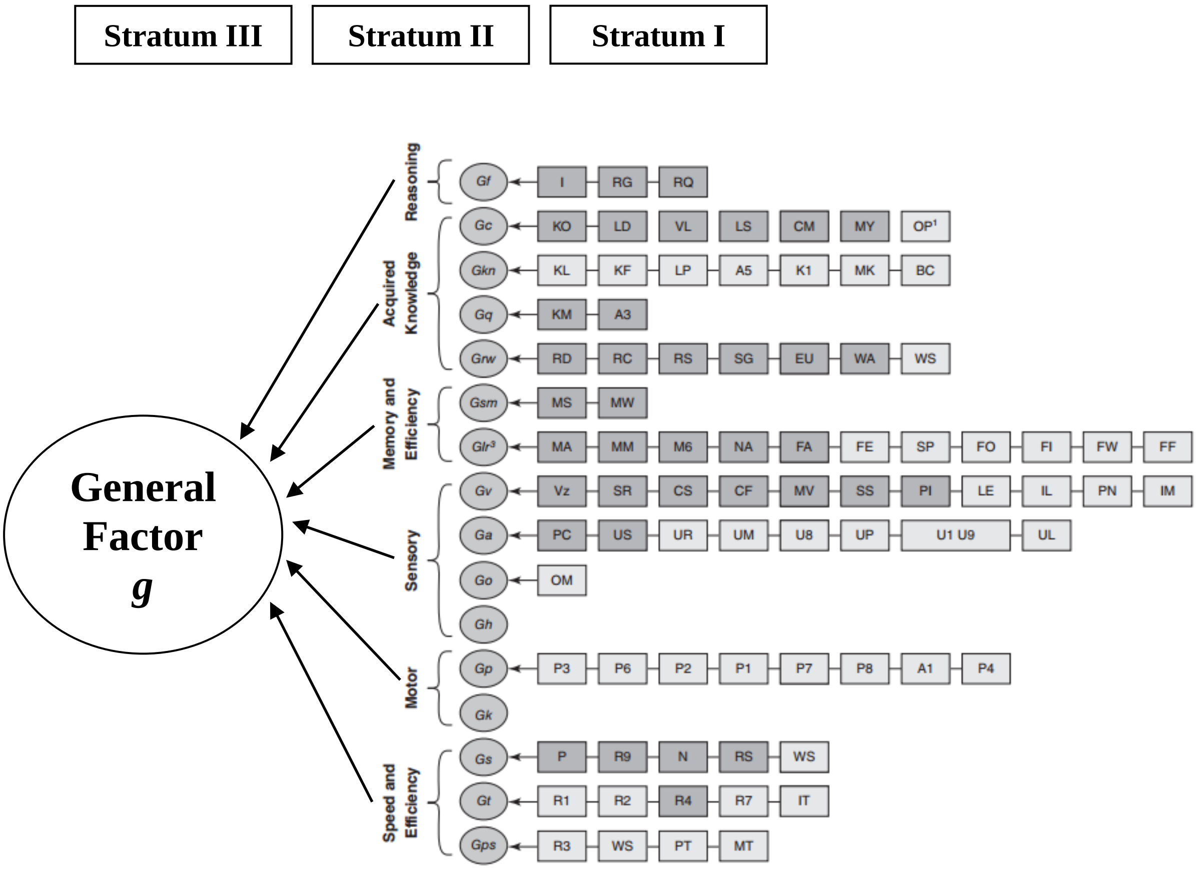


Figure 2.1: Current and expanded CHC theory of cognitive abilities, (figure based on Flanagan et al., 2013, p. 14)

When applied to language-learning it is observed that particular aspects of language are associated with particular cognitive abilities. For example, the CHC envisages a listening ability (LS, stratum I) which is considered part of a broader crystallised intelligence factor (Gc, stratum II). Of particular relevance is the notion of inductive learning (I, stratum I), a marker of fluid intelligence (Gf, stratum II). Inductive learning is defined by the CHC model as the ability to discover an underlying characteristic (rule, concept, process, trend, or class membership) that governs a problem or set of materials (Flanagan & Dixon, 2013). Seen in this light, the mechanism of morphemic analysis (c.f. section 1.1.2) may be considered an example of the application of inductive learning, where the problem of acquiring semantic information from an unknown lexical item is solved by noticing trends between bases and affixes.

Secondly, a cognitive linguistic approach emphasises the highly social nature of humans where linguistic forms that arise in particular contexts of use give rise to particular inferences (Tyler, 2012). With regard to lexical items, a specific lexical unit may have a conventionally accepted meaning within a discourse community. However, meaning extension may occur whereby a single meaningful phonological form (morpheme) develops distinct meanings (polysemy) via its usage in situated communication. For example, Tyler and Evans (2003, pp. 138–140) trace the semantics of *up*, a spatial particle which denotes the vertical trajectory of an object relative to a reference point. The authors outline three distinct meaning extensions; i) An increase in quantity – *The farmer fattened up the calf*; ii) Improvement – *I brushed up on my German before the conference in Landau*; iii) Completion – *The server filled up the pitcher with beer*. As these distinct meanings are related and associated with the same lexical form, the authors conclude that polysemy is motivated and likely to follow some systematic patterns which guide speakers' inferences. Furthermore, Tyler (2012) argues that when inferences are recurrent, they become strongly associated with linguistic form, and these inferences are often the basis of a new extended meaning. Of relevance, therefore, is the realisation that the morphological system of a language may be shaped by the way in which it is used in social interactions between speakers.

Due to the cognitive linguistic approach detailed above, a structural model of language is envisaged where language is analysed in accordance with the size of the linguistic unit at play. Specifically, phonemes are considered the smallest linguistic unit, followed by morphemes, the smallest phonological unit which carries semantic information (Kuo & Anderson, 2006, p. 161), syntax, semantics, and pragmatics (Fromkin, Rodman, & Hyams, 2011). This view of language is supported by the CHC model in that linguistic units are often associated with corresponding cognitive abilities, for example the crystallised intelligence (Gc) factor is sub-divided into general verbal information (K*0*), language development (LD), lexical knowledge (VL), listening ability (LS), communication ability (CM), grammatical sensitivity (MY), and oral fluency factors (OP) (Flanagan & Dixon, 2013). As the focus of this thesis is to describe and explain how knowledge of the morpheme may lead to increased levels of vocabulary acquisition, this thesis focusses on the lexical level of language.

2.1.2 A model of language learning and operationalisation of morphological awareness

The mechanism of morphemic analysis assumes a model of language learning whereby the mental lexicon of learners is morphologically organised. Indeed, psycholinguistic studies have repeatedly shown that morphological information is used when processing complex words (e.g. Nagy, Anderson, Schommer, Scott, & Stallman, 1989). By storing semantic information in this way, morphological knowledge may serve as a framework to efficiently store lexical items (Sandra, 1994). Moreover, the capacity to temporarily store an unfamiliar word increases the ability to form a corresponding entry in a long-term lexical memory. In turn, the retrieval of such items may be facilitated if stored in a morphological framework, due to a decreased load on working memory (Zhang, Lin, Wei, & Anderson, 2013).

Based on this view of language learning, morphological awareness has been operationalised in two main ways in the literature. On the one hand, a single-system view advocates the position that all lexical items are stored in one mental lexicon (e.g. Bybee, 1985), regardless of whether such words can be assembled based on concatenative rules, or not. These words form associations with one another based on characteristics such as phonological or semantic similarity. Furthermore, the frequency of these associations affect the speed or viability of retrieval of the lexical item (Gor, 2007). On the other hand, a dual-system approach (e.g. Pinker, 1999) proposes a model whereby multimorphemic words are either decomposed into their constituent morphemes (c.f. section 1.1.2) by a computational system, or are stored as a separate entity in the mental lexicon. As Gor (2007, p. 369) describes, decomposed items are not stored but rather assembled by the application of concatenative rules. Decomposable items which are not stored in the mental lexicon are not subject to frequency effects.

This study adopts the dual-system approach as some psycholinguistic evidence indicates that L2 processing relies less on morphological decomposition than L1 processing. Indeed, as Kremmel (2016) notes, whilst L2 learners have some knowledge of the relationships between morphologically related words, the assumption that if a language learner knows the meaning of a base, they will also know the meaning of all morphologically related forms of the base, may not hold. Consequently, morphological decomposition may not be the only way that words are processed by L2 learners. One reason why morphological decomposition may not be applicable in some cases is due to the semantic opacity of some lexical items. For example, the meaning of the multimorphemic noun *strawberry* cannot be obtained by decomposition into its constituent morphemes. In such cases, the lexical item may be stored whole in the mental lexicon.

2.1.3 Language learning motivation

As this study is concerned with language learning outcomes, it is reasonable that motivation to learn language may present itself as a confound variable in the association between morphological awareness and vocabulary knowledge. Whilst it is beyond the scope of this thesis to offer a comprehensive overview of motivation theories, an outline of two fundamental characteristics relevant to this study are offered here. At its most basic level, motivation is a tri-faceted construct which concerns; i) *Why* people decide on a particular activity; ii) *How long* people are willing to maintain an activity; iii) *How hard* people are willing to pursue an activity (Dörnyei & Ushioda, 2010, p. 4).

In attempting to conceptualise motivation in terms of these three facets, a 'cause and effect' approach has often been adopted in the literature, whereby researchers have alternatively focussed on the drivers behind choosing and maintaining a course of action, or the effects on motivation that a course of action has (see Dörnyei & Ushioda, 2010, p. 5 for an overview). The consequence of this approach has been the conceptualisation of motivation as either a cause or an effect of learning. However, a subsequent approach, and one which is taken up here, is the conceptualisation of motivation in a cyclical relationship with learning. Such cycles may be positive such that high motivation leads to high achievement which in turn leads to high motivation, or negative, such that low motivation leads to low achievement which in turn leads to low motivation. The advantage of such an approach acknowledges the dynamic nature of motivation over time. As this study compares year 8 pupils to year 10 pupils (c.f. section 3.1), cohort differences may exist in terms of motivation due to the influence of time. Consequently, any measure of motivation would ideally be able to capture this temporal aspect of the construct.

A further characteristic of motivation relevant to this study concerns its nature as either intrinsic or extrinsic. As Wigfield and Eccles (2000) explain, intrinsic motivation to pursue an activity is defined by an interest in an or aesthetic appreciation of the activity in question, where one derives enjoyment from said activity. In contrast, extrinsic motivation to pursue an activity is characterised by an awareness of how well a task relates to current and future goals. Such a delineation is relevant to this study as year 10 pupils will most likely be studying towards GCSE qualifications in English and French, whereas this will not be the case for year 8 pupils. The presence of this proximal goal in the minds of year 10 pupils may mean that these participants have more extrinsic motivation to learn language compared to year 8 pupils.

Due to this conceptualisation of motivation, a model is sought which adequately reflects both the dynamic nature of motivation and its intrinsic and extrinsic characteristics. One such model is encapsulated by Dörnyei and Otto's process model of L2 motivation (Dornyei & Ottó, 1998). In this model Dörnyei and Otto describe motivation as an action-orientated process which takes place over three stages; i) A preactional phase; ii) An actional phase; iii) A postactional phase. The dynamic nature of motivation is accounted for by allowing the modification of an activity during the actional phase. This is governed by an on-going appraisal of the activity by the learner. In addition, both intrinsic and extrinsic facets of motivation are represented in the preactional phase, by including both the desires of the learner (intrinsic factors) and the opportunities perceived by the learner (extrinsic factors).

2.1.4 Third language learning

As the EAL participants in this study are learning French as at least a third language, it is important to discuss the issues surrounding third language acquisition and how this differs to L2 learning. Although third language acquisition (TLA) may refer to a variety of concepts (see Hammarberg, 2010), the term is used here to denote a language acquired chronologically after the first and second language. As Cenoz (2013) argues, those acquiring a third language may have an advantage over second language learners. Indeed, there is good empirical data to suggest that this may be the case. For example, Thomas (1988) found that English-Spanish bilingual learners recorded significantly higher scores in French than their English monolingual peers. However, there may be multiple reasons behind such an advantage.

Firstly, third language learners have a broader linguistic knowledge base which they can draw to help understand linguistic aspects of the target language. Whilst the utility of this linguistic knowledge base may be regulated by the proximity of the languages already acquired to the target language (Saville-Troike & Barto, 2016), it is argued that a broader linguistic knowledge base may reasonably have more characteristics, such as structures or vocabulary items, in common with the target language, than the knowledge base of a learner who has only one language to draw upon. Specifically, the presence of cognates in either of the languages already acquired, with French vocabulary items, may introduce a confound variable into the measurement of the association between French morphological awareness and French vocabulary knowledge. Consequently, development of the items included in the test of French vocabulary knowledge should be carefully monitored to ensure that no English-French cognates are present (c.f. Appendix 3.14). However, it is acknowledged that it may not be possible to control for cognates shared with French and all languages known by the EAL participants in this study.

Furthermore, third language learners may be more familiar with language learning as a process. Knowledge of this process may give third language learners particular skills which help them in acquiring new vocabulary items. In this context, superior knowledge of the language learning process may be an advantage for third language learners over their peers who do not have as much language learning experience. Of relevance to this study, therefore, is the realisation that morphemic analysis may be one such linguistic skill which third language learners draw upon to a greater extent than their English monolingual peers, when learning target vocabulary items.

On the other hand, empirical data suggests that knowledge of other languages facilitates third language learning only at intermediate levels of the L3 (Dewaele, 2010). Therefore, EAL participants in this study who have not been learning French for a long period may not be at an advantage compared to their English monolingual peers. In addition, Cenoz (2013) notes that the effect of previous languages on third language acquisition may not be as strong as that of other, theoretically important control variables, such as non-verbal IQ, or socioeconomic status. Consequently, well-controlled studies into third language acquisition are welcomed.

2.2 Systematic review

As detailed in section 1.1.2, the mechanism of morphemic analysis implies a regressive relationship whereby scores on a measure of morphological awareness are used to predict variance in scores on a vocabulary measure. However, the explicit conceptualisation of this theory as a regression equation has been lacking in past literature. Consequently, it is argued that much published data may exist which speaks directly to the theory of vocabulary acquisition via morphemic analysis but which has not been recognised as relevant due to a focus on reading outcomes. For example, whilst Dallasheh-Khatib, Ibrahim, and Karni, (2014) investigated the relationship between morphological awareness and reading acquisition, the authors also included a measure of vocabulary and an associated correlation coefficient between this measure and a measure of morphological awareness. From this data, a regression equation can be constructed which speaks directly to the theory of vocabulary acquisition via morphemic analysis. In addition, it is accepted that much unpublished data may be available which may elucidate the relationship between morphological awareness and vocabulary acquisition.

Due to these reasons, a systematic review was conducted in order to identify relevant studies. Relevant studies were defined as those which quantitatively investigated the mechanism of morphemic analysis, either in the form of a bivariate correlation or a regression model. Lists of inclusion and exclusion criteria were then compiled. These criteria were created in order to maximise the likelihood of identifying empirical research which quantitatively investigated the relationship between morphological awareness and vocabulary for samples of typically developing learners:

Inclusion criteria

1. Research that was empirical in nature
2. Research that was quantitative in nature
3. Research included a measure of morphological awareness
4. Research included a measure of vocabulary
5. Research investigated a correlational or regressive relationship between a morphological awareness measure and a vocabulary measure

Exclusion criteria

1. Research was published in a language that the researcher could not understand (not English, French, German, Spanish)
2. Research was not quantitative in nature or sample size was too small (<10 per group)
3. Primary focus of research was on atypically developing learners
4. Research did not include a vocabulary measure
5. Research adopted a neurolinguistic approach
6. Research identified was not a study but a commentary, amendment, review or introduction to a different study

7. Unable to obtain copy of research
8. Research used morphology to refer to a concept in a different discipline
9. Research focussed on the development of an instrument
10. Research did not include a measure of morphological awareness
11. Research was a meta-analysis
12. No correlational or regressive relationship between a morphological awareness measure and a vocabulary measure

Titles and abstracts in electronic databases were then chosen by consulting previous systematic reviews or meta-analyses which had investigated morphologically-based intervention studies (e.g. Goodwin & Ahn, 2013), and by selecting candidate databases based on their description. Consequently, the following databases were consulted: i) PsychINFO; ii) WorldCat; iii) Education Resources Information Center (ERIC); iv) British Education Index (BEI); v) American doctoral dissertations; vi) Chicano database; vii) EBSCO eBook collection; viii) Education abstracts; ix) Child development and adolescent studies; x) Linguistics and Language Behaviour Abstracts (LLBA); xi) Web of Science. In addition, citations and reference lists of known studies on morphological awareness were searched.
A broad search strategy was employed in order to maximise the number of relevant studies identified. This search strategy can be seen in Table 2, with the 'OR' operator in effect between each row:

Table 2: Keyword search strategy

morpholog*	**AND**	vocabulary	**NOT**	case stud*
		literacy		disorder
		reading		autism
		writing		ethnography
		spelling		dyslexi*
		orthograph*		

As Table 2 shows, all studies which mentioned morphology and any measure of literacy in the title were identified. This search strategy was employed as it was noted that many studies which investigated morphology and a measure of literacy also included vocabulary as a covariate, even if this was not the main focus of the study. In addition, a number of ‘NOT’ terms were used in order to identify studies which abided by the exclusion criteria. Figure 2.2 shows how the search strategy was applied:

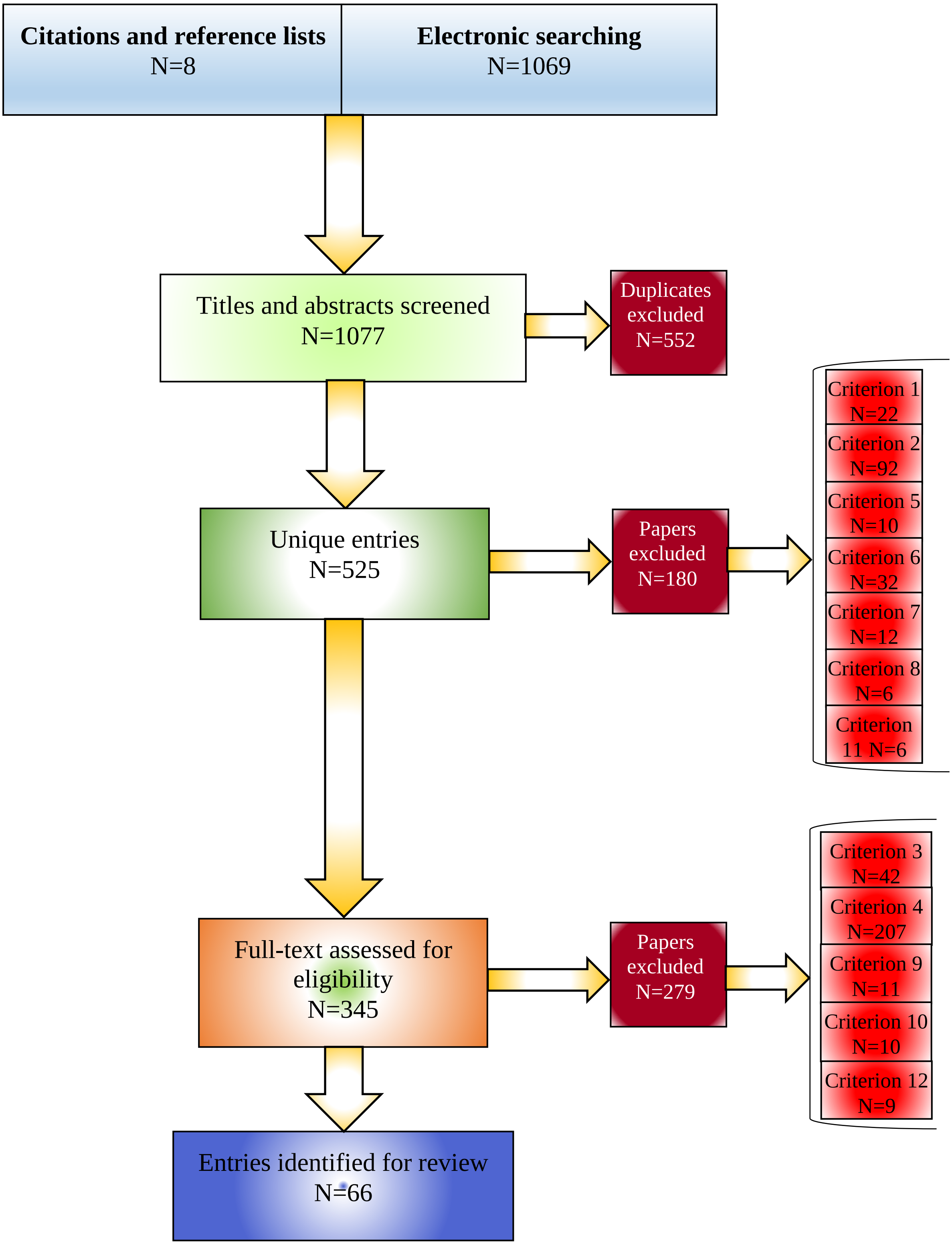


Figure 2.2 Application of search strategy

As Figure 2.2 illustrates, 525 unique entries were initially identified. Subsequently, exclusion criteria were applied, firstly to titles and abstracts, and then to full text. The main reason for exclusion was lack of vocabulary measure (207). After all exclusion criteria had been applied, 66 entries were identified for review. The main characteristics of these entries are presented in Appendix 2.1.

To avoid repetition, in all following instances where a study identified by the systematic review is cited the reader is requested to refer to Appendix 2.1 in order to check information about research design, samples, instruments, and analyses. After identifying these studies, an analysis was valuable in identifying useful gaps in the literature, in informing the research design and analytical approach for the study, and in forming the basis of hypotheses and research questions.

2.3 Identifying gaps in the literature

A large proportion (40 per cent) of studies were carried out in the United States whilst only two studies (3 per cent) were carried out in the United Kingdom. This finding is illustrated in Table 3:

Table 3: Breakdown of studies by country (N=66)

Country	**Number (not mutually exclusive)**
USA	27
Canada	16
China (including Hong Kong)	13
United Kingdom	2
South Korea	4
Greece	1
Israel	1
France	1
The Netherlands	1
Iran	1
North America (not specified)	1
Not specified	1

The finding that a large proportion of research was carried out in the United States has important implications for research into morphological awareness and language status in England, as such literature is based on a relatively homogenous EAL population in terms of L1 profile. For example, in the United States 80 per cent of EAL speakers have Spanish as their L1 (Kindler, 2002). In contrast, the cumulative percentage of the top five L1s spoken by EAL pupils in England is 38.7 per cent; i) Panjabi = 11.0; ii) Urdu = 10.3; Bengali = 8.3; Polish = 5.1; Somali = 4.0 (National Association for Language Development in the Curriculum (NALDIC), 2012).

The differential L1 profile between EAL speakers in the United States and England has two ramifications for this study. In terms of main effects of language status on vocabulary, it is reasonable to hypothesise that acquisition of target language vocabulary varies as a function of L1 profile, due to proportion of shared cognates between L1 and target language. Furthermore, in terms of the link between morphological awareness and vocabulary, generalisations based on Spanish are problematic for pupils with EAL in England as there are differential degrees of morphological transparency between typologically distant languages. As strength of morphemic analysis may depend on degree of morphological transparency, due to differential ratios of bases to affixes, it is reasonable to hypothesise that the link between morphological awareness and vocabulary acquisition may vary as a function of L1 typology.

Secondly, in terms of the language context in which studies were carried out, a vast majority of studies included at least some element of research in the native language context (89 per cent), whilst the additional language context (33 per cent), and especially the foreign language context (6 per cent), were less well represented. These findings are highlighted in Table 4:

Table 4: Breakdown of studies by language context (N=66)

Language context	Number (not mutually exclusive)
Native	59
Additional	22
Foreign	4

Such a disparity is noteworthy. Whilst studies with English-speaking monolinguals highlight the positive effects of morphological awareness on receptive vocabulary size (e.g. Carlisle, 2000; McBride-Chang et al., 2005; Nagy, Berninger, & Abbott, 2006) studies with EAL pupils present an ambiguous picture (e.g. McBride-Chang et al., 2006; Kieffer and Lesaux 2012a). In addition, due to the lack of exposure to multimorphemic words in the modern foreign language (MFL) classroom, the effects of morphological awareness on vocabulary in the foreign language context is unknown. Consequently, more research into morphological awareness and vocabulary is warranted in additional and foreign language contexts.

Furthermore, in terms of the language(s) under investigation, English (82 per cent) and Chinese (23 per cent) were by far the best represented:

Table 5: Breakdown of studies by language and language context (N=66)

Language	Language context			Number (not mutually exclusive)
	Native	Additional	Foreign	
English	31	20	3	54
Chinese	14	1		15
Greek	1			1
Arabic	1			1
French	2		1	3
Spanish	2	1		3
Cantonese	2			2
Korean	4			4
Dutch	1			1
Japanese	1			1
Number (not mutually exclusive)	60	22	4	86

As stated above, the association between morphological awareness and vocabulary may vary as a function of morphological transparency of the language in question. Consequently, research into languages other than English and Chinese is warranted. Specifically, due to the rationale outlined in the introduction (c.f. section 1.3), research in the French language is necessary in order to improve language learning outcomes in the MFL classroom in England.

Of further interest was whether the mechanism of morphemic analysis is robust not only within-languages, but also across languages where the measure of morphological awareness is in a different language to the measure of vocabulary. Therefore, studies were analysed according to association type:

Table 6: Breakdown of studies by association type (within and/or cross-language) (N=66)

Type of association	Number (N=66)
Within	55
Within and cross	11

Table 6 showed that within-language associations between morphological awareness and vocabulary were much better represented in the literature than cross-language associations (83 per cent versus 17 per cent). The under-representation of cross-language research in the literature leaves both empirical and theoretical gaps in the field. Regarding the former, it is reasonable to investigate cross-language links between morphological awareness and vocabulary as the identification of a specific type of meta-linguistic awareness which helps vocabulary acquisition in the native, additional, and foreign language contexts may be beneficial to MFL teachers based in classrooms containing pupils with a variety of different language-learning backgrounds. In addition, cross-language associations are theoretically interesting as they permit the investigation of morphological awareness within Cummins' Common Underlying Proficiency (CUP; Cummins, 2005) framework (c.f. section 2.5).

In terms of sampling a vast majority of studies recruited only groups of speakers with no non-native language-learning experience or only groups of speakers with at least some non-native language-learning experience (86 per cent), whilst only a small proportion focused on a combination of groups (14 per cent):

Table 7: Breakdown of studies by sampling type according to language learning experiences

Sampling	Number (N=66)
Only groups with no non-native language-learning experience (monolinguals)	38
Only groups with some experience of non-native language learning (foreign and/or additional language learners)	19
Combination of groups	9

The relative paucity of studies which included a combination of groups is a weakness in the literature. Specifically, the explicit comparison of such groups would enable the investigation both of main effects of language status, and of moderator effects of language status between morphological awareness and vocabulary.

In addition, in terms of participant age-groups, a vast majority of studies included participants who were primary-school age (76 per cent), whilst kindergartners, secondary school pupils, and adults were less well represented:

Table 8: Breakdown of studies by age of participants (N=66)

Age	Number (not mutually exclusive)
Kindergarten	7
Primary school (grades 1-6)	50
Secondary school (grades 7-12)	10
University/adult	7

The under-representation of older age-groups may mean that main effects of morphological awareness on vocabulary are under-estimated in the literature. As Goodwin (2010) recognises, there exists a positive correlation between morphological awareness and language exposure. Additionally, there is evidence to suggest that greater levels of morphological awareness are associated with greater levels of vocabulary (Kieffer & Lesaux, 2012a).

Specifically, the association between derivational awareness and vocabulary may be under-estimated, as derivational awareness develops during the secondary school years whereas inflectional awareness develops earlier (Carlisle, 2003; Kuo & Anderson, 2006). For example, in the first study of morphological awareness in children, Berko (1958) found that preschool children could correctly produce the plural form of nouns. Moreover, the results of Berko's (1958) study have been replicated with English speaking children (Carlisle, 1995), as well as with French speaking children (Casalis & Louis-Alexandre, 2000). Inflectional awareness has also been found to continue to develop through early primary school (Goodwin, 2010). In contrast to inflectional awareness, only a rudimentary form of derivational awareness is found in preschool aged children (Anglin, 1993) and continues to develop through the secondary school years (Mahony, 1994).

The data also spoke to facets of vocabulary knowledge that were predicted by morphological awareness. As the current study focusses on the relationship between morphological awareness and vocabulary in English and French, only vocabulary measures in these languages were analysed:

Table 9: Breakdown of studies by facets of English and French vocabulary (N=53)

Facet of vocabulary		**Number (not mutually exclusive)**
Receptive (46)	Reading	17
	Oral	29
Expressive (19)	Oral	14
	Written	4

Table 9 shows that measures of receptive vocabulary were much more common than measures of expressive vocabulary (70 per cent versus 29 per cent). Such a finding is unsurprising as the mechanism of morphemic analysis most readily lends itself to the prediction of receptive vocabulary from morphological awareness through deduction of word meaning by identification of constituent morphemes in multimorphemic words.

However, there is also good reason to investigate the prediction of expressive vocabulary by morphological awareness. As Nation (1990) underlines, expressive vocabulary includes and extends receptive knowledge, and therefore any significant predictor of receptive vocabulary may also significantly predict expressive vocabulary. Indeed, Spencer et al., (2015) report significant predictions of standardised measures of English expressive vocabulary (R^2=.42, p<.01), and English receptive vocabulary (R^2=.41, p<.01), by an experimental measure of morphological awareness (Carlisle, 2000). Additionally receptive and expressive vocabulary may be conceptualised as two points on a continuous scale, rather than a dichotomous variable (Hatch & Brown, 1995). From this viewpoint there is no well-defined demarcation between receptive and expressive vocabulary. Instead, it is argued that word knowledge tends towards the expressive end of the scale when there is a rich representation of meaning (Henriksen, 1999). As morphemes are by definition the smallest unit of meaning-bearing information (Carlisle, 1995), morphological awareness may be able to explain some variance on expressive vocabulary outcomes. Lastly, it is empirically interesting to include a measure of expressive vocabulary in the current study as expressive vocabulary has been identified to vary as a function of language status (EL1, EAL) (Murphy, 2014).

In summary, analysis of the literature on morphological awareness and vocabulary showed that there was a relative lack of research carried out in the United Kingdom, that the additional and foreign language contexts have been under-researched in comparison to the native language context, that English and Chinese were by far the most researched languages, that within-language associations more much more researched than cross-language associations, that only a small minority of studies included samples of participants with mixed language learning experiences, that the vast majority of studies included participants who were of primary-school age but not older, and that expressive vocabulary outcomes were relatively under-researched compared to receptive vocabulary outcomes.

2.4 Informing research design and analytical approach

The literature was instructive in terms of informing the research design and analytical approach of this study. In terms of analytical approach to the relationship between morphological awareness and vocabulary, four were discerned in the literature:

Table 10: Breakdown of studies by analytical approach (N=66)

Analytical approach	Number (not mutually exclusive)
Bivariate correlation	65
Multiple regression	13
Structural equation modelling	22
ANOVA	1

Table 10 demonstrates that the vast majority of studies included data on bivariate correlations (98 per cent). This is not surprising as bivariate correlations are often performed as part of preliminary statistical analysis procedures. However, it is apparent that 44 per cent of studies did not include any further inferential statistics. Whilst bivariate correlations provide valuable information, the use of more complex inferential analyses can provide useful information not only about the prediction of one variable from another, but also about the magnitude of this relationship in the presence of theoretically important covariates (c.f. Table 12). Furthermore, it is noteworthy that both structural equation and ANOVA models are based on regression equations. As the theory of morphemic analysis focusses on the prediction of one variable, vocabulary, from another, morphological awareness, this relationship lends itself to an analysis using regression equations. In doing so, the analytical model clearly reflects the theory underlying it whilst also being readily comparable to past literature.

Secondly, the literature showed differing approaches to the confound variable of time in the relationship between morphological awareness and vocabulary:

Table 11: Breakdown of studies by approach to time (N=66)

Approach to time		**Number (not mutually exclusive)**
Not dealt with		24
Cross-sectional design (23)	Age/grade used as control variable	8
	Two different groups	11
	Three different groups	4
	Four different groups	1
Longitudinal design (26)	Age/grade used as control variable	2
	2 time points	17
	3 time points	3
	4 time points	2
	5 time points	1
	6 time points	1

Table 11 shows that a large proportion of studies (36 per cent) did not address the variable of time at all. The same proportion of studies (36 per cent) adopted cross-sectional designs, and a similar number adopted longitudinal designs (39 per cent). As stated above (c.f. section 2.2), time is an important factor in the relationship between morphological awareness and vocabulary as morphological awareness increases with language exposure (Goodwin, 2010), and there is evidence to suggest that greater levels of morphological awareness are associated with greater levels of vocabulary (Kieffer & Lesaux, 2012a). However, whilst longitudinal designs are preferable when tracing the relationship between morphological awareness and vocabulary over time, they are often not feasible. As the literature demonstrates, in such situations a cross-sectional design may be used, however this suffers from limitations of sample bias. Moreover, cross-sectional designs do not speak to questions of directionality between variables.

Furthermore, an analysis of the literature was informative with regard to covariates measured in the relationship between morphological awareness and vocabulary. As bivariate correlations by definition employ no covariates, only studies which employed multiple regression, ANOVA, or structural equation modelling were analysed:

Table 12: Covariates measured in multiple regression, ANOVA, or structural equation modelling studies (N=36)

Covariates		**Number (not mutually exclusive)**
None		17
Phonological awareness (29)	Phoneme/syllable deletion	13
	Phoneme rhyme production	1
	Word segmentation	1
	Real word naming	4
	Phonemic decoding	5
	Nonword repetition	2
Nonverbal IQ		9
Socioeconomic status		2
Age/Grade		9
Rapid automized naming (RAN)		1
Receptive vocabulary		2
Word reading		2
Lexical inferencing		2
Syntactic awareness		1
Length of time in country		1
Orthographic awareness		2
Other types of morphological awareness		2

Table 12 shows that out of the 36 studies to employ multiple regression, ANOVA, or structural equation modelling, 17 studies (47 per cent) did not measure any covariates. Although this seems like a large proportion, it is noted that the majority of studies employing structural regression models were investigating reading outcomes as the dependent variable. In such models, the regression equation predicting vocabulary from morphological awareness often did not include any covariates, although covariates were present later in the model when controlling for predictions of reading outcomes. In studies which did include covariates, an aspect of phonological awareness was always measured, whilst nonverbal IQ and age/grade were present approximately half of the time.

This data has important implications for the study. Firstly, it is noted that it is possible to draw only very tentative conclusions about the relationship between morphological awareness and vocabulary when no covariates are measured, as the prediction of vocabulary may be due to unmeasured, but theoretically important variables. Secondly, as the data shows phonological awareness is considered a theoretically important variable when investigating morphological awareness. As Kuo and Anderson (2006) note, at its core the morpheme is a pairing of semantic and phonological information. In other words, it is problematic to separate phonological awareness from morphological awareness at point of measurement. One way to tackle this problem is to include a covariate of phonological awareness in a regression equation which is used to partial out shared variance with the vocabulary measure, thereby leaving unique variance which can be attributed to the measure of morphological awareness.

Due to the importance of phonological awareness, it is argued that working memory (WM) should also be included as a covariate in an analysis of morphological awareness and vocabulary, despite the fact that none of the identified studies included a WM measure. WM has been targeted as a covariate due to evidence which links WM to phonological processing capacity (Weiss, Saklofske, Prifitera, & Holdnack, 2006). The link between WM and phonological processing capacity is based on the Working Memory Model (Baddeley & Hitch, 1974). This model visualises a bi-directional relationship between the part of the WM which deals with spoken and written material, the phonological loop, and the main hub of the WM, the central executive. Consequently, it is conjectured that extremely poor WM capacity may lead to poor phonological awareness which would in turn negatively skew results on assessments of morphological awareness.

Another widely measured variable in the literature was nonverbal IQ. Nonverbal IQ is theoretically important in this study as there tends to be very little difference in nonverbal IQ scores between children and adolescents of the same age, up until the age of 16 (Abdel-Khalek & Lynn, 2006). Consequently, if extreme results are found this may be indicative of an intellectual disability (ID). Data from such a participant would violate exclusion criteria 3 of the study (c.f. section 2.1). Moreover, nonverbal IQ can be measured independently of language and cultural backgrounds (Raven, 2008), which is extremely relevant in research involving EAL pupils. Additionally, significant correlations between nonverbal IQ and measures of morphological awareness have been noted in past literature (e.g. Hayashi & Murphy, 2013), indicating that morphological awareness may vary as a function of nonverbal IQ.

Although socioeconomic status (SES) was measured only in two of the studies identified by the systematic review, it is of theoretical importance for the relationship between morphological awareness and vocabulary. Children from higher SES families tend to be exposed to more written text than children from lower SES families (Hart & Risley, 1995). As a result, children from higher SES families are exposed to a larger input of multimorphemic words, and can reasonably be expected to improve their morphological awareness in English at a faster rate than children from lower SES families. Consequently, level of morphological awareness may vary as a function of SES.

Lastly, it is argued that when predicting variance in a vocabulary measure other facets of vocabulary are theoretically important covariates. As mentioned above (c.f. section 2.2) Nation (1990) remarks that expressive vocabulary includes and extends receptive vocabulary. As such, predictors of one are often predictors of the other (e.g. Spencer et al., 2015). Due to shared variance between facets of vocabulary, it is important to partial out variance of one vocabulary facet when measuring the other. The fact that only two of the studies identified by the systematic review measured receptive vocabulary as a covariate, and none measured expressive vocabulary as a covariate, is a weakness in the literature.

Moreover, the literature was informative with regard to measures of morphological awareness. As this study focusses on the relationship between morphological awareness and vocabulary in English and French, only measures in these languages were analysed:

Table 13: Studies measuring the morphology of English and French (N=54)

Morphology measure	Number (not mutually exclusive)
Inflectional	14
Derivational	75
Compounding	15

Table 13 shows that in total 104 measures of morphological awareness were identified across the 54 studies which investigated English or French morphological awareness. The majority of these measures (72 per cent) focussed on derivational awareness. As this study is concerned with the association between derivational awareness and vocabulary (c.f. Chapter 1, section 1.1.1), the 75 measures of derivational awareness identified above were analysed further:

Table 14: Measures of derivational morphology in English and French (N=75)

Characteristics of derivational awareness measures	Number (not mutually exclusive)
Receptive	30
Productive	45
Distributional	4
Syntactic	37
Relational	34
Real words	67
Pseudowords	8
Sentence completion tasks	51
Isolated word tasks	24

Table 14 shows that a plethora of instruments were used in the literature to measure derivational awareness, all of which were unstandardised. Two fifths of derivational measures contained some measure of receptive derivational awareness whilst three fifths contained some measure of productive derivational awareness. Furthermore, tasks measuring syntactic and relational aspects of derivational awareness were more popular than tasks measuring distributional awareness. In addition, the vast majority of derivational morphology measures used real words (89 per cent) whilst only 11 per cent of measures used pseudowords. Lastly, sentence completion tasks and isolated word tasks were represented in approximately a two to one ratio.

Although one might argue that the multitude of derivational awareness measures is a weakness in the literature as it makes for problematic inter-study comparisons, it is often useful to create experimental measures that can be validated and adapted to the requirements of individual studies where small sample sizes are an issue. Furthermore, as Spencer et al., (2015) demonstrate, different measures of morphological awareness often measure the same construct. In their study, the authors gave nine measures of morphological awareness and two vocabulary measures to 99 grade 4 EL1 pupils. Measures differed in terms of administration (oral versus written), response format (open-ended versus multiple-choice), and item type (real words versus pseudowords). Confirmatory factor analysis was then carried out and revealed a uni-dimensional model. This uni-dimensional model was compared to two-factor models; the oral versus written administration [χ^2 difference = 2.98(1), p>.05] and multiple-choice versus oral response format [χ^2 difference =-0.35(1), p>.05] were not significantly different to the two-dimensional model. However, a two-factor model comparing item type (real words versus pseudoword) was not investigated.

In summary, with regard to research design and analytical approach, the literature showed that apart from bivariate correlations, inferential statistics were underused, and that cross-sectional and longitudinal designs were approximately equally popular. When covariates were measured phonological awareness was always present, however important variables such as socioeconomic status were often omitted, whilst working memory, and expressive vocabulary were never present. Furthermore, when derivational awareness was measured real word items were often preferred over pseudoword items, and sentence completion exercises were more commonly used than words in isolation, although there was evidence to suggest that different measures of morphological awareness were tapping into the same construct.

2.5 Forming hypotheses and research questions

Review of the literature was useful for collating data about effects of morphological awareness and language status on vocabulary. Due to the theoretical and practical reasons outlined in the introduction, these effects were investigated in English and in French according to the schematic set out in Table 1 (repeated here for convenience):

Table 1: Relationships between morphological awareness and vocabulary knowledge under investigation

			Morphological awareness	
			French	**English**
Vocabulary knowledge	**Receptive**	**French**	Within-language associations	Cross-language associations
		English	Cross-language associations	Within-language associations
	Expressive	**English**	Cross-language associations	Within-language associations
		French	Within-language associations	Cross-language associations

Table 1 shows that there are three within-language relationships that were of interest:

1. Is English receptive vocabulary predicted by English morphological awareness and language status?
2. Is English expressive vocabulary predicted by English morphological awareness and language status?

3. Is French receptive vocabulary predicted by French morphological awareness and language status?

In addition, there are three cross-language relationships that were of interest:

4. Is French receptive vocabulary predicted by English morphological awareness and language status?
5. Is English receptive vocabulary predicted by French morphological awareness and language status?
6. Is English expressive vocabulary predicted by French morphological awareness and language status?

The literature was analysed in order to build hypotheses for each of these research questions.

2.5.1 Calculating effect sizes

In multiple regression models ΔR^2 was used as the basis for making cross-study comparisons as this value represents additional variance explained by the inclusion of a measure of derivational morphological awareness to a regression model after variance explained by covariates. Where bivariate correlations were given these values were squared to give amount of variance explained in the response variable.

2.5.2 Empirical data: Within-language associations

1. Is English receptive vocabulary predicted by English morphological awareness and language status?
    a) Is there a main effect of English morphological awareness on English receptive vocabulary?
    b) Is there a main effect of language status on English receptive vocabulary?
    c) Is there a moderator effect of language status between English morphological awareness and English receptive vocabulary?

Main effect of English morphological awareness on English receptive vocabulary

Out of the 66 studies identified by the literature review, 19 investigated the relationship between English receptive vocabulary and English relational derivational awareness in the form of a multiple regression equation. However, out of these 19 studies, only 7 reported effects in terms of ΔR^2. Table 15 summarises these studies. Effects are reported in terms of additional percentage of variance explained. Significant effect sizes are displayed graphically in Figure 2.3.

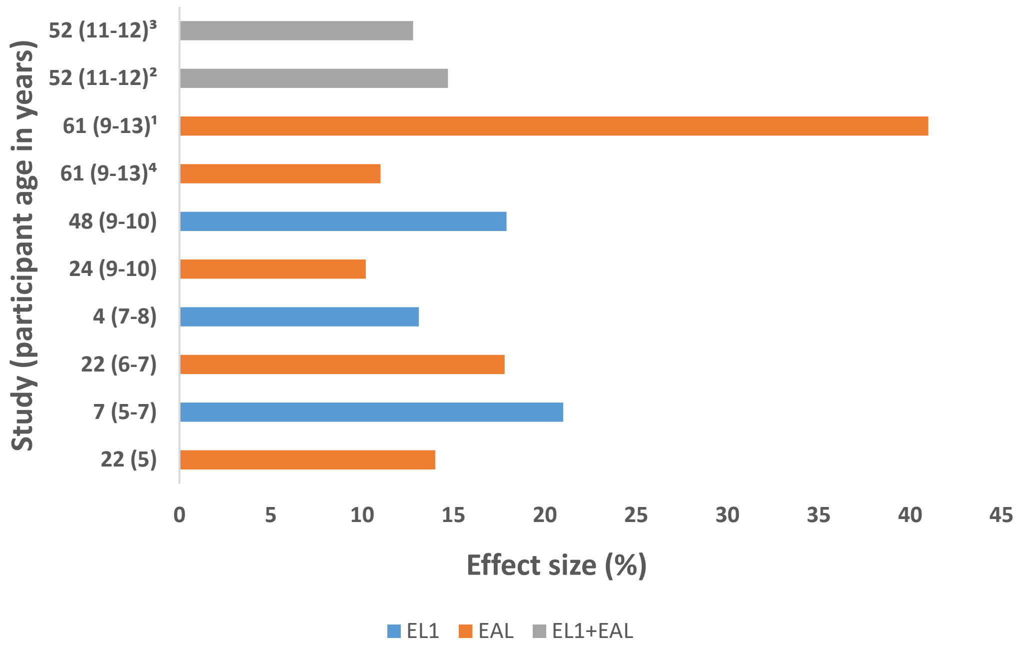
Table 15: Effects of English morphological awareness on English receptive vocabulary

Language status	Study	Covariates									
		Demographic		Nonverbal	Phonological				Orthographic		Morphological
		Age/Grade	Length of residence	Nonverbal IQ	Phoneme elision	Word reading	Pseudoword reading	Oral word segmentation	Orthographic processing	Orthographic fluency	English syntactic awareness
EL1	4	✓		✓	✓	✓	✓				
	7				✓				✓		
	48							✓		✓	
EAL	22	✓			✓						
	24				✓	✓					
	61	✓	✓	✓	✓						
EL1+ EAL	52										✓
					✓						

Table 15 (continued)

Language status	Study	Derivational awareness measure			Participant age	L1 of EAL participants	Effect (%)
		Productive/ receptive (P/R)	**Real words/pseudowords (R/P)**	**Sentence /isolated words (S/I)**			
EL1	4	P	R	I	7-8		13.1^{**}
					8-9		2.4^{ns}
	7	P	R	S	5-7		21.0^{***}
	48	R	R	S+I	9-10		17.9^{***}
EAL	22	R	R	S	5-6 (Time 1)	Chinese	10.1^{ns}
					5-6 (Time 2)		14.0^{*}
					6-7 (Time 1)		17.8^{*}
					6-7 (Time 2)		9.8^{ns}
	24	P	R	S	9-10	Spanish	10.2^{**}
	61	R+P	R	S	9-13 (cognates)		11.0^{***}
					9-13 (noncognates)		41.0^{***}
	52	R	R+P	S	11-12	Korean, Persian, Chinese Filipino Germanic, Romance, Slavic	14.7***
							12.8***

* $p<.05$
** $p<.01$
***$p<.001$
ns $p>.05$



[1] Response variable included cognates only
[2] English syntactic awareness included as covariate
[3] Phoneme elision included as covariate
[4] Response variable included noncognates only

Figure 2.3: Significant effect sizes of English morphological awareness on English receptive vocabulary

Figure 2.3 shows that significant effect sizes ranged from 10.2 to 41 per cent variance explained. Effect sizes did not appear to vary systematically as a function of language status. However, as Table 15 shows, a range of covariates and derivational awareness measures with different characteristics were used in measuring main effects of English morphological awareness on English receptive vocabulary. Consequently, comparison of these studies is problematic.

In addition, nonsignificant effects were reported in three instances. Study 4 (Sparks & Deacon, 2015) reported a nonsignificant contribution for 100 EL1 participants aged 8-9. This finding was puzzling, as the same measure of English morphological awareness contributed significantly (13.1%, p<.01) to the same measure of English receptive vocabulary, for the same participants a year earlier. Upon closer inspection of the data, the nonsignificant contribution may have been due to the stronger explanatory power of the control variables in the model, notably phonological awareness which explained 18.8% (p<.01) of variance in English receptive vocabulary in participants aged 8-9, compared to only 4.2% (p<.05) in participants aged 7-8. As the participants were 7 to 8 years old in Grade 2, it is possible that their phonological awareness was still developing rapidly during this year. This possibility is plausible, as the measure of phonological awareness was a phoneme elision task and the ability to manipulate phonemes has been shown to develop more fully under exposure to formal reading and spelling instruction (Perfetti, Beck, Bell, & Hughes, 1987).

Moreover, study 22 (Lam, Chen, Geva, Luo, & Li, 2012) discovered a nonsignificant contribution for a sample of 46 Chinese EAL kindergarteners, and a different sample of 23 Chinese EAL pupils tested at the end of grade 1 (6-7 years old). Bearing in mind the developmental trajectory of derivational morphological awareness (c.f. section 2.2) such results are not too surprising considering the age of the participants in this study. Furthermore, considering the small sample size of the group tested at the end of grade 1, and the number of predictors in the model (3), there may have been a lack of sufficient power to detect an effect.

Bearing in mind this trend in results, it was hypothesised that this study would also find a main effect of English morphological awareness on English receptive vocabulary, and that this effect would be greater for older participants.

Main effect of language status on English receptive vocabulary

In terms of a main effect of language status on English receptive vocabulary, the data were sparser. Out of the 66 studies identified, only 9 included a combination of groups. Out of these 9 studies, only 2 (studies 64 and 52) explicitly compared an EL1 group to an EAL group on a measure of English receptive vocabulary.

Unfortunately, both of these studies were unclear in their reporting of effect sizes. Study 64 (Carlo et al., 2004) investigated the effects of a vocabulary intervention study based on data from 254 pupils aged 10-11 (169 treatment of which 94 EAL and 75 EL1, 85 control of which 48 EAL and 37 EL1). The authors used a standardised measure of English oral receptive vocabulary (PPVT-R) as a proxy variable for initial English proficiency. They reported that EL1 pupils performed significantly better than EAL pupils prior to treatment, however no associated effect size was reported. This measure of English receptive vocabulary was then used as a covariate for all subsequent analyses.

In addition, the authors developed a measure of English written receptive vocabulary, Word Mastery. This instrument presented to participants one word and a list of definitions. Participants were required to choose the definition which best represented the meaning of the word. Items were target words taught during the intervention. Performance on Word Mastery did not vary as a function of language status (EL1, EAL) after accounting for initial difference on the PPVT-R. This finding indicated that after controlling for initial knowledge of English receptive vocabulary, number of words learned during the intervention did not vary as a function of language status.

Study 52 (Marinova-Todd, Siegel, & Mazabel, 2013) investigated the effect of language status (EL1, Chinese EAL, Filipino EAL, Germanic EAL, Korean EAL, Persian EAL, Romance EAL, Slavic EAL) on two proxy measures of English receptive vocabulary, the reading subtest of the Wide Range Achievement Test -3 (WRAT-3), and the word identification subtest of the Woodcock Reading Mastery Tests – Revised (WRMT-R), for a sample of 1132 pupils aged 11-12 (888 EL1, 244 EAL). In both tasks participants were required to read words of increasing difficulty. According to the authors, these tasks were considered a proxy for English vocabulary as only children who were familiar with the words would be able to recognise them quickly and easily.

The authors ran a series of ANOVAs with language group as the between-subjects variable to see if the 8 language groups differed on the two proxy measures of English receptive vocabulary. They reported no significant difference on the reading subtest of the WRAT-3, whilst a significant difference was reported on the word identification subtest of the WRMT-R $F(8, 1123) = 3.16$ (p<.01), $\eta_p^2 = .019$. This showed that 1.9% of variance on the word identification subtest was accounted for by language status. As language status was coded on 8 levels, post-hoc tests were then conducted which revealed that the Korean EAL group had lower scores than the English and Slavic groups, however associated effect sizes were not able to be calculated based on the data presented.

Due to the lack of reported effect sizes, use of proxy variables over standardised assessments of English receptive vocabulary, and the general sparseness of data, further empirical data were consulted outside of that identified by the systematic review. As the systematic review targeted studies which investigated a bivariate or regressive relationship between a measure of morphological awareness and vocabulary, and not necessarily a main effect of language status on vocabulary, the need to consult further studies was unsurprising.

Bialystok, Luk, Peets, and Yang (2010) presented an aggregate analysis on data obtained from the Peabody Picture Vocabulary Test (PPVT; (Leota. Dunn & Dunn, 1997)) scores. A primary purpose of this analysis was to understand the generalizability of an effect of language status on a standardised measure of English oral receptive vocabulary. Data were obtained from 1,738 pupils aged 3 to 10 (772 EL1, 996 EAL). The authors ran a two-way ANOVA with between-subjects factors of age and language status on PPVT scores. Significant effects of age and language status were found. No interaction was found. In addition, differences in mean score by language group were examined by plotting score distributions for each group. Distributions for both groups resembled a bell curve, meaning that comparisons of all three measures of central tendency were possible. As the authors noted, these statistics showed a consistent 9-point advantage for EL1 pupils over EAL pupils.

Although the authors did not present effect sizes with their ANOVA results, partial eta squared was calculable using the following formula: $\eta_p^2 = n_1F/n_1F+n_2$ where n_1=degrees of freedom for the between-subjects variable, and n_2=degrees of freedom for the within-subjects variable (Kennedy, 1970). Using this formula, η_p^2 for language status was calculated as .35.

To summarise, Bialystok et al., (2010) demonstrated a significant effect of language status on English receptive vocabulary scores. However, this calculation was based on EAL pupils aged between 3-10. Consequently, further studies were sought to elucidate effects of language status for older EAL pupils.

Cameron (2002) compared 63 EAL pupils to 84 EL1 speakers, aged 13 to 14 on two measures of English receptive vocabulary, Nation's vocabulary levels test (1990) and Meara's Yes/No task (Meara, Lightbown, & Halter, 1994). Whilst she found that EAL pupils had descriptively lower scores on the Yes/No task, no inferential statistics were reported. With regard to the vocabulary levels test, EAL pupils performed significantly lower than EL1 pupils at the 3K level; t(145) = -1.37, $p<.05$, and 5K level; t(119.59) = -2.90, $p<.01$. Unfortunately no effect sizes were reported, however r was calculable using the following formula: $r = \sqrt{\frac{t^2}{t^2+df}}$ (Field, 2009, p. 332). Using this formula, an effect size of $r = 0.11$ (R^2= .121, $p<.05$) was calculated for items at the 3K level, and $r = 0.26$ ($R^2 = .068$, $p<.05$) for items at the 5K level. Therefore, at both levels a small significant effect of language status on English receptive vocabulary was present.

However, Cameron (2002) also reported nonsignificant effects at the 10K level; t(144.57) = -1.57, $p>.05$, and on academic vocabulary; t(145) = -1.52, $p>.05$. Although the author reported these findings she offered no explanation for the lack of significant findings on less frequent vocabulary items. One explanation may have been that on these items a floor effect was present for both EL1 pupils and EAL pupils. In order to investigate a possible floor effect, a chance analysis on 10K and academic items was conducted. The most probable score was calculated to be 3/18 on each level (c.f. Appendix 2.2). One sample *t*-tests were then conducted to investigate whether mean scores generated by EL1 and EAL pupils on these items were significantly different than 3. On 10K items both EL1 pupils t(82) = 13.56, $p<.001$, and EAL pupils t(61) = 12.01, $p<.001$, performed better than chance. On academic items both EL1 pupils t(82) = 15.13, $p<.001$ and EAL pupils t(61) = 13.73, $p<.001$ also performed better than chance. Consequently, there was no evidence of a floor effect for either group on either level.

Nevertheless, the results showed that performance for both groups was descriptively low on both 10K items and academic items. It may have been that both EL1 and EAL pupils were exposed to such items only infrequently and only at school, for example through written materials or textbooks. As the EAL pupils in this study had been receiving English medium instruction for 10.5 years on average, they would have received the same amount of exposure to their EL1 peers, with regard to 10K and academic items. In such a situation, it is not surprising that performance on the vocabulary levels test did not vary as a function of language status. Although this line of reasoning is highly conjectural, it does fit the data reported by Cameron (2002).

A further aspect of interest is how main effect of language status on English receptive vocabulary develops with time. As reported above, Bialystok, Luk, Peets, and Yang (2010) did not find a significant interaction between age and language status on PPVT scores for pupils aged 3-10. In other words, the gap between EL1 and EAL scores on the PPVT did not vary as a function of age.

On the other hand, there is evidence to suggest that EAL pupils do eventually approach their EL1 peers in terms of English receptive vocabulary knowledge, although this takes several years. Genesee, Lindholm-Leary, Saunders, and Christian (2006) conducted a systematic review of research on outcomes for EAL pupils aged from pre-Kindergarten through to Grade 12 in the United States. The authors identified approximately 200 articles and reports in their review, from which they drew several conclusions. Firstly, on average EAL pupils only approach native-like oral proficiency after 5 years of formal schooling, regardless of the type of program attended (bilingual or English only). Secondly, rate of progress for EAL pupils decreases such that the majority of progress is made within 3 years of formal schooling. Lastly, despite varied measures, samples, programs, and languages, rates of L2 oral language progress appeared to be consistent.

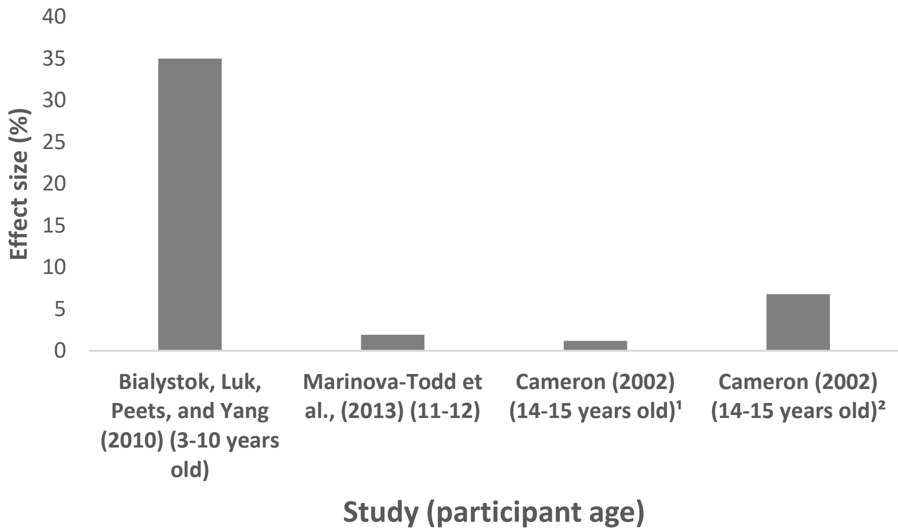
Main effect of language status on English receptive vocabulary: Summary

To summarise, a variety of effects of language status on English receptive vocabulary were found in the literature, both within and outside of the systematic review conducted for this study. These effects ranged from nonsignificant to significant with a moderate effect size, however no covariates were measured. In addition, the literature was ambiguous with regard to a possible interaction effect of time×languagestatus on English receptive vocabulary. Furthermore, it was noticeable that only one study, Cameron (2002) was conducted in the UK context, whilst the vast majority of literature was conducted in the United States. As such literature is based on a relatively homogenous EAL population in terms of L1 spoken (80 per cent Spanish L1, (Kindler, 2002)), implications for a UK-based EAL population are made cautiously. Lastly, as a variety of measures of effect sizes were reported or calculated, these were subsequently converted into R^2 or η^2 values to make comparison easier. Conversions were made using the formulae given in Lakens (2013). Table 16 summarises these studies. Significant effects are displayed graphically in Figure 2.4:

Table 16: Effects of language status on English receptive vocabulary

Study	Language groups	Participant age	Vocabulary measure	Effect size (% variance explained)
64 (Carlo et al., 2004)	EL1, Spanish	10-11	Word mastery: 36 target words followed by choice of 4 definitions	ns
52 (Marinova-Todd et al., 2013)	EL1, Chinese, Filipino, Germanic, Korean, Persian, Romance, Slavic	11-12	Proxy measure: Reading subtest of the Wide Range Achievement Test -3 (WRAT-3)	ns
			Proxy measure: Word identification subtest of the Woodcock Reading Mastery Tests – Revised (WRMT-R)	1.9** in favour of English and Slavic groups over Korean group
Bialystok, Luk, Peets, and Yang (2010)	EL1, EAL (mixed - unspecified)	3-10	Peabody Picture Vocabulary Test (PPVT; (Leota. M Dunn & Dunn, 1997). Standardised test of receptive oral vocabulary	35*** in favour of EL1
Cameron (2002)	EL1, EAL (mixed – Gujerati, Panjabi, Urdu, Arabic)	14-15	Nation's (1990) levels test: A multiple choice vocabulary test of word-recognition 3K level	1.2** in favour of EL1
			5K level	6.8** in favour of EL1
			10K level	ns
			Academic items	ns

** $p<.01$
*** $p<.001$
ns $p>.05$



[1] 3K levels as response variable
[2] 5K levels as response variable

Figure 2.4: Significant effect sizes of language status on English receptive vocabulary

Moderator effect of language status between English morphological awareness and English receptive vocabulary

Out of the 66 studies identified by the systematic review, only 2 explicitly tested the presence of a moderator effect of language status on English receptive vocabulary. Study 13, (Kieffer & Box, 2013) employed structural equation modelling to investigate the relationships between morphological awareness, academic vocabulary, word reading fluency, and reading comprehension, for a sample of 137 pupils aged 11-12 (55 EL1, 82 EAL). Specifically, the authors employed a likelihood ratio test to see if the direct effect of morphological awareness on academic vocabulary varied as a function of language status. The result of this test was nonsignificant $\Delta\chi 2$ (Δdf) = 1.89 (1), p>.05.

Similarly, study 20 (Kieffer & Lesaux, 2012c) employed structural equation modelling to investigate the relationships between morphological awareness, reading vocabulary, silent word reading fluency, and reading comprehension, for a sample of 952 pupils aged 11-12 (323 EL1, 499 Spanish EAL, 48 Vietnamese EAL, 82 Filipino EAL). Specifically, the authors employed a log likelihood ratio test to see if the direct effect of morphological awareness on reading vocabulary varied as a function of language status. The result of this test was significant (Δ-2LL=6.321; df = 3; $p<.05$). Unfortunately, the authors did not include an associated effect size for this difference, although the standardised regression coefficients for the effect of morphological awareness on reading vocabulary for each language group were given; Filipino EAL ($.72^{***}$), Spanish EAL ($.51^{***}$), Vietnamese EAL ($.48^{**}$), and EL1 ($.57^{**}$). Given the sparseness of empirical data, no hypothesis about the presence or magnitude of a moderator effect of language status on English receptive vocabulary can be constructed.

2. Is English expressive vocabulary predicted by English morphological awareness and language status?
    a) Is there a main effect of English morphological awareness on English expressive vocabulary?
    b) Is there a main effect of language status on English expressive vocabulary?
    c) Is there a moderator effect of language status between English morphological awareness and English expressive vocabulary?

Main effect of English morphological awareness on English expressive vocabulary

Out of the 66 studies identified by the literature review, 2 investigated the relationship between English expressive vocabulary and English relational derivational awareness in the form of a multiple regression equation with control variables. As there were so few studies, additional studies were analysed which included regressive relationships without control variables and data on bivariate correlations between measures of English derivational awareness and English expressive vocabulary. These bivariate correlations were then converted into R^2 values. In doing so, the amount of variance in English expressive vocabulary could be predicted by the measure of English morphological awareness, albeit without any covariates in the model. In total, 7 studies were identified. Table 17 summarises these studies. Significant effect sizes are displayed graphically in Figure 2.5:

Table 17: Effects of English morphological awareness on English expressive vocabulary

Language status	Study	Covariates							
		Demographic	Phonological			Rapid naming		Morphological	
		Age/Grade	Word reading	Pseudoword reading	Nonword repetition	Rapid number naming	Rapid object naming	Compound awareness	Syntactic awareness
EL1	3								
	39	✓	✓	✓	✓	✓	✓	✓	✓
	40								
	58								
	62								
EAL	27			✓					
	62								
EL1 + EAL	26								

Table 17 (continued)

Language status	Study	Derivational awareness measure			Participant age	L1 of EAL participants	Effect size (%)
		Productive/receptive (P/R)	**Real words/pseudowords (R/P)**	**Sentence/isolated words (S/I)**			
EL1	3	R	R	S	9-12		26.0^{**}
		R	R	S			10.9^{**}
		R	P	S			10.2^{**}
		R	R	I			4.0^{ns}
		P	R	S			38.4^{**}
	39	R	R	I	5-6		3^{*}
					7-8		2^{ns}
					5-8		2^{**}
	40	R	R	S	9-10		33.6^{**}
					11-12		20.3^{**}
		P	R	S	9-10		37.2^{**}
					11-12		23.0^{*}
		R	R	I	9-10		7.3^{*}
					11-12		7.3^{*}
	58	P	R	S	8-9		22.8^{**}
	62	R	R	I	Adult		$^{a}5.1^{ns}$
							$^{b}33.1^{**}$
		P	R	S			18.2^{ns}
EAL	27	P	R	S	10-11	Spanish	$^{c}8.4^{**}$
		P	R	S			$^{d}19.4^{**}$
		P	R	S			$^{e}25.0^{**}$
		P	R	S			$^{f}18.5^{**}$
	62	R	R	I	Adult	Japanese	$^{a}0.05^{ns}$
							$^{b}0.4^{ns}$
		P	R	S			69.2^{**}
EL1+EAL	26	P	R	I	7-9	Spanish	42.3^{**}

* $p<.05$
** $p<.01$
ns $p>.05$
[a] Predictor variable scored using crude (0,1) system
[b] Predictor variable scored using sensitive (0, 1, 2) system
[c] Predictor involved no phonological or orthographic change in base word
[d] Predictor involved phonological change in base word
[e] Predictor involved orthographic change in base word
[f] Predictor involved phonological and orthographic change in base word

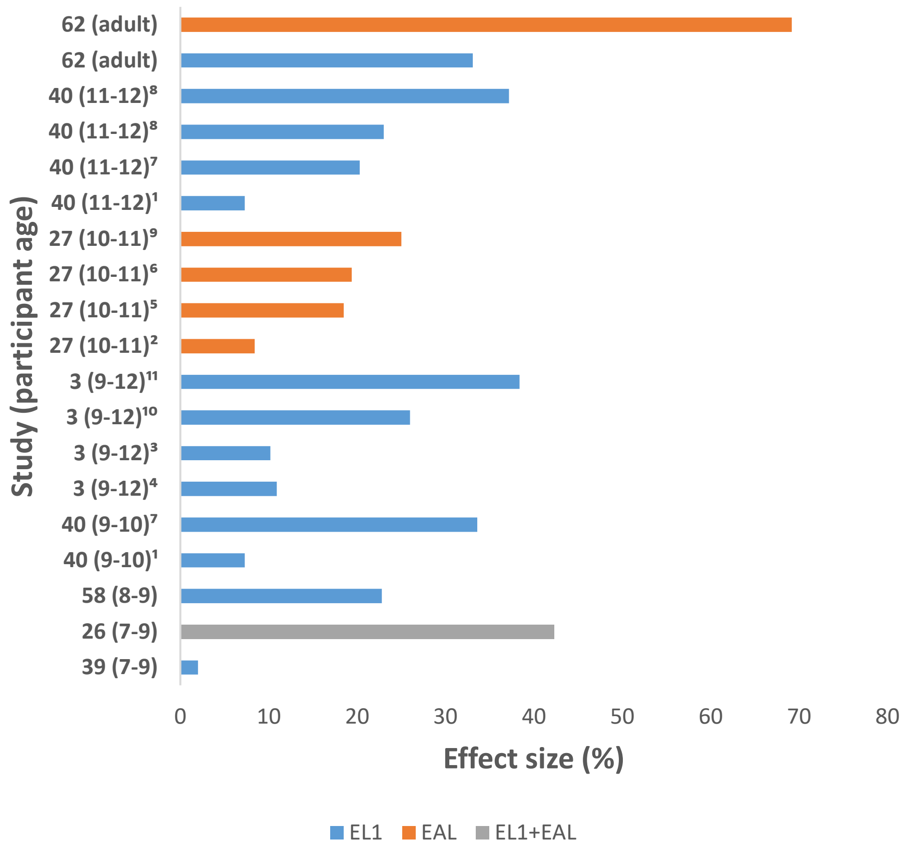


Figure 2.5: Significant effects of English morphological awareness on English expressive vocabulary

[1] Predictor is Comes From Test
[2] Predictor involved no phonological or orthographic change in base word
[3] Predictor is derivational suffix task using improbable words
[4] Predictor is derivational suffix task using nonwords
[5] Predictor involved phonological and orthographic change in base word
[6] Predictor involved phonological change in base word
[7] Predictor is receptive decomposition test
[8] Predictor is productive decomposition test
[9] Predictor involved orthographic change in base word
[10] Predictor is derivational suffix task using real words
[11] Predictor is morphological structure task

Figure 2.5 shows main effects of English derivational awareness on English expressive vocabulary ranging from 3 to 69 per cent variance explained, with most effects ranging between 7 and 42 per cent variance explained. Effect sizes did not appear to vary systematically as a function of language status. As Table 17 shows, the vast majority of these studies did not include any covariates. Whilst this facilitates cross-study comparison, interpretation of these results is made cautiously.

In addition, three studies reported nonsignificant effects. Study 39 (McBride-Chang et al., 2005) reported a nonsignificant effect of a measure of relational derivational awareness on English expressive vocabulary, for 102 EL1 pupils aged 7-8. One explanation for this is that study 39 included several covariates. Specifically, a measure of morphological compound and syntactic awareness was used as a covariate. As the authors noted, the two measures of morphological awareness were moderately associated with one another ($r = .32^{**}$), and therefore they were likely tapping into similar skills. As syntactic awareness builds on relational knowledge (Tyler & Nagy, 1989), this conclusion is theoretically grounded.

Perhaps more surprisingly, Spencer et al., (2015) reported a nonsignificant effect in the absence of any covariates, for a measure of derivational awareness, the Comes From Test (CFT), on a standardised task of expressive vocabulary, the vocabulary subtest from the Stanford-Binet, 4th edition (Thorndike, Hagen, & Sattler, 1986), for a sample of 99 EL1 participants aged 9-12. The Comes From Test was a 12-item multiple choice task administered orally and in writing which required participants to assess whether one word was derived from another word. Items were scored dichotomously. It is noteworthy that in the same study the authors administered 4 other tests of derivational awareness to the same sample. Main effects from each of these measures ranging from 10.2 per cent to 38.4 per cent variance explained, were recorded. An important difference between these tests and the CFT is the use of sentences. Whilst the CFT presented isolated words to participants, the other tests were all comprised of gap-filling exercises in sentences. Consequently, it is plausible that the inclusion of sentences in those tasks tapped into vocabulary knowledge of other words in the sentences. Therefore, such tests may have inflated the main effect of derivational awareness on vocabulary, by measuring vocabulary as part of the predictor. In this context, the CFT may be considered a purer measure of derivational awareness. This conclusion is reinforced by the results of Study 40 (Katz, 2004) where the author found a significant but small effect (7.3 per cent, $p<.05$) for a sample of 77 EL1 pupils aged 9-10, and an identical effect for 70 EL1 pupils aged 11-12, of the CFT on the picture vocabulary subtest of the Woodcock-Johnson Psychoeducational Battery-III (WJPB-III; Woodcock & Johnson, 1989).

Lastly, study 62 (Hayashi & Murphy, 2011) reported nonsignificant effects of a measure of English relational derivational awareness on English expressive vocabulary, for a sample of 20 adult EL1 participants, and for a sample of 22 adult Japanese EAL participants. The measure of English receptive derivational awareness was the Word Segmentation (WS) task. This task presented to participants morphologically complex words in isolation. Participants were required to parse the target item into its component morphemes, e.g., ‘wondering > (wonder + ing)’. Two systems were used to score this test; a crude system which scored each item dichotomously, and a sensitive scoring system where one mark was awarded for each affix correctly identified. For example, the item ‘irregularly’ (correct response ir + regular + ly) was scored either 0 or 1 under the crude system, or 0 or 1 or 2 under the sensitive system. For the Japanese EAL participants, nonsignificant effects were reported under both scoring systems. However, for EL1 participants, a nonsignificant effect was discovered only under the crude marking system, but a moderate significant effect was discovered under the sensitive marking system (33.1%, $p<.01$).

Such a difference may have been due to the small sample size (Knofczynski & Mundfrom, 2007), where one value may have made a large difference to the amount of variance predicted by the model. In addition, the use of a crude, dichotomous marking system when assessing trimorphemic items may have masked expressive vocabulary variance predicted by derivational awareness at the lower end of the scale.

Bearing in mind this trend in results, it was predicted that this study would also find a main effect of English morphological awareness on English expressive vocabulary. However, with a model including several covariates it was also predicted that this effect would be small and may near nonsignificance. Specifically, it was also expected that English receptive vocabulary would be an important covariate in predicting English expressive vocabulary. Due to the mechanism of morphemic analysis it was expected that a measure of English receptive vocabulary would share a lot of variance with a measure of English derivational awareness. Consequently, the main effect of the measure of derivational awareness may be reduced to nonsignificance by the inclusion of English receptive vocabulary.

Main effect of language status on English expressive vocabulary

The data were very sparse when investigating main effects of language status on English expressive vocabulary. Out of the 66 studies identified, only 1 (study 26) explicitly compared an EL1 group to an EAL group on a measure of English expressive vocabulary.

Study 26 (Logan, 2010) investigated the effect of language status on the picture naming vocabulary subtest of the Woodcock Muñoz Language Survey-Revised (WMLS) for 124 pupils aged 7-8 (52 EL1, 72 EAL), and 168 pupils aged 8-9 (77 EL1, 91 EAL). A significant effect of language status was found in favour of EL1 pupils for pupils aged 7-8 and for pupils aged 8-9. The d values presented were converted into R^2 values using the formulae given in Borenstein, Hedges, Higgins, and Rothstein (2009, p. 48). This yielded R^2 values of .375 and .314 meaning that language status predicted 37.5 per cent and 31.4 per cent for pupils aged 7-8 and pupils aged 8-9, respectively.

Due to the sparseness of data, studies outside of the systematic review were again consulted. Burgoyne, Kelly (née Hutchinson), Whiteley, and Spooner (2009) reported the effect of language status on the Expressive One-Word Picture Vocabulary Test (Brownell, 2000) for 92 pupils aged 7-8 (46 EL1, 46 EAL). A significant effect of language status was found in favour of EL1 pupils with language status predicting 21.9 per cent of the variance in English expressive vocabulary. Burgoyne, Whiteley, and Hutchinson, (2011) reported on this same relationship using the same measure of English expressive vocabulary, this time for 32 pupils aged 7-8 (16 EL1, 16 EAL). A significant effect of language status was again found in favour of EL1 pupils with language status predicting 45 per cent of the variance in English expressive vocabulary.

Lastly, McKendry (2013) found a main effect of language status on the English expressive vocabulary subtest of the Test of Word Knowledge (Wiig & Secord, 1992) for a sample of 93 pupils aged 9 to 10 years old (47 EL1, 46 EAL). Although no covariates were measured in this relationship, the author did match groups on age, gender, reading comprehension, and phonemic decoding ability. A significant effect of language status was again found in favour of EL1 pupils with language status predicting 9 per cent of the variance in English expressive vocabulary.

To summarise, the data relating language status to English expressive vocabulary was relatively sparse compared to that linking language status to English receptive vocabulary. Whilst all of the effects found were significant, they varied in magnitude from 9 per cent reliable prediction to 45 per cent, all in favour of EL1. One strength of the data was that a majority of studies were based in the UK context, although age, L1s, and other important covariates such as nonverbal IQ and working memory were left unmeasured. Table 18 summarises these studies. Significant effects are displayed graphically in Figure 2.6:

Table 18: Effects of language status on English expressive vocabulary

Study	Language groups	Participant age	Vocabulary measure	Effect size (%)
26 (Logan, 2010)	EL1, EAL (Spanish + other unspecified)	7-8	The Picture Vocabulary Subtest, of the Woodcock Mufioz Language Survey-Revised (WMLS) (Woodcock, Mufioz-Sandoval, Ruef, & Alvarado, 2005)	37.5*** in favour of EL1
		8-9		31.4*** in favour of EL1
Burgoyne et al., (2009)	EL1, EAL (Punjabi, Urdu, Gujerati, Pushto, Bengali)	7-8	Expressive One-Word Picture Vocabulary Test (Brownell, 2000)	21.9*** in favour of EL1
Burgoyne et al., (2011)	EL1, EAL (Punjabi, Urdu, Gujerati, Pushto, Bengali)	7-8	Expressive One-Word Picture Vocabulary Test (Brownell, 2000)	45*** in favour of EL1
McKendry (2013)	EL1, EAL (Bengali, Gujerati, Marathi, Nepali, Panjabi, Urdu, Sindhi)	9-10	Test of Word Knowledge (Wiig & Secord, 1992)	9** in favour of EL1

** p<.01
***p<.001

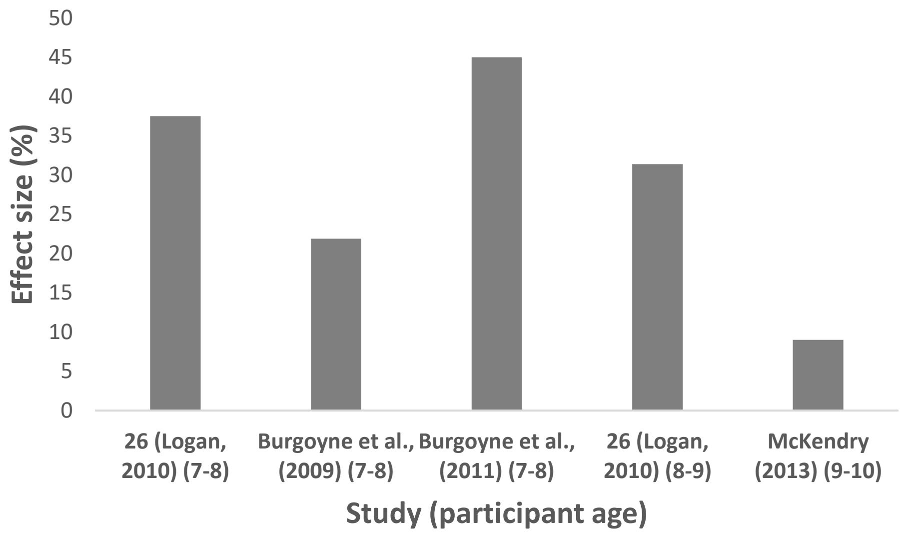


Figure 2.6: Significant effect sizes of language status on English expressive vocabulary

Moderator effect of language status between English morphological awareness and English expressive vocabulary

Only 1 study tentatively investigated the presence of a moderator effect of language status on English expressive vocabulary. Study 26 (Logan, 2010) employed structural equation modelling to investigate the relationships between morphological awareness, vocabulary, word reading, and reading comprehension, for a sample of 292 pupils aged 7-9 (149 EL1, 143 EAL). Specifically, the author employed a likelihood ratio test to see if the proposed model varied significantly as a function of language status. The result of this test was nonsignificant $\Delta\chi 2$ (Δdf) = 11.46 (10), $p>.05$. However, as this was a test of the whole model, and not exclusively the relationship between morphological awareness and vocabulary, the presence of a moderator effect of language status between these two variables cannot be explicitly refuted. Given the sparseness of empirical data, no hypothesis about the presence or magnitude of a moderator effect of language status on English expressive vocabulary can be made.

3. Is French receptive vocabulary predicted by French morphological awareness and language status?

a) Is there a main effect of French morphological awareness on French receptive vocabulary?

b) Is there a main effect of language status on French receptive vocabulary?

c) Is there a moderator effect of language status between French morphological awareness and French receptive vocabulary?

Main effect of French morphological awareness on French receptive vocabulary

Out of the 66 studies identified by the systematic review, only 3 included measures of French receptive vocabulary. Out of these, only 1 (study 37, Deacon, Wade-Woolley, and Kirby, 2007) was carried out in the foreign language context. Moreover, although this study was classified as taking place in the foreign language context, it was carried out in a French immersion classroom which may reasonably differ from the French MFL context in England in terms of amount of input received. Due to the tentative nature of this comparison, and the overall sparseness of data, all studies which looked at the learning of English in the foreign language context, and which included measures of English derivational awareness, were analysed. Even so, only 3 studies were identified. Table 19 summarises these studies. Significant effects are displayed graphically in Figure 2.7:

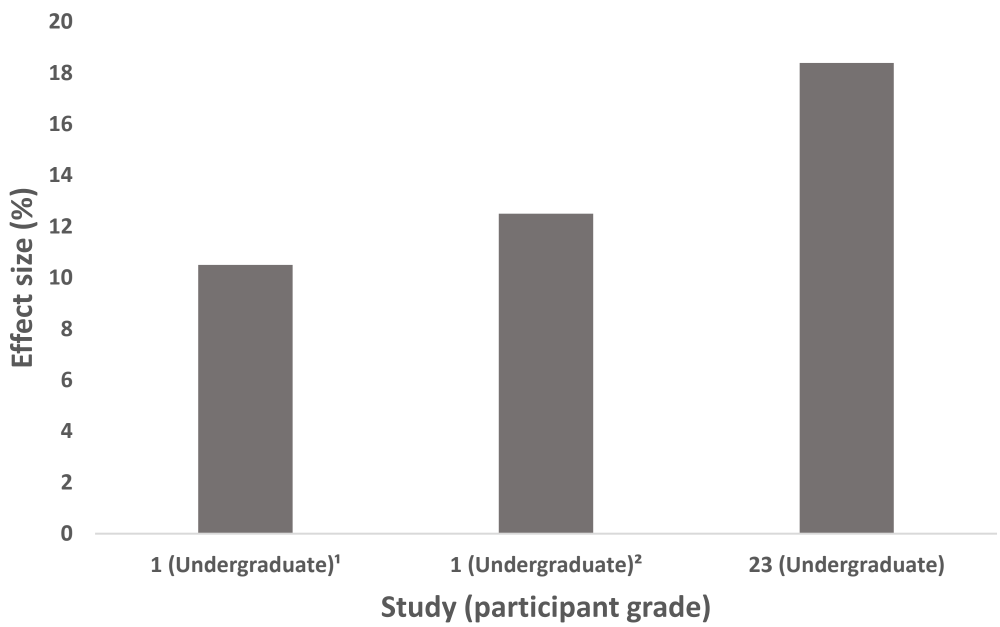
Table 19: Within-language effects of morphological awareness on receptive vocabulary in the foreign language context

L1	Foreign language	Study	Covariates		
			Morphological		
			Chinese homographic morpheme awareness	Chinese morphological production	English compound awareness
English	French	37			
Chinese	English	1			
			✓	✓	✓
Chinese	English	23			

Table 19 (continued)

L1	Foreign language	Study	Derivational awareness measure			Participant age	Effect size (%)
			Productive/receptive (P/R)	Real words/pseudowords (R/P)	Sentence/isolated words (S/I)		
English	French	37	R	R	S	6-7	1.7^{ns}
Chinese	English	1	P	R	S	Adult	10.5^{**}
			P	R	S		12.5^{**}
Chinese	English	23	R	R	I		18.4^{***}

^{ns} p>.05
** p<.01
***p<.001



[1] No covariates measured
[2] Pretest variables measured as covariates

Figure 2.7: Significant effect sizes of morphological awareness on foreign language receptive vocabulary

Figure 2.7 shows main effects of morphological awareness on foreign language receptive vocabulary ranging from 10.5 to 18.4 per cent variance explained. One nonsignificant effect was also found. Study 1 (Xue & Jiang, 2016) reported a small significant effect ($R^2 = .105$, $p<.01$) of English morphological awareness, measured by a modified form of Carlisle's (2000) derivational awareness task, on English receptive vocabulary, measured by the Gates Macginitie Reading Comprehension battery, for a sample of 139 Chinese undergraduate students studying English as Foreign Language. This small effect persisted when measured 9 months later, and after controlling for Chinese morphological awareness and English compound awareness measured at pretest ($\Delta R^2 = .125$, $p<.001$). Unfortunately, as the measure of English receptive vocabulary was more a measure of reading achievement, the effects of English morphological awareness on English receptive vocabulary in the EFL context are called into question.

Study 23 (Zhang & Koda, 2012) reported a small significant effect ($R^2 = .184$, $p<.001$) of English morphological awareness, measured by a word decomposition task, on English receptive vocabulary, measured by an adapted version of Nation's (1990) Vocabulary Levels Test, for a sample of 130 adult EFL undergraduates. Unfortunately, this relationship was not measured in the presence of any covariates.

Whilst studies 1 and 23 provide useful information about the relationship between morphological awareness and receptive vocabulary in the foreign language context, it is noteworthy that both studies were carried out on samples of undergraduate students, where the quantity of multimorphemic input likely differed substantially to that provided in a secondary school foreign language classroom. As such, study 37 (Deacon et al., 2007) was insightful as it was the only study to investigate the relationship in question in younger foreign language learners. Deacon et al., (2007) reported on the relationship between French morphological awareness, as measured by a sentence analogy task, and French receptive vocabulary, as measured by the Échelle Vocabulaire en Images Peabody (EVIP; Dunn, Thériault-Whalen, & Dunn, 1993), a standardised test of French oral receptive vocabulary. The authors tracked a sample of 58 pupils aged 6-9 from English-speaking homes who attended French immersion classes in six primary schools in Canada. As French receptive vocabulary was measured only in Grade 1, an analysis of only Grade 1 results is made here.

The authors discovered a nonsignificant effect of French morphological awareness on French receptive vocabulary at grade 1 ($R^2 = .017$, $p>.05$), indicating that in the early years foreign language context, morphological awareness does not significantly predict receptive vocabulary. However, the measure of French morphological awareness at Grade 1 suffered from reliability issues ($\alpha = .26$), and floor effects with 22.41 per cent of participants at floor in Grade 1. Were a more fine-grained measure of French morphological awareness to have been used, a greater variance of French vocabulary may have been predicted, although this conclusion is highly conjectural.

In addition, as this study investigated the early years foreign language context, there remains a lack of data about the secondary school foreign language context. Given this sparseness of empirical data, no hypothesis about the presence or magnitude of a main effect of morphological awareness on receptive vocabulary in the foreign language context can be made.

Main effect of language status on French receptive vocabulary

The systematic review provided no data about the main effects of language status on foreign language vocabulary. Consequently, data outside of the systematic review were again consulted. Strand, Malmberg, and Hall (2015) analysed evidence from national data in England with regard to the achievement of pupils with EAL. With respect to foreign language achievement, their results were twofold. Firstly, pupils with EAL outperformed their EL1 peers on the outcome measure foreign language GCSE grades (including community languages, d = 0.36) (Strand et al., 2015, p. 36). This d value was then converted into R^2 (Borenstein et al., 2009, p. 48) yielding a value of $R^2 = .014$, meaning that 1.4 per cent of variance in GCSE foreign language attainment was accounted for by language status. Secondly, pupils with EAL outperformed their EL1 peers on modern foreign language GCSE grades (French, German, Spanish only, d = 0.24) (Strand et al., 2015, p. 36). This d value was not converted to R^2 as unfortunately the authors did not include the exact sample sizes for each group on which the calculation of d was based.

The analysis from Strand et al., (2015) showed a small but significant effect of language status on GCSE foreign language grades. On the one hand, this was not surprising considering that many pupils with EAL may take GCSE exams in their community language. In such cases, it would not be surprising if EAL pupils outperformed their EL1 peers, due to an input deficit between the two groups. However, it is noteworthy that a small effect still persisted even after discounting community languages. This effect may be explained by the first language of EAL pupils in that pupils with French, German, or Spanish as an L1 may reasonably be expected to outperform their EL1 peers. A further explanation may be that due to their prior language-learning experiences, EAL pupils are in some way better equipped to learn further languages. Specifically, EAL pupils may have better morphological awareness which helps them acquire foreign language vocabulary items with greater facility than their EL1 peers. Lastly, it is noted that Strand et al., (2015) did not investigate the link between language status and foreign language receptive vocabulary explicitly. As the GCSE qualification tests a variety of linguistic knowledge, one can draw only tentative conclusions about this relationship from the data available.

Moderator effect of language status between French morphological awareness and French receptive vocabulary

There was no data available with regard to the moderator effect of language status between a measure of morphological awareness and a measure of foreign language receptive vocabulary.

2.5.3 Empirical data: Cross-language associations

Main effects of language status on vocabulary outcomes are not analysed here as they have been investigated above. In addition, none of the 66 studies identified investigated the possibility of a moderator effect of language status between a measure of morphological awareness in one language and a vocabulary measure in another language. Consequently, this section of the literature review focusses only on cross-linguistic main effects of morphological awareness on vocabulary.

4. Is French receptive vocabulary predicted by English morphological awareness and language status?
   a) Is there a main effect of English morphological awareness on French receptive vocabulary?

From the studies identified by the systematic review 2 investigated the cross-linguistic relationship between a measure of derivational awareness in either the native or additional language, and a measure of receptive vocabulary in a foreign language. These studies are summarised in Table 20:

Table 20: Cross-language effects of morphological awareness on receptive vocabulary in the foreign language context

Morphological awareness language	Foreign language	Study	Covariates	
			Morphological	
			English derivational awareness	English compound awareness
English	French	37		
Chinese	English	1		
			✓	✓

Table 20 (continued)

Morphological awareness language	Foreign language	Study	Derivational awareness measure			Participant age	Effect size (%)
			Productive/receptive (P/R)	Real words/pseudowords (R/P)	Sentence/isolated words (S/I)		
English	French	37	R	R	S	6-7	26.0^{***}
Chinese	English	1	P	R	S	Undergraduate	$^{a}0.00^{ns}$
							$^{b}0.00^{ns}$
			P	R	S		$^{c}0.00^{ns}$

^{ns} $p>.05$
$^{***}p<.001$
[a] Measured at pretest
[b] Measured at posttest
[c] Measured at posttest with covariates

As Study 1 (Xue & Jiang, 2016) and Study 37 (Deacon et al., 2007) are described in section 2.4.1, they are not described here. Taken together the data implied that cross-language prediction of foreign language receptive vocabulary decreases with time, contrary to the expected trend (c.f. section 2.2). However, this conclusion is tempered by the lack of covariates measured by Deacon et al., (2007). Furthermore, in this study there existed the possibility of a floor effect when English derivational awareness was measured, with 10.34 per cent of participants obtaining a score of zero. In addition, the use of a reading measure by Xue and Jiang (2016) as a proxy variable for English receptive vocabulary calls into question the construct validity of any conclusions drawn about the association between morphological awareness and vocabulary knowledge. Due to sparsity of data, no hypothesis can be made about cross-language effects of morphological awareness on receptive foreign language vocabulary.

5. Is English receptive vocabulary predicted by French morphological awareness and language status?
    a) Is there a main effect of French morphological awareness on English receptive vocabulary?

From the studies identified by the systematic review, none investigated the cross-linguistic relationship between a measure of derivational awareness in a foreign language, and a measure of receptive vocabulary in the native or additional language. Due to this lack of data, any cross-linguistic study was considered which investigated the cross-linguistic relationship between a measure of derivational awareness in the native language, and a measure of receptive vocabulary in an additional language. 4 studies were identified. These studies are summarised in Table 21 and displayed graphically in Figure 2.8:

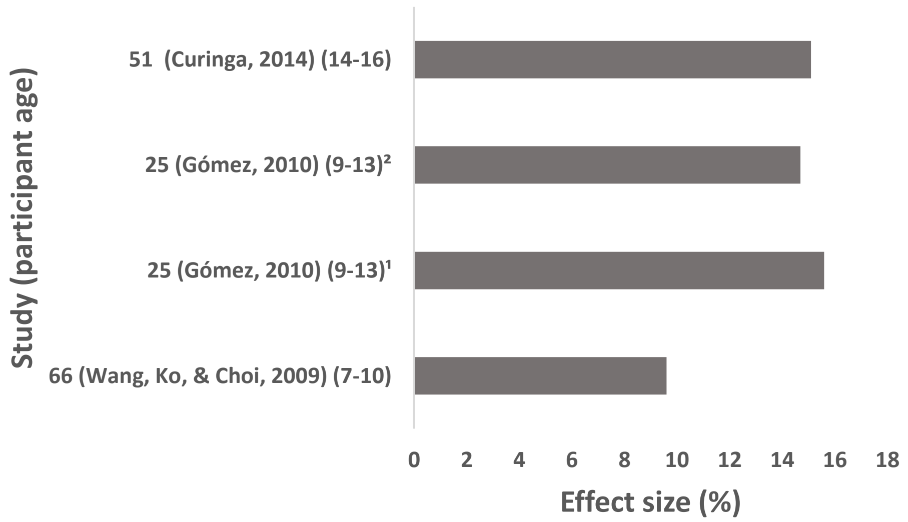
Table 21: Cross-language effects of L1 morphological awareness on additional language receptive vocabulary

Morphological awareness language	Additional language	Study	Covariates				
			Demographic	Nonverbal	Phonological	Morphological	
			Grade	Nonverbal IQ	English word reading	English morphological sensitivity	English morphological structure
Spanish	English	25	✓	✓	✓	✓	✓
		51					
Chinese	English	65					
Korean	English	66					

Table 21 (continued)

Morphological awareness language	Additional language	Study	Derivational awareness measure			Participant age/grade	Effect size (%)
			Productive/receptive (P/R)	Real words/pseudowords (R/P)	Sentence/isolated words (S/I)		
Spanish	English	25	R	R	S	9-13	[a]1.9^{ns}
							[b]0.5^{ns}
							[c]2.9^{ns}
			P	R	S		[a]14.7^{*}
							[b]15.6^{**}
							[c]0.4^{ns}
		51	P+R	R	S	14-16	15.1^{**}
Chinese	English	65	P	R	S	7-10	1.0^{ns}
Korean	English	66	P	R	S	7-10	9.6^{*}

^{ns} $p>.05$
* $p<.05$
** $p<.01$
***$p<.001$
a Cognates and noncognates measured by response variable
b Cognates only measured by response variable
c Noncognates only measures by response variable



[1] Cognates only measured by response variable
[2] Cognates and noncognates measured by response variable

Figure 2.8: Significant effect sizes of L1 morphological awareness on additional language receptive vocabulary

Figure 2.8 shows main effects of L1 morphological awareness on additional language English receptive vocabulary ranging from 9.6 to 15.6 per cent. However, Table 21 also shows 5 instances where nonsignificant effects were found with nonsignificant effects more prevalent than significant ones. In general, significant effects were found when the measure of derivational awareness tapped into relational knowledge rather than syntactic knowledge, and when the measure of receptive vocabulary tapped into knowledge of cognates, rather than knowledge of non-cognates. As so few studies were identified by the systematic review, they are each analysed here in turn.

Study 25 (Gómez, 2010) investigated the prediction of additional language English receptive vocabulary from two measures of L1 Spanish derivational awareness, in the presence of serval covariates, for a sample of 90 Spanish EAL pupils aged 9-13. Additionally, the measure of English receptive vocabulary was measured using three different adaptations of a shortened version of the PPVT-R; i) Cognate and non-cognates; ii) Cognates only; iii) Noncognates. The two measures of L1 Spanish derivational awareness were a modified version of the Test of Morphological Structure (TMS; Carlisle, 2000), and the Test of Morphological Sensitivity (Mahony, Singson, & Mann, 2000). The TMS assessed pupil's ability to manipulate derivational suffixes by requiring the pupil to complete a sentence orally using the correct form of the target word. For example, the pupil hears the word *magic* and is then read the sentence *The performer was a good* ______. The pupil is then required to say the correct response, *magician*. This measure was considered a test of relational knowledge as it required the pupil to recognise the relatedness of the base form *magic* with the derived form *magician*. The Test of Morphological Sensitivity on the other hand assessed derivational syntactic knowledge by requiring the pupil to complete sentences by selecting one out of four given derived words. In addition, half of the given items involved pseudowords comprised of a fake root with a real suffix.

Three main findings came out of this study. Firstly, when the Test of Morphological Sensitivity was entered as predictor, no significant prediction of any measure of English receptive vocabulary was made. Secondly, when the TMS was entered as predictor, main effects were found on cognates and non-cognates, and on cognates only, but not on non-cognates only. Thirdly, where main effects were found these were present after accounting for grade, nonverbal IQ, English word reading, and English derivational awareness (parallel versions of the two measures of Spanish derivational awareness). Specifically, it is noteworthy that within-English measures often accounted for variance in the measure of English vocabulary in excess of 20 per cent. Consequently, Gómez (2010) shows the importance of using robust controls in cross-linguistic prediction of vocabulary from morphological awareness, which include within-language measures in the language in which vocabulary is measured. In addition, Gómez (2010) hints that prediction of vocabulary may vary as a function of cognate knowledge, although this conclusion is highly tentative as it was not tested inferentially. However, given the data presented by Gómez (*ibid.*) there is some evidence to suggest that cognate knowledge may be a confound variable in such a cross-linguistic relationship.

Study 51 (Curinga, 2014) investigated the prediction of additional language English reading vocabulary from a composite measure of L1 Spanish morphological awareness, for a sample of 88 Spanish EAL pupils aged 14-16. The composite measure of L1 Spanish morphological awareness was comprised of 4 individual measures that tapped into aspects of relational and syntactic knowledge, as well as compound awareness. Unfortunately, the use of such a measure meant that it was impossible to tease apart main effects which could be attributed to L1 Spanish derivational awareness. In addition, as the main focus of this study was on reading comprehension, no covariates were measured in the relationship between morphological awareness and vocabulary. Consequently, the finding that 15.1 per cent of variance in English receptive vocabulary can be attributed to Spanish morphological awareness, is treated with caution.

Similarly, study 65 (Wang, Cheng, & Chen, 2006) investigated the prediction of additional language English oral receptive vocabulary from a measure of L1 Chinese derivational awareness, for a sample of 64 Chinese EAL pupils aged 7-10. Interestingly, despite a lack of covariates, no significant effect of Chinese derivational awareness on English receptive vocabulary was found in this sample. As the authors suggest, this finding may be due to the limited use of derivational morphology in Chinese, a language which relies more heavily on compounding. Therefore, L1 Chinese speakers may have a low level of derivational awareness resulting in poor morphemic analysis.

Lastly, study 66 (Wang, Ko, & Choi, 2009) investigated the prediction of additional language English oral receptive vocabulary by a measure of L1 Korean derivational awareness, for a sample of 65 Korean EAL pupils aged 7-10. In this instance, a main effect of Korean derivational awareness on English receptive vocabulary was discovered ($R^2 = .096$, $p<.05$), albeit in the absence of covariates. Such a finding is unsurprising given that Korean Hangul is a derivationally rich language, however the lack of measured covariates means that once again, this finding is to be treated cautiously.

In summary, the systematic review identified a combination of nonsignificant and main effects of L1 morphological awareness on additional language receptive vocabulary. However, where main effects were found, even in the presence of covariates, the implications for the present study are ambiguous. As measures of morphological awareness were taken in the L1, the level of morphological awareness in this language can reasonably be assumed to be higher than that measured in a foreign language where input deficit may come into play. Furthermore, the systematic review had nothing to say about cross-linguistic predictions of morphological awareness on expressive vocabulary (research question 6). Given the sparsity of the data, theoretical models will now be considered from which hypotheses can be made.

2.5.4 Theoretical considerations

Of theoretical relevance to this study is Cummins' Common Underlying Proficiency framework and Dual Iceberg model, (CUP; Cummins, 2005). The CUP states that in a bilingual situation where there is knowledge of two languages, L1 and L2, these languages are interdependent and such interdependence is based on a common underlying proficiency. This common underlying proficiency refers to a central processing system from which both languages operate (Cummins, 1991). Consequently, L1 development can facilitate L2 development (Cummins, 1979; Melby-Lervåg & Lervåg, 2011). Although it is not clear what the common underlying proficiency is comprised of (e.g. Genesee et al., 2006), morphological awareness is one possible candidate.

There are three reasons why morphological awareness may be considered at least a constituent part of the CUP for this study. Firstly, there is precedent to interpret the CUP as a type of language proficiency as opposed to an underlying cognitive ability (e.g. Genesee et al., 2006; Melby-Lervåg & Lervåg, 2011). As the CUP describes a theoretical model which explains language learning outcomes, it is reasonable to expect that any common predictor of L1 and L2 outcomes has at least some linguistic element at its core. Therefore, as a type of metalinguistic awareness, morphological awareness is a good candidate predictor.

Secondly, there is evidence to suggest that bilingual children possess a more analytic orientation to linguistic structures than EL1 children (Balkan, 1970; Ben-Zeev, 1977; Cummins, 1978), by comparing similarities and differences in the vocabulary of two languages (Lambert & Tucker, 1972). As morphological awareness rests on the ability to manipulate and reflect upon morphemes, it is argued that a more analytic orientation to language is synonymous with greater morphological awareness. Moreover, as morphemes are by definition constituent parts of vocabulary it is reasonable to conclude that an analytical approach to vocabulary as observed by Lambert and Tucker (1972) is a reflection of greater morphological awareness. In this context, a greater analytic orientation to language as operationalised by greater morphological awareness may lead to better L1 and L2 outcomes, thereby fulfilling the definition of the common underlying proficiency.

Lastly, in his Dual Iceberg model Cummins (2005) specifies that the CUP underlies surface features of language:

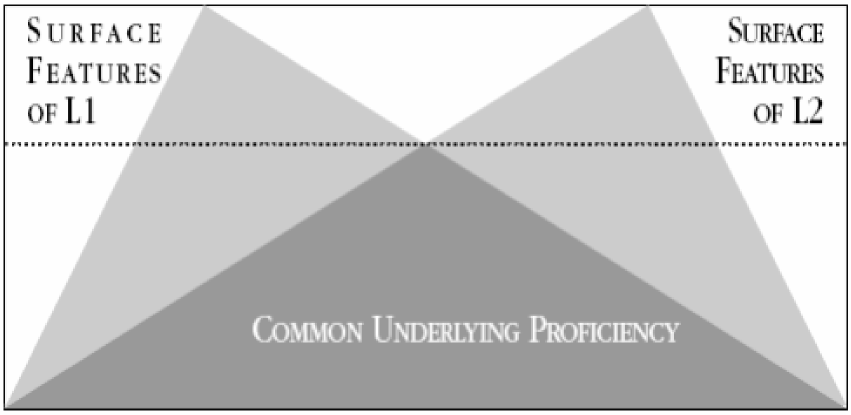


Figure 2.9: Cummins' (2005) dual-iceberg representation of bilingual proficiency

Surface features of language include vocabulary and underlying features include semantic meaning (Cummins, 1992). In other words, the dual-iceberg model is a theoretical way to conceptualise the prediction of vocabulary outcomes by a measure of semantic meaning. As the main aim of this study is to predict vocabulary from morphological awareness via the mechanism of morphemic analysis, the operationalisation of the CUP as morphological awareness is appropriate.

On the other hand, the dual-iceberg may be considered an inappropriate model to assess the prediction of vocabulary from morphological awareness in this study. Whilst surface features do include vocabulary, Cummins (1992) also lists several other surface features such as grammar, knowledge, comprehension, and application, as part of the dual-iceberg model. This study has nothing to say about such outcomes. In addition, EAL speakers learning French as a foreign language in England are acquiring at least a third language. It is yet to be seen whether the dual-iceberg model can appropriately be applied to languages other than the L1 or L2 as a maximum threshold may be reached whereby the CUP offers no further prediction. Such arguments will be taken into consideration when interpreting the results of this study.

With regard to the research questions of this study, the dual-iceberg can be used as a conceptual model. This is presented in Figure 2.10:

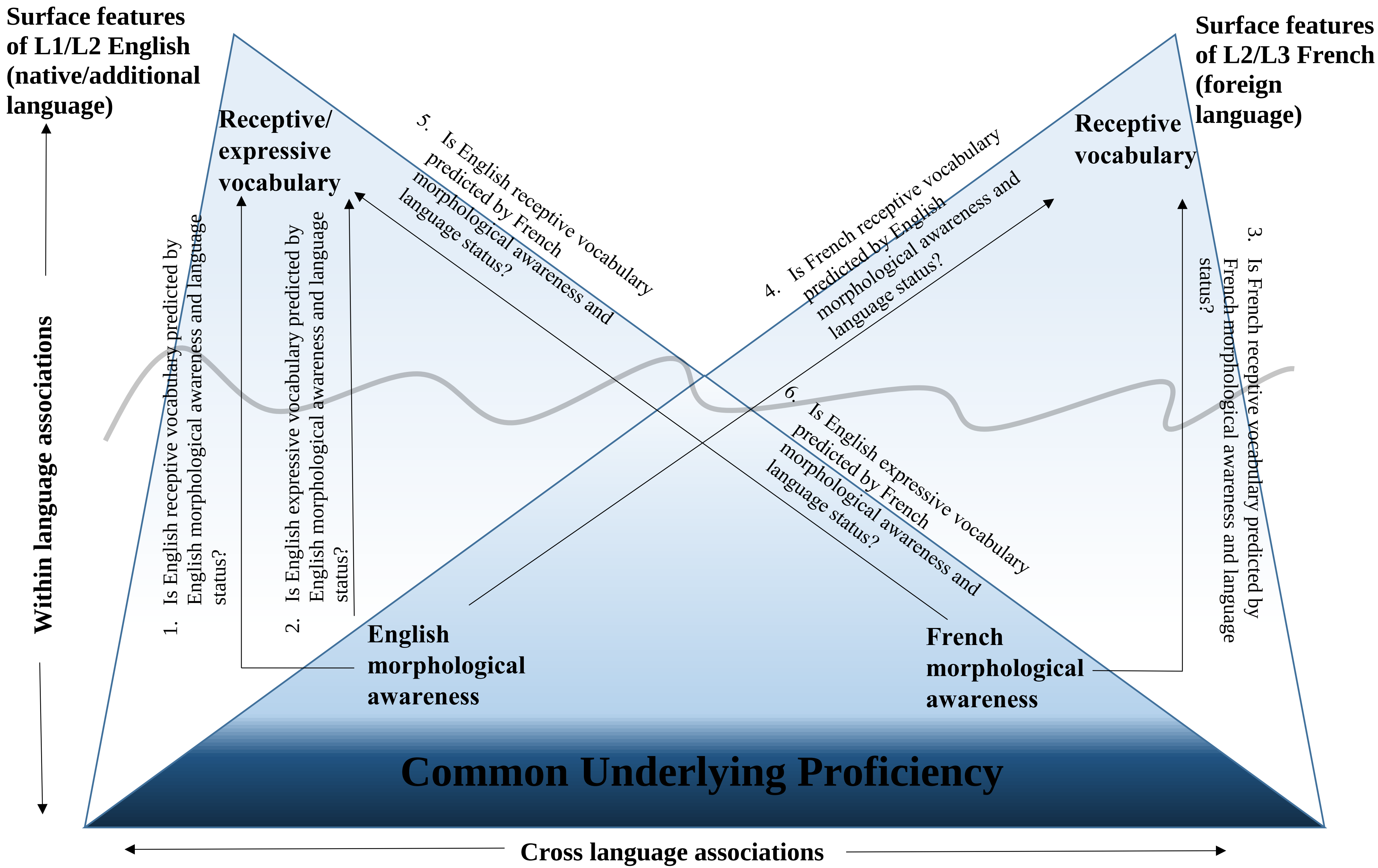


Figure 2.10: Within and cross-languages associations of morphological awareness and vocabulary in the dual iceberg model

The model presented in Figure 2.10 shows that surface features are operationalised by vocabulary measures (English receptive and expressive, French receptive) and that the CUP is operationalised by two measures of morphological awareness (English and French). As the CUP is ideally measured by a single task this may be considered inappropriate. Unfortunately, a dual measurement of the CUP is unavoidable due to the objective of assessing both within and cross-language contributions of morphological awareness to vocabulary. Furthermore, as morphological awareness is a measure of semantic knowledge, it is necessarily measured in a specific language. In other words, it is not considered possible to create an entirely abstract, non-language specific measure of morphological awareness.

However, steps can be taken to minimise task and language effects between the two measures of morphological awareness, thereby approximating a global measure of morphological awareness and therefore the CUP. In terms of task format and administration, these should ideally be identical for both tasks. Moreover, in terms of items pseudowords may be used in order to avoid the confound variable of cognates and in order to create a more abstract measure of morphological awareness. Such arguments will be taken into consideration when designing morphological awareness instruments for this study (c.f. Chapter 3, section 3.4.9, and section 3.4.10)

Moreover, Figure 2.10 presents within and cross-language predictions of vocabulary by morphological awareness. These are represented by single-headed arrows and correspond to the research questions of the study (c.f. section 2.4). An interpretation of this model can be useful in creating hypotheses for the research questions. In terms of within-language associations, the Dual Iceberg model may be interpreted to predict main effects of morphological awareness for all three response variables (English receptive and expressive vocabulary, French receptive vocabulary), main effects of language status when the response variable is French receptive vocabulary, and moderator effects of language status between morphological awareness and vocabulary for all three response variables. These predictions will now be evaluated in turn.

In terms of main effects, the model clearly predicts that morphological awareness should predict vocabulary (English receptive and expressive vocabulary, French receptive vocabulary). Such a prediction is based on the understanding that it is morphological awareness which drives the CUP and is responsible for variance in surface features such as vocabulary. However, as younger learners have spent less time developing their CUP, it is to be expected that the magnitude of morphological awareness main effects are more for older learners. Indeed, for some younger learners this main effect may diminish to nonsignificance due to underdeveloped morphological awareness. Additionally, no main effects of morphological awareness may be found in the foreign language context, for both younger and older learners, as a lack of time spent learning the foreign language may mean that a minimum threshold has not been achieved for transfer from the CUP to surface feature to occur.

The model also predicts a main effect of language status in favour of EAL over EL1 on foreign language vocabulary. Due to differential language learning experiences, EAL pupils can be expected to have a richer CUP where levels of morphological awareness are higher than their EL1 peers, which in turn leads to greater outcomes in the foreign language. However, once again this prediction depends greatly on the amount of time spent learning the foreign language as a minimum vocabulary level may need to be achieved before a richer CUP can lead to greater vocabulary learning outcomes. Additionally, the model also predicts moderator effects of language status between morphological awareness and vocabulary. As EAL pupils can be expected to have a richer CUP they may also be expected to utilise their CUP more in order to achieve greater language learning outcomes, although this is an assumption which is in need of empirical verification.

In terms of cross-language associations the model again predicts main effects of morphological awareness on vocabulary, although these may be of a smaller magnitude to the within-language main effects. Due to the way that the CUP has been operationalised with two measures of morphological awareness, cross-language prediction of vocabulary may be diminished due to shared variance between measures of morphological awareness. Furthermore, with regard to moderator effects of language status between a measure of morphological awareness in one language and a measure of vocabulary in another, the same arguments apply as above; as EAL pupils can be expected to have a richer CUP they may also be expected to utilise their CUP more in order to achieve greater language learning outcomes. Once again, this assumption is in need of empirical verification.

2.5.5 Summary of hypotheses and research questions

Table 22 presents a summary of the research questions and hypotheses formed on the basis of analysing the empirical data driven by the systematic review and Cummins' (2005) Dual Iceberg model:

Table 22: Summary of research questions and hypotheses

Research Question	Hypotheses	Empirical Evidence	Prediction from theory
Within-language relationships			
1. Is English receptive vocabulary predicted by English morphological awareness and language status?	H_0: There is no main effect of English morphological awareness	Study 4: EL1 Grade 3: 2.4^{ns} Study 22: EL1 Younger cohort (kindergarten) time 1: 10.1^{ns} Study 22: EAL Grade 1 time 2: 9.8^{ns}	Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP.
	H_1: There is a main effect of English morphological awareness	Study 4: EL1 Grade 2: 13.1^{**} Study 7: EL1 Kindergarten and Grade 1: 21.0^{***} Study 48: EL1 Grade 4: 17.9^{***} Study 22: Chinese EAL kindergarten time 2: 14.0^{*} Study 22: Chinese EAL Grade 1 time 1: 17.8^{*} Study 24: Spanish EAL Grade 4: 10.2^{**} Study 61: Spanish EAL Grade 4 cognates: 11.0^{***} Study 61: Spanish EAL Grade 4 noncognates: 41.0^{***} Study 52: Combined EAL Grade 6 English syntactic awareness covariate: 14.7^{***} Study 52: Combined EAL Grade 6 phoneme elision covariate: 12.8^{***}	Main effect of CUP on surface feature. Main effect greater for older pupils.
	H_2: There is no main effect of language status	Study 64: Grade 5 pupils: No main effect of language status on Word Mastery (experimental measure) Cameron (2002): Pupils aged 13-14: No main effect on 10K items Cameron (2002): Pupils aged 13-14: No main effect on academic items	
	H_3: There is a main effect of language status	Study 52: Grade 6 pupils. Main effect of 1.9^{**} in favour of English and Slavic groups (language status categorical variable on 8 levels) Study 64: Grade 5 pupils: Main effect in favour of EL1 on PPVT-R. No effect size reported. Bialystok, Luk, Peets, and Yang (2010): Pupils aged 3-10: Main effect of $.35^{***}$ in favour of EL1 Cameron (2002): Pupils aged 13-14: Main effect of 1.2^{**} in favour of EL1 on 3K items Cameron (2002): Pupils aged 13-14: Main effect of 6.8^{**} in favour of EL1 on 5K items	

	H_4: There is no moderator effect of language status between English morphological awareness and English receptive vocabulary	Study 13: Nonsignificant likelihood ratio test: $\Delta\chi2$ (Δdf) = 1.89 (1), p>.05	
	H_5: There is moderator effect of language status between English morphological awareness and English receptive vocabulary	Study 20: Significant log likelihood ratio test: (Δ-2LL=6.321; df = 3; p<.05). No effect size reported.	EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.
2. Is English expressive vocabulary predicted by English morphological awareness and language status?	H_0: There is no main effect of English morphological awareness	Study 3: EL1 9-12 years old Comes From Test: 4.0^{ns} Study 39: EL1 Grade 2: 2^{ns} Study 62: EL1 Adult crude marking system receptive task: 5.1^{ns} Study 62: EL1 Adult productive task: 18.2^{ns} Study 62: Japanese EAL Adult crude marking system receptive task: 0.05^{ns} Study 62: Japanese EAL Adult sensitive marking system receptive task: 0.4^{ns}	Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP. Main effect may diminish to nonsignificance after accounting for English receptive vocabulary
	H_1: There is a main effect of English morphological awareness	Study 3: EL1 Grade 4, four tasks of derivational awareness: 10.2^{**}-38.4^{**} Study 39: EL1 Kindergarten: 3^{*} Study 39: EL1 Kindergarten and grade 2: 2^{**} Study 40: EL1 Grade 4, three tasks of derivational awareness: 7.3^{*}-37.2^{**} Study 40: EL1 Grade 6, three tasks of derivational awareness: 7.3^{*}-23.0^{*} Study 58: EL1 Grade 3: 22.8^{**} Study 62: EL1 Adult Word segmentation sensitive: 33.1^{**} Study 27: Spanish EAL Grade 5, four tasks of derivational awareness: 8.4^{**}-25.0^{**} Study 26: EL1 + EAL Grade 2 and 3: 42.3^{**} Study 62: Japanese EAL Adult productive task: 69.2^{**}	Main effect of CUP on surface feature. Main effect greater for older pupils.
	H_2: There is no main effect of language status		
	H_3: There is a main effect of language status	Study 26: Grade 2: 37.5^{***} in favour of EL1 Study 26: Grade 3: 31.4^{***} in favour of ELI Burgoyne et al., (2009): Year 3: 21.9^{***} in favour of EL1 Burgoyne et al., (2011): Year 3: 45^{***} in favour of EL1 McKendry (2013): Year 5: 9^{**} in favour of EL1	
	H_4: There is no moderator effect of language status between English morphological	Nonsignificant likelihood ratio test: $\Delta\chi2$ (Δdf) = 11.46 (10), p>.05	

	awareness and English expressive vocabulary		
	H_5: There is moderator effect of language status between English morphological awareness and English expressive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.
3. Is French receptive vocabulary predicted by French morphological awareness and language status?	H_0: There is no main effect of French morphological awareness	Study 37: EL1 Grade 1 French immersion pupils: 1.7^{ns}	No main effect due to underdeveloped surface feature which may not be able to draw on CUP. Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP.
	H_1: There is a main effect of French morphological awareness	Study 1: Chinese undergraduate EFL students Pretest: 10.5^{**} Study 1: Chinese undergraduate EFL students Posttest: 12.5^{**} Study 23: Chinese undergraduate students: 18.4^{***}	Main effect of CUP on surface feature. Main effect greater for older pupils.
	H_2: There is no main effect of language status		No main effect of language status due to time spent learning foreign language.
	H_3: There is a main effect of language status	Strand, Malmberg, and Hall (2015): Main effect of 1.4^{***} in favour of EAL	Main effect of language status due to more developed CUP for EAL pupils.
	H_4: There is no moderator effect of language status between French morphological awareness and French receptive vocabulary		
	H_5: There is moderator effect of language status between French morphological awareness and French receptive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.
Cross-language relationships			
	H_0: There is no main effect of English morphological awareness	Study 1: No main effect of L1 Chinese morphological awareness on EFL for undergraduate students on pretest Study 1: No main effect of L1 Chinese morphological awareness on EFL for undergraduate students on posttest Study 1: No main effect of L1 Chinese morphological awareness on EFL for undergraduate students on posttest with pretest items entered as covariates	No main effect due to underdeveloped surface feature which may not be able to draw on CUP. Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP. No main effect due to shared variance between morphological awareness measures.

4. Is French receptive vocabulary predicted by English morphological awareness and language status?	H_1: There is a main effect of English morphological awareness	Study 37: Main effect of 26.0*** of L1 English morphological awareness on French foreign language receptive vocabulary for Grade 1 pupils	Main effect of CUP on surface feature. Main effect greater for older pupils.
	H_2: There is no main effect of language status		No main effect of language status due to time spent learning foreign language.
	H_3: There is a main effect of language status	Strand, Malmberg, and Hall (2015): Main effect of 1.4*** in favour of EAL	Main effect of language status due to more developed CUP for EAL pupils.
	H_4: There is no moderator effect of language status between English morphological awareness and French receptive vocabulary		
	H_5: There is moderator effect of language status between English morphological awareness and French receptive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.
5. Is English receptive vocabulary predicted by French morphological awareness and language status?	H_0: There is no main effect of French morphological awareness	Study 25: No main effect of L1 Spanish morphological sensitivity on English receptive vocabulary (cognates + noncognates) for Grade 4 and 7 Spanish EAL pupils Study 25: No main effect of L1 Spanish morphological sensitivity on English receptive vocabulary (cognates) for Grade 4 and 7 Spanish EAL pupils Study 25: No main effect of L1 Spanish morphological sensitivity on English receptive vocabulary (noncognates) for Grade 4 and 7 Spanish EAL pupils Study 25: No main effect of L1 Spanish morphological structure on English receptive vocabulary (noncognates) for Grade 4 and 7 Spanish EAL pupils Study 65: No main effect of L1 Chinese morphological awareness on English receptive vocabulary for Grade 2 and Grade 4 Chinese EAL	Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP. No main effect due to shared variance between morphological awareness measures.
	H_1: There is a main effect of French morphological awareness	Study 25: Main effect of 14.7* of L1 Spanish morphological structure on English receptive vocabulary (cognates + noncognates) for Grade 4 and 7 Spanish EAL pupils Study 25: Main effect of 15.6** of L1 Spanish morphological structure on English receptive vocabulary (cognates) for Grade 4 and 7 Spanish EAL pupils Study 51: Main effect of 15.1** of L1 Spanish morphological awareness on English receptive vocabulary for Grade 9 and 10 Spanish EAL pupils Study 61: Main effect of 9.6* of L1 Korean morphological awareness on English receptive vocabulary for Grade 2, 3, and 4 Korean EAL pupils	Main effect of CUP on surface feature. Main effect greater for older pupils.

	H_2: There is no main effect of language status	Study 64: Grade 5 pupils: No main effect of language status on Word Mastery (experimental measure) Cameron (2002): Pupils aged 13-14: No main effect on 10K items Cameron (2002): Pupils aged 13-14: No main effect on academic items	
	H_3: There is a main effect of language status	Study 52: Grade 6 pupils. Main effect of 1.9^{**} in favour of English and Slavic groups (language status categorical variable on 8 levels) Study 64: Grade 5 pupils: Main effect in favour of EL1 on PPVT-R. No effect size reported. Bialystok, Luk, Peets, and Yang (2010): Pupils aged 3-10: Main effect of $.35^{***}$ in favour of EL1 Cameron (2002): Pupils aged 13-14: Main effect of 1.2^{**} in favour of EL1 on 3K items Cameron (2002): Pupils aged 13-14: Main effect of 6.8^{**} in favour of EL1 on 5K items	
	H_4: There is no moderator effect of language status between French morphological awareness and English receptive vocabulary		
	H_5: There is moderator effect of language status between French morphological awareness and English receptive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.
6. Is English expressive vocabulary predicted by French morphological awareness and language status?	H_0: There is no main effect of French morphological awareness		Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP. No main effect due to shared variance between morphological awareness measures.
	H_1: There is a main effect of French morphological awareness		Main effect of CUP on surface feature. Main effect greater for older pupils.
	H_2: There is no main effect of language status		
	H_3: There is a main effect of language status		

	H_4: There is no moderator effect of language status between French morphological awareness and English expressive vocabulary		
	H_5: There is moderator effect of language status between French morphological awareness and English expressive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.

2.6 Chapter summary

This literature review analysed the conceptual issues surrounding the association between morphological awareness and vocabulary knowledge for EL1 and EAL speakers. 66 studies were then identified which quantitatively investigated the relationship between vocabulary and morphological awareness. These studies were analysed to identify useful gaps in the literature, and were critiqued in order to inform the research design and analytical approach for this study. Next, these studies were analysed to form the basis of research questions and hypotheses.

Analysis of the literature shaped the methodology of this study in four ways. Firstly, the importance of suitable control variables was highlighted, particular the measurement of working memory, other facets of vocabulary, and motivation to learn language. Secondly, the salience of the impact of time on the relationship between morphological awareness and vocabulary was highlighted. It was suggested that a cross-sectional design may be the most practical way to approach this issue, although a longitudinal design would be preferable. Furthermore, the use of pseudowords in morphological awareness tasks was underlined, due to the confound variable of previous vocabulary knowledge. Lastly, the importance of eliminating all English-French cognates in the measurement of French vocabulary knowledge was emphasised.

3 Methodology

This chapter is divided into seven sections, the first of which describes the research design of the study. This is followed by an explanation of the sampling frame employed for the selection of research sites used including a description of the site where the main phase of data collection was carried out. The third section focuses on a description of the exclusion criteria used for the selection of participants including a description of EAL participant characteristics. A description of research instruments follows. The chapter continues by outlining the procedures used during the main phase of the study. Next, any ethical issues are described and analysed, and lastly a summary of the chapter is given.

3.1 Research design

This investigation employs a cross-sectional, correlational design and has 2x2 between-participant factors. The between-participant factors are language status (EAL, EL1), and year group (year 8, year 10). The response variable is vocabulary (English receptive, English expressive, French receptive), the predictor variable is morphological awareness (English, French), and the moderator variable is language status.

3.1.1 Rationale for a 2x2 between-participant factorial design

This design was chosen for two reasons. Firstly, as identified in chapter 2, section 2.3, there is a lack of studies which have compared EAL pupils to EL1 pupils on measures of morphological awareness and vocabulary knowledge. The first between-participant factor, language status, allows for the comparison of EAL to EL1 pupils. Secondly, it was also identified in chapter 2, section 2.3 that there is a lack of empirical data which describe the growth of morphological awareness in one language and how this correlates to growth of vocabulary knowledge in another. Although the design of this study does not allow us to investigate this phenomenon directly, the second between-participant factor, year group, allows for the comparison of a year 8 cohort with a year 10 cohort and thereby make inferences about knowledge and skill in French in two different academic year groups.

However, there are two important limitations to this design. Firstly, the design is based on the underlying assumption that neither the year 8 nor the year 10 cohorts are subject to differential cohort effects which may distort any inference about the developmental trajectory of morphological awareness. Even though this limitation was highlighted in Chapter 2, section 2.3 it proved impractical to implement a longitudinal design due to the presence of the summer holidays which would have introduced a problematic confound variable into any calculation of vocabulary knowledge growth in the MFL classroom. Furthermore, from a pilot study performed prior to the main period of data collection (c.f. Appendix 3.1) it became apparent that a two time point longitudinal design within an academic year would not have shown statistically significant growth on any measure of French vocabulary, hence rendering it impossible to investigate growth of morphological awareness. Therefore, the data collection phase of a longitudinal study investigating French MFL vocabulary would necessarily have had to have lasted more than one academic year. Due to the time constraints of a DPhil project, a cross-sectional design was considered more appropriate.

Consequently, any conclusions drawn from the results of this study are qualified to reflect possible cohort effects which may have reduced the reliability and validity of the data. Differences between cohorts may include differential amounts of motivation to learn MFL French, differential degrees of L1 literacy, and differential degrees of morphological transparency between typologically distant L1s. These cohort effects are discussed in Chapter 6.

Secondly, due to the correlational nature of this design, no inferences can be made about causation. In order to make inferences about causation, further research is needed based on intervention studies which include random assignment to groups. Due to constraints of time and resources, this was not possible.

3.1.2 Outline of data-collection

Data-collection took place during the 2014 to 2015 academic year and consisted of a piloting phase followed by a main phase. None of the participants who took part in the piloting phase took part in the main phase. During the piloting phase which was carried out between November 2014 and April 2015, a total of 67 participants from three schools (10 from School 1, 12 from School 2, and 45 from School 3) were administered a variety of individual and group-based tests designed to increase familiarity with the instruments and also to help determine the suitability of unstandardised instruments for the participants who took part in the main study. A detailed description of the piloting phase is in Appendix 3.1.

The main phase of data-collection took place from February and July 2015. During this period, 177 participants (c.f. section 3.3 for a breakdown of participants) were each administered measures of morphological awareness in English and in French in groups, and measures of working memory, phonological awareness, nonverbal IQ, English expressive vocabulary, English receptive vocabulary, and French receptive vocabulary individually. Moreover, each participant filled in a Background Information Questionnaire (BIQ) and each EAL participant filled in a Language Background Questionnaire (LBQ) (c.f. section 3.5 for a breakdown of the procedures during the main phase of the study).

3.2 Sampling

This section of the methodology chapter is divided into four subsections. Firstly, a description of the sampling frame is given. Secondly, a description of the populations sizes and characteristics represented in this study is presented. This is followed by an explanation and evaluation of the sampling strategy used for the selection of School 1 as the site of data collection during the main phase of the study. Lastly, a description of School 1 is given.

3.2.1 Sampling frame

A sampling frame was created in order to recruit participants which represented the four groups required by the 2x2 between-participant research design. These groups were: i Year 8 EL1 French pupils in England; ii Year 8 EAL French pupils in England; Year 10 EL1 French pupils in England; Year 10 EAL French pupils in England.

Year 8 and year 10 secondary school pupils were selected for three reasons. Firstly, as year 8 pupils are not subject to any national examinations it was easier to gain access to this year groups as parents and teachers were more likely to let the pupils put some time aside for the purposes of this research project. Additionally, whilst year 10 pupils were in the process of studying towards the GCSE qualification, it was acknowledged that none of these pupils were going to sit any of the formal written assessments in the year the research was carried out. Consequently, it was considered to be more ethically correct to take time from participants who did not have national examinations to take during the year of testing, compared to those who did. Secondly, it was anticipated that year 8 and year 10 pupils would have the required vocabulary knowledge to generate a set of results on a measure of French receptive vocabulary which did not suffer from either ceiling effects or floor effects, whilst also representing age groups which were comparable to those who were tested by the European Commission in French (2012). Lastly, after observations of French modern foreign language classrooms in England, and conversations with French language teachers (c.f. Appendix 3.1) it was anticipated that there would be a significant difference between year 8 and year 10 pupils on a measure of French receptive vocabulary. This was important as it then enabled the researcher to correlate higher levels of French vocabulary knowledge with morphological awareness.

3.2.2 Population size and characteristics

After having selected the populations which were to be represented in this study, it was then necessary to estimate the size and key characteristics of these populations in order to inform the sampling strategy. According to the UK government (Department for Education (DfE), 2014a) there were a total of 550,430 pupils in year 8 in January 2012, where ‘state secondary schools’ includes middle schools, city technology colleges, and all secondary academies. However, key stage 4 data show that approximately only 160,600 pupils took French GCSE in the 2013/2014 academic year (Department for Education (DfE), 2014b). Furthermore, 13.6 per cent of all secondary school pupils were recorded as not having English as a first language (National Association for Language Development in the Curriculum (NALDIC), 2013). From the above data it was estimated that the numbers of pupils included in each of the four populations represented by the current study are as follows: i 475,572 year 8 EL1 French pupils; ii 74,858 year 8 EAL French pupils; iii 138,758 year 10 EL1 French pupils; iv 21,842 year 10 EAL French pupils.

However, the above estimates are likely to be inaccurate for four reasons. Firstly, the aforementioned estimates represent the total number of pupils in year 8 in England, not those pupils who are studying French. Therefore, the above estimates for the year 8 cohorts likely largely overestimate the size of the year 8 populations. Secondly, although 13.6 per cent of secondary school pupils were recorded as not having English as a first language, the distribution of EAL pupils across all of the secondary school year groups is unknown. Moreover, the estimates for the year 10 cohorts are based on the number of French GCSE entries and do not allow for pupils ceasing to study French before they are entered into GCSE exams in year 11. Consequently, the estimates for the year 10 cohorts may underestimate the actual population size. Lastly, data relating to the year 8 cohort are a year older than the data relating to the year 10 cohort. As a result, the size of the year 8 cohort might be slightly underestimated due to population growth. Nevertheless, even though the above inaccuracies exist it should be emphasised that an estimation of these populations serves only as a guide in order to give the reader an idea of the magnitude of EL1 and EAL pupils studying French as a modern foreign language in year 8 and in year 10 in England.

Putting population size estimates to one side, it was also necessary to define the key characteristics of the populations represented by this study. These populations are heterogeneous in their nature. For example, even though the mean proportion of EAL pupils in schools was recorded as 13.6 per cent the distribution of these pupils across schools in England is extremely skewed with 53.8 per cent of schools having less than 5 per cent of pupils with EAL whilst in 8.4 per cent of schools EAL pupils are in the majority (Strand et al., 2015). Furthermore, from an analysis of local authority data it was found that "concentrations of EAL can be very specific to small local areas and schools…it is therefore important to consider the school level" (*ibid*. p.26).

3.2.3 Sampling strategy for selection of schools

Due to the heterogeneity of the four populations represented by this study, a purposive sampling (Cohen, Manion, & Morrison, 2013) strategy was adopted which targeted schools in England with high numbers of EAL pupils. Consequently, in November 2014 a professional network for modern language teachers in England, Routes into Languages (Higher Education Funding Council for England (HEFCE), 2013), was contacted via email to inquire about the availability of schools in England for this study. As part of this inquiry, an information letter was sent (c.f. Appendix 3.2) to a contact at the organisation so that it could be disseminated to schools in England.

After receiving responses to this initial inquiry, three schools (School 1, School 2, and School 3) were selected in which data collection took place. School 2 and School 3 took part in the piloting phase (c.f. Appendix 3.1) whilst School 1 took part in the piloting phase and the main phase of the study. These schools were selected as they had a high proportion of pupils with EAL. School 1 was chosen as the site where the main phase of data collection took place on the basis that it had the highest total number and highest proportion of EAL pupils out of the three schools. Furthermore, School 1 was a state school which meant that the data collected at this site would be somewhat more generalisable to other schools in England compared to a selective or fee-paying school.

School 1 was then asked to give parental information sheets (c.f. Appendix 3.3) and opt-in consent forms (c.f. Appendix 3.4) to the parents and guardians of all year 8 and year 10 pupils taking French excluding those who: i Had an identified Specific Educational Need (SEN); ii Were an EAL pupil who had arrived in the country within the last 2 years. These exclusion criteria were applied so that the study could focus on typically developing pupils whose level of English was of a comparable nature.

3.2.4 Representativeness of sample and description of School 1

Due to the heterogeneity of the populations from which the four groups in this study are drawn, and the skewed spread of EAL pupils across schools in England (Strand et al., 2015) the participants cannot be considered representative of their respective populations. Moreover, even with regard to state schools with a large proportion of EAL pupils, the exact makeup of EAL pupils with regard to their L1 varies across England (*ibid.*). Consequently, the results of this study are not generalisable to their populations. Instead, any implications drawn from the results of this study with regard to the relationship between vocabulary, morphological awareness, and language status, will be interpreted as specific to School 1.

Nevertheless, a number of comparisons can be made between the samples in this study and the respective populations that they represent. With regard to other modern foreign languages, 12.5 per cent (12.2 EL1, 12.8 EAL) of year 8 pupils and 22.2 per cent (26.8 EL1, 17.5 EAL) of year 10 pupils in School 1 reported studying another foreign language other than French. Whilst data on year 8 pupils was hard to come by, it is known that one third of state secondary schools offer their pupils the opportunity to study a second foreign language, although whether this opportunity is taken up is another matter (Board & Tinsley, 2014). In terms of year 10 pupils, data analysis from Strand et al., (2015, p. 36) indicate that approximately 2.9 per cent of pupils took GCSE examinations in more than one foreign language in 2013. Although the number of dual linguists in year 10 at School 1 seems remarkably high compared to the national average, it is noted that School 1 does have specialist language college status. In addition, pupils in School 1 are not permitted to take foreign language GCSE qualifications early, i.e. before year 11. This compares to approximately 10 per cent of pupils who took French GCSE early in 2010 (Department for Education (DfE), 2011).

School 1 is a maintained secondary school located in East Anglia. Its main characteristics as compared to schools regionally and nationally are shown in Table 23:

Table 23: School 1 contextual information

	Number of pupils on roll	Percentage of EL1 pupils on roll	Percentage of EAL pupils on roll	Percentage of pupils eligible for and who claim Free School Meals (FSM)	Percentage of pupils with SEN statement or on School Action Plus (SA+)	Overall attendance (percentage of sessions attended in school)
School 1	1761[d]	44.5[a]	55.5[a]	18.8[b]	10.5[a]	94.2[a]
Regional [b] mean		70.8	29.2	14.0	8.0	94.5
National mean	957[c]	85.8[b]	14.2[b]	13.3[b]	7.3[b]	94.8[a]

a) (Department for Education (DfE), 2014c)
b) (Tutor Hunt, 2015)
c) (Office for Standards in Education, Children's Services and Skills (Ofsted), 2015)
d) (Department for Education (DfE), 2015)

Table 23 shows that School 1 is an extremely large secondary school with the number of pupils on roll representing 184.0 per cent of the mean national number of pupils on roll of maintained secondary schools in England. This statistic is reinforced by the fact that the number of pupils on roll of School 1 lies in the highest quintile of schools in England when ranked by population (Office for Standards in Education, Children's Services and Skills (Ofsted), 2015).

Secondly, the percentage of EAL pupils on roll at School 1 is a lot higher than both the mean regional and mean national percentage of EAL pupils on roll at schools in England. Specifically, the percentage of EAL pupils on roll at School 1 is 1.9 times higher than the mean percentage of EAL pupils on roll regionally and 3.9 times higher than the mean percentage of EAL pupils on roll nationally, of all maintained secondary schools in England. From this statistic it is concluded that School 1 is one of the most linguistically diverse schools, not only in East Anglia but also in England.

Thirdly, the percentage of pupils on roll at School 1 who are eligible for and who claim free school meals (FSM) is higher than both the regional mean and the national mean percentage of pupils who claim FSM. Specifically, the percentage of pupils on roll at School 1 who claim FSM is 1.4 times higher than the mean percentage of pupils who claim FSM regionally and 1.5 times higher than the mean percentage of pupils who claim FSM nationally. This statistic is important as FSM is a widely used, although imperfect, proxy variable of socioeconomic status in UK based research (Hobbs & Vignoles, 2007). In turn, there is a documented correlation between socioeconomic status and exposure to written text (Hart & Risley, 1995) which may consequently affect the results of any study into morphological awareness.

Moreover, the percentage of pupils on roll at School 1 who have a statement of a Specific Educational Need (SEN) or who are on School Action Plus (SA+) is higher than both the regional mean and the national mean percentage of pupils with an SEN or who are on SA+. Specifically, the percentage of pupils on roll at School 1 with an SEN or who are on SA+ is 1.3 times higher than equivalent pupils regionally, and 1.4 times higher than equivalent pupils nationally. This statistic is important as it may indicate that a relatively large proportion of pupils in School 1 might not be able to take part in the current study as they will not be considered to be normally developing (c.f. section 3.2.3).

Furthermore, the overall attendance percentage of pupils in School 1 is lower than the mean overall attendance percentage both regionally and nationally. Whilst the raw figures do not show a large difference between School 1 and the regional and national attendance records, Ofsted (2015) reports that School 1 lies in the 4th quintile of schools nationally with regard to attendance records. Such a statistic is of consequence for this study as it may indicate that a relatively high proportion of pupils are not being exposed to the same amount of French language input, or written language input in either French or English, as the rest of their classmates. In turn, this could lead to pronounced cohort effects.

Lastly, with regard to the aforementioned factors it is clear that School 1 differs considerably not only to the national 'average' school profile, but also to the regional 'average' profile. Such a contextual analysis of School 1 serves only to reinforce the view that with regard to the EAL makeup of schools in England, it is the school level which is of greater importance than the regional and national level (Strand et al., 2015). Consequently, it is reemphasised here that the results of this study are specific to School 1.

3.2.4.1 EAL support

As seen in Table 23, there are a large number of EAL pupils at School 1. Moreover, the EAL population at School 1 is extremely diverse with over 60 languages represented. Owing to the large number and linguistically diverse nature of EAL pupils present at School 1, there exists an EAL department. One of the main functions of the EAL department at School 1, and of relevance to this study, is to help pupils with EAL with any problems they may have when expressing themselves in written English in any subject. There are three aspects to this provision.

Firstly, new arrivals initially meet with an EAL support coordinator who will note the L1 of pupils with EAL whilst also learning about their educational experiences prior to arrival. This allows the EAL department to create a tailor-made timetable for each pupil with EAL which includes English language classes in the EAL department. The number of such classes depends on the needs of each pupil with EAL and occur within the normal school timetable.

Consequently, pupils with EAL may miss out on lesson time in their other subjects.

Secondly, the content of classes in the EAL department is driven by the needs that pupils with EAL have in particular subjects. As a result, there is no prescribed curriculum for classes in the EAL department as teachers will react to the problems pupils are facing in their regular lessons. In turn, the general focus of the support given to pupils with EAL is based on building English vocabulary in areas where pupils are lacking. As such, materials given to pupils with EAL are often designed to promote repetition of particular vocabulary items in order to aid retention of new vocabulary. Conversely, the content of the classes given to pupils with EAL is very rarely focussed on the explicit instruction of grammar.

Lastly, due to the diversity of linguistic needs for pupils with EAL, classes in the EAL department are often small with pupils sometimes being matched according to their L1 or language group if possible. The advantage of this is that pupils with the same L1 often encounter similar linguistic and cultural problems. By being part of the same class, these pupils can help each other settle into the school and improve their English at an increased rate than would have otherwise been possible.

3.3 Participant selection

After having selected School 1 as the site of data collection for the main phase, exclusion criteria were applied to all EL1 and EAL pupils studying French in year 8 and to all EL1 and EAL pupils studying French in year 10. The remaining participants were then used to create 4 groups which were established to answer the research questions of the study (c.f. section 3.1). Figure 3.1 describes the exclusion criteria which led to the final selection of participants:

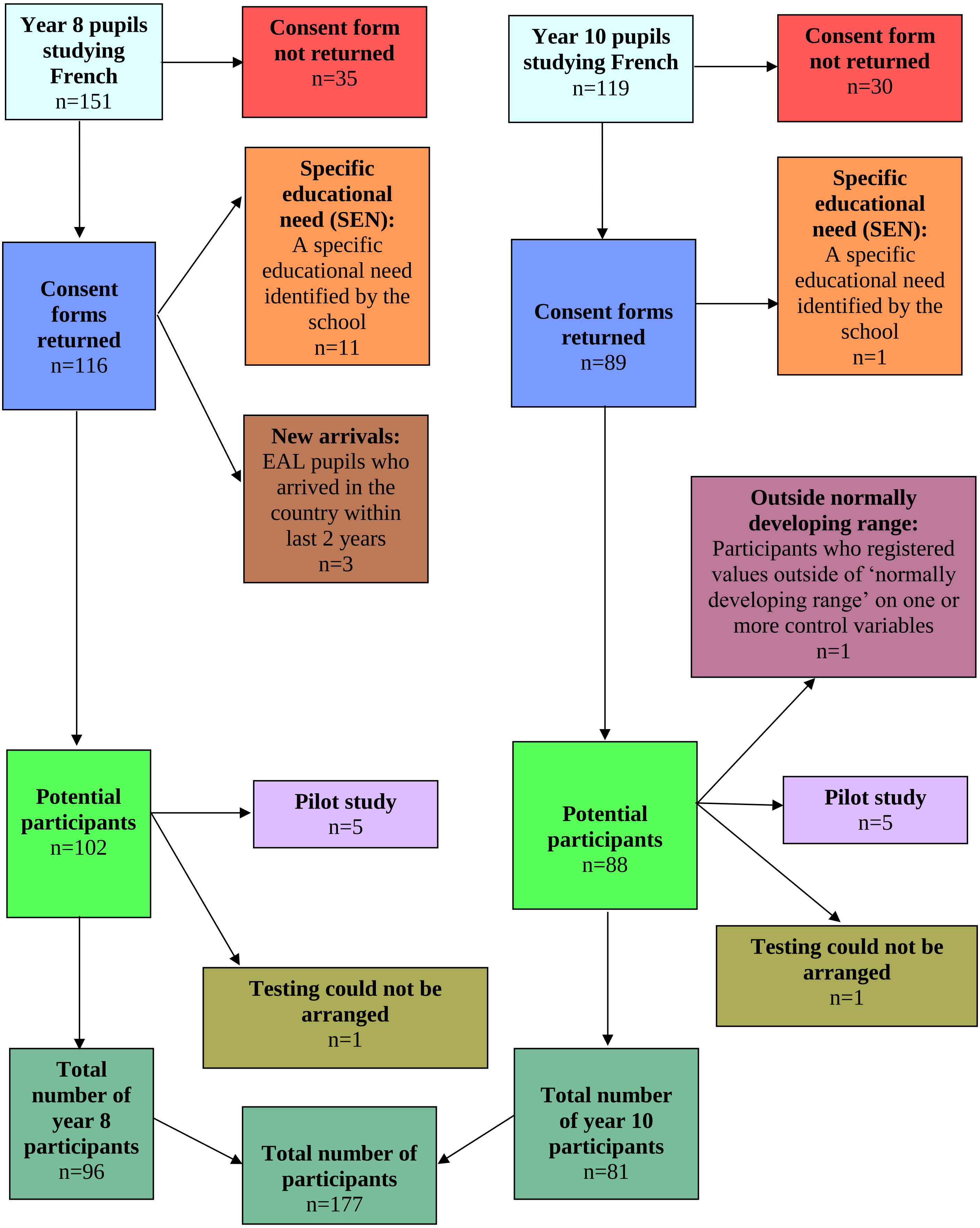


Figure 3.1: Flow diagram showing how the final number of participants was achieved

As described in Figure 3.1, the following exclusion criteria were applied to all year 8 and year 10 pupils studying French at School 1:

Exclusion criterion 1: From the initial school population of 151 year 8 pupils studying French, the 35 pupils who did not return consent forms were excluded. In addition, from the initial school population of 119 year 10 pupils studying French, the 30 pupils who did not return consent forms were excluded.

Exclusion criterion 2: From the remaining 116 year 8 pupils studying French, the 11 pupils with a Specific Educational Need (SEN) as identified by the school were excluded. In addition, from the remaining 89 year 10 pupils studying French, the 1 pupil with a Specific Educational Need (SEN) as identified by the school was excluded. This exclusion criterion was applied in order to ensure that the results of the study would be applicable to all typically developing pupils.

Exclusion criteria 3: From the remaining 105 year 8 pupils studying French, the 3 EAL pupils who arrived in the country within the last 2 years were excluded. There were no year 10 EAL pupils who had arrived in the country within the last 2 years. This exclusion criterion was applied in order to ensure that the level of English of EAL participants would not unduly skew any results obtained during the current study.

Exclusion criterion 4: From the remaining 88 year 10 pupils studying French, there was 1 pupil who registered a value which lay outside of the typically developing range on the standardised measure of non-verbal reasoning ability. This pupil was excluded in order to ensure that results of the current study are applicable to all typically developing pupils. There were no results on standardised measures from year 8 pupils studying French which lay outside of the typically developing range.

Exclusion criterion 5: From the remaining 102 year 8 pupils studying French, the 5 pupils who were involved in the pilot study (c.f. Appendix 3.1) were excluded. In addition, from the remaining 87 year 10 pupils studying French, the 5 pupils who were involved in the pilot study were excluded. This exclusion criterion was applied as the participants involved in the pilot study would have been subject to a practice effect if they had also taken part in the main phase of the study.

In addition to the above exclusion criteria, there was 1 pupil in year 8 and 1 pupil in year 10 for whom testing could not be arranged due to absence from school. Consequently, the final selection of participants for this study was comprised of 96 year 8 pupils and 81 year 10 pupils, making a total of 177 pupils. Furthermore, these participants were comprised of 49 year 8 EL1 pupils, 47 year 8 EAL pupils, 41 year 10 EL1 pupils, and 40 year 10 EAL pupils. The 4 groups used for the main analyses of this study is shown in Table 24:

Table 24: Participant groupings for main phase

	Year 8	**Year 10**
EL1	49	41
EAL	47	40

3.3.1 EAL participant characteristics:

It was outside the scope of this study to control the number and language group of L1s spoken by the EAL participants. Consequently, there is variation not only in the number of L1s spoken by EAL participants (17 different languages represented), but also in the number of language groups represented by these different L1s (10). The exact breakdown of languages to language group and year group is shown in Table 25:

Table 25: Breakdown of languages to language group and year group for EAL participants

Language group	**Languages**	**Year 8**	**Year 10**	**Total**
Indo-Aryan	Urdu Hindi Punjabi	8 1 5	4 2 0	12 3 5
Total	3	14	6	20
Slavic	Polish Russian Slovakian Serbian	3 4 1 1	2 2 0 0	5 6 1 1
Total	4	9	4	13
Dravidian	Malayalam	5	5	10
Total	1	5	5	10
Semitic	Arabic	2	7	9
Total	1	2	7	9
Baltic	Lithuanian Latvian	8 1	0 0	8 1
Total	2	9	0	9
Romance	Portuguese	5	3	8
Total	1	5	3	8
Niger-Congo	Shona	0	6	6
Total	1	0	6	6
Germanic	Afrikaans German	0 0	3 2	3 2
Total	2	0	5	5
Sino-Tibetan	Cantonese	2	2	4
Total	1	2	2	4
Afro-Asiatic	Somali	1	2	3
Total	1	1	2	3
Grand total	17	47	40	87

Table 25 shows that there are a wide range of L1s and language groups which are represented by the EAL participants who took part in the study. Moreover, the distribution of languages and language groups to year group is uneven. However, as there are small numbers of speakers of each language and even within each language group, no statistical analyses can be carried out comparing the performance of EAL speakers of different L1s as the results from such analyses would be unreliable. Consequently, due to the impossibility of comparing EAL participants by language group, there might be a pronounced cohort effect caused by the uneven distribution of L1s across year group (c.f. section 3.1.1).

3.4 Measures

A total of 12 variables were measured by 11 instruments. 10 out of the 11 instruments were administered to all participants. The Language Background Questionnaire (LBQ) was administered only to EAL pupils.

3.4.1 The Language Background Questionnaire (LBQ)

The LBQ (c.f. Appendix 3.5) is a questionnaire designed to obtain a rich description of EAL participants' linguistic background (McKendry, 2013). The version of the LBQ used in this study has been reduced as it was not used to elicit any personal or demographic information. Instead, this information was elicited by the Background Information Questionnaire (BIQ) (c.f. section 3.4.2).

The LBQ was chosen to offer an insight into the L1 language and literacy background of all EAL participants. This is important as the designation of pupils as EAL by schools across England is often unreliable. In addition, the information provided by the LBQ can be used to compare EAL participants in year 8 and in year 10 in order to check for cohort effects in terms of self-reported use of the L1 at home, and self-judgement of L1 literacy. This is important due to the weaknesses of the cross-sectional design of the study (c.f. section 3.1.1). Moreover, information generated by the LBQ allows for an analysis of linguistic background factors and how these factors correlate to measures of morphological awareness and vocabulary knowledge.

Whilst the LBQ is a well-suited instrument for the measurement of background linguistic information for EAL participants, it is purely a self-report measure, and therefore cannot be considered a measure of L1 proficiency. Consequently, data generated by the LBQ will be used only as part of an analysis of background data.

In terms of administration, the LBQ was administered orally by the researcher on a one-to-one basis to each EAL participant. The administration of the LBQ took approximately 10 minutes per participant. With regard to scoring, the LBQ is divided into 6 sections. Each section provides an insight into a different aspect of the EAL participants' home language use. As per McKendry (2013), for each section a total score was calculated which had a maximum value of 1. Higher values indicate either greater exposure to, or greater use of the L1 or English. The focus of each section of the LBQ is shown in Table 26:

Table 26: Breakdown of the Language Background Questionnaire (LBQ)

Section	**Aspect of language use**
Section A Total	Interpersonal interaction
Section B Total	L1 media exposure
Section C English	Computer use in English
Section C L1	Computer use in L1
Section C Total	Computer use in English and in L1
Section D English	Home print exposure in English
Section D L1	Home print exposure in L1
Section D Total	Home print exposure in English and in L1
Section E	Non-English literacy
Section F	Language for religious purposes

3.4.2 The Background Information Questionnaire (BIQ)

The BIQ (c.f. Appendix 3.6) is a questionnaire designed to elicit basic personal and demographic information, as well as attitudes towards learning French in the modern foreign language classroom. It is heavily based on the Background Information Data Elicitation Instrument used by Erler and Macaro (2011) and has been modified in order to elicit participants' postcodes. In addition, two Likert Scale questions have been added which were taken from a research report into the perceptions of modern foreign languages in year 9 (Taylor & Marsden, 2012).

The BIQ was chosen in order to obtain basic personal and demographic data which were used to describe the participants of this study. In addition, the acquisition of postcodes helped to create a proxy variable which was used to measure participant's socioeconomic status (c.f. Chapter 4). Furthermore, the BIQ helped to give an insight into the attitudes of year 8 and year 10 participants towards the learning of French. This last point is particularly important as French is a compulsory subject at School 1 in year 8 however this is not the case in year 10. Consequently, it is reasonable to expect that year 10 pupils who have chosen to study French are more motivated to do so than year 8 pupils. As a result, motivation to learn French may present itself as a confound variable in the current study as it is reasonable to expect that those pupils who are more motivated to learn French may dedicate more of their time engaged with written French texts compared to less motivated pupils. The extra time spent reading French texts could then increase their morphological awareness.

Unfortunately, motivation was not measured adequately by the BIQ in three ways. Firstly, the BIQ did not attempt to measure motivation to learn English. Secondly, even though the two Likert scale items did minimally tap into both intrinsic motivation (I have fun/I get bored), and extrinsic motivation (I learn a lot/I don't learn much) to learn French, these items only scratched the surface of what is undoubtedly an extremely complex construct. Specifically, the notions of 'desires' and 'opportunities' as described by the Process Model (c.f. section 2.1.3) are most likely not adequately measured by the BIQ. Lastly, the BIQ made no attempt to capture the dynamic nature of motivation. Due to these shortcomings, the BIQ was not used as a covariate in any statistical model which directly answered the research questions. However, the BIQ did help to describe participant characteristics and to check for cohort differences, albeit at a superficial level.

The BIQ was administered orally on a one-to-one basis and required approximately 5 minutes. The BIQ is comprised of 12 items and is scored as follows. The majority of items are scored dichotomously (0 or 1), with the exception of item 10 which is scored trichotomously (0, 1, or 2), and items 11 and 12 which are scored on a scale of 0 to 5 with the higher number representing either greater enjoyment or greater learning, respectively. Item 2 was in effect scored dichotomously (0 or 1), as participants who respond that they learn French for longer than 1 year prior to year 7 are excluded from the study in order to remove prior French knowledge as a confound variable. However, there were no instances of this. Lastly, if the response to item 9 is a romance language this generates a score of 1, as the learning of another romance language in addition to French may aid French vocabulary knowledge via the acquisition of cognates.

3.4.3 Backwards Digit Recall subtest of the Wechsler Intelligence Scale for Children Revised (WISC-R)

The backwards digit recall subtest of the WISC-R (Wechsler, 1976) is a psychometric instrument which is standardised on a UK population and designed to measure the working memory (WM) of children aged 6 to 16 years old. The subtest entails that participants recite a sequence of digits read aloud in reverse order.

The backwards digit recall subtest of the WISC-R was administered following the procedures outlined in the manual (Wechsler, 1976). There were seven items, each of which was comprised of two trials. The participant continued through the items until they achieved two incorrect scores on two trials of the same item. At such point, the test was discontinued. The test was administered orally on a one-to-one basis and took 5 minutes.

A score of 1 was given if all numbers in the sequence of one trial were correct. A score of 0 was given if one or more of the digits in a sequence were incorrect. The number of correct responses for all trials were then added together to create a total raw score for each participant. As the whole subtest consisted of 7 items, there was a possible maximum score of 14.

3.4.4 Phonological awareness: The Pseudoword Decoding subtest of the Wechsler Individual Achievement Test – Second UK Edition (WIAT-II UK)

Due to the importance of measuring phonological awareness in any study investigating morphological awareness (c.f. section 2.3), two aspects of phonological awareness were measured in this study; i) Phonetic decoding ability; ii) Word segmentation ability. Phonetic decoding ability is defined as the ability to convert graphemes to phonemes using knowledge of the target language's symbol to sound correspondences (Woore, 2010). This was identified as a possible confound variable as pseudowords were employed in both measures of morphological awareness (c.f. sections 3.4.9 and 3.4.10). As pseudowords are likely words which have never been viewed before by the participants, it is likely that reading them for the first time will involve an overreliance on phonetic decoding skills, rather than the ability to recall the pronunciation of a word which the participant is familiar with.

The Pseudoword Decoding subtest of the WIAT-II UK was used to measure phonetic decoding ability. This is an individually administered instrument designed to be administered to children and adolescents aged between 4 years and 16 years 11 months (Wechsler, 2005) and requires participants to pronounce unknown words in English. The pseudoword decoding subtest of the WIAT-II UK was administered following the procedures outlined in the manual (Wechsler, 2005). Each participant was given the pseudoword card and was asked to read the two practice items out aloud. The participant was then asked to continue by reading out the test items by row. Incorrect pronunciations were noted on the score sheet. All items were scored dichotomously. A score of 1 was given if all phonemes in the trial word were correct. A score of 0 was given if one or more of the phonemes in the trial word was incorrect. The number of correct responses for all words were then added together to create a total raw score for each participant. The maximum score was 55.

3.4.5 Phonological awareness: The Spoonerisms subtest of the Phonological Assessment Battery (PhAB)

The second aspect of phonological awareness which was measured in this study was word segmentation ability. Word segmentation ability was identified as a possible confound variable due to the overlap which word segmentation has with the measurement of morphological awareness. As with phonetic decoding, the decomposition of multimorphemic words may involve word segmentation ability due to the requirement of phonetically parsing words when looking for single morphemes in a multimorphemic word. Therefore, poor word segmentation ability might lead to negatively skewed results on measures of morphological awareness.

The spoonerisms subtest of the PhAB (Frederickson, Frith, & Reason, 1997) was used to measure word segmentation ability. This is an individually administered instrument designed to be administered to children and adolescents aged between 6 years and 14 years 11 months (*ibid*.) and is divided into two parts. The first part requires participants to listen to a word which is followed by a phoneme and then to say out aloud a new word which is formed by replacing the first phoneme of the original word with the new phoneme. The second part requires participants to listen to two words and to say out aloud two new words which are formed by swapping the initial phonemes of each word with each other.

The spoonerisms subtest of the WIAT-II UK was administered following the procedures outlined in the manual (Frederickson et al., 1997). The test took approximately 8 minutes to administer. In part one of the spoonerisms subtest of the PhAB, all items were scored dichotomously. A score of 1 was given if all phonemes in the trial word were correct. A score of 0 was given if one or more of the phonemes in the trial word were incorrect. In part two all items were scored trichotomously. A score of 2 was given if all phonemes in both trial words were correct. A score of 1 was given if all phonemes in one trial word were correct. A score of 0 was given if one or more phonemes in both trial words were incorrect. The number of correct responses for all words were then added together to create a total raw score for each participant. The maximum score was 30.

3.4.6 The Matrix Reasoning subtest of the Wechsler Abbreviated Scale of Intelligence 2nd Edition (WASI II)

The matrix reasoning subtest of the WASI-II is an individually administered test designed to assess the non-verbal intelligence of those aged from six to 90 years old (Wechsler, 2011). This subtest presents participants with a series of incomplete matrices. Participants are required to complete each matrix by choosing the option which correctly completes them. The matrix reasoning subtest of the WASI II (Wechsler, 2011) was administered according to the manual. The test took approximately 5 minutes to administer per participant. All items were scored dichotomously (0 for an incorrect answer and 1 for a correct answer). All remaining items which were remaining in the reverse sequence were given a score of 1. The raw mark was calculated by taking away the number of incorrect responses from the number of the last item which was attempted. The maximum possible score was 30.

3.4.7 The British Picture Vocabulary Scale: Third Edition (BPVS3)

The BPVS3 is an individually administered instrument which tests the English receptive vocabulary knowledge of participants aged from 3 to 16 years old (Dunn, Dunn, Sewell, & Styles, 2009). This test requires participants to identify the picture which best corresponds to the meaning of a word which is read to them. The BPVS3 was administered according to the manual (Dunn et al., 2009) and took approximately 10 minutes to administer. Items were scored dichotomously with 1 point awarded when the participant correctly identified the relevant picture. The raw score was established by taking away the total number of errors made from the last item which was administered.

3.4.8 The Expressive Vocabulary subtest of the Test of Word Knowledge Level 2 (TOWK)

The expressive vocabulary subtest of the TOWK Level 2 (Wiig & Secord, 1992) is an instrument which tests the English expressive vocabulary of participants aged 8 to 17 years old. This test requires participants to name verbs and nouns one at a time using single-word answers. The verbs and nouns are depicted pictorially. The expressive vocabulary subtest of the TOWK Level 2 was administered according to the manual and took approximately 5 minutes to administer. All items were scored dichotomously with a score of 1 given for a correct answer. In order to calculate a raw score the number of incorrect items was subtracted from the last administered item.

3.4.9 Morphological Decomposition test-English

The Morphological Decomposition test-English (c.f. Appendix 3.7) is a researcher developed, group administered written instrument designed to test the morphological awareness in English of the participants in this study. It was developed in conjunction with the Morphological Decomposition test-French (c.f. section 3.4.10) and the French 1k Levels test (cf. 3.4.11). For details of the development, reliability, and validity statistics of this test, see Appendix 3.8. The Morphological Decomposition test- English presents participants with a list of 30 pseudowords in English, 10 of which are monomorphemic, 10 of which are prefixed, and 10 of which are suffixed (c.f. Appendix 3.9 for categorisation of items according to affixation). Participants are required to circle the affix of each word, if they think that one is present. If participants think that no affix is present they leave the item blank. Morphological awareness in English has been identified as a possible confound variable in cross-linguistic analyses predicting English vocabulary from French morphological awareness, as measures of morphological awareness in English and in French may share variance with one another (Deacon, Wade-Woolley, & Kirby, 2007).

The Morphological Decomposition test-English was administered to each French class (c.f. section 3.5) according to the procedure set out in pilot study two (c.f. Appendix 3.1). Firstly, the concept of an affix and a base was explained to the class. This was followed by a description of the task requirements using the instructions which were printed out on the task sheet (c.f. Appendix 3.7). Subsequently, practice items were administered and any questions were answered. Afterwards, test items were administered; each item was read aloud and pupils were given approximately 30 seconds per item. No more questions were answered at this stage. The test took approximately 20 minutes to administer per class. Scoring was dichotomous with a score of 1 given when an affix or a monomorphemic word was correctly identified. The maximum possible mark for this test was 30.

3.4.10 Morphological Decomposition test-French

The Morphological Decomposition test-French (c.f. Appendix 3.10) is a researcher developed, group administered and written instrument designed to test the morphological awareness in French of the participants in this study. It was developed in conjunction with the Morphological Decomposition test-English (c.f. section 3.4.9) and the French 1k Levels test (c.f. section 3.4.11). This test presents participants with a list of 30 pseudowords in French, 10 of which are monomorphemic, 10 of which are prefixed, and 10 of which are suffixed. Participants are required to circle the affix of each word, if they think that one is present. If participants think that no affix is present they leave the item blank. For details of the development, reliability, and validity statistics of this test, see Appendix 3.11.

This test was administered to each French class according to the procedure set out in pilot study two (c.f. Appendix 3.1). As the concept of an affix and a base had already been explained to the class when the Morphological Decomposition test-English was performed, the administrating of the Morphological Decomposition test-French started with the administration of practice items and the answering of any questions. Afterwards, test items were administered by reading out each test item and giving pupils approximately 30 seconds per item. No more questions were answered at this stage. The test took approximately 15 minutes to administer per class. Scoring was dichotomous with a score of 1 given when an affix or a monomorphemic word was correctly identified. The maximum possible mark for this test was 30.

3.4.11 French 1k Levels test

The French 1k Levels test (c.f. Appendix 3.13) is a researcher developed, individually administered and written instrument designed to test the French receptive vocabulary knowledge of the participants in this study. It was developed in conjunction with the Morphological Decomposition test-English (c.f. section 3.4.9) and the Morphological Decomposition test-French (c.f. section 3.4.10). The French 1k Levels test presents participants with 10 blocks of words. In each block there are 6 words in French and 3 words in English. Each of the words in French is numbered from 1 to 6. Participants are required to write the number of the French word next to the English word which best corresponds to its meaning. In total, there are 30 items, 10 of which are monomorphemic, 10 of which are prefixed, and 10 of which are suffixed. For details of the development, reliability, and validity statistics of this test, see Appendix 3.14.

The French 1k Levels test was administered to each French class individually. Firstly, instructions were read out and then practice items were administered. At this point any questions were answered. The test items were then administered block by block. At the start of each block all of the French items were read out aloud. The participant moved on to the next block only after completing every question in the previous block. The test took approximately 10 minutes to administer. Scoring was dichotomous with a score of 1 given when the number of the correct French word was written next to the appropriate word in English. The maximum possible mark for this test was 30.

3.4.12 Summary of instruments

Table 27 summarises the different measures used in this study:

Table 27: Summary of measures

Test or instrument	Subtest	Skill assessed or information measured	Time needed for administration	Method of administration	Reliability
Language Background Questionnaire (LBQ)	n/a	Background linguistic information of EAL pupils	10 minutes	Oral and individual	n/a
Background Information Questionnaire (BIQ)	n/a	Personal information, SES via postcode, and motivation to learn French	5 minutes	Oral and individual	Cronbach's Alpha of 0.77-0.83 across all 4 groups of study
Wechsler Intelligence Scale for Children Revised (WISC-R)	Backwards digit recall	Working memory assessed by the ability to recite digits in the reverse order to which they are heard	5 minutes	Oral and individual	Mean Test-retest coefficient of 0.78 across all age groups
Wechsler Individual Achievement Test – Second UK Edition (WIAT-II UK)	Pseudoword decoding	Phonological awareness: pseudoword decoding accuracy assessed by reading pseudowords out aloud	5 minutes	Oral and individual	Mean Spearman-Brown split half reliability of 0.97 across all age groups
Phonological Assessment Battery (PhAB)	Spoonerisms	Phonological awareness: word segmentation ability assessed by the manipulation of phonemes	8 minutes	Oral and individual	Mean Cronbach's Alpha of 0.92 across all age groups
Wechsler Abbreviated Scale of Intelligence 2nd Edition (WASI II)	Matrix reasoning	Nonverbal IQ assessed by choosing a correct picture to complete a patterned matrix	5 minutes	Oral and individual	Mean split half reliability of 0.92 across the 6 to 16 years age group
British Picture Vocabulary Scale third edition (BPVS3)	n/a	English receptive vocabulary assessed by pointing to pictures named by researcher	10 minutes	Oral and individual	Mean Cronbach's Alpha of 0.91 across the 3 to 16 years age group

Test of Word Knowledge (TOWK)	Expressive vocabulary subtest	Naming objects or concepts represented by pictures	5 minutes	Oral and individual	Mean test-retest coefficient of 0.92 across the 8 to 17 age group
Morphological Decomposition test-English	n/a	English morphological awareness assessed by circling a real affix in a pseudoword if present	20 minutes	Oral, written, and in groups	Cronbach's Alpha of 0.72-0.80 across all 4 groups of study
Morphological Decomposition test-French	n/a	French morphological awreness assessed by circling a real affix in a pseudoword if present	15 minutes	Oral, written, and in groups	Cronbach's Alpha of 0.63-0.75 across all 4 groups of study
French 1k Levels test	n/a	French receptive vocabulary assessed by matching French words to English words	10 minutes	Oral, written, and individually	Cronbach's Alpha of 0.69-0.78 across all 4 groups of study

3.4.13 Measures and research questions

Having described the measures, the variables which they measure and how these were used to answer the research questions are now described. These shown in Table 28:

Table 28: How the variables measured correspond to the research questions

Research question	Response variable	Predictor variable	Moderator variable	Covariates
Within-language relationships				
1. Do English morphological awareness and language status predict English receptive vocabulary?	English receptive vocabulary	English morphological awareness	Language status	Socioeconomic status, nonverbal IQ, working memory, English expressive vocabulary, pseudoword decoding, word segmentation
2. Do English morphological awareness and language status predict English expressive vocabulary?	English expressive vocabulary	English morphological awareness	Language status	Socioeconomic status, nonverbal IQ, working memory, English receptive vocabulary, pseudoword decoding, word segmentation
3. Do French morphological awareness and language status predict French receptive vocabulary?	French receptive vocabulary	French morphological awareness	Language status	Socioeconomic status, nonverbal IQ, working memory, pseudoword decoding, word segmentation
Cross-language relationships				
4. Do English morphological awareness and language status predict French receptive vocabulary?	French receptive vocabulary	English morphological awareness	Language status	Socioeconomic status, nonverbal IQ, working memory, English receptive vocabulary, English expressive vocabulary, pseudoword decoding, word segmentation, French morphological awareness
5. Do French morphological awareness and language status predict English receptive vocabulary?	English receptive vocabulary	French morphological awareness	Language status	Socioeconomic status, nonverbal IQ, working memory, English expressive vocabulary, French receptive vocabulary, pseudoword decoding, word segmentation, English morphological awareness
6. Do French morphological awareness and language status predict English expressive vocabulary?	English expressive vocabulary	French morphological awareness	Language status	Socioeconomic status, nonverbal IQ, working memory, English receptive vocabulary, French receptive vocabulary, pseudoword decoding, word segmentation, English morphological awareness

3.5 Procedures

For the procedures used during the piloting phase of this study see Appendix 3.1. Data collection during the main phase of the study took place in four stages. As described in section 3.2.3, in December 2014 School 1 was asked to give parental information sheets (c.f. Appendix 3.3) and opt-in consent forms (c.f. Appendix 3.4) to the parents and guardians of all year 8 and year 10 pupils taking French excluding those who: i Had an identified Specific Educational Need (SEN); ii Were an EAL pupil who had arrived in the country within the last 2 years. This ensured that all of the participants in the current study had given informed consent to take part.

Secondly, in February and March 2015 the group testing phase of the study took place. During this phase both morphological decomposition tests were administered during scheduled French classes as described in sections 3.4.9 and 3.4.10. These tests were administered to all five year 8 French classes and all four year 10 French classes. Before administration, participants were made to feel by emphasising that these tasks were only for research purposes and as such would have no impact on their French assessment by the teacher. Furthermore, during these sessions the Morphological Decomposition test-English was administered first on each occasion. As the Morphological Decomposition test-French was considered the harder of the two tests of morphological awareness, it was argued that if this test were administered first it may demotivate some participants to the extent where they would not wish to attempt the second test. Each group testing session took approximately 35 minutes to complete. After each session all participants and the teacher were thanked for their time. It was also explained that those who had agreed should expect to perform some further tasks individually later in the year.

The group testing phase of data collection was followed by the first individual testing phase which took place from March 2015 to July 2015. All individual tests were administered in a quiet room which contained a desk and two chairs, and was customarily used for foreign language oral examinations. In addition, the scheduling for the testing of each pupil was organised in conjunction with all French teachers. This ensured that both teachers and participants knew the timing and whereabouts of their testing session with due notice, thereby enabling a smooth testing phase and minimal disruption to the school day.

During this phase, the following tests were administered in the following order (approximate times are given in brackets): i) The LBQ for EAL pupils only (10 minutes); ii) The BIQ (5 minutes); iii) The BPVS3 (10 minutes); The matrix reasoning subtest of the WASI II (5 minutes); iv) The Expressive Vocabulary subtest of the TOWK (5 minutes); v) The Pseudoword Decoding subtest of the WIAT-II UK (5 minutes); vi) The Backwards Digit Recall subtest of the WISC-R (5 minutes); vii) The Spoonerisms subtest of the PhAB (8 minutes). Consequently, the entirety of the first individual testing phase took approximately 53 minutes for EAL pupils and approximately 43 minutes for EL1 pupils.

Although it may be expected that such a long testing session may have put a heavy testing burden on participants and may have led to testing fatigue by the end of the session, participants at School 1 were used to having one hour lessons. Moreover, as both the LBQ and the BIQ are questionnaires and not psychometric tests, it is reasonable to expect that these instruments did not add to the testing burden during this session. The second individual testing phase took place from April to July 2015. During this phase the French 1k Levels test was administered as described in section 3.4.11. This took approximately 10 minutes per participant. A summary of the main stages of data collection is given in Table 29:

Table 29: Summary of main stages of data collection

Stage	Purpose	Setting	Timing	Materials
1 – December 2014 to February 2015	Attainment of informed consent	Individual	Participants given approximately 2 and a half months to return opt-in consent form	Opt-in consent forms
2 – February and March 2015	Administration of group tests	Group – in French classes	Approximately 20 minutes for Morphological Decomposition test-English and 15 minutes for Morphological Decomposition test-French	Morphological Decomposition test-English and Morphological Decomposition test-French
3 - March 2015 to July 2015	Administration of individual standardised psychometric tests and questionnaires	Individual	Approximately 43 to 53 minutes depending on language status (EL1 or EAL)	LBQ, BIQ, BPVS3, matrix reasoning subtest of WASI II, expressive vocabulary subtest of TOWK, pseudoword decoding subtest of WIAT-II UK, backwards digit recall subtest of WISC-R, and spoonerisms subtest of PhAB
4 – April 2015 to July 2015	Administration of non-standardised individual test	Individual	Approximately 10 minutes	French 1k Levels test

After stage 4 of data collection was completed all French teachers, EAL staff, and other support staff who had taken time to facilitate this study, were thanked. Gratitude was expressed by giving a thank you card to all staff in the modern languages staffroom at School 1 as well as giving boxes of chocolates to share out between all staff that made this project possible. Furthermore, it was explained to all staff in the MFL staffroom at School 1 that feedback from this study would be given by the summer of 2016.

3.6 Ethical considerations

This study has been approved by the University of Oxford’s Central University Research Ethics Committee (CUREC) (University of Oxford, 2014). Specifically, this study is governed by CUREC protocol SSH/IDREC/2013/P13.1 (2013) which informs the researcher on his or her code of conduct when working with minors. These guidelines are also consistent with current British Educational Research Association (BERA) (2012) regulations. In particular, an emphasis was put on confidentiality of data and anonymity of participants, teachers, and schools. Furthermore, great care was taken to gain informed consent from parents or guardians, and pupils by issuing an information letter to parents and guardians (c.f. Appendix 3.3), along with an opt-in consent form (c.f. Appendix 3.4). Moreover, participants' wishes were listened to at all points and it was made clear that there was no obligation to take part. Assent was gained from each pupil and it was explained that they could withdraw at any time without having to give a reason for doing so.

As well as abiding by official guidelines, there were three ethical considerations which were of particular relevance to this study, the first of which was the gaining of informed consent from parents of EAL participants. It was reasonably expected that some parents of EAL participants may have limited English proficiency and as a result would not be able to give informed consent. Although this problem was partially guarded against by only including EAL participants who had been in the country for at least two years, it was still possible that a language barrier might prevent the giving of informed consent. Consequently, staff in the EAL department encouraged any parents who they thought had limited English proficiency to visit or telephone the school for a further explanation of the study.

Secondly, this study inevitably caused a level of disruption to the normal school day for some participants. However, the impact on participants' learning was mitigated somewhat by liaising with participants' teachers. Specifically, no participant was withdrawn from an English or a maths lesson as these subjects were considered to be vital to the academic progress of each pupil. Furthermore, no participant was taken out of a class if this meant that they would miss a mock exam. In addition, if either the pupil or the teacher felt that it was important for the pupil to attend a particular class, these wishes were always adhered to. Moreover, all participants and teachers were made aware of the specific testing schedule well in advance of the testing phase, thereby allowing both participants and teachers to prepare for any class time which would be missed.

Lastly, the handling of the data generated by this study was an important ethical issue. The data that were collected in the first instance were in the form of test scores and questionnaires. Subsequently, these data were converted to an electronic format. In order to protect these data, the paper scores and questionnaires were stored in a locked room. Moreover, the electronic data are stored in password protected files and participants are identified by a list of codes. Only the researcher and his supervisor are able to access these files. These data will be destroyed once the researcher no longer has any use for it.

3.7 Chapter summary

This chapter started by outlining the research design of this study after which the sampling process was described. This was followed by a description of the exclusion criteria used for participant selection and a description of EAL participant characteristics. Next, the research instruments were outlined, followed by the procedures used in the main phase. Lastly, ethical considerations were outlined.

4 Results Chapter (I): Data screening and initial data analysis

This chapter is divided into seven parts the first of which provides a justification behind pursuing separate analyses for year 8 and year 10 groups. An analysis of background data provided by the Language Background Questionnaire (LBQ) is then given. Then, an analysis of background data provided by the Background Information Questionnaire (BIQ) is presented. Subsequently, an analytic strategy is offered followed by screening of the data. Next, initial descriptive statistics, correlational analyses, and preliminary inferential statistics are provided for year 8 pupils, followed by year 10 pupils. Lastly, a chapter summary is given.

4.1 Justifying separate analyses for year 8 and year 10 groups

Due to the differential distribution of L1s and language groups across year groups (c.f. section 3.3.1), and due to the expected trend of higher morphological awareness and therefore higher vocabulary scores, for older pupils (c.f. section 2.3), response variables were investigated to see whether they varied systematically by year group. Table 4.1 presents the means and standard deviations of the three response variables (English receptive vocabulary, English expressive vocabulary, French receptive vocabulary) by year group:

Table 30: Means (standard deviations) for Year 8 (n=96) and Year 10 (n=81) groups on response variables (English receptive vocabulary, English expressive vocabulary, French receptive vocabulary)

Measure	Year 8 mean (standard deviation)	Year 10 mean (standard deviation)
English receptive vocabulary	133.88 (9.92)	144.96 (9.68)
English expressive vocabulary	18.98 (2.73)	21.40 (3.21)
French receptive vocabulary	12.45 (3.79)	19.56 (3.55)

Table 30 shows that year 10 pupils had descriptively higher scores than year 8 pupils on all three response variables. Independent samples t tests were then conducted to see if there were significant differences between groups on the three response variables. This revealed a significant difference on the measure of English receptive vocabulary $t(175)=-7.49$, $p<.001$, the measure of English expressive vocabulary $t(175)=-5.41$, $p<.001$, and the measure of French receptive vocabulary $t(175)=-12.79$, $p<.001$, between year 8 and year 10 pupils. As expected, all differences were in favour of year 10 pupils. Due to these differences, the rest of the analysis was conducted separately on year 8 and year 10 pupils.

4.2 Background data: The Language Background Questionnaire

As described in section 3.4.1, the Language Background Questionnaire (LBQ) was administered orally, on a one to one basis, to every EAL pupil who took part in the main phase of the study. Although the data obtained by the LBQ played no formal role in answering the research questions, it fulfilled four functions. Firstly, the data provided a basis to verify the EAL status of pupils as identified by the school. EAL status was confirmed if a pupil reported a score of at least 0.5 on any of the sections of the LBQ which focussed on L1 use (Section A, B, C L1, D L1, E or F). Additionally, the data provided an indication of EAL participants' language experiences outside of school, with regard to both English and their L1. Moreover, the data allowed for a comparison of year 8 and year 10 EAL participants on the various subsections of the LBQ, to check for cohort differences. In addition, the relationship between each of these subsections and morphological awareness and vocabulary knowledge was analysed. This analysis provided an insight into the background linguistic characteristics of EAL participants and the outcome variables.

4.2.1 Analysing the Language Background Questionnaire

As described in Table 26 in section 3.4.1, the LBQ is divided into 6 sections which each looked at a distinct aspect of either English or L1 usage at home. For each section, a score ranging for 0 to 1 was calculated with higher values representing more frequent use of English or the L1. Groups' mean scores can be seen in Table 31:

Table 31: Means (standard deviations) for Year 8 EAL and Year 10 EAL scores on the Language Background Questionnaire

Section	Aspect of language use	Year 8 EAL	Year 10 EAL
Section A Total	Interpersonal interaction	0.70 (0.14)	0.65 (0.22)
Section B Total	L1 media exposure	0.52 (0.23)	0.36 (0.24)
Section C English	Computer use in English	0.64 (0.16)	0.59 (0.18)
Section C L1	Computer use in L1	0.35 (0.15)	0.31 (0.21)
Section C Total	Computer use in English and in L1	0.50 (0.12)	0.45 (0.19)
Section D English	Home print exposure in English	0.50 (0.20)	0.50 (0.18)
Section D L1	Home print exposure in L1	0.26 (0.25)	0.32 (0.19)
Section D Total	Home print exposure in English and in L1	0.38 (0.16)	0.41 (0.17)
Section E	Non-English literacy	0.55 (0.26)	0.41 (0.15)
Section F	Language for religious purposes	0.45 (0.28)	0.30 (0.14)

The analysis of the LBQ is divided into three parts. Firstly, within – group differences were checked with regard to English versus L1 computer usage at home (Section C), and English versus L1 print exposure at home (Section D). Secondly, between group differences were checked for each section of the LBQ, and lastly, relationships between each section of the LBQ and each of the outcome variables were analysed. Sections A, E, and F were the only instances where the assumption of homogeneity of variance was violated (see Table 32). Consequently, for these sections the *t*-test result was checked using a Mann-Whitney test. In both instances, the Mann-Whitney test confirmed the *t*-test result.

Table 32: Tests of homogeneity of variance for the Language Background Questionnaire, EAL participants only (violations of normality highlighted in red)

Test of Homogeneity of Variance					
	Group	**Levene statistic**	**df1**	**df2**	**Sig.**
Section A Total	Based on Mean	8.96	1	85	.00
	Based on Median	8.94	1	85	.00
	Based on Median and with adjusted df	8.94	1	79.82	.00
	Based on trimmed mean	8.98	1	85	.00
Section B Total	Based on Mean	1.74	1	85	.19
	Based on Median	1.06	1	85	.31
	Based on Median and with adjusted df	1.06	1	81.34	.31
	Based on trimmed mean	1.80	1	85	.18
Section C English	Based on Mean	0.01	1	85	.93
	Based on Median	0.21	1	85	.65
	Based on Median and with adjusted df	0.21	1	84.78	.65
	Based on trimmed mean	0.03	1	85	.86
Section C L1	Based on Mean	0.17	1	85	.68
	Based on Median	0.31	1	85	.58
	Based on Median and with adjusted df	0.31	1	73.53	.58
	Based on trimmed mean	0.16	1	85	.69
Section C Total	Based on Mean	0.99	1	85	.32
	Based on Median	1.03	1	85	.31
	Based on Median and with adjusted df	1.03	1	64.32	.32
	Based on trimmed mean	0.94	1	85	.34
Section D English	Based on Mean	0.21	1	85	.65
	Based on Median	0.15	1	85	.70
	Based on Median and with adjusted df	0.15	1	82.10	.70
	Based on trimmed mean	0.19	1	85	.66
Section D L1	Based on Mean	0.76	1	85	.39
	Based on Median	0.21	1	85	.65
	Based on Median and with adjusted df	0.21	1	76.07	.65
	Based on trimmed mean	0.33	1	85	.57
Section D Total	Based on Mean	0.14	1	85	.71
	Based on Median	0.14	1	85	.71
	Based on Median and with adjusted df	0.14	1	84.99	.71
	Based on trimmed mean	0.22	1	85	.64
Section E	Based on Mean	40.83	1	85	.00
	Based on Median	17.10	1	85	.00
	Based on Median and with adjusted df	17.10	1	75.06	.00
	Based on trimmed mean	39.98	1	85	.00
Section F	Based on Mean	11.58	1	85	.00
	Based on Median	12.68	1	85	.00
	Based on Median and with adjusted df	12.68	1	71.00	.00
	Based on trimmed mean	12.35	1	85	.00

4.2.2 Within – group differences

As Sections C and D provided direct comparisons between L1 and English usage at home, paired samples *t*-tests were carried out in order to see if within-group differences existed with regard to L1 and English computer usage, and L1 and English home print exposure. For the year 8 EAL group, the score for computer use in English was significantly higher than the score for computer use in the L1, $t(46) = 9.44$, $p<.001$. In addition, the score for English exposure to print in the home was significantly higher than the score for L1 exposure to print in the home, $t(46) = 5.49$, $p<.001$. The same effects were observed for the year 10 EAL group, where the score for computer use in English was significantly higher than in the L1, $t(39) = 15.22$, $p<.001$, and the score for English exposure to print in the home was significantly higher than for L1 $t(39) = 8.62$, $p<.001$. Consequently, these results indicated that for both year 8 and 10 EAL groups, there was greater computer usage in English and greater exposure to print in English, than the L1 at home.

4.2.3 Between – group differences

Independent samples *t*-tests were carried out in order to check for significant differences between year 8 and year 10 EAL groups on the scores for each section.

The results of the *t*-tests are presented in Table 33:

Table 33: Year 8 EAL and Year 10 EAL scores on the Language Background Questionnaire

t-test for Equality of Means[a]				
		t	**df**	**Sig. (2-tailed)**
Section A Total	**Equal variances assumed**	1.23	85	.22
	Equal variances not assumed	1.19	64.90	.24
Section B Total	**Equal variances assumed**	3.20	85	.00
	Equal variances not assumed	3.19	81.83	.00
Section C English	**Equal variances assumed**	1.17	85	.25
	Equal variances not assumed	1.16	80.51	.25
Section C L1	**Equal variances assumed**	1.02	85	.31
	Equal variances not assumed	0.99	68.04	.33
Section C Total	**Equal variances assumed**	1.24	85	.22
	Equal variances not assumed	1.20	63.57	.24
Section D English	**Equal variances assumed**	0.13	85	.90
	Equal variances not assumed	0.13	84.87	.90
Section D L1	**Equal variances assumed**	-1.17	85	.25
	Equal variances not assumed	-1.19	84.04	.24
Section D Total	**Equal variances assumed**	-0.79	85	.43
	Equal variances not assumed	-0.79	81.61	.43
Section E	**Equal variances assumed**	3.07	85	.00
	Equal variances not assumed	3.20	74.52	.00
Section F	**Equal variances assumed**	3.10	85	.00
	Equal variances not assumed	3.25	70.87	.00

a) The α - level was set to .005 (.05/10) to account for multiple comparisons

Table 33 shows that significant group differences at the $p<.005$ level were found for Section B (L1 media exposure), Section E (non-English literacy), and Section F (Language for religious purposes). For all three sections, scores from the year 8 EAL cohort were significantly higher than scores from the year 10 EAL cohort. This finding suggests that the year 8 EAL cohort have greater exposure than the year 10 EAL cohort with regard to L1 media, non-English literacy, and the use of language for religious purposes.

Whilst such cohort differences were taken into account when drawing conclusions about morphological awareness and vocabulary knowledge, it was noted that no other significant differences existed between the two EAL groups. Of particular relevance was the lack of a group difference between the two EAL groups for Section D, home print exposure in English and in the L1. As it may reasonably be conjectured that increased exposure to the written word may increase morphological awareness in that language and therefore vocabulary knowledge, the lack of a significant difference on this variable is preferable.

4.2.4 The Language Background Questionnaire, morphological awareness, and vocabulary knowledge

In order to analyse the relationship between sections of the LBQ, morphological awareness in English and French, and vocabulary knowledge in English in French, a series of bivariate correlations was carried out between LBQ section scores and i) Morphological Decomposition Test-English; ii) Morphological Decomposition Test-French; iii) French receptive vocabulary; iv) English receptive vocabulary and v) English expressive vocabulary. These correlations were carried out separately for each EAL group. Table 34 shows the results for the year 8 EAL group:

Table 34: Correlating scores on the Language Background Questionnaire with scores on Morphological Decomposition Test-English, Morphological Decomposition Test-French, French receptive vocabulary, English receptive vocabulary, and English expressive vocabulary for Year 8 EAL participants

		Morphological Decomposition Test- English	Morphological Decomposition Test- French	French receptive vocabulary	English receptive vocabulary	English expressive vocabulary
LBQ Section A Total	Pearson correlation	.12	.17	.06	.20	-.00
	Sig. (2-tailed)	.44	.26	.71	.18	.98
LBQ Section B Total	Pearson correlation	.26	-.03	-.21	-.12	-.09
	Sig. (2-tailed)	.08	.83	.16	.41	.56
LBQ Section C English	Pearson correlation	-.07	.11	.10	.01	.12
	Sig. (2-tailed)	.64	.47	.50	.95	.42
LBQ Section C L1	Pearson correlation	.04	.18	.17	.12	.13
	Sig. (2-tailed)	.77	.24	.25	.43	.39
LBQ Section C Total	Pearson correlation	-.03	.19	.18	.08	.16
	Sig. (2-tailed)	.87	.20	.24	.59	.27
LBQ Section D English	Pearson correlation	.01	.03	.13	.20	-.07
	Sig. (2-tailed)	.96	.84	.37	.18	.62
LBQ Section D L1	Pearson correlation	.07	-.06	-.01	.18	.22
	Sig. (2-tailed)	.63	.067	.93	.24	.14
LBQ Section D Total	Pearson correlation	.06	.33	.06	.23	.09
	Sig. (2-tailed)	.71	.03*	.67	.13	.55
LBQ Section E Total	Pearson correlation	.27	-.03	.15	.15	-.07
	Sig. (2-tailed)	.07	.87	.30	.32	.66
LBQ Section F Total	Pearson correlation	-.03	.12	-.09	-.15	-.09
	Sig. (2-tailed)	.85	.44	.53	.30	.57

*****significant at $p<.05$

Table 34 shows that there were no significant correlations between any sections of the LBQ and four of the five aforementioned variables. However, there was a significant positive correlation with a medium effect size between the Year 8 EAL group's Section D Total score and scores on Morphological Decomposition Test-French. Section D is a measure of home print exposure in the L1 and in English. With this in mind it is not surprising that those with more home print exposure have higher morphological awareness in a foreign language as they may have greater opportunity to analyse component morphemes of multimorphemic words, thereby increasing their morphological awareness. However, it should be stressed that this conclusion is only inferred from a correlation and as such no causal relationship can be implied. Table 35 shows the results for the year 10 EAL group:

Table 35: Correlating scores on the Language Background Questionnaire with scores on Morphological Decomposition Test-English, Morphological Decomposition Test-French, French receptive vocabulary, English receptive vocabulary, and English expressive vocabulary for Year 10 EAL participants

		Morphological Decomposition Test- English	Morphological Decomposition Test- French	French receptive vocabulary	English receptive vocabulary	English expressive vocabulary
LBQ Section A Total	Pearson correlation	-.15	-.14	-.01	-.08	.00
	Sig. (2-tailed)	.35	.41	.94	.63	.99
LBQ Section B Total	Pearson correlation	-.19	-.10	.05	-.19	.05
	Sig. (2-tailed)	.24	.55	.75	.23	.78
LBQ Section C English	Pearson correlation	.03	.25	-.09	.12	.18
	Sig. (2-tailed)	.86	.12	.58	.45	.27
LBQ Section C L1	Pearson correlation	.02	.23	-.11	.11	.18
	Sig. (2-tailed)	.90	.16	.49	.51	.28
LBQ Section C Total	Pearson correlation	.02	.25	-.11	.12	.18
	Sig. (2-tailed)	.88	.13	.51	.47	.26
LBQ Section D English	Pearson correlation	.01	-.13	.13	.22	.27
	Sig. (2-tailed)	.96	.43	.44	.18	.10
LBQ Section D L1	Pearson correlation	.11	-.04	.09	.05	.01
	Sig. (2-tailed)	.50	.83	.59	.77	.96
LBQ Section D Total	Pearson correlation	.07	-.09	.12	.14	.15
	Sig. (2-tailed)	.69	.59	.48	.39	.37
LBQ Section E Total	Pearson correlation	-.24	-.20	.35	.21	.02
	Sig. (2-tailed)	.13	.22	.03*	.18	.90
LBQ Section F Total	Pearson correlation	.05	.22	.07	-.19	-.13
	Sig. (2-tailed)	.76	.18	.65	.24	.44

*significant at $p<.05$

Table 35 shows that there were no significant correlations between any sections of the LBQ and four of the five aforementioned variables. However, there is a significant positive correlation with a medium effect size between the Year 10 EAL group's Section E Total score and French receptive vocabulary. Section E is a measure of non-English literacy. With this in mind it is plausible that those who have better non-English literacy are more likely to pick up French vocabulary knowledge, either through cognates or through increased morphological awareness. However, as with the year 8 EAL cohort, this conclusion is only inferred from a correlation and as such no causation can be implied.

4.3 The Background Information Questionnaire (BIQ)

As described in section 3.4.2, the Background Information Questionnaire (BIQ) was administered orally, on a one to one basis, to every pupil who took part in the main phase of the study. As different items of the BIQ are scored differently and measure different constructs, they will be described in different sections; i) Items 1 to 9 are dichotomous in nature and measures participants' exposure to the French language; ii) Item 10 is trichotomous in nature (no, unsure, yes) and measures participants' surety to take GCSE French; iii) Items 11 and 12 are measured on a 6-point scale and measure participants' motivation to learn French.

4.3.1 Analysing items 1 to 9 of the Background Information Questionnaire (BIQ)

Items 1 to 9 of the BIQ are dichotomous in nature (yes or no). Table 36 shows the percentage of positive responses to each item for each group:

Table 36: Percentage of positive responses to items 1 to 9 on the Background Information Questionnaire assessed by language and year group

	Group			
Item	**Year 8 EL1**	**Year 8 EAL**	**Year 10 EL1**	**Year 10 EAL**
1	46.9	40.4	36.6	35.0
2	44.9	40.4	36.6	32.5
3	32.7	21.3	34.1	40.0
4	24.5	38.3	29.3	35.0
5	2.0	6.4	9.8	15.0
6	20.4	27.7	26.8	20.0
7	8.2	8.5	2.4	12.5
8	12.2	12.8	26.8	17.5
9	10.2	8.5	9.8	10.0

For the purposes of brevity, only the most striking trends shown by the above data are discussed. Firstly, Table 36 shows that on every item the percentage of positive responses was below 50 per cent for each group. This is slightly surprising as it could reasonably be expected that participants in the year 10 groups who have chosen to study French may have had experience of the language in a variety of situations. On the other hand, the choice to study French at school might be unrelated to the experience of the language outside of school.

This suggestion is backed up by the responses to items 1, 2, and 3. Table 36 shows that item 1 (Did you learn French before year 7?) and item 2 (If yes, how many years did you learn French before year 7?) have the highest positive response rate across all groups. In addition, whilst item 3 (Do you have any help with French at home?) also had a relatively high positive response rate and relates to the learning of French in a domestic setting, it may reasonably be expected that this item is inquiring about the completion of homework and therefore has a strong link to the formal learning of French. Consequently, the data indicate that the most common experience of French is in a formal learning environment.

Conversely, those items which pertain to an unstructured exposure to French outside of the classroom have a low positive response rate across all groups. For example, Item 5 inquires if the pupil has ever been on a school trip to a francophone country and has a positive response rate of 2 to 15 per cent. However, this finding may be explained by the observation that schools simply do not have the capacity to take many pupils on trips. In addition, Item 7 (do you know any French people outside school who you can speak a little French with?), generates a positive response rate of only 2.4 to 12.5 per cent.

One exception to this trend is Item 6 which inquires if the pupil has ever been on holiday to a francophone country. For this item, there was at least a 20 per cent positive response rate for each group. However, it is noteworthy that choice of holiday destination is usually decided by parents. From this observation one may conclude that when the decision lies in the hands of pupils to expose themselves to French outside of the classroom, the response is often negative.

Lastly, one seemingly anomalous finding is that an unusually large proportion of year 10 EL1 pupils (26.8 per cent), reported learning another foreign language at school besides French. This finding may not be due to a cohort effect as only 17.5 per cent of year 10 EAL pupils responded positively to this item. In addition, although a high correlation between the studying of romance languages may have been expected, we know from Item 9 (Which foreign language are you learning other than French?) that only 9.8 per cent of year 10 EL1 pupils have chosen to study another romance language in addition to French. Consequently, from the data it can be stated only that a relatively high proportion of year 10 EL1 pupils elected to study another non-romance foreign language but the reasons for doing so were unclear.

4.3.2 Analysing Item 10 of the Background Information Questionnaire (BIQ)

Item 10 of the BIQ was a trichotomous item which assessed participants' surety to take the French GCSE examination. Even though year 10 pupils have already started learning towards the GCSE qualification, it was important to measure the likelihood that these same pupils would take the exam in year 11, as in some instances pupils may change their mind before taking the GCSE examination. Responses were coded as 0, 1, and 2, if participants were definitely not, unsure of, or definitely going to take French at GCSE. Table 37 shows the percentage breakdown responses to Item 10 for each group.

Table 37: Percentage of positive responses to Item 10 on the Background Information Questionnaire assessed by language and year group

	Group			
Item 10	**Year 8 EL1**	**Year 8 EAL**	**Year 10 EL1**	**Year 10 EAL**
No	20.4	40.4	0.0	0.0
Unsure	59.2	40.4	4.9	0.0
Yes	20.4	19.1	95.1	100.0

Table 37 shows that unsurprisingly, the vast majority of year 10 pupils were sure that they are going to study French for GCSE. This finding differs to the year 8 cohort in two main ways. Firstly, in comparison to the year 10 group there is a lot more uncertainty in the year 8 group although there is some within year group difference. As Table 37 shows, almost 60 per cent of year 8 EL1 pupils are unsure of whether they will study French at GCSE. This is almost 20 per cent higher than the equivalent figure for the year 8 EAL group. In addition, the percentage of negative responses in the year 8 groups is higher than in the year 10 groups, although again there is some within year group difference. As Table 37 shows, almost twice the percentage of year 8 EAL pupils responded that they will definitely not study French at GCSE compared to their EL1 classmates. Overall therefore, it seems that year 8 EAL pupils are more decisive when considering the take-up of French at GCSE.

However, these findings should be treated with caution. Whilst it can reasonably be expected that pupils in the year 10 groups will not change their views greatly between now and their GCSE year, the same cannot be said of the year 8 cohort. In other words, year 8 perspectives may be more dynamic than year 10 ones. Unfortunately, the cross-sectional nature of the present study is not able to capture this aspect of pupils' views.

4.3.3 Analysing Items 11 and 12 of the Background Information Questionnaire (BIQ)

As detailed in section 3.4.2, intrinsic motivation to learn French may present itself as a confound variable as those pupils who are more motivated to learn French may dedicate more of their time engaged with written French texts compared to less motivated pupils. The extra time spent reading French texts could then increase their morphological awareness or French vocabulary. Consequently, it was of interest to measure motivation to learn French. The measure of motivation, the mean of items 11 and 12 of the BIQ (Motivation), had a maximum score of 5.0. Mean scores and standard deviations for each of these measures are reported in Table 38:

Table 38: Mean scores and standard deviations on items 11 and 12 of the BIQ (motivation)

Measure	**Mean score**	**Standard Deviation**
Motivation		
Year 8 EL1 (n=49)	1.39	1.47
Year 8 EAL (n=47)	1.34	1.57
Year 8 total (n=96)	1.36	1.51
Year 10 EL1 (n=41)	3.74	0.92
Year 10 EAL (n=40)	3.75	0.95
Year 10 total (n=81)	3.75	0.93

In terms of motivation Table 38 indicated a difference between year groups, with the year 10 cohort presenting a higher measure of motivation to learn French than the year 8 cohort. To explore this observation further, an independent samples *t*-test was conducted to compare levels of motivation for year 8 and year 10 participants. This revealed a significant difference on the measure of motivation for year 8 and year 10 participants; $t(175)=-12.36$, $p<.01$. Moreover, the standard deviation of both year 10 groups indicated more homogeneity compared with the year 8 groups. As studying a foreign language is compulsory in year 8 at school 1, whilst it is optional in year 10, these results are not surprising. However, such data again indicates a cohort difference which may contribute to higher levels of morphological awareness and French vocabulary for year 10 pupils. Such a difference will be taken into account when discussing results in Chapter 6.

4.4 Analytic strategy

The theoretical basis of this study was based on the prediction of vocabulary via morphemic analysis (c.f. Chapter 1, section 1.1.2). In addition, section 2.3 outlined the arguments for measuring this relationship after accounting for several covariates. Consequently, the analytic strategy was twofold. Initially, the data was explored using a range of descriptive statistics, bivariate correlations, and *t*-tests, to look for relationships between predictors, response variables, and covariates. The results of these analyses are presented in this chapter. Secondly, in Chapter 5 multiple regressions were performed to explore the prediction of vocabulary outcomes by morphological awareness predictors, after controlling for covariates. All of the descriptive and inferential statistical techniques reported were calculated using Statistical Package for the Social Sciences (SPSS) version 21.

When interpreting the findings of these analyses care was taken to ensure that causality was not assumed. Such care was warranted due to the correlational nature of the study design. This important limitation was taken into account when discussing the findings of the study (c.f. Chapter 6). On the other hand, there were four reasons which justified the use of this analytic strategy. Firstly, a preliminary exploration of the data provided a solid foundation for the analysis of the research questions. In addition, the use of several covariates all of which have a theoretical justification supporting their inclusion (c.f. section 2.3), reduced within-group error variance and eliminated the effect of confound variables (Field, 2009, pp. 396–397). Furthermore, the use of multiple regression allowed for the prediction of the statistical effect of multiple predictor variables on one response variable. Lastly, such multivariate techniques have the advantage of enabling the researcher to avoid Type 1 errors 95 per cent of the time (Tabachnick & Fidell, 2014).

4.5 Data screening

As the inferential statistical techniques used in this study were based on the assumptions of parametric statistics, a thorough consideration of these assumptions was warranted. Consequently, prior to any preliminary analysis, the data were screened and if necessary were transformed, so that they met the assumptions of parametric statistical procedures. Any additional assumptions which were specific to the multivariate analytical techniques used to directly answer the research questions are addressed in the appropriate sections of Chapter 5.

4.5.1 Ensuring accuracy of the data file

The first step of the data screening process involved checking the accuracy of the data file. To that end, the original data on paper were proofread against the computerised SPSS data file. Furthermore, accuracy of input of continuous variables was judged by plausible means and standard deviations, and reasonable maximum and minimum values, whilst ordinal variables were checked for out of range numbers.

4.5.2 Checking for missing data

After having screened the data file, the file was checked for missing variables. No items of missing data were found.

4.5.3 Checking for normality

Each predictor, response, and covariate variable, was checked for normality. Establishing normality was an important preliminary step in this study as it strengthened the inferences made from the multivariate analyses performed in Chapter 5. Although Tabachnick and Fidell (2014, pp. 113–117) propose various ways of assessing normality, both statistical and graphical, this study employed one method in the first instance to avoid a situation where multiple methods were contraindicative of normality.

Z-scores of skewness and kurtosis were calculated for each variable. Although Brown (2011) specifies that z-scores are indicative of non-normality if they lie out of the +/-1.96 range, as Warner (2012) explains, non-normal distributions are only considered problematic when they differ greatly from the norm. Moreover, as Field (2009, p. 139) explains, in larger samples standard errors tend to be small which can lead to large z-scores even when deviations from normality are small. Consequently, scores which lay out of the +/-2.58 range were considered indicative of non-normality. As per Tabachnik and Fidell (2014, p. 115), if any scores were indicative of non-normality, Normal Q-Q plots were consulted to gain an appreciation of the extent of this deviation.

Z-scores of skewness and kurtosis were initially chosen to assess normality as this method is statistical in nature, and therefore more precise than a graphical method (Brown, 2011). In addition, both the K-S test and the Shapiro-Wilk test were not chosen as they have been documented as being significant even when scores are only slightly different from a normal distribution (Field, 2009). As the analyses carried out in this study involved comparing grouped data, normality was checked within groups for each variable. Outcomes of the assessment of normality are presented in Table 39.

Table 39: Tests of normality of variables within groups measured by z-scores of skewness and kurtosis (violations to normality highlighted in red)

Tests of Normality			
	Group	**Skewness/Std Error of skewness**	**Kurtosis/Std Error of kurtosis**
Motivation (mean of items 11 and 12 of BIQ)	Year 8 EL1	2.90	0.07
	Year 8 EAL	2.64	-0.50
	Year 10 EL1	-0.86	-0.90
	Year 10 EAL	-1.62	0.71
IDACI rank	Year 8 EL1	1.56	-0.66
	Year 8 EAL	1.82	-1.14
	Year 10 EL1	1.03	-1.28
	Year 10 EAL	-0.69	-1.27
WISC-R backwards digit recall	Year 8 EL1	0.40	-1.22
	Year 8 EAL	-0.66	-1.01
	Year 10 EL1	0.53	-1.67
	Year 10 EAL	-1.41	0.07
WASI II matrix reasoning score	Year 8 EL1	-0.32	-0.43
	Year 8 EAL	0.80	1.03
	Year 10 EL1	-1.57	-1.69
	Year 10 EAL	-0.50	-1.17
WIAT-II UK pseudoword decoding	Year 8 EL1	-2.00	-1.91
	Year 8 EAL	-0.11	-1.66
	Year 10 EL1	0.16	-0.85
	Year 10 EAL	0.72	-0.89
PhAB spoonerisms	Year 8 EL1	-0.09	-1.66
	Year 8 EAL	1.73	-0.24
	Year 10 EL1	-0.74	-1.95
	Year 10 EAL	-1.59	0.62
BPVS3 receptive vocabulary in English	Year 8 EL1	-0.74	-1.49
	Year 8 EAL	0.10	-1.50
	Year 10 EL1	1.04	-1.41
	Year 10 EAL	-1.62	0.71
TOWK expressive vocabulary in English	Year 8 EL1	2.30	0.54
	Year 8 EAL	1.62	-1.45
	Year 10 EL1	1.45	-0.74
	Year 10 EAL	1.91	-0.49
French 1k levels	Year 8 EL1	0.20	0.97
	Year 8 EAL	0.24	-0.95
	Year 10 EL1	-2.37	-0.91
	Year 10 EAL	-0.94	-0.18
Morphological Decomposition test English	Year 8 EL1	1.78	-0.36
	Year 8 EAL	0.46	-0.03
	Year 10 EL1	-0.67	-0.46
	Year 10 EAL	-1.33	0.74
Morphological Decomposition test French	Year 8 EL1	2.48	0.48
	Year 8 EAL	1.78	-0.34
	Year 10 EL1	1.34	-0.79
	Year 10 EAL	0.44	0.89

Table 39 shows that a non-normal distribution of scores was found in the two year 8 groups on the variable measuring motivation. Consequently, Normal Q-Q plots were checked to assess the extent of deviation from normality (see Figure 4.1 and Figure 4.2). These indicated that deviation from normality for both groups was not severe. Consequently, it was decided to use untransformed variables in the analyses of this study.

Figure 4.1: Normal Q-Q Plot of motivation for Year 8 EL1

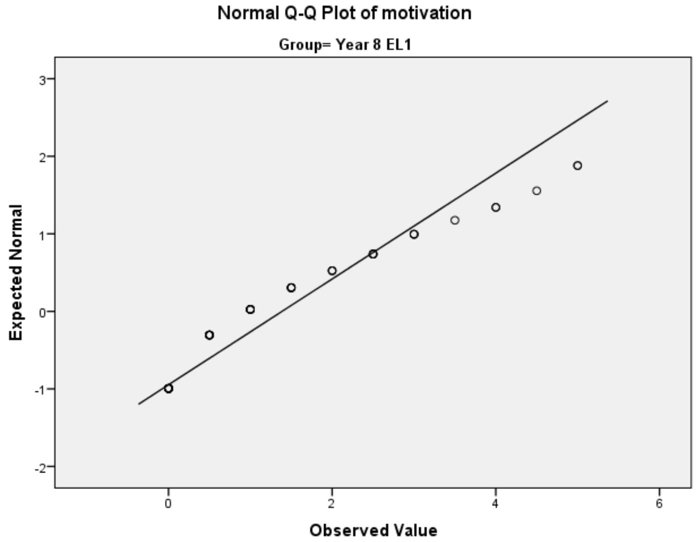
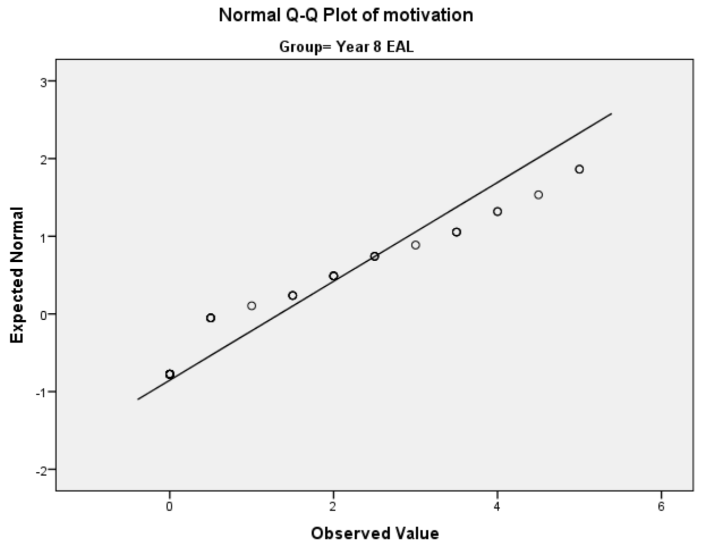


Figure 4.2: Normal Q-Q Plot of motivation for Year 8 EAL



4.5.4 Checking for univariate outliers

The data were then checked for outliers. Both univariate and multivariate outliers are problematic as they inflate the standard error of the sample mean, thereby reducing power when comparing groups, and consequently increasing the probability of making a Type II error. Therefore, it was important to identify outliers, understand their presence in the data set, and finally deal with them either by transformation or deletion.

In order to detect univariate outliers, z-scores were calculated for each variable. A z-score was regarded as indicative of an outlier if it lay outside of the +/-3.29 range (Tabachnick & Fidell, 2014, p. 107). As before, z-scores were calculated within groups. Only one case was identified as an outlier, on the WASI II matrix reasoning task. After inspection of this case, it was decided that the score represented a year 10 participant who was not 'typically developing' on this measure of nonverbal IQ as they achieved a score which was more than one standard deviation below the mean standardised score. Consequently, it was deemed that exclusion criterion 4 of the study had been violated (c.f. section 3.3) and the case was deleted from the data set.

4.5.5 Checking for multivariate outliers

After checking for univariate outliers, data were checked for multivariate outliers. Multivariate outliers were assessed by calculating Mahalanobis distance where a value of $p<.001$ was considered as an outlier (Tabachnick & Fidell, 2014, pp. 108–109). Although the use of Mahalanobis distance as a measure of multivariate outliers has been critiqued in the literature as being unreliable as it may both mask real outliers and give false positives, it is currently the method which most easily detects multivariate outliers and the one which is used most in the literature (*ibid.*). As above, Mahalanobis distance was calculated within groups. No multivariate outliers were identified.

4.5.6 Checking for extraneous variables: Sex

A Chi-square test was carried out in order to determine whether the 4 groups differed in terms of sex. No significant group differences were found, χ^2 (3) = 2.18, $p> .05$. As this result shows that there were no significant differences in the distributions of males and females in any of the 4 groups participating in the main phase of this study, sex was not considered an important variable in this study and did not feature in any subsequent analysis.

4.5.6.1 Age

An independent samples *t*-test was carried out to determine if there was a significant difference in terms of age between the year 8 EL1 group and the year 8 EAL group. There was no significant difference in age between the year 8 language groups, $t(94)=.78$, $p>.05$. Furthermore, a further independent samples *t*-test identified there was no significant difference in age between the year 10 EL1 group and the year 10 EAL group, $t(79)=1.65$, $p>.05$. Consequently, age was not an important variable in this study did not feature in any subsequent analysis.

4.5.6.2 Class

Class effects were checked separately for year 8 participants and year 10 participants. The distribution of the 96 year 8 participants to French classes is presented in Table 40:

Table 40: Distribution of year 8 participants to French classes

Class	Number of pupils
0	21
1	19
3	17
4	17
6	22

In order to check for class effects in year 8, the differences between pupils in all five year 8 classes on all predictor and response variables (morphological awareness in English, morphological awareness in French, receptive vocabulary in French, receptive vocabulary in English, and expressive vocabulary in English) were examined using a one-way ANOVA. The results of these analyses are presented in Table 41:

Table 41: One-Way ANOVA for year 8 classes on morphological awareness in English, morphological awareness in French, receptive vocabulary in French, receptive vocabulary in English, and expressive vocabulary in English

		df	F	Sig.
Morphological awareness in English	Between groups	4	2.07	.09
	Within groups	91		
	Total	95		
Morphological awareness in French	Between groups	4	.65	.63
	Within groups	91		
	Total	95		
Receptive vocabulary in French	Between groups	4	1.15	.34
	Within groups	91		
	Total	95		
Receptive vocabulary in English	Between groups	4	.99	.42
	Within groups	91		
	Total	95		
Expressive vocabulary in English	Between groups	4	.12	.98
	Within groups	91		
	Total	95		

Table 41 shows that no significant differences between the five year 8 classes were found on any of the predictor or response variables.

After checking for year 8 class effects, class effects amongst year 10 participants were also checked. The distribution of the 81 year 10 participants to French classes is presented in Table 42:

Table 42: Distribution of year 10 participants to French classes

Class	Number of pupils
2	19
5	22
7	17
8	23

In order to check for class effects in year 10, the differences between pupils in all four year 10 classes on all predictor and response variables were examined using a one-way ANOVA. The results of these analyses are presented in Table 43:

Table 43: One-Way ANOVA for year 10 classes on morphological awareness in English, morphological awareness in French, receptive vocabulary in French, receptive vocabulary in English, and expressive vocabulary in English

		df	F	Sig.
Morphological awareness in English	Between groups	3	.46	.71
	Within groups	77		
	Total	80		
Morphological awareness in French	Between groups	3	.53	.66
	Within groups	77		
	Total	80		
Receptive vocabulary in French	Between groups	3	1.90	.14
	Within groups	77		
	Total	80		
Receptive vocabulary in English	Between groups	3	.87	.47
	Within groups	77		
	Total	80		
Expressive vocabulary in English	Between groups	3	2.17	.10
	Within groups	77		
	Total	80		

Table 43 shows that no significant differences between the four year 10 classes were found on any of the predictor or response variables. As no significant differences were found, neither amongst year 8 pupils nor amongst year 10 pupils, it was decided that multilevel modelling was not required to adjust for class effects.

4.5.6.3 Teacher

Teacher effects were checked separately for year 8 participants and year 10 participants. For year 8 participants there were a total of three French teachers, two of whom taught two classes and one who taught one class. In order to check for teacher effects in year 8, the differences between pupils with the three different teachers on predictor and response variables were examined using a one-way ANOVA. The results of these analyses are presented in Table 44:

Table 44: One-Way ANOVA for year 8 teaching groups on morphological awareness in English, morphological awareness in French, receptive vocabulary in French, receptive vocabulary in English, and expressive vocabulary in English

		df	F	Sig.
Morphological awareness in English	Between groups	2	.77	.48
	Within groups	93		
	Total	95		
Morphological awareness in French	Between groups	2	.30	.75
	Within groups	93		
	Total	95		
Receptive vocabulary in French	Between groups	2	1.25	.29
	Within groups	93		
	Total	95		
Receptive vocabulary in English	Between groups	2	.66	.52
	Within groups	93		
	Total	95		
Expressive vocabulary in English	Between groups	2	.07	.93
	Within groups	93		
	Total	95		

Table 44 shows that no significant differences between year 8 participants who were working with the three French teachers were found on any of the predictor or response variables.

For year 10 participants there were a total of two French teachers, both of whom taught two classes each. In order to check for teacher effects in year 10, differences between pupils with the two different teachers on predictor and response variables were examined using independent samples *t*-tests. The results of these analyses are presented in Table 45:

Table 45: Independent samples *t*-tests for year 10 teaching groups on morphological awareness in English, morphological awareness in French, receptive vocabulary in French, receptive vocabulary in English, and expressive vocabulary in English

		t	**df**	**Sig. (2-tailed)**
Morphological awareness in English	Equal variances assumed	0.03	79	.98
	Equal variances not assumed	0.03	78.92	.98
Morphological awareness in French	Equal variances assumed	-0.81	79	.42
	Equal variances not assumed	-0.81	74.51	.42
Receptive vocabulary in French	Equal variances assumed	-1.32	79	.19
	Equal variances not assumed	-1.32	78.68	.19
Receptive vocabulary in English	Equal variances assumed	-0.54	79	.59
	Equal variances not assumed	-0.54	78.60	.59
Expressive vocabulary in English	Equal variances assumed	0.06	79	.96
	Equal variances not assumed	0.06	78.44	.96

Table 45 shows that no significant differences between year 10 participants who were working with the two French teachers were found on any of the predictor or response variables. As no significant differences were found, neither amongst year 8 pupils nor amongst year 10 pupils, it was decided that multilevel modelling was not required to adjust for teacher effects.

4.6 Descriptive statistics and bivariate correlations

In this section descriptive statistics are reported for all variables. Descriptive statistics are presented by language group×year group in order to explore within year group variance by language status. Subsequently, correlational analyses are carried out to provide an initial exploration of the data, and also to check for multicollinearity between variables. Preliminary inferential statistics are also presented in order to explore initial patterns in the data. Prior to the correlational analyses, variables were checked as above in order to confirm bivariate normal distribution and to identify outliers. Where one or both of these assumptions were violated, a Spearman's rank correlation coefficient was calculated instead of a Pearson's product-moment correlation coefficient.

4.6.1 Year 8 results

Within-language group means and standard deviations are reported in Table 46. Within-language group correlations are reported in Table 47 with EL1 correlations above the diagonal and EAL correlations below the diagonal.

Table 46: Year 8 mean scores (standard deviations)

Measure	**EL1 (49)**	**EAL (47)**
English morphological awareness	13.96 (3.29)	13.60 (4.45)
French morphological awareness	8.67 (2.76)	10.11 (2.29)
English receptive vocabulary	137.82 (8.01)	129.77 (9.66)
English expressive vocabulary	20.08 (2.47)	17.83 (2.53)
French receptive vocabulary	12.43 (3.64)	12.46 (3.91)
Word segmentation	21.57 (4.44)	19.87 (3.31)
Pseudoword decoding	46.33 (4.32)	47.32 (4.61)
Nonverbal IQ	16.08 (4.25)	15.32 (3.77)
Working memory	5.06 (1.38)	4.87 (1.38)
Socioeconomic status	9161.14 (4434.39)	7852.19 (3275.14)
Motivation to learn French	1.39 (1.47)	1.34 (1.57)

Table 47: Year 8 correlations between variables

EL1(49) / EAL(47)	English MA	French MA	English receptive	English expressive	French receptive	Word segmentation	Pseudoword decoding	Nonverbal IQ	Working memory	SES	Motivation
English MA	1	-.24	.19	.07	.17	.25	.19	.11	.18	.06	.04
French MA	-.12	1	.02	-.16	.01	-.09	-.09	.05	.01	.00	-.03
English receptive	.41**	-.02	1	.55**	.59**	.62**	.16	.51**	.24	.18	-.32*
English expressive	-.10	-.10	.27	1	.40**	.41**	.19	.38**	.16	.22	-.14
French receptive	.15	.01	.37**	.34*	1	.51**	.29*	.61**	.25	.36*	-.26
Word segmentation	.33*	-.04	.36*	.14	.48**	1	.38**	.52**	.44**	.28*	-.11
Pseudoword decoding	-.33*	-.11	.04	.30*	.35*	.13	1	.22	.46**	.22	-.17
Nonverbal IQ	.14	.20	.13	-.08	.25	.23	.13	1	.04	.43**	-.25
Working memory	.04	-.09	.41**	.44**	.26	.29*	.09	.09	1	.22	.04
SES	-.17	-.10	-.02	.28	.00	.03	.17	.00	.09	1	-.12
Motivation	-.08	-.08	-.13	.09	.03	-.10	-.06	.16	.02	.27	1

* $p<.05$
** $p<.01$
English MA = English morphological awareness, French MA = French morphological awareness, English receptive = English receptive vocabulary, English expressive = English expressive vocabulary, French receptive = French receptive vocabulary, SES = Socioeconomic status, Motivation = Motivation to learn French

4.6.2 Measures of morphological awareness

Two measures of morphological awareness were used in this study. Each measure had a maximum score of 30. Table 46 shows two main patterns. Firstly, mean scores on the Morphological Decomposition test – English were higher at a descriptive level compared to mean scores on the Morphological Decomposition test – French. To check for significant differences between morphological awareness scores in English and in French, paired samples *t*-tests were carried out. A significant difference was found between scores on measures of morphological awareness for year 8 EL1 pupils, $t(48)=7.73$, $p<.001$, and year 8 EAL pupils, $t(46)=4.56$, $p<.001$.

Furthermore, Table 46 indicates that with regard to morphological awareness in French, there is an advantage for EAL pupils over EL1 pupils at a descriptive level. To explore this observation further, an independent samples *t*-test was conducted to compare morphological awareness in French in year 8 EL1 pupils and year 8 EAL pupils. This revealed a significant advantage for year 8 EAL pupils over year 8 EL1 pupils on the measure of French morphological awareness, $t(94)= -2.76$, $p<.01$.

Bivariate correlations were then calculated between measures of morphological awareness for each year 8 language group. These are shown in Table 47. Table 47 shows no significant correlation between measures of morphological awareness for either year 8 language group. As discussed in Appendix 3.8, the non-significant correlation for Year 8 EAL pupils indicates that at this age group the two tests may be measuring different constructs.

4.6.3 Measures of vocabulary

Three measures of vocabulary knowledge were used in this study. The measure of English receptive vocabulary, the BPVS3, had a maximum score of 168. The measure of English expressive vocabulary, the expressive vocabulary subtest Level 2 of the TOWK, had a maximum score of 30, as did the measure of French receptive vocabulary, the French 1k Levels Test. Table 46 shows two main patterns. Firstly, for the two measures of English vocabulary knowledge, year 8 EL1 pupils showed descriptively higher mean scores than year 8 EAL pupils. To explore this observation further, independent samples *t*-tests were performed between year 8 EL1 and year 8 EAL pupils on both measures of English vocabulary knowledge. This revealed a significant advantage for year 8 EL1 pupils over year 8 EL1 pupils on the measure of English receptive vocabulary, $t(94)= 4.33$, $p<.01$, and a significant advantage for year 8 EL1 pupils over year 8 EAL pupils on the measure of English expressive vocabulary, $t(94)= 4.42$, $p<.01$. Both analyses confirm the observations seen at a descriptive level. Secondly, the standard deviation of year 8 EAL on the BPVS3 was noticeably larger than that of their EL1 peers. This denoted higher variability in the year 8 EAL group.

Bivariate correlations were then calculated between measures of vocabulary for each year 8 language group. Table 47 shows that for the year 8 EL1 group, all correlations between measures of vocabulary knowledge were positive and significant at $p<.01$. This picture differs to the year 8 EAL group in two important ways. Firstly, although the correlation between English receptive vocabulary and French receptive vocabulary is still significant at $p<.01$, the strength of this correlation is markedly weaker than that of the year 8 EL1 group (r=.37 compared to r=.59). Secondly, the correlation between English receptive vocabulary and English expressive vocabulary only approaches significance (r=.27, $p>.05$). One explanation for this could be that the relationship between receptive vocabulary and expressive vocabulary in English is somewhat more complex for EAL pupils than for EL1 pupils (Murphy, 2014).

4.6.4 Measures of phonological awareness

Two measures of phonological awareness were used in this study. The measure of pseudoword decoding accuracy, the Pseudoword decoding subtest of the WIAT-II UK, had a maximum score of 55. The measure of word segmentation ability, the Spoonerisms subtest of the PhAB, had a maximum score of 30. Two main patterns can be discerned from Table 46. Firstly, the pseudoword decoding subtest does not seem to differentiate well across language status. Secondly, year 8 EL1 participants perform better at a descriptive level on the spoonerisms subtest than year 8 EAL participants. To explore this observation further an independent samples *t*-test was conducted to compare scores on the spoonerisms subtest for year 8 EL1 and year 8 EAL pupils. This revealed a significant difference in favour of year 8 EL1 pupils; $t(94)=2.12$, $p<.05$.

Bivariate correlations were then calculated between measures of phonological awareness for each year 8 language group. Table 47 shows that the two measures of phonological awareness were significantly related to one another only for the year 8 EL1 group ($r=.38$, $p<.01$). This represents a moderate association. However, for year 8 EAL pupils no significant association was found. This result indicates a possible effect of language status with the Pseudoword decoding test and the Spoonerisms test tapping into slightly different aspects of phonological awareness for EAL pupils compared to EL1 pupils.

4.6.5 Measures of nonverbal intelligence

Two measures of non-verbal intelligence were used in this study. The measure of working memory, the backwards digit recall subtest of the WISC-R, had a maximum score of 14. The measure of nonverbal IQ, the matrix reasoning subtest of the WASI II, had a maximum score of 30. Table 46 shows that year 8 EL1 and year 8 EAL groups had similar scores on both measures of nonverbal intelligence. Nevertheless, independent samples *t*-tests were conducted to check for significant differences on both measures of nonverbal intelligence between year 8 EL1 and year 8 EAL pupils. This revealed no significant difference on the measure of working memory; $t(94)= 0.66$, $p>.05$, and no significant difference on the measure of nonverbal IQ; $t(94)= 1.00$, $p>.05$. Both analyses confirm the observations seen at a descriptive level.

Bivariate correlations were then calculated between measures of nonverbal intelligence for each year 8 language group. Table 47 shows no significant correlation for either year 8 language group.

4.6.6 Measures of socioeconomic status and written English

As detailed in section 2.3, there is a documented correlation between socioeconomic status (SES) and exposure to written text (Hart & Risley, 1995). Consequently, it may be reasonably expected that SES correlates with English receptive vocabulary, and English morphological awareness. The measure of SES, the IDACI, had a maximum score of 32,482. The smaller standard deviation shown in Table 46 for year 8 EAL pupils compared to their EL1 peers indicates greater homogeneity in this group, on the measure of SES. As the measure of SES was descriptively higher for year 8 EL1 pupils compared to their EAL peers, an independent samples *t*-test was carried out to check for a significant difference on this measure. The analysis, however, revealed no significant difference; $t(94)= 1.61$, $p>.05$.

Bivariate correlations were then analysed between measures of written English and SES for each year 8 language group. Table 47 shows that there were no significant correlations between SES and English receptive vocabulary, and SES and English morphological awareness, for year 8 EL1, and year 8 EAL pupils. Although this finding is surprising, one explanation for this result may be due to the highly socioeconomically diverse area in which

School 1 is located. In such a situation, using the IDACI as a measure of socioeconomic status can become problematic as it is not a subtle enough instrument to be able to capture the socioeconomic status of all participants accurately. Another possible explanation may be that the relationship between these measures is mediated by one or more variables such as working memory, word segmentation ability, or pseudoword decoding ability.

4.6.7 Measures of French and motivation to learn French

As detailed above (c.f. section 4.2.3), intrinsic motivation to learn French may present itself as a confound variable as those pupils who are more motivated to learn French may dedicate more of their time engaged with written French texts compared to less motivated pupils. The extra time spent reading French texts could then increase their French morphological awareness or French vocabulary. Consequently, it was of interest to explore how measures of French and the measure of motivation to learn French, related to one another. The measure of motivation, the mean of items 11 and 12 of the BIQ (Motivation), had a maximum score of 5.0.

Table 46 indicated similar levels of motivation between year 8 EL1 and year 8 EAL pupils. Indeed, this observation was confirmed by a nonsignificant independent samples *t*-test on the measure of motivation; $t(94)=0.15$, $p>.05$. Bivariate correlations between French receptive vocabulary, French morphological awareness, and motivation to learn French, were then analysed. Table 47 shows that there were no significant correlations for either 8 year group between any of the measures. Although this finding is surprising, one explanation may be that the relationship between motivation to learn French, French receptive vocabulary, and French morphological awareness is mediated by other variables.

4.6.8 Year 10 results

Within-language group means and standard deviations are reported in Table 48. Within-language group correlations are reported in Table 49 with EL1 correlations above the diagonal and EAL correlations below the diagonal.

Table 48: Year 10 mean scores (standard deviations)

Measure	**EL1 (41)**	**EAL (40)**
English morphological awareness	24.68 (3.27)	23.58 (3.35)
French morphological awareness	16.83 (5.36)	19.75 (3.97)
English receptive vocabulary	145.44 (9.45)	144.48 (10.03)
English expressive vocabulary	21.95 (3.32)	20.83 (3.14)
French receptive vocabulary	19.11 (3.50)	20.02 (3.59)
Word segmentation	23.76 (4.01)	23.30 (4.20)
Pseudoword decoding	46.56 (3.75)	46.40 (4.02)
Nonverbal IQ	18.44 (4.08)	16.38 (3.43)
Working memory	5.95 (1.87)	5.58 (1.82)
Socioeconomic status	11382.73 (4183.40)	11496.20 (4416.70)
Motivation to learn French	3.74 (0.92)	3.75 (0.95)

Table 49: Year 10 correlations between variables

EL1(41) / EAL(40)	English MA	French MA	English receptive	English expressive	French receptive	Word segmentation	Pseudoword decoding	Nonverbal IQ	Working memory	SES	Motivation
English MA	1	.19	.39*	.30	.35*	.18	.25	.00	.23	.02	.10
French MA	.33*	1	-.02	-.20	.19	.06	-.15	-.23	.00	.15	-.06
English receptive	.40*	.54**	1	.69**	.46**	.45**	.41**	.47**	.59**	.18	.34*
English expressive	.04	.20	.45**	1	.23	.27	.21	.32*	.48**	.13	.41**
French receptive	.35*	.55**	.37*	.03	1	.41**	.13	-.03	.46**	.04	.26
Word segmentation	.20	.41**	.47**	.25	.62**	1	.22	-.13	.15	-.04	.27
Pseudoword decoding	.18	.10	.16	.39*	.05	.09	1	.10	.05	-.22	.16
Nonverbal IQ	-.09	.18	.10	-.10	.39*	.13	-.23	1	.37*	.07	-.11
Working memory	-.04	.14	-.12	-.24	.38*	.41**	-.14	.26	1	-.14	.35*
SES	.04	.07	.21	.25	-.09	.25	.11	-.21	-.11	1	.13
Motivation	.20	-.07	-.13	.12	-.06	.13	.22	-.12	.10	-.07	1

* $p<.05$

** $p<.01$

English MA = English morphological awareness, French MA = French morphological awareness, English receptive = English receptive vocabulary, English expressive = English expressive vocabulary, French receptive = French receptive vocabulary, SES = Socioeconomic status, Motivation = Motivation to learn French

4.6.9 Measures of morphological awareness

Table 48 shows three main patterns. Firstly, as was the case with year 8 pupils (c.f. section 4.6.2) mean scores on the Morphological Decomposition test – English were higher at a descriptive level compared to mean scores on the Morphological Decomposition test – French. To check for significant differences between morphological awareness scores in English and in French, paired samples *t*-tests were carried out. A significant difference was found between scores on measures of morphological awareness for year 10 EL1 pupils, $t(40)=8.77$, $p<.001$, and year 10 EAL pupils, $t(39)=6.01$, $p<.001$.

Secondly, with regard to morphological awareness in French there is an advantage for EAL pupils over EL1 pupils at a descriptive level. To explore this observation further, an independent samples *t*-test was conducted to compare morphological awareness in French in year 10 EL1 pupils and year 10 EAL pupils. This revealed a significant advantage for year 10 EAL pupils over year 10 EL1 pupils on the measure of French morphological awareness, $t(79)= -2.95$, $p<.01$.

Bivariate correlations were then calculated between measures of morphological awareness for each year 10 language group. These are shown in Table 49. Table 49 shows that the only significant correlation between measures of morphological awareness is for year 10 EAL participants ($r=.33$, $p<.05$). As discussed in Appendix 3.8, in the case of year 10 EAL pupils this correlation was taken as evidence of convergent validity, whilst in the case of year 10 EL1 pupils the above correlation was taken as evidence of discriminant validity.

4.6.10 Measures of vocabulary

Table 48 shows three main patterns. Firstly, year 10 EAL pupils seem to demonstrate a similar level of English receptive vocabulary knowledge compared to their EL1 peers. To explore this observation further, an independent samples *t*-test was conducted to compare

English receptive vocabulary in year 10 EL1 pupils and year 10 EAL pupils. No significant difference was found; t(79)= 0.45, $p>.05$. Secondly, year 10 EL1 pupils seem to slightly outperform their EAL peers at a descriptive level on the measure of English expressive vocabulary. To explore this observation, a further independent samples *t*-test was performed. As no significant difference was found, t(79)= 1.60, $p>.05$, the indication seen at the descriptive level was not confirmed. Lastly, there seems to be a slight advantage for year 10 EAL pupils over year 10 EL1 pupils on the measure of French receptive vocabulary. However, an independent samples *t*-test revealed no significant difference; t(79)= 0.25, $p>.05$. Again, the indication seen at the descriptive level was not confirmed.

Bivariate correlations were then calculated between measures of vocabulary for each year 10 language group. Table 49 shows that for year 10 EL1 pupils there is a strong correlation between English receptive vocabulary and English expressive vocabulary (r=.69) whilst the correlation between English receptive vocabulary and French receptive vocabulary is noticeably weaker, although still moderate (r=.46). Lastly, English expressive vocabulary is not significantly related French receptive vocabulary (r=.23, p = n.s). This last finding is not surprising given that these two variables are measures not only of different types of vocabulary knowledge but of different types of vocabulary knowledge in different languages.

Year 10 EAL pupils present a similar picture to their year 10 EL1 classmates. The only noteworthy difference is a markedly weaker correlation between English receptive vocabulary and English expressive vocabulary (r=.48). Again, this may be explained by the trouble EAL pupils have in matching their EL1 counterparts on measures of expressive vocabulary in English, even when they have a good base of receptive vocabulary knowledge (Murphy, 2014).

4.6.11 Measures of phonological awareness

Table 48 shows two main patterns. Firstly, as for year 8 pupils (c.f. section 4.6.4) the pseudoword decoding subtest does not seem to differentiate well across language status. Secondly, the oral word segmentation task also did not seem to differentiate between year 10 EL1 pupils and their EAL peers. To check these observations, independent samples *t*-tests were performed on both measures of phonological awareness to check for significant differences between year 10 EL1 pupils and year 10 EAL pupils. Unsurprisingly, no significant difference was found on the measure of pseudoword decoding; $t(79)= 0.18$, $p>.05$, or of oral word segmentation; $t(79)= 0.50$, $p>.05$.

Bivariate correlations were then calculated between measures of phonological awareness for each year 10 language group. Surprisingly, Table 49 shows that these two measures of phonological awareness were not significantly correlated to one another for either group. This indicated that the two tests may have been tapping into vastly different aspects of phonological awareness.

4.6.12 Measures of nonverbal intelligence

Table 48 showed that year 10 EL1 pupils have a descriptively higher nonverbal IQ mean score, compared to year 10 EAL pupils. To explore this observation further, an independent samples *t*-test was conducted to compare scores on the matrix reasoning subtest for year 10 EL1 and year 10 EAL pupils. There was a significant difference in the scores for year 10 EL1 and year 10 EAL pupils; $t(79)=2.46$, $p<.05$. Bivariate correlations were then calculated between measures of nonverbal intelligence for each year 10 language group. Table 49 shows a significant and moderately strong correlation for year 10 EL1 pupils on both measures of nonverbal intelligence ($r=.37$, $p<.05$). On the other hand, the correlation for year 10 EAL pupils is not significant.

4.6.13 Measures of socioeconomic status and written English

Table 48 shows a similar mean score on the IDACI for year 10 EL1 and year 10 EAL pupils. This indicated a similar level of socioeconomic status across groups of different language status. In addition, the standard deviations of both groups on this measure were similar, indicating a similar level of heterogeneity in both groups.

Bivariate correlations were then analysed between measures of written English and SES for each year 10 language group. Table 49 shows that there were no significant correlations between SES and English receptive vocabulary, and SES and English morphological awareness, for year 10 EL1, and year 10 EAL pupils. As for year 8 pupils (c.f. section 4.6.6) an explanation for this result may be due to the highly socioeconomically diverse area in which School 1 is located, in conjunction with measurement error associated with the IDACI. Alternatively, the relationship between these measures may be mediated by one or more variables such as working memory, word segmentation ability, or pseudoword decoding ability.

4.6.14 Measures of French and motivation to learn French

Table 48 indicated similar levels of motivation between year 10 EL1 and year 10 EAL pupils. Bivariate correlations between motivation to learn French and French receptive vocabulary, and motivation to learn French and French morphological awareness, were then analysed. Table 49 shows that there were no significant correlations for either year 10 group between any of the measures. As for year 8 pupils (c.f. section 4.6.7) an explanation for this finding may be that the relationship between motivation to learn French, French receptive vocabulary, and French morphological awareness is mediated by other variables. Additionally, it was noted that whilst French morphological awareness was significantly correlated to French receptive vocabulary for year 10 EAL pupils, ($r=.55$, $p<.01$), the same was not true for their EL1 peers ($r=.19$, $p>.05$). Whilst this initial finding may indicate the potential for a moderator effect of language status between French morphological awareness and French receptive vocabulary, it is noted that the correlation coefficient is only part of the regression equation. Furthermore, the introduction of covariates into this relationship may reduce the moderator effect of language status to nonsignificance.

4.7 Chapter summary

This chapter presented a justification for pursuing separate analyses on year 8 and year 10 groups. In addition, background data in the form of an analysis of the Language Background Questionnaire (LBQ) and the Background Information Questionnaire (BIQ), were presented. Subsequently, an analytic strategy to answer the research questions was outlined. This was followed by a screening of the data. Lastly, a detailed analysis of descriptive statistics for each year group was presented, along with some inferential analyses in order to explore certain patterns present at the descriptive level. This was accompanied by a series of bivariate correlations in order to see how measures of similar constructs related to one another.

In terms of possible cohort effects, there seemed to be a higher level of motivation to learn French in year 10 compared to year 8. In addition, a significant difference between EL1 and EAL speakers was found on both measures of English vocabulary (receptive and expressive) at year 8, whilst no significant differences were found at year 10. With regard to measures of morphological awareness, both year groups showed similar patterns where the measure of English morphological awareness was significantly higher than the measure of French morphological awareness. In addition, both EAL groups demonstrated significantly higher scores of French morphological awareness than their EL1 peers. Lastly, there was no significant difference between EL1 and EAL pupils in either year group on the measure of English morphological awareness.

5 Results Chapter (II): Answering the Research Questions

This chapter addresses the research questions in turn. For reasons of concision, and to reduce repetition, a detailed description of the construction of regression models is presented only for research question 1. The first three analyses deal with within-language relationships between morphological awareness, language status, and vocabulary, whilst the last three address cross-language relationships between morphological awareness, language status, and vocabulary. Subsequently, post-hoc analyses are conducted to further explain some of the initial findings. The final part of the chapter summarises the results and their respective interpretation may be found in Chapter 6.

5.1 Construction of regression models

Each research question was answered by constructing two regression models per year group. Firstly, all candidate variables were regressed onto the response variable using the backward deletion method. This method was used to identify significant covariate predictors of the response variable, and to create a parsimonious and best fit model. After eliminating non-significant candidate variables, significant predictors were then entered into a hierarchical regression model in the following order: i) Background variables – nonverbal IQ, working memory, and socioeconomic status; ii) Measures of vocabulary - English receptive vocabulary, English expressive vocabulary, French receptive vocabulary; iii) Measures of linguistic skill, the predictor variable and the moderator variable - pseudoword decoding, word segmentation, morphological awareness in English, morphological awareness in French, language status (EL1, EAL); iv) The interaction term $languagestatus \times predictor$ variable.

5.2 Within-language analyses: Research Question 1

Do English morphological awareness and language status predict English receptive vocabulary?

a) Is there a main effect of English morphological awareness on English receptive vocabulary?

b) Is there a main effect of language status on English receptive vocabulary?

c) Is there a moderator effect of language status between English morphological awareness and English receptive vocabulary?

English receptive vocabulary served as the response variable, and morphological awareness in English served as the predictor variable. In addition, the dichotomous variable status (EL1, EAL) served as the moderator variable whilst the interaction term language status×morphological awareness in English tested for any significant interaction effect between the strength of association of morphological awareness in English and English receptive vocabulary, and the two levels of language status. Other candidate variables which were initially considered as predictors of English receptive vocabulary were: i) Working memory; ii) Nonverbal IQ; iii) English expressive vocabulary; iv) Pseudoword decoding ability; v) Word segmentation ability; vi) Socioeconomic status.

5.2.1 Selection of predictors: Year 8

Firstly, descriptive statistics were produced for all variables (c.f. Table 1, Appendix 5.1). Next, correlation analyses were conducted to investigate potential collinearity between candidate variables (c.f. Table 2, Appendix 5.1). At this stage, no candidate variables were eliminated. As a result, working memory, nonverbal IQ, English expressive vocabulary, pseudoword decoding, word segmentation, and socioeconomic status were all regressed onto English receptive vocabulary using the backwards deletion method. After evaluating assumptions (c.f. Appendix 5.2), no transformation of variables was necessary. The results of this regression model are shown in Table 50, although for reasons of concision only the initial and final models are presented:

Table 50: Backwards deletion regression on English receptive vocabulary to identify significant predictors for year 8 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Initial model						.66	.44	-	.40
Constant	97.50	9.40		10.37^{**}					
Working memory	1.01	0.63	.14	1.59	.02				
Nonverbal IQ	0.44	0.24	.17	1.83	.03				
English expressive vocabulary	1.32	0.32	.36	4.13^{**}	$.13^{**}$				
Pseudoword decoding	-0.34	0.19	-.15	-1.82	.02				
Word segmentation	0.81	0.24	.33	3.34^{**}	$.11^{**}$				
Socioeconomic status	0.00	0.00	-.08	-.88	.01				
Final model						.63	.39[a]	-.02	.38
Constant	88.22	6.10		14.45^{**}					
English expressive vocabulary	1.33	.31	.37	4.24^{**}	$.13^{**}$				
Word segmentation	.99	.21	.40	4.61^{**}	$.16^{**}$				

* $p<.05$
**$p<.01$
[a]95% confidence limits from .25 to .53

The last step revealed that only English expressive vocabulary, and word segmentation were significant predictors of English receptive vocabulary. Consequently, only these predictors were put into the final regression model.

5.2.2 Evaluation of assumptions: Year 8

For a full description of the evaluation of assumptions, see Appendix 5.3. As a result of multicollinearity, the continuous variable which was used to create the interaction term, morphological awareness in English, was centred to create the variable morphological awareness in English centred, and the interaction term language status×morphological awareness in English centred. After centering, the largest VIF value was below 10, the average VIF value was not substantially larger than 1, there were no tolerance statistics below .2, and consequently the assumption of no multicollinearity was upheld.

5.2.3 Main analysis: Year 8

A three stage hierarchical multiple regression was performed to determine if the strength of association between morphological awareness in English and English receptive vocabulary varied as a function of language status for year 8 participants, after accounting for the covariate predictors of English expressive vocabulary, and word segmentation, and the main effects of language status and morphological awareness in English. English expressive vocabulary was entered in step 1, word segmentation, language status, and morphological awareness in English centred were entered in step 2, and language status×morphological awareness in English centred was selected in step 3. Table 51 displays the results of this multiple regression:

Table 51: Hierarchical regression analysis on English receptive vocabulary for year 8 participants

Variable	**B**	**SE B**	**β**	***t***	**sr^2 (incremental)**	**R**	**R^2**	**ΔR^2**	**Adjusted R^2**
Step 1						.50	.25	-	.25
Constant	99.11	6.21		15.97**					
Expressive vocabulary English	1.830	.32	.50	5.66**	.25**				
Step 2						.69	.47[a]	.22**	.45
Constant	98.12	6.70		14.64**					
Expressive vocabulary English	1.14	0.32	.31	3.56**	.07**				
Word segmentation	0.77	0.21	.31	3.65**	.08**				
Language status	-3.96	1.66	-.20	-2.39*	.03*				
Morphological awareness in English centred	0.56	0.20	.22	2.74**	.04**				
Step 3						.70	.48	.01	.46
Constant	97.41	6.68		14.58**					
Expressive vocabulary English	1.17	0.32	.32	3.68**	.07**				
Word segmentation	0.78	0.21	.31	3.70**	.08**				
Language status	-3.91	1.65	-.20	-2.37*	.03*				
Morphological awareness in English centred	0.18	0.33	.07	.56	.00				
Language status× morphological awareness in English centred	0.59	0.40	.18	1.45	.01				

* p<.05
**p<.01
[a]95% confidence limits from .30 to .57

The hierarchical multiple regression revealed that at step 1 English expressive vocabulary contributed significantly to the regression model, (F (1, 94) = 32.03, p<.01), and accounted for 25.4% of the variation in English receptive vocabulary. The introduction of word segmentation, language status and morphological awareness in English centred explained an additional 21.8% of variation in English receptive vocabulary, and this change in R^2 was significant (F (3, 91) = 12.52, p<.01). Part correlations were then calculated in order to obtain the unique contribution of each measure at step 2. This yielded 7.3% (p<.01) explained non-shared variance for English expressive vocabulary, 7.7% (p<.01) explained non-shared variance for word segmentation, 3.3% (p<.05) explained non-shared variance for language status, and 4.4% (p<.01) explained non-shared variance for morphological awareness in English centred. The introduction of language status×morphological awareness in English centred explained an additional 1.2% of variation in English receptive vocabulary, and this value was not significant (F (1, 90) = 2.11, p>.05).

This pattern of results revealed three main findings. Firstly, a main effect of morphological awareness in English was found at step 2, accounting for 4.4% of variability in English receptive vocabulary. Secondly, a main effect of language status on English receptive vocabulary was also found at step 2. Taking into account both the sign and magnitude of the β value (-.20), this indicates that English native speakers reliably performed 3.3% better than their year 8 EAL peers on the measure of English receptive vocabulary, after taking into account covariates. Lastly, as language status×morphological awareness in English centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in English and English receptive vocabulary is moderated by language status for year 8 participants. As a nonsignificant moderator effect was found at step 3, step 2 was taken as the final model. After step 2, R^2 = .47 with 95% confidence limits from .30 to .57. The adjusted R^2 value of .45 indicated that just under a half of the variability in English receptive vocabulary was predicted by the model.

5.2.4 Selection of predictors: Year 10

Descriptive statistics were produced for all variables (c.f. Table 1, Appendix 5.4). Next, correlation analyses were conducted to investigate potential collinearity between candidate variables (c.f. Table 2, Appendix 5.4). At this stage, no candidate variables were eliminated.

As a result, working memory, nonverbal IQ, English expressive vocabulary, pseudoword decoding, word segmentation, and socioeconomic status were all regressed onto English receptive vocabulary using the backwards deletion method. After evaluating assumptions (c.f. Appendix 5.5), no transformation of variables was necessary. The results of this regression model are shown in Table 52, although for reasons for concision only the initial and final models are presented:

Table 52: Backwards deletion regression on English receptive vocabulary to identify significant predictors for year 10 participants

Variable	**B**	**SE B**	**β**	***t***	**sr^2 (incremental)**	**R**	**R^2**	**ΔR^2**	**Adjusted R^2**
Initial model						.71	.50	-	.46
Constant	73.80	11.06		6.67**					
Working memory	0.14	0.49	.03	0.30	.00				
Nonverbal IQ	0.58	0.22	.23	2.59*	.05*				
English expressive vocabulary	1.15	0.28	.38	4.09**	.14**				
Pseudoword decoding	0.33	0.22	.13	1.52	.02				
Word segmentation	0.75	0.21	.32	3.53**	.10**				
Socioeconomic status	0.00	0.00	.11	1.31	.01				
Final model						.69	.47[a]	-.01	.45
Constant	88.01	6.93		12.71**					
Nonverbal IQ	0.54	0.21	.22	2.59*	.05*				
English expressive vocabulary	1.33	0.26	.44	5.06**	.19**				
Word segmentation	0.81	0.20	.34	3.98**	.12**				

* *p*<.05
***p*<.01
[a]95% confidence limits from .29 to .58

The last step revealed that only nonverbal IQ, English expressive vocabulary, and word segmentation were significant predictors of English receptive vocabulary. Consequently, only these predictors were put into the final regression model.

5.2.5 Evaluation of assumptions: Year 10

For a full description of the evaluation of assumptions, see Appendix 5.6. In order to avoid multicollinearity, the continuous variable which was used to create the interaction term, morphological awareness in English, was centred in the same way as for the year 8 model. However, the Breusch-Pagan (BP) test revealed a significant effect at step 4 of the model (F (1, 74) = 5.01, p>.05) and therefore null hypothesis of homoscedasticity was rejected. Unfortunately, after trying several transformations of variables, no model was found which did not reject the assumption of homoscedasticity. Whilst not preferable, Fox (1997) argues that violations of the assumption of homoscedasticity are only worth correcting if the problem is severe and not if all other assumptions have been met. Consequently, the violation of homoscedasticity was not deemed to be problematic in this case as all other assumptions were upheld.

5.2.6 Main analysis: Year 10

A four stage hierarchical multiple regression was performed to determine if the strength of association between morphological awareness in English and English receptive vocabulary varied as a function of language status for year 10 participants, after accounting for the covariate predictors of nonverbal IQ, English expressive vocabulary, and word segmentation, and the main effects of language status and morphological awareness in English. Nonverbal IQ was entered in step 1, English expressive vocabulary was entered in step 2, word segmentation, language status, and morphological awareness in English centred were entered in step 3, and language status×morphological awareness in English centred was selected in step 4. Table 53 displays the results of this multiple regression:

Table 53: Hierarchical regression analysis on English receptive vocabulary for year 10 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Step 1						.30	.09	-	.08
Constant	131.96	4.77		27.69**					
Nonverbal IQ	0.75	0.27	.30	2.80**	.09**				
Step 2						.61	.37	.28**	.35
Constant	101.70	6.56		15.50**					
Nonverbal IQ	0.50	0.23	.20	2.21*	.04*				
English expressive vocabulary	1.61	0.28	.53	5.82**	.28**				
Step 3						.75	.56[a]	19**	.53
Constant	88.35	6.95		12.71**					
Nonverbal IQ	0.65	0.20	.26	3.25**	.06**				
English expressive vocabulary	1.26	0.25	.42	5.05**	.15**				
Word segmentation	0.72	0.19	.30	3.74**	.08**				
Language status	2.98	1.57	.16	1.91	.02				
Morphological awareness in English centred	0.77	0.22	.28	3.45**	.07**				
Step 4						.75	.56	.00	.53
Constant	87.86	6.99		12.58**					
Nonverbal IQ	0.66	0.20	.26	3.26**	.06**				
English expressive vocabulary	1.29	0.25	.43	5.11**	.16**				
Word segmentation	0.71	0.19	.30	3.70**	.08**				
Language status	3.00	1.57	.16	1.91	.02				
Morphological awareness in English centred	0.56	0.33	.20	1.70	.02				
Language status× morphological awareness in English centred	0.37	0.44	.10	.85	.00				

* p<.05
**p<.01
[a]95% confidence limits from .37 to .64

The hierarchical multiple regression revealed that at step 1 nonverbal IQ contributed significantly to the regression model (F (1, 79) = 7.81, p<.01) and accounted for 9.0% of the variation in English receptive vocabulary. The introduction of English expressive vocabulary at step 2 explained an additional 27.6% of variation, and this change in R^2 was significant (*F* (1, 78) = 33.92, *p*<.01). The introduction of word segmentation, language status and morphological awareness in English centred at step 3 explained an additional 19.1% of variation, and again this change in R^2 was significant (*F* (3, 75) = 10.76, *p*<.01). Part correlations were then calculated in order to obtain the unique contribution of each measure at step 3. This yielded 6.3% (*p*<.01) explained non-shared variance for nonverbal IQ, 15.1% (*p*<.01) explained non-shared variance for English expressive vocabulary, 8.2% (*p*<.01) explained non-shared variance for word segmentation, 2.2% (*p*>.05) explained non-shared variance for language status, and 7.0% (*p*<.01) explained non-shared variance for morphological awareness in English centred. The introduction of language status×morphological awareness in English centred explained an additional 0.4% of variation in English receptive vocabulary, and this value was not significant (*F* (1, 74) = 0.72, *p*>.05).

This pattern of results revealed three main findings. Firstly, a main effect of morphological awareness in English was found at step 3, accounting for 7.0% of variability in English receptive vocabulary. Secondly, no main effect of language status on English receptive vocabulary was found meaning that English native speakers do not reliably perform better than their year 10 EAL peers on the measure of English receptive vocabulary, after taking into account covariates. Lastly, as language status×morphological awareness in English centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in English and English receptive vocabulary is moderated by language status for year 10 participants. As a nonsignificant moderator effect was found at step 4, step 3 was taken as the final model. After step 3, R^2 = .56 with 95% confidence limits from .37 to .64. The adjusted R^2 value of .53 indicated that just over a half of the variability in English receptive vocabulary was predicted by the model.

5.2.7 Answering Research Question 1

Do English morphological awareness and language status predict English receptive vocabulary?

a) Is there a main effect of English morphological awareness on English receptive vocabulary?

b) Is there a main effect of language status on English receptive vocabulary?

c) Is there a moderator effect of language status between English morphological awareness and English receptive vocabulary?

Main effects of English morphological awareness on English receptive vocabulary knowledge was found for both year groups. This main effect ranged from 4.4 to 7.0 per cent of variability explained, and was a stronger predictor for year 10 participants. Secondly, a main effect of language status on English receptive vocabulary was found for year 8 pupils only. Taking into account the sign of the associated β value (-.20), this indicates that year 8 English native speakers reliably performed 3.3% better than their EAL peers on the measure of English receptive vocabulary, after taking into account covariates. Lastly, the variable language status×morphological awareness in English was not a significant predictor of English receptive vocabulary for year 8 or year 10 participants. In other words, strength of association between morphological awareness in English and English receptive vocabulary was not moderated by language status for either year group.

5.3 Within-language analyses: Research Question 2

Do English morphological awareness and language status predict English expressive vocabulary?

a) Is there a main effect of English morphological awareness on English expressive vocabulary?

b) Is there a main effect of language status on English expressive vocabulary?

c) Is there a moderator effect of language status between English morphological awareness and English expressive vocabulary?

5.3.1 Year 8

After producing descriptive statistics (c.f. Table 1, Appendix 5.7), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.7), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.8), and no transformation of variables was necessary. After regressing all candidate variables onto English expressive vocabulary using the backwards deletion method, English receptive vocabulary, and socioeconomic status were selected as predictors to be entered into the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.9) and after centering the predictor variable, English morphological awareness, no further transformation of variables was necessary.

Therefore, a four stage hierarchical multiple regression was performed to determine if the strength of association between morphological awareness in English and English expressive vocabulary varied as a function of language status for year 8 participants, after accounting for the covariate predictors of socioeconomic status, and English receptive vocabulary, and the main effects of language status and morphological awareness in English. Socioeconomic status was entered in step 1, English receptive vocabulary was entered in step 2, language status, and morphological awareness in English centred were entered in step 3, and language status×morphological awareness in English centred was selected in step 4. Table 54 displays the results of this multiple regression:

Table 54: Hierarchical regression analysis on English expressive vocabulary for year 8 participants

Variable	**B**	**SE B**	**β**	***t***	**sr^2 (incremental)**	**R**	**R^2**	**ΔR^2**	**Adjusted R^2**
Step 1						.27	.08	-	.07
Constant	17.33	0.63		27.41**					
Socioeconomic status	0.00	0.00	.29	2.89**	.08**				
Step 2						.55	.30	.22**	.29
Constant	0.30	3.20		.09					
Socioeconomic status	0.00	0.00	.22	2.48*	.05*				
English receptive vocabulary	0.13	0.02	.47	5.39**	.22**				
Step 3						.60	.36[a]	.06*	.33
Constant	2.42	3.69		.66					
Socioeconomic status	0.00	0.00	.18	2.12*	.03*				
English receptive vocabulary	0.12	0.03	.44	4.48**	.14**				
Language status	-1.16	0.50	-.21	-2.31*	.04*				
Morphological awareness in English centred	0.10	0.06	.15	1.65	.02				
Step 4						.61	.37	.01	.33
Constant	2.09	3.70		.56					
Socioeconomic status	0.00	0.00	.17	1.99*	.03*				
English receptive vocabulary	0.12	0.03	.45	4.56**	.15**				
Language status	-1.14	0.50	-.21	-2.27*	.04*				
Morphological awareness in English centred	-0.02	0.10	-.03	-.23	.00				
Language status× morphological awareness in English centred	-0.13	0.12	-.15	-1.05	.01				

* p<.05
**p<.01
[a]95% confidence limits from .18 to .47

The hierarchical multiple regression revealed that at step 1 socioeconomic status contributed significantly to the regression model (F (1, 94) = 8.36, p<.01) and accounted for 8.2% of the variation in English expressive vocabulary. The introduction of English receptive vocabulary at step 2 explained an additional 21.9% of variation, and this change in R^2 was significant (F (1, 93) = 29.08, p<.01). The introduction of language status and morphological awareness in English centred at step 3 explained an additional 6.1% of variation, and again this change in R^2 was significant (F (2, 91) = 4.36, p<.01). Part correlations were then calculated to obtain the unique contribution of each measure at step 3. This yielded 3.1% (p<.05) explained non-shared variance for socioeconomic status, 14.1% (p<.01) explained non-shared variance for English receptive vocabulary, 3.7% (p<.05) explained non-shared variance for language status, and 1.9% (p<.05) explained non-shared variance for morphological awareness in English centred. The introduction of language status×morphological awareness in English centred explained an additional 0.8% of variation in English expressive vocabulary, and this value was not significant (F (1, 90) = 1.10, p>.05).

This pattern of results revealed three main findings. Firstly, no main effect of morphological awareness in English on English expressive vocabulary was found. Secondly, a main effect of language status on English expressive vocabulary was found at step 3. Taking into account both the sign and magnitude of the β value (-.21), this indicates that English native speakers reliably performed 3.7% better than their year 8 EAL peers on the measure of English expressive vocabulary, after taking into account covariates. Lastly, as language status×morphological awareness in English centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in English and English expressive vocabulary is moderated by language status for year 8 participants. As a nonsignificant moderator effect was found at step 4, step 3 was taken as the final model. After step 3, R^2 = .36 with 95% confidence limits from .18 to .47. The adjusted R^2 value of .33 indicated that a third of the variability in English expressive vocabulary was predicted by the model.

5.3.2 Year 10

After producing descriptive statistics (c.f. Table 1, Appendix 5.10), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.10), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.11), and no transformation of variables was necessary. After regressing all candidate variables onto English expressive vocabulary using the backwards deletion method, only English receptive vocabulary was selected as a predictor to be entered into the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.12) and after centering the predictor variable, English morphological awareness, no further transformation of variables was necessary.

Therefore, a three stage hierarchical multiple regression was performed to determine if the strength of association between morphological awareness in English and English expressive vocabulary varied as a function of language status for year 10 participants, after accounting for the covariate predictor of English receptive vocabulary, and the main effects of language status and morphological awareness in English. English receptive vocabulary was entered in step 1, language status, and morphological awareness in English centred were entered in step 2, and language status×morphological awareness in English centred was selected in step 3. Table 55 displays the results of this multiple regression:

Table 55: Hierarchical regression analysis on English expressive vocabulary for year 10 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Step 1						.57	.33	-	.32
Constant	-6.04	4.45		-1.36					
English receptive vocabulary	0.19	0.03	.57	6.18**	.33**				
Step 2						.59	.35[a]	.03	.33
Constant	-6.33	4.81		-1.32					
English receptive vocabulary	0.19	0.03	.59	5.88**	.29**				
Language status	-1.00	0.59	-.16	-1.69	.02				
Morphological awareness in English centred	0.06	0.09	.06	0.61	.00				
Step 3						.61	.37	.02	.34
Constant	-6.37	4.77		-1.34					
English receptive vocabulary	0.19	0.03	.59	5.93**	.29**				
Language status	-0.99	0.59	-.16	-1.69	.02				
Morphological awareness in English centred	-0.09	0.13	-.09	-0.67	.00				
Language status× morphological awareness in English centred	0.26	0.17	.21	1.54	.02				

* $p<.05$
**$p<.01$
[a]95% confidence limits from .17 to .47

The hierarchical multiple regression revealed that at step 1 English receptive vocabulary contributed significantly to the regression model (F (1, 79) = 38.21, $p<.01$) and accounted for 32.6% of the variation in English expressive vocabulary. The introduction of language status and morphological awareness in English centred at step 2 explained an additional 2.5% of variation, but this change in R^2 was not significant (F (2, 77) = 1.49, $p>.05$). Part correlations were nonetheless calculated to obtain the unique contribution of each measure at step 2. This yielded 29.2% ($p<.01$) explained non-shared variance for English receptive vocabulary, 2.4% ($p>.0$%) explained non-shared variance for language status, and 0.3% ($p>.05$) explained non-shared variance for morphological awareness in English centred. The introduction of language status×morphological awareness in English centred explained an additional 2.0% of variation in English expressive vocabulary, and this value was not significant (F (1, 76) = 2.39, p>.05).

This pattern of results revealed three main findings. Firstly, no main effect of morphological awareness in English on English expressive vocabulary was found. Secondly, no main effect of language status on English expressive vocabulary was found. Lastly, as language status×morphological awareness in English centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in English and English expressive vocabulary is moderated by language status for year 10 participants. As a nonsignificant moderator effect was found at step 3, step 2 was taken as the final model. After step 2, R^2 = .35 with 95% confidence limits from .17 to .47. The adjusted R^2 value of .33 indicated that a third of the variability in English expressive vocabulary was predicted by the model.

5.3.3 Answering Research Question 2

Do English morphological awareness and language status predict English expressive vocabulary?

a) Is there a main effect of English morphological awareness on English expressive vocabulary?
b) Is there a main effect of language status on English expressive vocabulary?
c) Is there a moderator effect of language status between English morphological awareness and English expressive vocabulary?

No main effect of English morphological awareness on English expressive vocabulary was found for either year group. This means that after taking into account covariates, morphological awareness in English did not reliably account for any further predicted variance in English expressive vocabulary for year 8 or year 10 participants. Secondly, a main effect of language status on English expressive vocabulary was found for year 8 pupils only. Taking into account the sign of the associated β value (-.21) this indicates that year 8 English native speakers reliably performed 3.7% better than their EAL peers on the measure of English expressive vocabulary, after accounting for covariates. Lastly, the variable language status×morphological awareness in English was not a significant predictor of English expressive vocabulary for year 8 or year 10 participants. In other words, strength of association between morphological awareness in English and English expressive vocabulary was not moderated by language status for either year group.

5.4 Within-language analyses: Research Question 3

Do French morphological awareness and language status predict French receptive vocabulary?

a) Is there a main effect of French morphological awareness on French receptive vocabulary?
b) Is there a main effect of language status on French receptive vocabulary?
c) Is there a moderator effect of language status between French morphological awareness and French receptive vocabulary?

5.4.1 Year 8

After producing descriptive statistics (c.f. Table 1, Appendix 5.13), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.13), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.14), and no transformation of variables was necessary. After regressing all candidate variables onto French receptive vocabulary using the backwards deletion method, nonverbal IQ, pseudoword decoding, and word segmentation were selected as predictors to be entered into the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.15), however after centering the predictor variable, French morphological awareness, a Breusch-Pagan (BP) test revealed a significant effect at step 2 and step 3 of the model. Therefore, the null hypothesis of homoscedasticity was rejected. As above (c.f. section 5.2.5), the violation of homoscedasticity was not deemed to be problematic in this case as all other assumptions were upheld.

Consequently, a three stage hierarchical multiple regression was performed to determine if the strength of association between morphological awareness in French and French receptive vocabulary varied as a function of language status for year 8 participants, after accounting for the covariate predictors of nonverbal IQ, pseudoword decoding, and word segmentation, and the main effects of language status and morphological awareness in French. Nonverbal IQ was entered in step 1, pseudoword decoding, word segmentation, language status, and morphological awareness in French centred were entered in step 2, and language status×morphological awareness in French centred was selected in step 3. Table 56 displays the results of this multiple regression:

Table 56: Hierarchical regression analysis on French receptive vocabulary for year 8 participants

Variable	**B**	**SE B**	**β**	***t***	**sr^2 (incremental)**	**R**	**R^2**	**ΔR^2**	**Adjusted R^2**
Step 1						.44	.19	-	.19
Constant	5.45	1.52		3.59**					
Nonverbal IQ	0.45	0.09	.44	4.75**	.19**				
Step 2						.58	.34[a]	.15**	.30
Constant	-6.26	3.58		-1.75					
Nonverbal IQ	0.27	0.10	.27	2.28**	.06**				
Pseudoword decoding	0.16	0.08	.19	2.09*	.03*				
Word segmentation	0.32	0.09	.34	3.39**	.08**				
Language status	0.58	0.70	.08	0.83	.01				
Morphological awareness in French centred	0.03	0.13	.02	0.24	.00				
Step 3						.58	.34	.00	.30
Constant	-6.24	3.60		-1.74					
Nonverbal IQ	0.28	0.10	.27	2.81**	.06**				
Pseudoword decoding	0.16	0.08	.19	2.07*	.03*				
Word segmentation	0.32	0.10	.34	3.38**	.08**				
Language status	0.59	0.70	.08	0.84	.01				
Morphological awareness in French centred	0.06	0.17	.04	0.33	.00				
Language status× morphological awareness in French centred	-0.06	0.26	-.03	-0.23	.00				

* p<.05
**p<.01
[a]95% confidence limits from .15 to .44

The hierarchical multiple regression revealed that at step 1 nonverbal IQ contributed significantly to the regression model (F (1, 94) = 22.52, p<.01) and accounted for 19.3% of the variation in French receptive vocabulary. The introduction of pseudoword decoding, word segmentation, language status and morphological awareness in French centred at step 2 explained an additional 14.8% of variation, and this change in R^2 was significant (F (4, 90) =

5.05, $p<.01$). Part correlations were then calculated to obtain the unique contribution of each measure at step 2. This yielded 5.8% ($p<.01$) explained non-shared variance for nonverbal IQ, 3.2% ($p<.05$) explained non-shared variance for pseudoword decoding, 8.4% ($p<.01$) explained non-shared variance for word segmentation, 0.5% ($p>.05$) explained non-shared variance for language status, and 0.0% ($p>.05$) explained non-shared variance for morphological awareness in French centred. The introduction of language status×morphological awareness in French centred explained an additional 0.0% of variation in French receptive vocabulary, and unsurprisingly this value was not significant (F (1, 89) = 0.05, $p>.05$).

This pattern of results revealed three main findings. Firstly, no main effect of morphological awareness in French on French receptive vocabulary was found. Secondly, no main effect of language status on French receptive vocabulary was found. Lastly, as language status×morphological awareness in French centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in French and French receptive vocabulary is moderated by language status for year 8 participants. As a nonsignificant moderator effect was found at step 3, step 2 was taken as the final model. After step 2, $R^2 = .34$ with 95% confidence limits from .15 to .44. The adjusted R^2 value of .30 indicated that just under a third of the variability in French receptive vocabulary was predicted by the model.

5.4.2 Year 10

After producing descriptive statistics (c.f. Table 1, Appendix 5.16), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.16), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.17), and no transformation of variables was necessary. After regressing all candidate variables onto French receptive vocabulary using the backwards deletion method, working memory, and word segmentation were selected as predictors to be entered into the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.18), however after centering the predictor variable, French morphological awareness, an analysis of unstandardised residuals found that the assumption of normality had been violated. Consequently, the dependent variable, French receptive vocabulary, was transformed to French receptive vocabulary squared. The assumption of normality of residuals was then upheld, as were all other assumptions.

Consequently, a three stage hierarchical multiple regression was performed to determine if the strength of association between morphological awareness in French and French receptive vocabulary varied as a function of language status for year 10 participants, after accounting for the covariate predictors of working memory, and word segmentation, and the main effects of language status and morphological awareness in French. Working memory was entered in step 1, word segmentation, language status, and morphological awareness in French centred were entered in step 2, and language status×morphological awareness in French centred was selected in step 3. Table 57 displays the results of this multiple regression:

Table 57: Regression analysis on French receptive vocabulary squared for year 10 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Step 1						.39	.15	-	.14
Constant	235.23	45.22		5.20**					
Working memory	27.71	7.47	.39	3.71**	.15**				
Step 2						.64	.42[a]	.27**	.38
Constant	-46.44	74.55		-0.62					
Working memory	20.16	6.60	.28	3.05**	.07**				
Word segmentation	13.18	3.02	.41	4.36**	.15**				
Language status	30.18	24.66	.11	1.22	.01				
Morphological awareness in French centred	6.81	2.68	.24	2.54*	.05*				
Step 3						.66	.44	.02	.40
Constant	-20.31	74.89		-0.27					
Working memory	19.86	6.51	.28	3.05**	.07**				
Word segmentation	12.00	3.05	.37	3.93**	.12**				
Language status	21.36	24.80	.08	0.86	.01				
Morphological awareness in French centred	4.11	3.04	.14	1.35	.01				
Language status× morphological awareness in French centred	10.84	6.02	.20	1.80	.02				

*p<.05
**p<.01
[a]95% confidence limits from .21 to .52

The hierarchical multiple regression revealed that at step 1 working memory contributed significantly to the regression model (F (1, 79) = 13.74, p<.01) and accounted for 14.8% of the variation in French receptive vocabulary squared. The introduction of pseudoword word segmentation, language status and morphological awareness in French centred at step 2 explained an additional 26.7% of variation, and this change in R^2 was significant (F (3, 76) = 11.54, p<.01). Part correlations were then calculated to obtain the unique contribution of each measure at step 2. This yielded 7.2% ($p<.01$) explained non-shared variance for working memory, 14.7% ($p<.01$) explained non-shared variance for word segmentation, 1.1% ($p>.05$) explained non-shared variance for language status, and 5.0% ($p<.05$) explained non-shared variance for morphological awareness in French centred. The introduction of language status×morphological awareness in French centred explained an additional 2.4% of variation in French receptive vocabulary squared, but this value was not significant (F (1, 75) = 3.25, $p>.05$).

This pattern of results revealed three main findings. Firstly, a main effect of morphological awareness in French was found at step 2, accounting for 5.0% of variability in French receptive vocabulary squared. Secondly, no main effect of language status on French receptive vocabulary was found. Lastly, as language status×morphological awareness in French centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in French and French receptive vocabulary is moderated by language status for year 10 participants. As a nonsignificant moderator effect was found at step 3, step 2 was taken as the final model. After step 2, R^2 = .42 with 95% confidence limits from .21 to .52. The adjusted R^2 value of .38 indicated that just under two fifths of the variability in French receptive vocabulary squared was predicted by the model.

5.4.3 Answering Research Question 3

Do French morphological awareness and language status predict French receptive vocabulary?

a) Is there a main effect of French morphological awareness on French receptive vocabulary?
b) Is there a main effect of language status on French receptive vocabulary?

c) Is there a moderator effect of language status between French morphological awareness and French receptive vocabulary?

A main effect of morphological awareness in French on French receptive vocabulary was found for the year 10 group only and it accounted for 5.0% of variance, after taking into account covariates. Secondly, no main effect of language status on French receptive vocabulary was found for either year group. This meant that both year 8 and year 10 EL1 pupils performed as well as their EAL peers on the measure of French receptive vocabulary, after taking into account covariates. Lastly, the variable language status×morphological awareness in French was not a significant predictor of French receptive vocabulary for year 8 or year 10 participants. In other words, strength of association between French morphological awareness and French receptive vocabulary was not moderated by language status for either year group.

5.5 Cross-language analyses: Research Question 4

Do English morphological awareness and language status predict French receptive vocabulary?

a) Is there a main effect of English morphological awareness on French receptive vocabulary?

b) Is there a main effect of language status on French receptive vocabulary?

c) Is there a moderator effect of language status between English morphological awareness and French receptive vocabulary?

5.5.1 Year 8

After producing descriptive statistics (c.f. Table 1, Appendix 5.19), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.19), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.20), and no transformation of variables was necessary. After regressing all candidate variables onto French receptive vocabulary using the backwards deletion method, nonverbal IQ, English receptive vocabulary, and pseudoword decoding were selected as predictors to be entered into the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.21). After centering the predictor variable, English morphological awareness, a Breusch-Pagan (BP) test revealed a significant effect at step 3 of the model. Therefore, the null hypothesis of homoscedasticity was rejected. As above (c.f. section 5.2.5), the violation of homoscedasticity was not deemed to be problematic in this case as all other assumptions were upheld.

Consequently, a four stage hierarchical multiple regression was performed to determine if the strength of association between morphological awareness in English and French receptive vocabulary varied as a function of language status for year 8 participants, after accounting for the covariate predictors of nonverbal IQ, English receptive vocabulary, and pseudoword decoding, and the main effects of language status and morphological awareness in English. Nonverbal IQ was entered in step 1, English receptive vocabulary was entered in step 2, pseudoword decoding, language status, and morphological awareness in English centred were entered in step 3, and language status×morphological awareness in English centred was selected in step 4. Table 58 displays the results of this multiple regression:

Table 58: Hierarchical regression analysis on French receptive vocabulary for year 8 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Step 1						.44	.19	-	.19
Constant	5.45	1.52		3.59**					
Nonverbal IQ	0.45	0.09	.44	4.75**	.19**				
Step 2						.53	.28	.09**	.26
Constant	-8.86	4.52		-1.96					
Nonverbal IQ	0.34	0.10	.33	3.54**	.10**				
English receptive vocabulary	0.12	0.04	.31	3.34**	.09**				
Step 3						.61	.37[a]	.09**	.33
Constant	-21.47	5.80		-3.70**					
Nonverbal IQ	0.29	0.09	.28	3.12**	.07**				
English receptive vocabulary	0.14	0.04	.37	3.64**	.09**				
Pseudoword decoding	0.21	0.07	.25	2.84**	.06**				
Language status	1.21	0.70	.16	1.72	.02				
Morphological awareness in English centred	0.04	0.09	.04	0.46	.00				
Step 4						.61	.37	.00	.33
Constant	-21.51	5.84		-3.68**					
Nonverbal IQ	0.29	0.09	.28	3.10**	.07**				
English receptive vocabulary	0.14	0.04	.37	3.58**	.09**				
Pseudoword decoding	0.21	0.08	.25	2.76**	.05**				
Language status	1.20	0.71	.16	1.69	.02				
Morphological awareness in English centred	0.03	0.14	.03	0.19	.00				
Language status× morphological awareness in English centred	0.02	0.18	.02	0.13	.00				

**$p<.01$

[a]95% confidence limits from .18 to .46

The hierarchical multiple regression revealed that at step 1 nonverbal IQ contributed significantly to the regression model (F (1, 94) = 22.52, $p<.01$) and accounted for 19.3% of the variation in French receptive vocabulary. The introduction of English receptive vocabulary at step 2 explained an additional 8.6% of variation, and this change in R^2 was significant (F (1, 93) = 11.16, p<.01). Furthermore, the introduction of pseudoword decoding, language status, and English morphological awareness centred at step 3 explained an additional 8.9% of variation, and this change in R^2 was also significant (F (3, 90) = 4.26, p<.01). Part correlations were then calculated to obtain the unique contribution of each measure at step 3. This yielded 6.8% (p<.01) explained non-shared variance for nonverbal IQ, 9.3% (p<.01) explained non-shared variance for English receptive vocabulary, 5.6% (p<.01) explained non-shared variance for pseudoword decoding, 2.1% (p>.05) explained non-shared variance for language status, and 0.1% (p>.05) explained non-shared variance for morphological awareness in English centred. The introduction of language status×morphological awareness in English centred explained an additional 0.0% of variation in French receptive vocabulary, and unsurprisingly this value was not significant (F (1, 89) = 0.02, p>.05).

This pattern of results revealed three main findings. Firstly, no main effect of morphological awareness in English was found. Secondly, no main effect of language status on French receptive vocabulary was found. Lastly, as language status×morphological awareness in English centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in English and French receptive vocabulary is moderated by language status for year 8 participants. As a nonsignificant moderator effect was found at step 4, step 3 was taken as the final model. After step 3, R^2 = .37 with 95% confidence limits from .18 to .46. The adjusted R^2 value of .33 indicated that one third of the variability in French receptive vocabulary was predicted by the model.

5.5.2 Year 10

After producing descriptive statistics (c.f. Table 1, Appendix 5.22), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.22), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.23), and no transformation of variables was necessary. After regressing all candidate variables onto French receptive vocabulary using the backwards deletion method, working memory, word segmentation, and French morphological awareness were entered as predictors into the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.24). After centering the predictor variable, English morphological awareness, no further transformation of variables was necessary.

Consequently, a three stage hierarchical multiple regression was performed to determine if the strength of association between morphological awareness in English and French receptive vocabulary varied as a function of language status for year 10 participants, after accounting for the covariate predictors of working memory, word segmentation, and French morphological awareness, and the main effects of language status and English morphological awareness. Working memory was entered in step 1, word segmentation, French morphological awareness, language status, and English morphological awareness centred were entered in step 3, and language status×morphological awareness in English centred was selected in step 4. Table 59 displays the results of this multiple regression:

Table 59: Hierarchical regression analysis on French receptive vocabulary for year 10 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Step 1						.40	.16	$.16^{**}$	.15
Constant	15.13	1.20		2.74^{**}					
Working memory	0.77	0.20	0.40	3.86^{**}	$.16^{**}$				
Step 2						.67	.45[a]	$.29^{**}$	.41
Constant									
Working memory	0.56	0.17	.29	3.21^{**}	$.08^{**}$				
Word segmentation	0.31	0.08	.36	3.91^{**}	$.11^{**}$				
Morphological awareness in French	0.14	0.07	.19	2.02^{*}	$.03^{*}$				
Language status	1.09	0.66	.15	1.65	.02				
Morphological awareness in English centred	0.22	0.09	.22	2.38^{*}	$.04^{*}$				
Step 3						.67	.45	.00	.41
Constant	5.84	2.15		2.72^{**}					
Working memory	0.56	0.18	.29	3.21^{**}	$.08^{**}$				
Word segmentation	0.31	0.08	.36	3.87^{**}	$.11^{**}$				
Morphological awareness in French	0.14	0.07	.19	2.01^{*}	$.03^{*}$				
Language status	1.09	0.66	.15	1.64	.02				
Morphological awareness in English centred	0.19	0.14	.18	1.38	.01				
Language status× morphological awareness in English centred	0.06	.18	.04	0.33	.00				

*p<.05
**p<.01
[a]95% confidence limits from .24 to .54

The hierarchical multiple regression revealed that at step 1 working memory contributed significantly to the regression model (F (1, 79) = 14.92, p<.01) and accounted for 15.9% of the variation in French receptive vocabulary. The introduction of word segmentation, French morphological awareness, language status, and English morphological awareness centred at step 2 explained an additional 29.0% of variation, and this change in R^2 was significant (F (4, 75) = 9.86, p<.01). Part correlations were then calculated to obtain the unique contribution of each measure at step 2. This yielded 7.6% (p<.01) explained non-shared variance for working memory, 11.2% (p<.01) explained non-shared variance for word segmentation, 3.0% (p<.05) explained non-shared variance for French morphological awareness, 2.0% (p>.05) explained non-shared variance for language status, and 4.2% (p<.05) explained non-shared variance for morphological awareness in English centred. The introduction of language status×morphological awareness in English centred explained an additional 0.1% of variation in French receptive vocabulary, and unsurprisingly this value was not significant (F (1, 74) = 0.11, p>.05).

This pattern of results revealed a main effect of morphological awareness in English at step 2, accounting for 4.2% of variability in French receptive vocabulary. Secondly, no main effect of language status on French receptive vocabulary was found. Lastly, as language status×morphological awareness in English centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in English and French receptive vocabulary is moderated by language status for year 10 participants. As a nonsignificant moderator effect was found at step 3, step 4 was taken as the final model. After step 3, R^2 = .45 with 95% confidence limits from .24 to .54. The adjusted R^2 value of .41 indicated that just over two fifths of the variability in French receptive vocabulary was predicted by the model.

5.5.3 Answering Research Question 4

Do English morphological awareness and language status predict French receptive vocabulary?

a) Is there a main effect of English morphological awareness on French receptive vocabulary?

b) Is there a main effect of language status on French receptive vocabulary?

c) Is there a moderator effect of language status between English morphological awareness and French receptive vocabulary?

Firstly, a main effect of morphological awareness in English on French receptive vocabulary was found for the year 10 group only and it accounted for 4.2% of variance, after taking into account covariates. Secondly, no main effect of language status on French receptive vocabulary was found for either year group. This meant that both year 8 and year 10 English native speakers performed as well as their EAL peers on the measure of French receptive vocabulary, after taking into account covariates. Lastly, the variable language status×morphological awareness in English was not a significant predictor of French receptive vocabulary for year 8 or year 10 participants. In other words, strength of association between morphological awareness in English and French receptive vocabulary was not moderated by language status for either year group.

5.6 Cross-language analyses: Research Question 5

Do French morphological awareness and language status predict English receptive vocabulary?

a) Is there a main effect of French morphological awareness on English receptive vocabulary?

b) Is there a main effect of language status on English receptive vocabulary?

c) Is there a moderator effect of language status between French morphological awareness and English receptive vocabulary?

5.6.1 Year 8

After producing descriptive statistics (c.f. Table 1, Appendix 5.25), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.25), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.26), and no transformation of variables was necessary. After regressing all candidate variables onto English receptive vocabulary using the backwards deletion method, English expressive vocabulary, word segmentation, and English morphological awareness were entered as predictors in the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.27). After centering the predictor variable, French morphological awareness, a Breusch-Pagan (BP) test revealed a significant effect at step 3 of the model. Therefore, the null hypothesis of homoscedasticity was rejected. As above (c.f. section 5.2.5), the violation of homoscedasticity was not deemed to be problematic in this case as all other assumptions were upheld.

Consequently, a three stage hierarchical multiple regression was performed to determine if the strength of association between French morphological awareness and English receptive vocabulary varied as a function of language status for year 8 participants, after accounting for the covariate predictors of English expressive vocabulary, word segmentation, and English morphological awareness, and the main effects of language status and French morphological awareness. English expressive vocabulary was entered in step 1, word segmentation, English morphological awareness, language status, and French morphological awareness centred were entered in step 2, and language status×morphological awareness in French centred was selected in step 3. Table 60 displays the results of this multiple regression:

Table 60: Hierarchical regression analysis on English receptive vocabulary for year 8 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Step 1						.50	.25	-	.25
Constant	99.11	6.21		15.97**					
English expressive vocabulary	1.83	0.32	.50	5.66**	.25**				
Step 2						.70	.48[a]	.23**	.45
Constant	88.89	7.11		12.50**					
English expressive vocabulary	1.20	0.32	.33	3.74**	.08**				
Word segmentation	0.77	0.21	.31	3.64**	.08**				
Morphological awareness in English	0.61	0.21	.24	2.95**	.05**				
Language status	-4.41	1.68	-.22	-2.62*	.04*				
Morphological awareness in French centred	0.41	0.31	.11	1.36	.01				
Step 3						.70	.48	.00	.45
Constant	88.87	7.14		12.44**					
English expressive vocabulary	1.21	0.32	.33	3.72**	.08**				
Word segmentation	0.77	0.21	.31	3.63**	.08**				
Morphological awareness in English	0.61	0.21	.24	2.94**	.05**				
Language status	-4.36	1.69	-.22	-2.57*	.04*				
Morphological awareness in French centred	0.53	0.39	.14	1.37	.01				
Language status× morphological awareness in French centred	0.30	0.61	.05	0.49	.00				

*p<.05
**p<.01
[a]95% confidence limits from .30 to .57

The hierarchical multiple regression revealed that at step 1 English expressive vocabulary contributed significantly to the regression model (F (1, 94) = 32.03, p<.01) and accounted for 25.4% of the variation in English receptive vocabulary. The introduction of word segmentation, English morphological awareness, language status, and French morphological awareness centred at step 2 explained an additional 22.9% of variation, and this change in R^2 was significant (F (4, 90) = 9.94, p<.01). Part correlations were then calculated to obtain the unique contribution of each measure at step 2. This yielded 8.0% (p<.01) explained non-shared variance for English expressive vocabulary, 7.6% (p<.01) explained non-shared variance for word segmentation, 5.0% (p<.01) explained non-shared variance for English morphological awareness, 4.0% (p<.05) explained non-shared variance for language status, and 1.1% (p>.05) explained non-shared variance for French morphological awareness centred. The introduction of language status×morphological awareness in French centred explained an additional 0.1% of variation in English receptive vocabulary, and unsurprisingly this value was not significant (F (1, 89) = 0.24, p>.05).

This pattern of results indicated that no main effect of morphological awareness in French was found. Secondly, a main effect of language status on English receptive vocabulary was found at step 2. Taking into account both the sign and magnitude of the β value (-.22), this indicates that English native speakers reliably performed 4.0% better than their year 8 EAL peers on the measure of English receptive vocabulary, after taking into account covariates. Lastly, as language status×morphological awareness in French centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in French and English receptive vocabulary is moderated by language status for year 8 participants. As a nonsignificant moderator effect was found at step 3, step 2 was taken as the final model. After step 2, R^2 = .48 with 95% confidence limits from .30 to .57. The adjusted R^2 value of .45 indicated that just under one half of the variability in English receptive vocabulary was predicted by the model.

5.6.2 Year 10

After producing descriptive statistics (c.f. Table 1, Appendix 5.28), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.28), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.29), and no transformation of variables was necessary. After regressing all candidate variables onto English receptive vocabulary using the backwards deletion method, nonverbal IQ, English expressive vocabulary, word segmentation, and English morphological awareness were entered as predictors in the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.30). After centering the predictor variable, French morphological awareness, no further transformation of variables was necessary.

Consequently, a four stage hierarchical multiple regression was performed to determine if the strength of association between French morphological awareness and English receptive vocabulary varied as a function of language status for year 10 participants, after accounting for the covariate predictors of nonverbal IQ, English expressive vocabulary, word segmentation, and English morphological awareness, and the main effects of language status and French morphological awareness. Nonverbal IQ was entered in step 1, English expressive vocabulary was entered in step 2, word segmentation, English morphological awareness, language status, and French morphological awareness centred were entered in step 3, and language status×morphological awareness in French centred was selected in step 4. Table 61 displays the results of this multiple regression:

Table 61: Hierarchical regression analysis on English receptive vocabulary for year 10 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Step 1						.30	.09	-	.08
Constant	131.96	4.77		27.69**					
Nonverbal IQ	0.75	0.27	.30	2.80**	.09**				
Step 2						.61	.37	.28**	.35
Constant	101.70	6.56		15.50**					
Nonverbal IQ	0.50	0.23	.20	2.21*	.04*				
English expressive vocabulary	1.61	0.28	.53	5.82**	.28**				
Step 3						.76	.57[a]	.21**	.54
Constant	71.95	8.12		8.87**					
Nonverbal IQ	0.68	0.20	.27	3.40**	.07**				
English expressive vocabulary	1.31	0.25	.43	5.28**	.16**				
Word segmentation	0.66	0.19	.28	3.42**	.08**				
Morphological awareness in English	0.69	0.23	.25	3.05**	.07**				
Language status	2.13	1.63	.11	1.31	.01				
Morphological awareness in French centred	0.29	0.17	.14	1.65	.02				
Step 4						.77	.59	.01	.55
Constant	75.77	8.42		9.00**					
Nonverbal IQ	0.62	0.20	.25	3.09**	.05**				
English expressive vocabulary	1.28	0.25	.42	5.16**	.15**				
Word segmentation	0.60	0.19	.25	3.11**	.05**				
Morphological awareness in English	0.65	0.22	.23	2.90**	.05**				
Language status	1.46	1.67	.08	0.87	.00				
Morphological awareness in French centred	0.14	0.20	.07	0.69	.00				
Language status× morphological awareness in French centred	-0.60	0.39	-.15	-1.53	.01				

*p<.05
**p<.01
[a]95% confidence limits from .38 to .65

The hierarchical multiple regression revealed that at step 1 nonverbal IQ contributed significantly to the regression model (F (1, 79) = 7.81, p<.01) and accounted for 9.0% of the variation in English receptive vocabulary. The introduction of English expressive vocabulary at step 2 explained an additional 27.6% of variation, and this change in R^2 was again significant (F (1, 78) = 33.92, p<.01). The introduction of word segmentation, English morphological awareness, language status, and French morphological awareness centred at step 3 explained an additional 20.7% of variation, and this change in R^2 was also significant (F (4, 74) = 8.94, p<.01). Part correlations were then calculated to obtain the unique contribution of each measure at step 3. This yielded 6.7% (p<.01) explained non-shared variance for nonverbal IQ, 16.1% (p<.01) explained non-shared variance for English expressive vocabulary, 6.8% (p<.01) explained non-shared variance for word segmentation, 5.4% (p<.01) explained non-shared variance for English morphological awareness, 1.0% (p>.05) explained non-shared variance for language status, and 1.6% (p>.05) explained non-shared variance for French morphological awareness centred. The introduction of language status×morphological awareness in French centred explained an additional 1.3% of variation in English receptive vocabulary, and this value was not significant (F (1, 73) = 2.35, p>.05).

This pattern of results indicated that no main effect of morphological awareness in French was found. Secondly, no main effect of language status on English receptive vocabulary was found. Lastly, as language status×morphological awareness in French centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in French and English receptive vocabulary is moderated by language status for year 10 participants. As a nonsignificant moderator effect was found at step 4, step 3 was taken as the final model. After step 3, R^2 = .57 with 95% confidence limits from .38 to .65. The adjusted R^2 value of .54 indicated that just over one half of the variability in English receptive vocabulary was predicted by the model at step 3.

5.6.3 Answering Research Question 5

Do French morphological awareness and language status predict English receptive vocabulary?

a) Is there a main effect of French morphological awareness on English receptive vocabulary?

b) Is there a main effect of language status on English receptive vocabulary?

c) Is there a moderator effect of language status between French morphological awareness and English receptive vocabulary?

Firstly, no main effect of morphological awareness in French on English receptive vocabulary was found for either year group. This means that after taking into account covariates, morphological awareness in French did not reliably account for any further predicted variance in English receptive vocabulary for year 8 or year 10 participants. Secondly, a main effect of language status on English receptive vocabulary was found for year 8 pupils only. Taking into account the sign of the associated β value (-.22) this indicates that year 8 English native speakers reliably performed 4.0% better than their EAL peers on the measure of English receptive vocabulary, after accounting for covariates. Lastly, the variable language status×morphological awareness in French was not a significant predictor of English receptive vocabulary for year 8 or year 10 participants. In other words, strength of association between morphological awareness in French and English receptive vocabulary was not moderated by language status for either year group.

5.7 Cross-language analyses: Research Question 6

Do French morphological awareness and language status predict English expressive vocabulary?

a) Is there a main effect of French morphological awareness on English expressive vocabulary?

b) Is there a main effect of language status on English expressive vocabulary?

c) Is there a moderator effect of language status between French morphological awareness and English expressive vocabulary?

5.7.1 Year 8

After producing descriptive statistics (c.f. Table 1, Appendix 5.31), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.31), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.32), and although the BP test was significant at step 1, all other assumptions were upheld. Hence, variables were left untransformed. After regressing all candidate variables onto English expressive vocabulary using the backwards deletion method, socioeconomic status, and English receptive vocabulary were entered as predictors in the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.33). After centering the predictor variable, French morphological awareness, a Breusch-Pagan (BP) test revealed a significant effect at step 4 of the model. Therefore, the null hypothesis of homoscedasticity was rejected. As above (c.f. section 5.2.5), the violation of homoscedasticity was not deemed to be problematic in this case as all other assumptions were upheld.

Consequently, a four stage hierarchical multiple regression was performed to determine if the strength of association between French morphological awareness and English expressive vocabulary varied as a function of language status for year 8 participants, after accounting for the covariate predictors of socioeconomic status, and English receptive vocabulary, and the main effects of language status and French morphological awareness. Socioeconomic status was entered in step 1, English receptive vocabulary was entered in step 2, language status, and French morphological awareness centred were entered in step 3, and language status×morphological awareness in French centred was selected in step 4. Table 62 displays the results of this multiple regression:

Table 62: Hierarchical regression analysis on English expressive vocabulary for year 8 participants

Variable	**B**	**SE B**	**β**	***t***	**sr^2 (incremental)**	**R**	**R^2**	**ΔR^2**	**Adjusted R^2**
Step 1						.29	.08	-	.07
Constant	17.33	0.63		27.41**					
Socioeconomic status	0.00	0.00	.29	2.89**	.08**				
Step 2						.55	.30	.22**	.29
Constant	0.30	3.20		0.09					
Socioeconomic status	0.00	0.00	.22	2.48*	.05*				
English receptive vocabulary	0.13	0.02	.47	5.39**	.22**				
Step 3						.60	.36[a]	.06*	.33
Constant	4.24	3.52		1.20					
Socioeconomic status	0.00	0.00	.19	2.20*	.03*				
English receptive vocabulary	0.11	0.03	.38	4.16**	.12**				
Language status	-1.05	0.52	-.19	-2.02*	.03*				
Morphological awareness in French centred	0.13	0.09	.12	1.38	.01				
Step 4						.60	.36	.00	.32
Constant	4.19	3.54		1.18					
Socioeconomic status	0.00	0.00	.19	2.20*	.03*				
English receptive vocabulary	0.11	0.03	.39	4.14**	.12**				
Language status	-1.06	0.52	-.20	-2.03*	.03*				
Morphological awareness in French centred	0.15	0.12	.15	1.30	.01				
Language status× morphological awareness in French centred	0.07	0.19	.04	0.37	.00				

*p<.05
**p<.01
[a]95% confidence limits from .17 to .46

The hierarchical multiple regression revealed that at step 1 socioeconomic status contributed significantly to the regression model (F (1, 94) = 8.36, p<.01) and accounted for 8.2% of the variation in English expressive vocabulary. The introduction of English receptive vocabulary at step 2 explained an additional 21.9% of variation, and this change in R^2 was again significant (F (1, 93) = 29.08, p<.01). The introduction of language status, and French morphological awareness centred at step 3 explained an additional 5.6% of variation, and this change in R^2 was also significant (F (2, 91) = 3.93, p<.05). Part correlations were then calculated to obtain the unique contribution of each measure at step 3. This yielded 3.4% (p<.05) explained non-shared variance for socioeconomic status, 12.3% (p<.01) explained non-shared variance for English receptive vocabulary, 2.9% (p<.05) explained non-shared variance for language status, and 1.3% (p>.05) explained non-shared variance for French morphological awareness centred. The introduction of language status×morphological awareness in French centred explained an additional 0.1% of variation in English expressive vocabulary, and this value was not significant (F (1, 90) = 2.71, p>.05).

This pattern of results indicated that no main effect of morphological awareness in French was found. Secondly, a main effect of language status on English expressive vocabulary was found at step 3. Taking into account both the sign and magnitude of the β value (-.19), this indicates that English native speakers reliably performed 2.9% better than their year 8 EAL peers on the measure of English expressive vocabulary, after taking into account covariates. Lastly, as language status×morphological awareness in French centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in French and English expressive vocabulary is moderated by language status for year 8 participants. As a nonsignificant moderator effect was found at step 4, step 3 was taken as the final model. After step 3, R^2 = .36 with 95% confidence limits from .17 to .46. The adjusted R^2 value of .33 indicated that one third of the variability in English expressive vocabulary was predicted by the model.

5.7.2 Year 10

After producing descriptive statistics (c.f. Table 1, Appendix 5.34), and consulting the correlation matrix for potential collinearity (c.f. Table 2, Appendix 5.34), candidate variables were selected. Assumptions were then evaluated (c.f. Appendix 5.35), and no transformation of variables was necessary. After regressing all candidate variables onto English expressive vocabulary using the backwards deletion method, English receptive vocabulary was entered as a predictor in the final regression model. Assumptions for this model were then evaluated (c.f. Appendix 5.36). After centering the predictor variable, French morphological awareness, no further transformation of variables was necessary.

Consequently, a three stage hierarchical multiple regression was performed to determine if the strength of association between French morphological awareness and English expressive vocabulary varied as a function of language status for year 10 participants, after accounting for the covariate predictor English receptive vocabulary, and the main effects of language status and French morphological awareness. English receptive vocabulary was entered in step 1, language status, and French morphological awareness centred were entered in step 2, and language status×morphological awareness in French centred was selected in step 3. Table 63 displays the results of this multiple regression:

Table 63: Hierarchical regression analysis on English expressive vocabulary for year 10 participants

Variable	B	SE B	β	*t*	sr^2 (incremental)	R	R^2	ΔR^2	Adjusted R^2
Step 1						.57	.33	-	.32
Constant	-6.04	4.45		-1.36					
English receptive vocabulary	0.19	0.03	.57	6.18**	.33**				
Step 2						.61	38[a]	.05	.35
Constant	-6.97	4.47		-1.56					
English receptive vocabulary	0.20	0.03	.60	6.49**	.34**				
Language status	-0.57	0.61	-.09	-0.95	.00				
Morphological awareness in French centred	0.12	0.07	.18	1.85	.03				
Step 3						.61	.38	.00	.34
Constant	-7.27	4.76		-1.53					
English receptive vocabulary	0.20	0.03	.60	6.12**	.31**				
Language status	-0.55	0.63	-.09	-0.09	.00				
Morphological awareness in French centred	0.12	0.08	.17	1.51	.02				
Language status× morphological awareness in French centred	0.03	0.16	.02	0.19	.00				

* *p*<.05
***p*<.01
[a]95% confidence limits from .18 to .49

The hierarchical multiple regression revealed that at step 1 English receptive vocabulary contributed significantly to the regression model (F (1, 79) = 38.21, p<.01) and accounted for 32.6% of the variation in English expressive vocabulary. The introduction of language status, and French morphological awareness centred at step 2 explained an additional 5.0% of variation, but this change in R^2 was not significant (F (2, 77) = 3.07, p>.05). Part correlations were nonetheless calculated to obtain the unique contribution of each measure at step 2. This 34.1% (p<.01) explained non-shared variance for English receptive vocabulary, 0.7% (p>.05) explained non-shared variance for language status, and 2.8% (p>.05) explained non-shared variance for French morphological awareness centred. The introduction of language status×morphological awareness in French centred explained an additional 0.0% of variation in English expressive vocabulary, and unsurprisingly this value was not significant (F (1, 76) = 0.04, p>.05).

This pattern of results indicated that no main effect of morphological awareness in French was found. Secondly, no main effect of language status on English expressive vocabulary was found. Lastly, as language status×morphological awareness in French centred did not reliably add any further predicted variance, there is no evidence that the strength of association between morphological awareness in French and English expressive vocabulary is moderated by language status for year 10 participants. As a nonsignificant moderator effect was found at step 3, step 2 was taken as the final model. After step 2, R^2 = .38 with 95% confidence limits from .18 to .49. The adjusted R^2 value of .35 indicated that just over one third of the variability in English expressive vocabulary was predicted by the model.

5.7.3 Answering Research Question 6

Do French morphological awareness and language status predict English expressive vocabulary?

a) Is there a main effect of French morphological awareness on English expressive vocabulary?
b) Is there a main effect of language status on English expressive vocabulary?
c) Is there a moderator effect of language status between French morphological awareness and English expressive vocabulary?

Firstly, no main effect of morphological awareness in French on English expressive vocabulary was found for either year group. This means that after taking into account covariates, morphological awareness in French did not reliably account for any further predicted variance in English expressive vocabulary for year 8 or year 10 participants. Secondly, a main effect of language status on English expressive vocabulary was found for year 8 pupils only. Taking into account the sign of the associated β value (-.19) this indicates that year 8 English native speakers reliably performed 2.9% better than their EAL peers on the measure of English expressive vocabulary, after accounting for covariates. Lastly, the variable language status×morphological awareness in French was not a significant predictor of English expressive vocabulary for year 8 or year 10 participants. In other words, strength of association between morphological awareness in French and English expressive vocabulary was not moderated by language status for either year group.

5.8 Post-hoc analyses

Due to the lack of moderator effects found, post-hoc analyses were conducted in an attempt to explain these results. Lack of moderator effects may have been due to similar levels of English or French morphological awareness, in groups of EL1 and EAL pupils. Consequently, ANCOVAs were conducted to discover if similar levels of morphological awareness were presented in groups of different language status.

In conducting the ANCOVAs, the following covariates were considered for inclusion; i) Demographic (SES); ii) Nonverbal (nonverbal IQ, working memory); iii) Phonological (word segmentation, pseudoword decoding). For French morphological awareness motivation was also considered for inclusion. Covariates were entered into the model if they were significantly correlated to English morphological awareness or French morphological awareness, in either language group (EL1, EAL).

5.8.1 Year 8 ANCOVA on English morphological awareness

As word segmentation and pseudoword decoding were significantly correlated to English morphological awareness for year 8 EAL pupils, these were entered into the model as covariates. Therefore, a one-way ANCOVA was conducted to compare the performance on the measure of English morphological awareness in the sample of year 8 EL1 pupils and the sample of year 8 EAL pupils. After controlling for covariates, no significant difference on the measure of English morphological awareness was found between year 8 language groups (F (1, 92) = 0.21, p>.05).

5.8.2 Year 8 ANCOVA on French morphological awareness

As no covariates were significantly correlated to French morphological awareness for either group, an ANCOVA was not performed. Consequently, the significant independent t-test result in favour of year 8 EAL pupils shown in Chapter 4 (c.f. section 4.6.2, t(94)= -2.76, p<.01) remain unchanged.

5.8.3 Year 10 ANCOVA on English morphological awareness

As no covariates were significantly correlated to English morphological awareness for either group, an ANCOVA was not performed. Consequently, an independent samples t-test was performed to check for significant differences between year 10 EL1 and year 10 EAL groups, on the measure of English morphological awareness. No significant difference was found between year 10 EL1 and year 10 EAL pupils on English morphological awareness t(79)= 1.44, p>.05).

5.8.4 Year 10 ANCOVA on French morphological awareness

As word segmentation was significantly correlated to French morphological awareness for year 10 EAL pupils, this variable was entered into the model as a covariate. Therefore, a one-way ANCOVA was conducted to compare the performance on the measure of French morphological awareness in the sample of year 10 EL1 pupils and the sample of year 10 EAL pupils. After controlling for word segmentation, a significant difference on the measure of French morphological awareness was found between year 10 language groups (*F* (1, 78) = 9.45, *p*<.01, η=.11) in favour of year 10 EAL pupils.

5.9 Chapter summary

This chapter has presented the results which directly answer the research questions. The first three research questions dealt with within-language relationships between morphological awareness, language status, and vocabulary, whilst the last three research questions dealt with cross-language relationships between morphological awareness, language status, and vocabulary. Specifically, the research questions were analysed by constructing multiple regression models which investigated the possibility of a main effect of a measure of morphological awareness on a measure of vocabulary, the possibility of a main effect of language status on a measure of vocabulary, and the possibility that the relationship between the measure of morphological awareness and the measure of vocabulary was moderated by language status. The results of these research questions are summarised in Table 64.

Table 64: Summary of results generated when analysing relationships between morphological awareness, language status, and vocabulary

Research Question	Sub-questions	Nature of research question	Response Variable	Predictor Variable	Interaction term	Unique contribution of morphological awareness (%)	Unique contribution of language status (%)	Unique contribution of interaction term (%)	Contribution of covariates entered into model (%)	Adjusted R^2 of model
Within-language relationships										
1) Do English morphological awareness, and language status predict English receptive vocabulary?	a) Is there a main effect of English morphological awareness? b) Is there a main effect of language status? c) Is there a moderator effect of language status?	Within-language: Native/additional language context	English receptive vocabulary	Morphological awareness in English centred	Morphological awareness in English centred×language status	Year 8: 4.4**	3.3*	ns	English expressive vocabulary: 7.3** Word segmentation: 7.7**	.45
						Year 10: 7.0**	ns	ns	Nonverbal IQ: 6.3** English expressive vocabulary: 15.1** Word segmentation: 8.2**	.53
2) Do English morphological awareness, and language status predict English expressive vocabulary?	a) Is there a main effect of English morphological awareness? b) Is there a main effect of language status? c) Is there a moderator effect of language status?	Within-language: Native/additional language context	English expressive vocabulary	Morphological awareness in English centred	Morphological awareness in English centred×language status	Year 8: ns	3.7*	ns	Socioeconomic status: 3.1* English receptive vocabulary: 14.1**	.33
						Year 10: ns	ns	ns	English receptive vocabulary: 29.2**	.33
3) Do French morphological awareness, and language status predict	a) Is there a main effect of French morphological awareness?	Within-language: Foreign language context	French receptive vocabulary	Morphological awareness in French centred	Morphological awareness in French centred×language status	Year 8: ns	ns	ns	Nonverbal IQ: 5.8** Pseudoword decoding: 3.2* Word segmentation: 8.4**	.30

French receptive vocabulary?	b) Is there a main effect of language status? c) Is there a moderator effect of language status?					Year 10[a]: 5.0*	ns	ns	Working memory: 7.2** Word segmentation: 14.7**	.38
Cross-language relationships										
4) Do English morphological awareness, and language status predict French receptive vocabulary?	a) Is there a main effect of English morphological awareness? b) Is there a main effect of language status? c) Is there a moderator effect of language status?	Cross-language	French receptive vocabulary	Morphological awareness in English centred	Morphological awareness in English centred×language status	Year 8: ns	ns	ns	Nonverbal IQ: 6.8** English receptive vocabulary 9.3** Pseudoword decoding: 5.6**	.33
						Year 10: 4.2*	ns	ns	Working memory: 7.6** Word segmentation: 11.2** Morphological awareness in French: 3.0*	.45
5) Do French morphological awareness, and language status predict English receptive vocabulary?	a) Is there a main effect of French morphological awareness? b) Is there a main effect of language status? c) Is there a moderator effect of language status?	Cross-language	English receptive vocabulary	Morphological awareness in French centred	Morphological awareness in French centred×language status	Year 8: ns	4.0*	ns	English expressive vocabulary: 8.0** Word segmentation: 7.6** Morphological awareness in English: 5.0**	.45
						Year 10: ns	ns	ns	Nonverbal IQ: 6.7** Expressive English vocabulary: 16.1** Word segmentation: 6.8** Morphological awareness in English: 5.4**	.54
6) Do French morphological awareness, and language status predict	a) Is there a main effect of French morphological awareness?	Cross-language	English expressive vocabulary	Morphological awareness in French centred	Morphological awareness in French centred×language status	Year 8: ns	2.9*	ns	Socioeconomic status: 3.4* English receptive vocabulary: 12.3**	.33

English expressive vocabulary?	b) Is there a main effect of language status? c) Is there a moderator effect of language status?					Year 10: ns	ns	ns	English receptive vocabulary: 34.1**	.35

*p<.05
**p<.01
a) Outcome variable was French receptive vocabulary squared

In terms of within-language relationships, Table 64 shows three main findings. Firstly, there tended to be a main effect of morphological awareness on vocabulary when the measure of vocabulary was receptive in nature. This pattern occurred in both in the native/additional language context and the MFL context. Secondly, there was no main effect of language status on vocabulary amongst year 10 participants. Amongst year 8 participants there was a main effect of language status on vocabulary in the native/additional language context, but not in the MFL context. Lastly, there was no moderator effect of language status between any measure of morphological awareness and any measure of vocabulary knowledge.

In terms of cross-language relationships, Table 64 also reveals three main findings. Firstly, there was only one main effect of morphological awareness on vocabulary. This was found amongst year 10 participants where morphological awareness in English accounted for 4.2% of variance in French receptive vocabulary. Secondly, as has been noted for the within-language relationships, there was no main effect of language status on vocabulary amongst year 10 participants whilst amongst year 8 participants there was a main effect of language status when the dependent variable was a measure of vocabulary in the native/additional language context, but not in the MFL context. Lastly, once again no moderator effect of language status between any measure of morphological awareness and any measure of vocabulary knowledge was found.

6 Discussion

This study sought to build on the existing literature about within and cross-language relationships between morphological awareness, language status, and vocabulary, in English (native and additional language context) and in French (MFL context). These relationships were examined by building multiple regression models which investigated main effects of morphological awareness and language status on vocabulary, and the moderator effect of language status between morphological awareness and vocabulary, after taking into account covariates. Moreover, these relationships were analysed in two different year groups, year 8 and year 10, due to systematic variance on the response variables (c.f. Chapter 4, section 4.1) and differential L1 profiles of EAL pupils across year groups (c.f. Chapter 3, section 3.3.1).

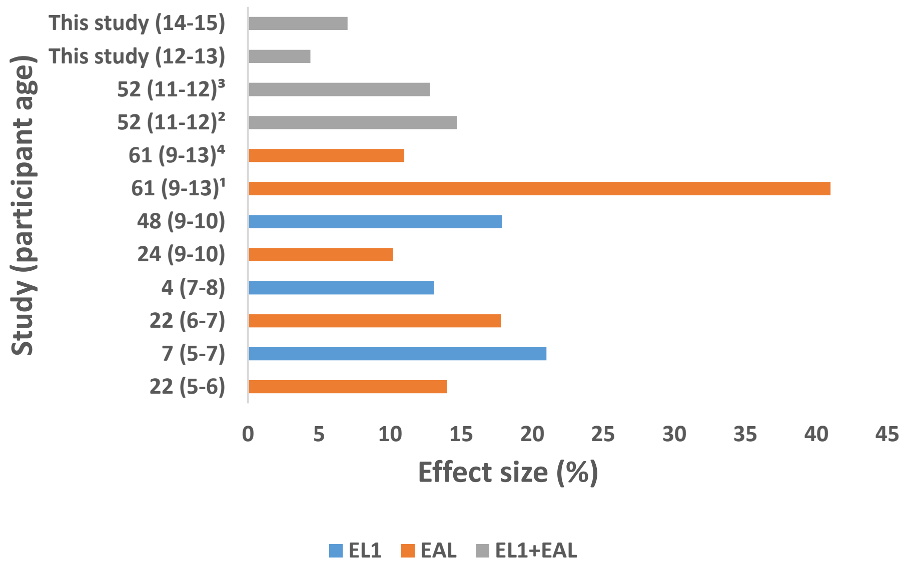
In discussing the results of these analyses, findings are briefly restated and explained in light of existing empirical research whilst taking into account limitations and possible alternative interpretations of the data. In addition, findings are explained in light of theoretical considerations. Furthermore, pedagogical implications are suggested. Next, areas for improvements to the study and further research are outlined. The chapter concludes with a summary of the study.

6.1 Contributions to empirical knowledge: Within-language findings

6.1.1 Main effects of morphological awareness in Research Question One

a) Is there a main effect of English morphological awareness on English receptive vocabulary?

Main effects of English morphological awareness on English receptive vocabulary were found for both year 8 pupils (4.4%, $p<.01$) and year 10 pupils (7.0%, $p<.01$) after taking into account covariates. Figure 6.1 situates these results among significant main effects identified in the systematic review (c.f. section 2.4, Figure 2.3):



[1] Response variable included cognates only
[2] English syntactic awareness included as covariate
[3] Phoneme elision included as covariate
[4] Response variable included noncognates only

Figure 6.1: Comparing results of year 8 and year 10 pupils with past literature: Significant effect sizes of English morphological awareness on English receptive vocabulary

On the one hand, the results of this study replicated those found in the literature. As significant effects of English morphological awareness on English receptive vocabulary were found for both year 8 and year 10 pupils, this added to the body of evidence which showed the prediction of receptive vocabulary via the mechanism of morphemic analysis (Wysocki & Jenkins, 1987). Furthermore, there was a descriptively higher magnitude of the main effect of morphological awareness on English receptive vocabulary for year 10 pupils compared to year 8 pupils. This finding reinforced the established view that older pupils have higher vocabulary levels, which are associated in turn with higher levels of morphological awareness (Goodwin, 2010; Kieffer & Lesaux, 2012b).

On the other hand, the magnitudes of the effect sizes found in this study were descriptively at the lower end of those found in the literature, although they were still significant.

Interpretations of this finding are twofold. Firstly, a difference in the covariates measured between studies may account for differential magnitudes of the main effect of morphological awareness. Table 65 explores this idea further:

Table 65: Accounting for variance in vocabulary by covariates

Language status	Study	Covariates (% variance explained)										
		Demographic		Nonverbal	Phonological				Vocabulary	Orthographic		Morphological
		Age/ Grade	Length of residence	Nonverbal IQ	Phoneme elision	Word reading	Pseudoword reading	Oral word segmentation	English expressive vocabulary	Orthographic processing	Orthographic fluency	English syntactic awareness
EL1	4[1]	ns		9.4***	4.2*	3.8*	ns					
	4[2]	ns		10.6**	18.8**	ns	ns					
	7				ns					ns		
	48							ns			11.1**	
EAL	22[3]	ns			ns							
	22[4]	ns			14.0*							
	22[5]	ns			17.6*							
	22[6]	15.5*			ns							
	24				ns	** magnitude unknown						
	61[7]	ns	ns	ns	ns							
	61[8]	7*	ns	ns	ns							
	52											5.2***
					7.8***							
EL1+ EAL	Year 8							7.7**	7.3**			
	Year 10			6.3**				8.2**	15.1**			

[1] Grade 2 pupils
[2] Grade 3 pupils
[3] Kindergarten Time 1
[4] Grade 1 Time 1
[5] Kindergarten Time 2
[6] Grade 1 Time 2
[7] Only cognates in response variable
[8] Only noncognates only in response variable

Table 65 shows that in the previous literature nine different covariates were measured when analysing the relationship between English morphological awareness and English receptive vocabulary. Furthermore, different combinations of covariates measured across previous studies makes cross-study comparisons problematic. Nonetheless, it is noteworthy that English expressive vocabulary was not measured in any of these studies. As expressive vocabulary includes and extends receptive vocabulary (Nation, 1990) it is expected that a measure of English expressive vocabulary shares variance with a measure of English receptive vocabulary. Consequently, it is plausible that the relatively small effect sizes reported in this study were due partly to the variance accounted for by the measure of English expressive vocabulary.

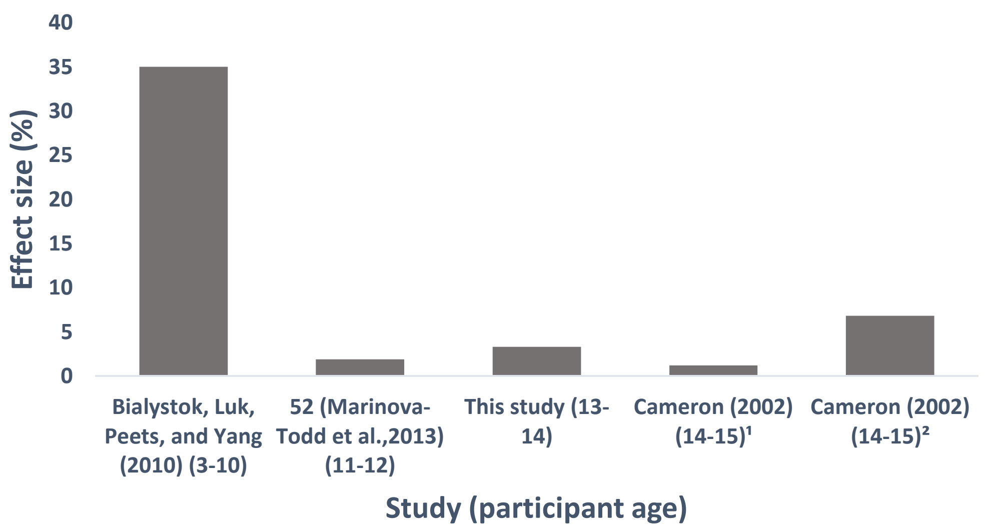
Moreover only one previous study, study 48 (Schwiebert, Green, & McCutcheon, 2002), measured oral word segmentation ability as a covariate. As reasoned in section 3.4.5, measures of morphological awareness may share variance with oral word segmentation ability due to the requirement of phonetically parsing words when looking for single morphemes in a multimorphemic word. Consequently, it is also plausible that the relatively small effect sizes reported in this study were due partly to the variance accounted for by the measure of oral word segmentation ability.

Secondly, the relatively small effect sizes reported in this study may have been due to the characteristics of the measure of English morphological awareness. The Morphological Decomposition Test – English, required manipulation of pseudowords in isolation. In contrast, only study 52 (Marinova-Todd et al., 2013), measured derivational awareness with pseudowords, and this was done with in combination with real words. Moreover, only study 4 (Sparks & Deacon, 2013) relied entirely on an isolated word measure of derivational awareness. As the completion of tasks using real words and sentence completion can be aided by vocabulary knowledge, it is plausible that such measures may have been tapping into vocabulary knowledge, as well as derivational awareness. Consequently, although the effect sizes reported in this study are relatively small, they might be considered a purer measure of derivational awareness. Conversely, effect sizes reported in previous literature may have been slightly inflated by tapping into vocabulary knowledge.

6.1.2 Main effects of language status in Research Question One

b) Is there a main effect of language status on English receptive vocabulary?

A main effect of language status on English receptive vocabulary in favour of EL1 pupils was found in year 8 (3.3%, $p<.05$) after taking into account covariates. Figure 6.2 situates these results among significant main effects identified in the systematic review (c.f. section 2.4, Figure 2.4):



[1] 3K levels as response variable
[2] 5K levels as response variable

Figure 6.2: Comparing results of year 8 pupils with past literature: Significant effect sizes of language status on English receptive vocabulary

As Figure 6.2 shows, the main effect of language status on English receptive vocabulary in favour of year 8 pupils supported the established view of the literature. However, it is noticeable that the main effect for year 8 pupils was considerably less than that found in the aggregate analysis by Bialystok, Luk, Peets, and Yang (2010). A possible explanation for this discrepancy may be found in the amount of time spent in an Anglophone country at time of testing. Unfortunately, Bialystok, Luk, Peets, and Yang (2010) did not record the amount of time their EAL participants had spent in an Anglophone country. Indeed, this was also a limitation of the present study. However, whilst a minimum amount of time (at least 2 years) living in the country was listed as an exclusion criteria in the present study, this was not the case for Bialystok, Luk, Peets, and Yang (2010). Consequently, differential language exposure of EAL pupils may have played a part in the large difference in effect sizes.
A further explanation of this discrepancy may also be found in the lack of covariates measured by Bialystok and colleagues (2010). In the regression model built for year 8 pupils, 4.4% of variance in English receptive vocabulary was explained by English morphological awareness, 7.3% by English expressive vocabulary, and 7.7% by oral word segmentation. Consequently, is it unsurprising that the main effect of language status for year 8 pupils was of a lesser magnitude than that found by an aggregate analysis which did not take account of covariates.

With regard to year 10 pupils, there was no significant effect of language status. Whilst this result contradicted much of the established literature, it was not without precedent. For example, Marinova-Todd et al., (2013) reported a nonsignificant effect of language status on their proxy measure of vocabulary, the reading subtest of the Wide Range Achievement Test -3 (WRAT-3). In addition, the authors reported a nonsignificant difference between Grade 6 (aged 11-12) EL1 pupils and Grade 6 EAL pupils with L1s from a wide range of typologies

(Slavic, Chinese, Filipino, German, and Persian), on a different proxy measure of vocabulary, the word identification subtest of the Woodcock Reading Mastery Tests – Revised (WRMT-R).

On the other hand, the same authors reported a significant difference on this same measure in favour of EL1 pupils and the Slavic group, over the Korean group, although no associated effect size was reported. Taken together, the findings from Marinova-Todd and colleagues (2013) highlight a major weakness of the present study. The lack of sub-analyses on EAL pupils with different L1 typologies meant that a large amount of variance in English receptive vocabulary was left unaccounted for. Unfortunately, this was not possible due to small sample sizes. Specifically, it was plausible that EAL pupils with L1s which shared a large amount of etymologically similar vocabulary with English, may have had higher levels of English receptive vocabulary than EAL pupils with L1s which shared a lesser amount of etymologically similar vocabulary with English.

Moreover, as described above (c.f. section 6.1.1), a further weakness of the present study was the lack of measurement of time spent in the country for EAL pupils. Such information is potentially important considering evidence that EAL pupils approach native-like oral proficiency after 5 years of formal schooling (Genesee, Lindholm-Leary, Saunders, & Christian, 2006). Consequently, it is possible that a nonsignificant effect of language status on English receptive vocabulary was due to amount of exposure to the language. Unfortunately, lack of data makes this reasoning impossible to verify.

6.1.3 Moderator effect of language status in Research Question One

c) Is there a moderator effect of language status between English morphological awareness and English receptive vocabulary?

No moderator effect of language status between English morphological awareness and English receptive vocabulary was found for year 8 or year 10 pupils. In other words, the strength of association between English morphological awareness and English receptive vocabulary did not vary as a function of language status. On the one hand this finding was surprising. As described in the literature review (c.f. section 2.4.2), Study 20 (Kieffer & Lesaux, 2012c) employed a log likelihood ratio test to see if the direct effect of morphological awareness on reading vocabulary varied as a function of language status. The result of this test was significant (Δ-2LL=6.321; df = 3; p<.05). As language status was coded on 4 levels (EL1, Spanish EAL, Vietnamese EAL, Filipino EAL), and as no associated effect sizes were reported, group regression coefficients of the prediction of English reading vocabulary by English morphological awareness were consulted to infer where significant differences lay; i) Filipino EAL (.72***); ii) Spanish EAL (.51***); iii) Vietnamese EAL (.48**); iv) and EL1 (.57**). From this data it is possible that there was a significant effect of language status in favour of Filipino EAL pupils over the other three groups, although this supposition needs to be verified by inferential tests.

However, a stronger prediction of English vocabulary from English morphological awareness for Filipino EAL pupils over the other three groups is a plausible finding considering the morphology of Tagalog. Tagalog is considered a morphologically complex language which makes use of prefixes, suffixes, and interfixes to express morphological relationships (Booij, Lehmann, Mugdan, & Skopeteas, 2004, pp. 1473–1476). Consequently, it is reasonable to conclude that Filipino EAL pupils are more used to implicitly analysing morphological relationships than pupils in the other three groups, and therefore have higher morphological awareness. In turn, they may then use more of their morphological awareness to infer vocabulary via morphemic analysis.

On the other hand, the data presented by (Kieffer & Lesaux, 2012c) indicated that strength of association between English morphological awareness and English reading vocabulary was similar for Spanish EAL, Vietnamese EAL, and EL1 pupils. In addition, Study 13, (Kieffer & Box, 2013) reported a nonsignificant likelihood ratio test, $\Delta\chi 2$ (Δdf) = 1.89 (1), p>.05, to see if the direct effect of morphological awareness on academic vocabulary varied as a function of language status for a sample of 137 pupils aged 11-12 (55 EL1, 82 Spanish EAL). This data reinforces that of Study 20 which indicated similar predictions of English vocabulary from English morphological awareness for EL1 pupils and Spanish EAL pupils.

Therefore, taken together these studies indicate that the presence or absence of a moderator effect of language status is associated with level of morphological transparency of the L1 of EAL pupils. Unfortunately, sub-group analyses of EAL pupils in this study was not possible due to small sample sizes. In addition, the measurement of morphological transparency by a continuous variable would have been welcomed not only in order to differentiate between EAL pupils with L1s of different typologies, but also to investigate the amount of variance in English receptive vocabulary accounted for by morphological transparency of the L1. However, no such instrument was available at the time of data collection. Lastly, one of the reasons why no moderator effect of language status was found may have been that EL1 and EAL participants had similar levels of English morphological awareness. This conclusion is borne out by the nonsignificant inferential tests performed on English morphological awareness with language status (EL1, EAL) as the between-participant factor, for both year 8 pupils, (c.f. Chapter 5, section 5.8.1), and year 10 pupils (c.f. Chapter 5, section 5.8.3).

6.1.4 Main effects of morphological awareness in Research Question Two

a) Is there a main effect of English morphological awareness on English expressive vocabulary?

No main effects of English morphological awareness on English expressive vocabulary were found for year 8 pupils (1.9%, ns) or year 10 pupils (0.3%, ns) after taking into account covariates. On the one hand, this was quite surprising. Out of the 26 separate results presented in the literature review (c.f. 2.4.2, Table 17) only 6 reported nonsignificant effects of a measure of English derivational awareness on a measure of English expressive vocabulary. In addition, significant effects ranged from 3 to 69, with most effects ranging between 7 and 42 per cent variance explained. Therefore, there was a sound empirical basis on which to expect a similar result in the present study.

On the other hand, an important difference with the established literature was the measurement of several covariates in predicting English expressive vocabulary, the most salient of which was English receptive vocabulary. English receptive vocabulary was demonstrated to be an important covariate, predicting 14.1 (p<.01) and 34.5 (p<.01) per cent of unique variance in English expressive vocabulary for year 8 and year 10 pupils, respectively. As stated above, this finding is not surprising given the conceptual overlap between these two facets of vocabulary (Nation, 1990).

More fundamentally however, this finding speaks directly to the theoretical premise behind the acquisition of vocabulary via the mechanism of morphemic analysis. Although previous studies (e.g. Spencer et al., 2015) have demonstrated significant predictions of both receptive and expressive facets of vocabulary by the same measures of morphological awareness, such studies have done so in the absence of controlling for knowledge of the other facet of vocabulary knowledge. In other words, there are few, if any, studies which have investigated the prediction of expressive vocabulary by morphological awareness, whilst controlling for receptive vocabulary. Moreover, whilst previous studies (*ibid*.) have included both receptive and expressive tasks of morphological awareness, no study has explicitly investigated the main effect of morphological awareness task type (receptive, expressive) on the two facets of vocabulary knowledge. Considering the initial claim that morphemic analysis may lead to pupils drawing "upon knowledge of a familiar word to aid them in deriving the meaning of an unfamiliar, but related word" (Wysocki & Jenkins, 1987, p. 69), this is an important weakness in the literature as it is unclear whether knowledge of a familiar word, and meaning of an unfamiliar but related word, are receptive or expressive in nature.

Unfortunately, a weakness of the present study was the inclusion of only receptive tasks of morphological awareness. Bearing in mind this limitation in the data, it may be argued, although only extremely tentatively at this point, that morphological awareness measured receptively may aid the expansion of expressive vocabulary only via an increase in receptive vocabulary. In other words, analysis of the data reveals the possibility of a fully mediated relationship between English morphological awareness (exogenous variable, ***X***), English receptive vocabulary (endogenous variable, or mediator, ***M***), and English expressive vocabulary (outcome, ***Y***).

According to accepted understanding (e.g. Baron & Kenny, 1986; Little et al., 2007) there are three necessary conditions that need to be met for full mediation to occur. Firstly, ***X*** is significantly related to ***M***. Secondly, ***M*** is significantly related to ***Y***, and lastly, the relationship of ***X*** to ***Y*** diminishes to nonsignificance when ***M*** is in the model. This relationship is depicted in Figure 6.3. For clarity of interpretation, the year 8 data predicting main effects of English morphological awareness on English receptive and expressive vocabulary are used in the following explanation.

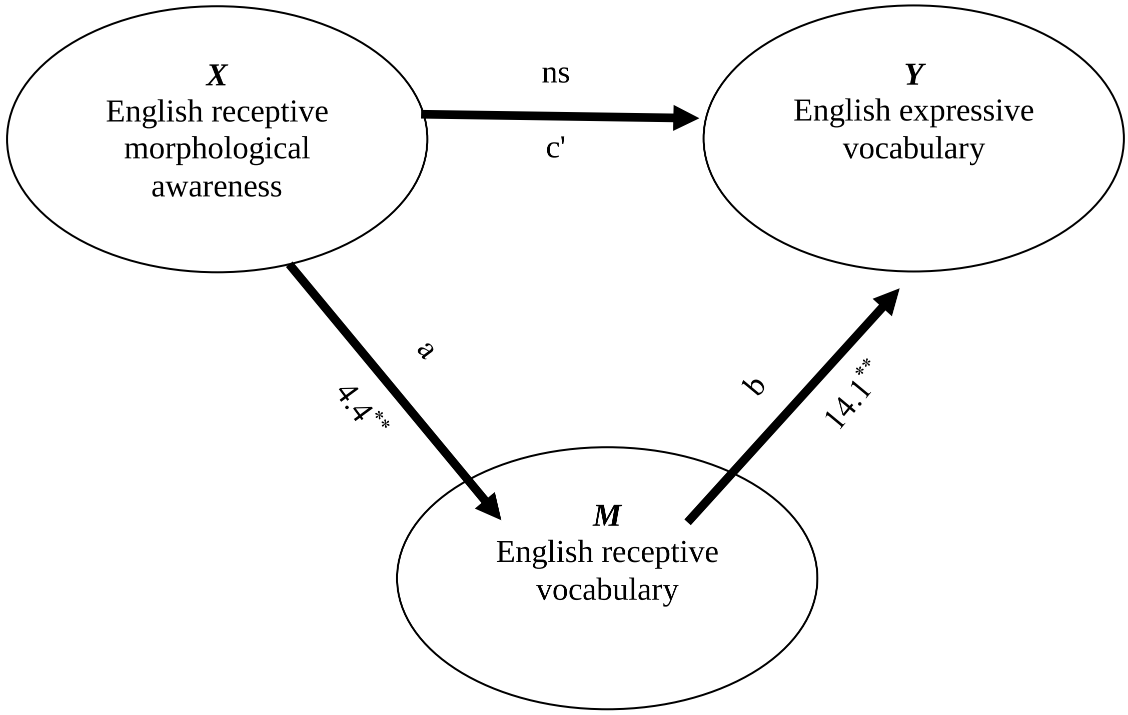


Figure 6.3: Full mediation model between English receptive morphological awareness (*X*), English receptive vocabulary (*M*), and English expressive vocabulary (*Y*)

As Figure 6.3 shows, the above model conforms to the accepted characteristics of a fully mediated model. English receptive morphological awareness significantly predicts English receptive vocabulary (4.4%, p<.01). In addition, English receptive vocabulary significantly predicts English expressive vocabulary (14.1%, p<.01). Lastly, English receptive morphological awareness is not a significant predictor of English expressive vocabulary when English receptive vocabulary is in the model. Whilst Figure 6.3 uses year 8 data, it is noted that a similar model could have been made based on year 10 data. This is taken as preliminary evidence that such a model may be robust to effects of pupil age.

A main advantage of this model is that it provides an intuitive way in which to conceptualise relationships between multiple predictors and the outcome variable. As Figure 6.3 shows, two possible causal relationships have emerged from the findings relating to English vocabulary outcomes; i) English receptive morphological awareness leads to English receptive vocabulary; ii) English receptive vocabulary leads to English expressive vocabulary. In this study, these relationships emerged from performing separate multiple regression analyses. Going forward a structural equation modelling approach may be better placed to summarise these relationships in one convenient model. Such an approach is highly welcomed, especially considering the possible interrelationships between theoretically important covariates and predictors.

In addition, a structural equation model allows for the simultaneous testing of all pathways, whereas in multiple regression a sequential approach is required. In other words, the model proposed in Figure 6.3 simultaneously tests the relationships between English receptive morphological awareness and English expressive vocabulary, English receptive morphological awareness and English receptive vocabulary, and English receptive vocabulary and English expressive vocabulary. Such an approach is favoured in a situation where a model has emerged from the findings of one empirical study, however no solid theory is yet present to explain the model.

However, whilst the above model may sensibly explain the year 8 and year 10 data, it should be interpreted with extreme caution. Specifically, it is highlighted that the testing of such a model was not one of the aims of this study. As such, the statistical assumptions which underpin a structural equation model such as that depicted in Figure 6.3 have not been tested. Furthermore, whilst such a model implies a causal link between morphological awareness and vocabulary knowledge, the multiple regression-based analysis of the year 8 and year 10 data can only speak to correlational observations. Although the theory of morphemic analysis has tended to imply a causal link between these two variables, bi-directional relationships have been established in the literature (e.g. McBride-Chang, Wagner, Muse, Chow, & Shu, 2005), albeit without controlling for the other facet of vocabulary knowledge. Consequently, further research which tests this model is highly encouraged.

6.1.5 Main effects of language status in Research Question Two

b) Is there a main effect of language status on English expressive vocabulary?

A main effect of language status on English expressive vocabulary in favour of EL1 pupils was found in year 8 (3.7%, *p*<.05) after taking into account covariates. Figure 6.4 situates these results among significant main effects identified in the systematic review (c.f. section 2.4, Figure 2.6):

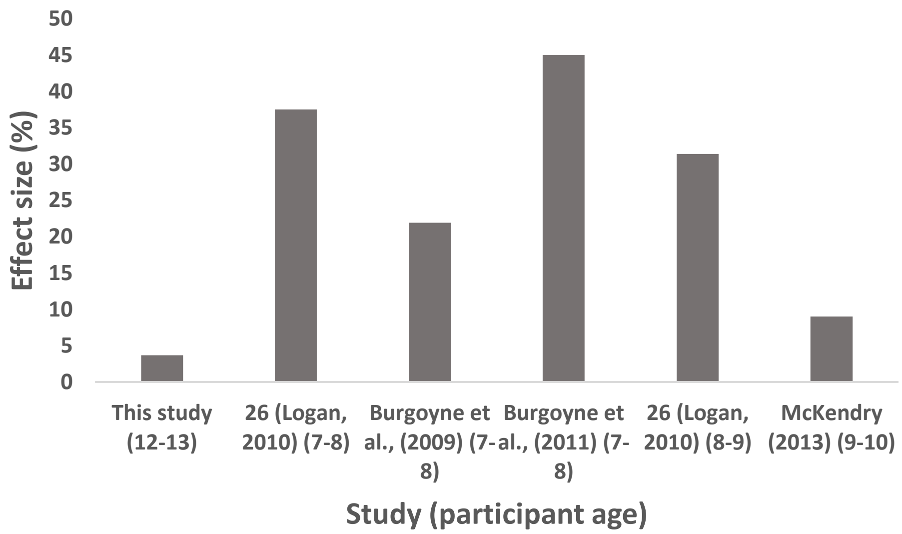


Figure 6.4: Comparing results of year 8 pupils with past literature: Significant effect sizes of language status on English expressive vocabulary

As Figure 6.4 shows, the main effect of language status on English expressive vocabulary in favour of year 8 pupils reinforced the established view of the literature. However, as for English receptive vocabulary (c.f. section 6.1.2) it is noticeable that the main effect for year 8 pupils was considerably less than that found in other studies. Once again, a possible explanation for this discrepancy may be found in the amount of time spent in an Anglophone country at time of testing. Unfortunately, this data was not recorded for the present study.

Furthermore, it is worth reemphasising the lack of covariates measured in previous studies. Indeed, in the only study (McKendry, 2013) which included groups matched on important variables such as age, gender, reading comprehension, and phonemic decoding ability, the main effect of language status on English expressive vocabulary was more comparable to the one found in this study (9%). In the regression model built for year 8 pupils, 3.1% and 14.1% of variance in English expressive vocabulary was explained by socioeconomic status, and English receptive vocabulary, respectively. Bearing in mind the overlap in variance between these two facets of vocabulary (Nation, 1990), and the reported effects of socioeconomic status on receptive vocabulary (Hart & Risley, 1995), it is unsurprising that the main effect of language status for year 8 pupils was of a lesser magnitude than that found by previous studies which did not take into account these covariates.

With regard to year 10 pupils, a nonsignificant effect of language status on English expressive vocabulary was found. Such a result was quite surprising as it was without precedent in the literature. However, as this result replicated that which was found for English receptive vocabulary (c.f. section 6.1.2) a cohort effect may have been in play. Specifically, the year 10 EAL participants may have spent sufficient time in the country to near native-like oral proficiency. Once again, due to the lack of measurement of time spent in the country for EAL pupils, such reasoning is purely conjectural.

6.1.6 Moderator effect of language status in Research Question Two

c) Is there a moderator effect of language status between English morphological awareness and English expressive vocabulary?

No moderator effect of language status between English morphological awareness and English expressive vocabulary was found for year 8 or year 10 pupils. In other words, the strength of association between English morphological awareness and English expressive vocabulary did not vary as a function of language status. Bearing in mind the similar result found for English receptive vocabulary (c.f. section 6.1.3), a nonsignificant result with English expressive vocabulary as the response variable was not surprising. Moreover, as argued above (c.f. section 6.1.3), levels of English morphological awareness did not vary as a function of language status for year 8 or year 10 pupils. Therefore, the lack of moderator effect between English morphological awareness and English expressive vocabulary is to be expected.

Taken together, the lack of moderator effect shows that in an additional language context EAL pupils might use their English morphological awareness to the same degree as their EL1 peers, in acquiring English expressive vocabulary. Furthermore, such a conclusion seems to be true both in groups where there is a main effect of language status in favour of EL1 pupils (year 8), and where no such main effect exists (year 10). In other words, when EL1 pupils do have a greater knowledge of vocabulary, the reasons behind this are unclear. However, whilst the participants in this study showed similar levels of English morphological awareness, EL1 pupils had likely experienced exposure to English over a longer period of time than their EAL peers. Consequently, one possible interpretation of the data is that levels of English vocabulary acquisition may vary as a function of amount of English exposure.

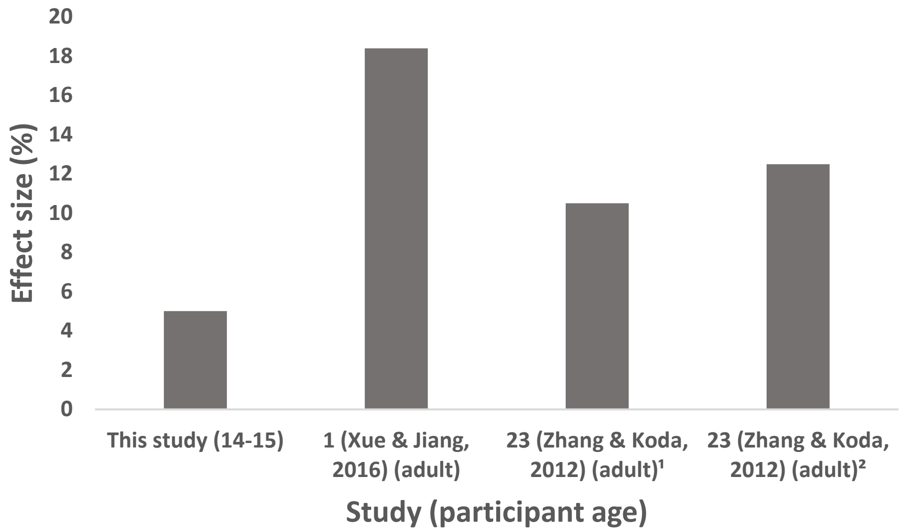
6.1.7 Main effects of morphological awareness in Research Question Three

a) Is there a main effect of French morphological awareness on French receptive vocabulary?

No main effect of French morphological awareness on French receptive vocabulary was found for year 8 pupils. This result confirmed the findings of the only other study which has investigated within-language main effects of morphological awareness on foreign language receptive vocabulary conducted at school, Study 37 (Deacon et al., 2007). Whilst Study 37 also found a nonsignificant prediction of French receptive vocabulary by French morphological awareness, their research took place with primary school pupils, the majority of whom were in their second year of French foreign language instruction. Moreover, as the authors recognised, the measure of French morphological awareness suffered from reliability issues (α=0.26). Therefore, there was reason to suspect that a lack of main effect was reported due to poor measurement of morphological awareness.

However, the measure of French morphological awareness employed in the present study did not suffer from reliability issues (year 8 α =0.70). As a result, the nonsignificant effect found for year 8 pupils adds to the evidence found by Deacon and colleagues (2007), indicating that morphological awareness does not contribute to receptive vocabulary acquisition for pupils who have started learning a foreign language within the last two years. Such a result may be explained by the lack of multimorphemic input which pupils receive during early years foreign language learning (McBride-Chang et al., 2005). In such a context, the mechanism of morphemic analysis may not be applicable, as the majority of input is monomorphemic bases. Moreover, the nonsignificant effect reported here complements qualitative research on MFL learning in England where some argue that the requirements of GCSE assessment have placed an overemphasis on rote memorisation to the detriment of linguistic skill (e.g. Häcker, 2008).

In contrast, a significant main effect of French morphological awareness on French receptive vocabulary was found for year 10 pupils (5.0%, $p<.05$). Figure 6.5 situates these results among significant main effects identified in the systematic review (c.f. section 2.4, Figure 2.7):



[1] No covariates measured
[2] Pretest variables measured as covariates

Figure 6.5: Comparing results of year 10 pupils with past literature: Significant effect sizes of morphological awareness on foreign language receptive vocabulary

Figure 6.5 shows that the results from year 10 pupils add to the body of evidence supporting the existence of a main effect of morphological awareness on foreign language receptive vocabulary. Although this effect was relatively small, it is noted that both Study 1 (Xue & Jiang, 2016) and Study 23 (Zhang & Koda, 2012) were carried out on samples of undergraduates. Therefore, results from year 10 pupils provide a first piece of evidence that morphological awareness can lead to receptive vocabulary acquisition in the foreign language context at school.

Interpretations of this result are twofold. Firstly, it is noteworthy that the year 10 pupils had been learning French for 4 to 5 years. Consequently, it is to be expected that they were exposed to greater multimorphemic input compared to the year 8 participants. As such, the year 10 pupils may have had more opportunity to practice vocabulary acquisition by morphemic analysis. Moreover, evidence of a main effect for year 10 participants demonstrate that given enough time pupils learning a foreign language GCSE can develop their meta-analytical linguistic skills, contrary to the views expressed by some in the literature (e.g. Häcker, 2008). Additionally, compared to the year 10 pupils in this study, the undergraduate students in Study 1 and in Study 23 would have had relatively greater opportunity to develop their vocabulary by analysing words at the morphemic level. In this context, the results of the literature so far display a readily understandable trend showing a positive correlation between effect size of morphological awareness on foreign language receptive vocabulary, and time spent learning the target foreign language.

Secondly, motivational issues may partly explain the year 10 results. As was detailed Chapter 4 (c.f. Chapter 4, section 4.3.2) intrinsic motivation to learn French may have been a confound variable as those pupils who were more motivated to learn French may have dedicated more of their time engaged with written French texts compared to less motivated pupils. The extra time spent reading French texts could then have increased their opportunity to acquire vocabulary by analysing words at the morphemic level. In addition, evidence from the BIQ showed that year 10 pupils had significantly higher motivation to learn French than their year 8 counterparts; $t(175)=-12.36$, $p>.001$. However, as the measure of motivation was not included as a covariate in any hierarchical regression models predicting French receptive vocabulary, the effect of this variable remains unclear.

6.1.8 Main effects of language status in Research Question Three

b) Is there a main effect of language status on French receptive vocabulary?

No main effects of language status on French receptive vocabulary were found for year 8 pupils or year 10 pupils. Bearing in mind previous literature which found a main effect of language status in favour of EAL of 1.4 per cent on foreign language GCSE grades (including community languages) (Strand et al., 2015, p. 36), a similar main effect was expected for the present study. In addition, it was noted that a main effect in favour of EAL found by Strand and colleagues persisted even when community languages were not taken into account, although this effect was smaller.

Interpretations of this result are twofold. Firstly, it is noted that the GCSE qualification tests several linguistic competencies, of which receptive vocabulary knowledge is just one. Consequently, the advantage demonstrated by Strand and colleagues in favour of EAL may not have necessarily been due differential vocabulary knowledge across language status. Secondly, although Strand and colleagues detected a small effect their analysis was sufficiently well powered to do so, with sample sizes in the tens and hundreds of thousands. As the present study was less well powered the possibility of a type II error is acknowledged.

6.1.9 Moderator effects of language status in Research Question Three

c) Is there a moderator effect of language status between French morphological awareness and French receptive vocabulary?

No moderator effects of language status between French morphological awareness and French receptive vocabulary were found for year 8 pupils or year 10 pupils. On the one hand, this result was unexpected due to the finding that EAL pupils have significantly higher French morphological awareness than EL1 pupils, in both year groups (c.f. Chapter 5, section 5.8.2, and section 5.8.4). As EAL pupils had demonstrably higher levels of French morphological awareness it was expected that this would lead to a similarly significantly higher level of French receptive vocabulary via morphemic analysis.

However, not only was there no difference in French receptive vocabulary in groups of different language status (c.f. section 6.1.8), it was also true that there was a similar strength of association between French morphological awareness and French receptive vocabulary, for EL1 and EAL pupils. In other words, whilst it seems as if EAL pupils have higher levels of

French morphological awareness than their EL1 peers, it does not seem as if they are using their extra morphological awareness to acquire more vocabulary compared to their EL1 classmates. Although purely speculative, one explanation for this occurrence may lie in the demands of GCSE assessment. As mentioned above (c.f. section 6.1.7) Häcker (2008) argues that the requirements of GCSE assessment have placed an overemphasis on rote memorisation to the detriment of linguistic skill. In a context where pupils are not encouraged to use linguistic knowledge, in particular word-level knowledge, it is to be expected that differential levels of morphological awareness do not lead to differential levels of vocabulary acquisition.

6.1.10 Summary of contributions to empirical knowledge: Within-language findings

Main effects of morphological awareness on English receptive vocabulary were replicated (e.g. McBride-Chang, Wagner, Muse, Chow, & Shu, 2005; Sparks & Deacon, 2013) in the presence of several demographic (SES), verbal (English expressive vocabulary), phonological (word segmentation, pseudoword decoding), and nonverbal (nonverbal IQ, working memory) covariates. Conversely, it was shown that main effects of morphological awareness on English expressive vocabulary did not hold, contrary to much of the established literature (e.g. Goodwin, 2010; Katz, 2004; McBride-Chang et al., 2005; Roth, 2007; Spencer et al., 2015). As a result, a fully mediated model between English receptive morphological awareness, English receptive vocabulary, and English expressive vocabulary, was suggested. Furthermore, it was demonstrated that a main effect of French morphological awareness on French receptive vocabulary can exist in the MFL context for older pupils. This finding was important as up until now the literature was ambivalent about contributions of morphological awareness to vocabulary in contexts of limited multimorphemic input. Moreover, main effects of language status in favour of EL1 in English were replicated for younger pupils, although surprisingly not for older pupils. Unexpectedly, a main effect of language status was also not found on foreign language vocabulary. Lastly, no moderator effect of language status between any measure of morphological awareness and any measure of vocabulary was found. This finding was surprising, particularly in the MFL context where EAL pupils were shown to have higher levels of French morphological awareness although this did not seem to predict additional French vocabulary compared to their EL1 peers.

6.2 Contributions to empirical knowledge: Cross-language findings

As main effects of language status on response variables have already been discussed, this section focusses on cross-language main effects of morphological awareness on vocabulary measures. In addition, as no empirical studies were identified in the literature review which investigated the possibility of a moderator effect of language status between a measure of morphological awareness in one language and a vocabulary measure in another language, this issue is reserved for discussion in relation to theoretical considerations (c.f. section 6.3).

6.2.1 Main effects of morphological awareness in Research Question Four

a) Is there a main effect of English morphological awareness on French receptive vocabulary?

No main effect of English morphological awareness on French receptive vocabulary was found for year 8 pupils. This result was quite surprising given that the only study to have investigated cross-language effects of morphological awareness on foreign language receptive vocabulary at school, study 37 (Deacon et al., 2007), found a clear main effect with English morphological awareness predicting 26.0 per cent of variance in French receptive vocabulary for Grade 1 pupils who were in their second year of learning French. As Deacon and colleagues were looking at the relationship between the same two languages investigated in the present study, with a sample who had been learning French as a foreign language for the same length of time as the year 8 pupils in this study, a comparable effect was expected.

On the other hand, it is noteworthy that the effect size calculated for Deacon et al. (2007) was based on an R^2 value derived from a bivariate correlation. As such, no covariates were accounted for. For year 8 pupils, the presence of a measure of phonological awareness, pseudoword decoding (5.6%), in a model predicting foreign language receptive vocabulary is not surprising given evidence of how highly transferable phonological awareness is across languages (Lesaux & Geva, 2006). Taken in conjunction with the presence a further indicator of verbal intelligence, English receptive vocabulary (9.3%), the multiple regression model built for year 8 pupils seems to predict foreign language French receptive vocabulary as expected.

Therefore, given the expectation of a cross-language main effect of morphological awareness, one may interpret the data as evidence for a minimum level of vocabulary knowledge, below which the mechanism of morphemic analysis does not apply. This interpretation is based on the following reasoning. Firstly, pupils memorise the form and meaning of a number of lexical items in the foreign language. Secondly, pupils notice the forms of bases and affixes which are repeated over a number of memorised lexical items. Thirdly, pupils link the forms of specific bases and affixes to specific meanings. Fourthly, pupils derive the meanings of new, multimorphemic lexical items in the foreign language using their knowledge of the forms and meanings of specific bases and affixes. From this reasoning it follows that year 8 pupils may still be at the memorising stage and may still have not acquired the minimum level of lexical knowledge needed in order to notice the forms of bases and affixes which are repeated over a number of lexical items. As nonverbal IQ has been linked to memorisation tasks (e.g. Ross-Reynolds, 1986), and as nonverbal IQ (6.8%) was also a significant covariate of French receptive vocabulary, the year 8 model provides evidence which supports this reasoning. Moreover, the lack of within-language main effect of French morphological awareness on French receptive vocabulary (c.f. section 6.1.7) suggests that the year 8 pupils in this study have not yet reached the stage where they can use the mechanism of morphemic analysis.

In contrast, a significant main effect of English morphological awareness on French foreign language receptive vocabulary was found for year 10 pupils (4.2%). Although this effect is much less than that found by Deacon and colleagues (2007), it was found in the presence of a number of covariates, including French morphological awareness. This finding provided the first piece of evidence that a cross-linguistic effect of morphological awareness on foreign language receptive vocabulary exists in the MFL context in England.

Furthermore, the cross-linguistic effect found here was done so in a context where vocabulary input, especially multimorphemic input, was relatively limited compared to the full immersion context of the study performed by Deacon and colleagues (2007). Consequently, this finding indicates that even with a relative lack of weekly input, pupils who have learned a foreign language in the MFL classroom over a number of years may indeed use meta-linguistic knowledge in order to acquire vocabulary. As stated above (c.f. section 6.1.7), although in need of replication this information acts as a counter-balance to the argument put forward by Häcker (2008) which links the constrains of GCSE foreign language examination requirements to an inhibition of meta-linguistic knowledge.

6.2.2 Main effects of morphological awareness in Research Question Five

a) Is there a main effect of French morphological awareness on English receptive vocabulary?

No cross-linguistic main effects of French morphological awareness on English receptive vocabulary were found for either year group. On the one hand, this finding contradicted much of the established literature (c.f. section 2.4.3, Table 21) where four significant cross-linguistic effects of morphological awareness were demonstrated ranging from 9.6 to 15.6 per cent variance explained. As significant effects were usually found when the measure of derivational awareness tapped into relational knowledge, as opposed to syntactic knowledge, the lack of significant effects found in the present study was particularly unexpected.

One important difference between the present study and previous literature may account for the nonsignificant effects found for year 8 and year 10 pupils. Whilst all of the previous literature had investigated the cross-linguistic effects of a measure of morphological awareness in the L1 on a measure of vocabulary in the additional language, the present study investigated the cross-linguistic effects of a measure of morphological awareness in the foreign language (at least L2), on a measure of vocabulary in the native or additional language. As the foreign language context necessarily provides limited input, compared to the additional language context, participants may not have been exposed to enough foreign language vocabulary, specifically multimorphemic vocabulary, in order to use the mechanism of morphemic analysis (c.f. section 6.2.1). Indeed, for year 8 pupils no within-language main effect of French morphological awareness on French receptive vocabulary was found, indicating that these participants were not using their meta-linguistic skills in the foreign language. In this case, the nonsignificant result is taken as evidence of a lack of morphemic analysis caused by the minimum threshold of French morphological awareness not being reached.

However, as a significant within-language effect of French morphological awareness on French receptive vocabulary was found for year 10 pupils, the interpretation of no cross-linguistic main effect on English receptive vocabulary is slightly different. In the case of year 10 pupils, both within-language effects of morphological awareness on French and English receptive vocabulary, and a cross-language effect of English morphological awareness on French receptive vocabulary, were demonstrated. In this context, there is evidence for morphemic analysis. Therefore, the lack of significant effect of French morphological awareness on English receptive vocabulary may be due to a relatively lower level of French morphological awareness compared to English morphological awareness, in conjunction with shared variance between the two measures of morphological awareness. Shared variance between the two measures of morphological awareness was to be expected as task effects were minimised during the process of task construction (c.f. section 3.4). Furthermore, a relatively lower level of French morphological awareness compared to English morphological awareness was unsurprising considering the relative input deficit of French vocabulary compared to English vocabulary.

Lastly, it is noteworthy that the systematic review also highlighted several nonsignificant cross-linguistic effects of L1 morphological awareness on additional language vocabulary. Indeed, nonsignificant effects were more prevalent than significant ones (c.f. section 2.4.3, Table 21). One trend shown in these studies was that the measure of morphological awareness was receptive in nature, as opposed to expressive. As mentioned above (c.f. section 6.1.4) a weakness of the present study was that no expressive measure of morphological awareness was employed. Bearing in mind this weakness in the data, an alternative interpretation of the nonsignificant findings is that cross-linguistic prediction of vocabulary may vary by depth of morphological awareness. As receptive and expressive facets of vocabulary may be considered as two points on a continuous scale representing depth of word knowledge (Henriksen, 1999), the same may also be true of morphological awareness. Moreover, a deeper level of morphological awareness may be more transferable across languages. Whilst this line of reasoning is highly speculative, it is a plausible interpretation of the current literature and may prove a fruitful area for further research (c.f. section 6.4.1).

6.2.3 Main effects of morphological awareness in Research Question Six

a) Is there a main effect of French morphological awareness on English expressive vocabulary?

No cross-linguistic main effects of French morphological awareness on English expressive vocabulary were found for either year group. As no previous study was found which had investigated the main effects of a measure of morphological awareness in a foreign language on a measure of expressive vocabulary in the native or additional language, this finding was considered an original contribution to the field.

Interpretations of this finding were twofold. Firstly, given the nonsignificant cross-linguistic main effects of French morphological awareness on English receptive vocabulary found for both year groups (c.f. section 6.2.2), the same arguments as above may apply. Namely, for year 8 pupils a lack of morphemic analysis caused by an insufficient level of French morphological awareness may have been a possible cause of the lack of significant cross-linguistic effect on English receptive vocabulary. In addition, for year 10 pupils a relatively lower level of morphological awareness in French compared to English, in conjunction with shared variance between the two measures, may have been a critical factor behind the nonsignificant finding.

Secondly, the influence of an unmeasured variable, depth of morphological awareness, may have had a particular bearing on the lack of cross-linguistic main effect found on English expressive vocabulary. As the measure of French morphological awareness was receptive in nature, compared to the expressive nature of the Test of Word Knowledge, the nonsignificant findings may due to the measurement of different facets of word knowledge. Due to insufficient data, the nature of the relationship between these variables remains unclear.

6.2.4 Summary of contributions to empirical knowledge: Cross-language findings

A main effect of English morphological awareness on French receptive vocabulary was replicated (Deacon et al., 2007) for year 10 pupils in the presence of several demographic (SES), verbal (English expressive vocabulary), phonological (word segmentation, pseudoword decoding), and nonverbal (nonverbal IQ, working memory) covariates. Conversely, the nonsignificant effect found for year 8 pupils was taken as evidence of a possible minimum threshold of vocabulary which may limit the mechanism of morphemic analysis. No further cross-linguistic effects of morphological awareness on vocabulary were found. Possible interpretations of this finding implicated the possibility of an unmeasured variable, depth of morphological awareness, affecting the relationship between morphemic knowledge and vocabulary acquisition. Additionally, differential levels of English and French morphological awareness, as well as shared variance between the two measures of morphological awareness, may have been at the root of the nonsignificant findings.

6.3 Theoretical considerations

6.3.1 Within-language findings

Findings are now discussed in relation to Cummins' Common Underlying Proficiency (CUP) framework and Dual Iceberg model, (Cummins, 2005). As detailed in section 2.4.4, the Dual Iceberg Model as conceptualised in this study was interpreted to predict within-language main effects of morphological awareness on vocabulary. Whilst interpretation of findings using these models was problematic, it was recognised that they are used in the literature to describe findings relating morphological awareness to vocabulary (e.g. Melby-Lervåg & Lervåg, 2011), presumably as a more precise model does not exist.

Nevertheless, morphological awareness was understood to be part of a possible CUP whilst vocabulary was taken to be a possible surface feature. Specifically, the finding of main effects of English morphological awareness on English receptive vocabulary for both year groups was interpreted as evidence of the facilitation of a surface feature by the CUP. Moreover, the finding of a greater main effect for older pupils concurred with the prediction of the model. This prediction was based on the reasoning that older pupils who have had more language learning experience were expected to have a richer CUP, operationalised by greater levels of morphological awareness, and therefore there would be a stronger link between this aspect of meta-linguistic awareness and the surface feature as measured by vocabulary.

Conversely, the lack of main effect of English morphological awareness on English expressive vocabulary for both year groups was surprising. The interpretation of this result is twofold. Firstly, as detailed in section 2.4.4, although morphological awareness might be a good candidate variable to measure as at least a constituent part of the CUP, no one is entirely sure what the CUP is comprised of (e.g. Genesee et al., 2006). Specifically, the central processing system as envisioned by Cummins (1991) has been conceptualised as, at least partially, cognitive in nature. Therefore, measurement of the CUP by an aspect of meta-linguistic awareness may be problematic. On the other hand, Cummins (1991) also states that academic language proficiency may form part of the CUP where surface features are supported by cognitive *and* linguistic abilities. Moreover, whilst the CUP has been used to investigate cross-linguistic associations (e.g. Sun & Curdt-Christiansen, 2016), use of the CUP to explain within-language associations is less well attested.

Secondly, as detailed in section 6.1.4 the lack of a significant main effect on English expressive vocabulary may in no small part be due to the measurement of English receptive vocabulary as a covariate. Indeed, Figure 6.3 posits a full mediation model between English receptive morphological awareness, English receptive vocabulary, and English expressive vocabulary. Unfortunately, the Dual Iceberg Model does not describe relationships between different surface features of the language. Consequently, the relationships described on the basis of empirical data are unable to be rejected or verified by one of the leading frameworks used to contextualise research into morphological awareness.

With regard to French morphological awareness, the nonsignificant main effect on French receptive vocabulary for year 8 pupils may be explained by an underdeveloped CUP which is unable to facilitate the development of surface features such as vocabulary (c.f. section 2.4.4, Table 22). However, an alternative interpretation is that year 8 French vocabulary may be so underdeveloped that it may not be able to draw on the CUP. As the Dual Iceberg Model only allows for predictions in both directions, there might be need for a more specified, uni-directional model. However, it is noted that although literature has often investigated the prediction of vocabulary from morphological awareness, some studies have explored the prediction of morphological awareness from vocabulary (e.g. Hayashi & Murphy, 2011, 2013), whilst at least one study has demonstrated a bi-directional relationship between the two (McBride-Chang et al., 2005). For year 10 pupils, the main effect of French morphological awareness was again interpreted as evidence of a language surface feature being facilitated by the CUP.

Of further theoretical interest was the lack of moderator effects found in all three within-language relationships. Nonsignificant moderator effects of language status between English morphological awareness, and English receptive and expressive vocabulary were found for both year groups. Due to similar levels of English morphological awareness for EL1 and EAL pupils, nonsignificant effects were taken as evidence of a similar CUP profile across language status which in turn facilitated language surface features to a similar degree. More interestingly, however, was the finding that EAL pupils in both year groups demonstrated significantly higher levels of French morphological awareness than their EL1 peers (c.f. Chapter 5, section 5.8.2, and section 5.8.4), although they did not use this extra morphological awareness to learn more vocabulary than their EL1 peers. In other words, the strength of relationship between French morphological awareness and French receptive vocabulary, did not vary as a function of language status. From a theoretical perspective therefore, the present study has demonstrated that a richer CUP does not necessarily lead to richer surface features of a language. Whilst this conclusion is of course tempered by the problematic nature of measuring the CUP, it nonetheless provides negative evidence against a key precept of the Dual Iceberg Model.

6.3.2 Theoretical considerations: Cross-language findings

The finding of a cross-language main effect of English morphological awareness on French receptive vocabulary for year 10 pupils was interpreted as the facilitation of a surface feature of language by the CUP. As the Dual Iceberg Model and CUP were originally conceptualised to account for consistently strong relationships across languages in bilingual and foreign language learning contexts (Jim Cummins, 2005), it seems to be better fitted to explain cross-language relationships rather than within-language ones (c.f. section 6.3). However, it was noteworthy that no such cross-linguistic main effect was discovered for year 8 pupils. An explanation for this lies in the specification of the model by Cummins (*ibid.*) when he stated that cross-language associations are present only given adequate exposure of and motivation to learn the target language. Taking into account the relative paucity of input given to year 8 pupils, and their relative lack of motivation compared to year 10 pupils (c.f. Chapter 4, section 4.3.2) it may be argued that the year 8 participants in this study do not meet the conditions necessary for the CUP model of language learning to apply.

On the other hand, no cross-language main effects of French morphological awareness were found on either measure of English vocabulary, for either year group. Given the relative abundance of input in English for both EL1 and EAL pupils in both year groups, input deficit in English likely does not play a role. An explanation for these results may be found in the covariates used to explain variance in English vocabulary. Specifically, one facet of English vocabulary was used as a covariate to explain variance in the other, before accounting for the effect of French morphological awareness. As attested above (c.f. section 6.3), the Dual Iceberg Model does not account for relationships between surface features of the language. Consequently, lack of significant cross-language effects on measures of English vocabulary might not necessarily reflect lack of language interdependence, but rather the close association of target language surface features with one another. Only after taking account of these close associations, does the measure of the CUP fail to explain added variance in the target language surface feature.

Moreover, the lack of moderator effects of language status between any measure of morphological awareness and any measure of vocabulary, was theoretically interesting. As the Dual Iceberg Model was originally conceptualised to explain the bilingual language learning profile, it may reasonably be expected that the learning profile of a bilingual learning at least an L3 differs to that of a monolingual learning a foreign language. Therefore, evidence of no moderator effect, especially when French receptive vocabulary was the response variable, was surprising. One explanation for this result may lie in the sample sizes used to detect moderator effects. As Aguinis (1995) notes, nonsignificant moderator effects may be reported due to type II errors caused by small effect sizes and insufficient statistical power. Although the sample sizes for year 8 (96) and year 10 (81) pupils in the present study may compare favourably to many studies reported in the systematic review, it is recognised that EL1 and EAL groups in past literature were rarely compared explicitly using inferential statistics. When this was the case, sample sizes were often larger than the ones reported here. Furthermore, a relatively large number of covariates were used in this study compared to previous literature, diminishing the power to detect a moderator effect. Moreover, with regards to the MFL context, there is good reason to suspect a small magnitude of moderator effect size due to limited weekly input of multimorphemic language. Consequently, the lack of moderator effects found in this study may be an artefact of an underpowered sample.

6.3.2 Summary of interpretation of findings and limitations

Appendix 6.1 summarises interpretations of the findings generated by year 8 and year 10 pupils in the light of hypotheses, previous empirical data, and theoretical considerations. In addition, Appendix 6.1 gives a detailed list of the limitations identified in the present study. For convenience, the main limitations are given here:

1. It is problematic to generalise from the results of this study due to the heterogeneous nature of EAL pupils, their ununiform distribution across secondary schools in England, and differing socioeconomic circumstances in secondary schools across the country.
2. Type II error may have been apparent due to relatively small sample in relation to the number of predictors measured.
3. There was no measure of L1 proficiency.
4. There was no measure of L1 transparency.

5. There was no measure of depth of morphological awareness.
6. There was no measure of the amount of time EAL pupils had been in the country.

6.4 Implications of findings

6.4.1 Pedagogy

There were five pedagogical implications which arose from the findings of this study. Firstly, positive main effects of morphological awareness on receptive vocabulary in the MFL secondary school context were established. This finding extended the importance of morphological awareness in acquiring vocabulary to a new learning environment. Consequently, vocabulary instruction which involves at least some element of word structure analysis in the MFL classroom, is encouraged.

This pedagogical implication is underpinned by the cognitive linguistic approach adopted in this study. In section 2.1.1 it was established that language may be viewed as a reflection of general cognitive processes. Specifically, the notion of inductive learning was highlighted as a possible way of interpreting the success of morphemic analysis in the process of acquiring new vocabulary items. However, as has been discussed in sections 6.1.7 and 6.1.9, the demands of GCSE assessment may encourage rote memorisation of foreign language vocabulary where vocabulary items remain unanalysed. In this context, vocabulary acquisition is minimised as pupils are not implicitly encouraged to look for links between parts of words.

Therefore, it is suggested that explicit vocabulary instruction is pursued where pupils are actively encouraged to pay attention to word-parts and their semantic relations with one another. In this context, pupils would be pursuing learning by deduction, or the ability to apply rules and to engage in one or more steps to reach a solution to a problem (Flanagan & Dixon, 2013). Details of one possible approach to vocabulary instruction based on word structure analysis are presented in Study 30 (Bowers & Kirby, 2009), where pupils were encouraged to analyse words at the morphemic level using word matrices:

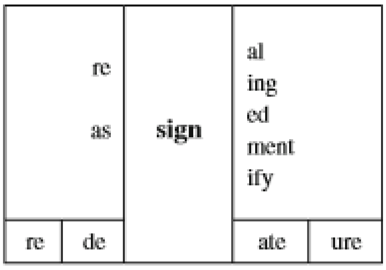


Figure 6.6: Word matrix on the word *sign* reproduced from Bowers and Kirby, 2009, p.520

As Figure 6.6. shows, items are presented to pupils by morpheme type, with bases surrounded by prefixes and suffixes which can legally bind with the base to form a morphologically complex word. Such a presentation of vocabulary items differs from the more usual approach of grouping items by semantic category. However, as demonstrated by Bowers and Kirby (*ibid*.) such an approach may aid pupils in analysing morphologically complex words, thereby developing vocabulary beyond the words which they are directly taught. Moreover, the graphical design of the word matrix presented above may reduce "working memory load by presenting the integrated structure and meaning of sets of words instead of presenting those connected words one at a time" (Bowers & Kirby, 2009, p. 520). In terms of item selection, Wysocki and Jenkins (1987) note that university students seem to gain very limited information from Latin affixes whilst secondary schools pupils gain even less. Therefore, care is required during item selection to ensure that non-Latinate affixes are chosen.

Secondly, a cross-language main effect of English morphological awareness on French receptive vocabulary was found. This finding highlighted the potential for morphological awareness in the native or additional language to aid foreign language vocabulary acquisition.

Consequently, a mutually-supportive teaching programme to promote word structure analysis in both the English and MFL classroom, is encouraged.

Although this precise result has not been replicated elsewhere in the literature, as far as is known, Lasagabaster (2001) reports on an empirical study which examined the effect of L1 metalinguistic knowledge on foreign language skills and grammar in a sample of 126 grade 5, and 126 grade 8, Basque pupils learning Spanish. The results showed a positive correlation between L1 metalinguistic knowledge, and reading, writing, and grammar tasks in Spanish, the target foreign language. In addition, as recent changes to the national curriculum in England have highlighted the importance of explicit knowledge of language in the English classroom (Watson, 2015) this seems an opportune time to call for cross-curricular links between English and foreign languages (e.g. Grenfell, 2007). Whilst it is acknowledged that GCSE MFL assessment does not address metalinguistic knowledge in any appreciable way (Liviero, 2017), the results of this study highlight the potential to maximise foreign language vocabulary outcomes by using knowledge of English metalinguistic awareness.

Furthermore, a cross-curricular emphasis on word structure analysis would not help only towards fulfilling the requirements of the English language national curriculum, but it would also give MFL pupils sufficient classroom time to use explicit knowledge of morphemic analysis in communicative tasks. As Macaro, Woore, and Graham (2016) acknowledge, the focus of the MFL classroom should be on language in use. Therefore, any grammar instruction should be pursued to the extent that it supports communicative ends. However, due time constraints, the MFL practitioner is often left with the choice of choosing one in exclusion of the other, with communicative tasks regularly winning out (Liviero, 2017).

Consequently, one implication of a cross-curricular approach to language learning is that time in the English classroom can be used to support form-focused learning in the MFL classroom. Such an approach may result in a not-too-onerous emphasis on form-focussed tasks in the MFL classroom which serve to aid the practice of communicative ones. In addition, the knowledge gained from this deductive approach in both classrooms may help in the formation of independent language learners. In a context where language learning opportunities may be limited by classroom time, this prospect is warmly welcomed.

Thirdly, no negative results were reported for EAL speakers learning a modern foreign language, even when those EAL speakers performed significantly worse than their EL1 peers on measures of English vocabulary knowledge. In contrast, it was discovered that EL1 and EAL pupils perform similarly on the measure of French receptive vocabulary even though EAL pupils have higher levels of French morphological awareness than their EL1 peers. Although the reasons for this are unclear, the present study presented no evidence that amount of foreign language vocabulary acquisition varies as a function of language status, or that the amount of morpheme-level knowledge that pupils use in acquiring vocabulary varies as a function of language status. Considering these findings, it is suggested that EAL pupils with a variety of language backgrounds may reasonably benefit from the same foreign language instruction, and to a similar degree, as their EL1 peers.

Fourthly, there is a need to provide pupils with more vocabulary input in the lower years, so that they meet the threshold past which they can use morphemic analysis to acquire vocabulary. Whilst no main effect of morphological awareness was found on foreign language vocabulary for year 8 pupils, this may have been because these pupils did not know enough base morphemes. Coupled with Milton's (2006) findings that French MFL vocabulary knowledge seems to stagnate for a couple of years after the first year of instruction, there seems to be a period where younger MFL learners repeatedly encounter the same high-frequency vocabulary items. Consequently, there may be a window of opportunity where pupils may benefit from exposure to a wider variety of vocabulary.

In turn, were younger MFL pupils to acquire a larger vocabulary base at an earlier age, they would be able to use morphemic analysis to acquire further vocabulary items, alongside rote memorisation. This increase in vocabulary knowledge may go some way towards bridging the vocabulary gap found by Gruber and Tonkyn (2013) between German pupils and English pupils learning MFL French. Importantly, the authors concluded that a gap existed not only in terms of total amount of vocabulary learnt, but also with regard to rate of vocabulary acquisition. It is argued that an emphasis on exposure to more vocabulary items will not merely increase average vocabulary size, but will also speed up the rate of vocabulary acquisition as pupils may better be able to apply morphemic analysis after possessing knowledge of the most prevalent base morphemes.

Lastly, the findings suggest that measures of phonological awareness are important to receptive vocabulary acquisition in English as an additional or native language, and to MFL French receptive vocabulary. As Dickinson and colleagues describe (Dickinson, Mccabe, Anastasopoulos, Peisner - Feinberg, & Poe, 2004), there is a large body of evidence which suggests that vocabulary knowledge and phonological awareness are language skills which are strongly linked to one another. Furthermore, as Kuo and Anderson (2006) note, at its core the morpheme is a pairing of semantic and phonological information, and therefore phonological awareness may also influence morphological awareness. Consequently, whilst the utility of vocabulary instruction based on explicit, form-focused instruction should not be under-estimated, neither should the value of oral interaction. Indeed, as Macaro, Woore, and Graham (2016) emphasise, oral interaction in the MFL classroom is a key part of developing communicative competence in the language classroom.

6.4.2 Implications of findings: Further research

Three areas for further research are highlighted. In terms of theory, interpretation of findings using the CUP and Dual Iceberg Model has proved to be problematic, in no great part due to the imprecise nature of the model. Indeed, it is readily accepted that such a framework may not have been the best explanatory model for the data (c.f. section 2.5.4). However, it is also recognised that these models are often used in the literature to describe findings relating morphological awareness to vocabulary. Bearing in mind this weakness in the literature, the need for a testable model which links morphological awareness to vocabulary is evident.

Consequently, one model is proposed here which seeks to describe classroom-based language learning in the light of present findings about morphological awareness and vocabulary. The model of the mediated mind proposed by socioculturalists (e.g. Vygotsky & Cole, 1978) is suggested as a fruitful way to represent classroom-based vocabulary acquisition by morphemic analysis. Mediation is broadly defined as "when something comes between us and the world" (Swain, Kinnear, & Steinman, 2010, p. 2). More specifically, mediation can be defined in opposition to direct action, where one operates directly on the world. The two ways of operating can be seen in the following diagram which shows the interaction of stimulus (S), response (R) and mediating artifact (X):

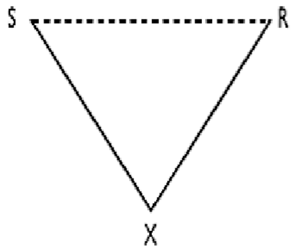


Figure 6.7: Mediated and unmediated action (figure redrawn from Vygotsky & Cole, 1978, p. 40)

As Figure 6.7 shows, one can either act via the S-R chain, in a direct manner, or via the S-X-R chain in a mediated manner. The former manner is typical of elementary, genetically-inherited behaviour that humans share with other animals (Vygotsky & Cole, 1978), whilst the latter is indicative of higher mental processes that only humans are capable of such as "attention, memory, perception and thinking" (Miller, 2011, p. 314). When one is mediated by one's own language, this is called self regulation. Conversely, when one is mediated by an object or another person, this is called other regulation (Swain et al., 2010). A specific form of other regulation is scaffolding, a "Process of supportive dialogue which directs the attention of the learner …and which prompts them through successive steps of a problem" (Mitchell & Myles, 2004, p. 195).

This model helps to elucidate the mechanism of morphemic analysis in three ways, the first of which is linked to deductive learning. If the definitions of scaffolding and deductive learning are compared, a clear overlap is identified, to the extent that scaffolding may be considered a specific instance of deductive learning directed by a teacher in a classroom setting. In this context, the notion of mediation may be useful in understanding the utility of a form-focused intervention such as the one described above.

More specifically, morphemic analysis may be considered a form of intra-word mediation, where the stimulus (S) is the presentation of a multimorphemic word, for example as an item in a vocabulary list, the response (R) is the acquisition of the multimorphemic word, and the mediating artifact (X) is the morphological decomposition of the target item. In this context, the mediating artifact, morphological decomposition of the target item, may be considered as either self regulation or other regulation. In the instance of self regulation, the process of morphological decomposition is conceptualised as taking place entirely within the mind of the individual language learner. In the instance of other regulation, the process of morphological decomposition may be aided by teacher dialogue (scaffolding), or the presentation of other multimorphemic items which have been similarly decomposed to serve as exemplars to the language learner. Moreover, it is expected that over time language learners will move from other regulation to self regulation, as externally-regulated thought processes are reconstructed internally, becoming psychological processes and thereby creating higher mental process. Indeed, the change from other regulation to self regulation is considered as one of the ways in which to create independent language learners who will then be able to maximise language learning opportunities outside of the classroom.

In addition, the notion of the mediated mind may help to take advantage of the linguistic repertoire of all pupils, whether EL1 or EAL, to maximise vocabulary acquisition in the target language. Whilst this study did not find any moderator effects of language status between measures of morphological awareness and measures of vocabulary, one reason might be that the effects of key stage 3 and key stage 4 assessment might serve to emphasise the importance of rote memorisation whilst ignoring the linguistic knowledge that all pupils bring into the classroom, albeit to differing degrees. However, if the mediating artefact were to include, as it should do, dialogue or writing from any language which aids in the acquisition of a target vocabulary item, pupils will be able to use their existing knowledge of morphemic analysis to maximise their vocabulary acquisition. Furthermore, as the mediated mind is a model of individual cognition, it allows EAL pupils to be treated as individuals, and not as a homogeneous group.

Whilst the potential advantages of this model are promising in terms of conceptualising vocabulary acquisition in multilingual classrooms, it is acknowledged that in its present form it needs much refinement if it is to become a truly testable model which links vocabulary acquisition and morphological awareness. In particular, the presence of theoretically important variables which influence the mediating artefact of morphemic analysis need to be accounted for (c.f. section 6.4.2). For example, Zhang, Lin, Wei, and Anderson (2013) propose a testable model which relates morphological awareness to reading comprehension, whilst integrating theoretically important variables such as vocabulary and working memory. Due to the good amount of empirical data linking morphological awareness to vocabulary present in the literature, refinements to the three-stage model proposed here are warmly welcomed.

Secondly, in terms of research design there is a need for more longitudinal studies. Indeed, the recognition of this need is not a novel one (e.g. Kieffer & Lesaux, 2012a). Whilst the number of longitudinal studies is relatively few, only a minority of these has focused on vocabulary acquisition whilst a majority has investigated reading or spelling. Furthermore, as demonstrated in the present study a weakness of cross-sectional designs is the influence of cohort effects. Specifically, when comparing EL1 pupils to their EAL peers the potential for cohort effects due to a differential spread of L1 typologies across cohorts is great. A cross-lagged design would not be vulnerable to such effects. Moreover, sample size is an important consideration when investigating potentially small effect sizes and the influence of moderating variables. As discussed above (c.f. section 6.3.1), well powered studies are welcomed to avoid type II errors whilst simultaneously controlling for several theoretically important covariates. In the MFL context, where small effect sizes are reasonably expected, power to detect small effects is especially pertinent.

Lastly, any future research may benefit from the measurement of the following variables: i) EAL length of residency in Anglophone country; ii) L1 proficiency; iii) L1 transparency; iv) Depth of morphological awareness. Although EAL length of residency has been measured in previous literature (c.f. section 2.4), it was surprisingly absent from many studies. However, as noted above (c.f. section 6.1.2) a major weakness of the present study was the likely strong correlation between this unmeasured variable and English receptive vocabulary. Therefore, measurement of this variable is welcomed in order to tease apart the contribution of time and morphological awareness, to vocabulary.

With regard to L1 proficiency, this study used a self-report measure, the Language Background Questionnaire, to gauge exposure to and usage of, the L1. Although such a measure may be correlated to L1 proficiency, both the reliability and accuracy of this instrument to measure L1 proficiency is questionable. Specifically, as L1 literacy may vary highly within EAL populations, and may play a large part in determining levels of morphological awareness in English, this variable is considered a major source of unexplained variance of target language vocabulary knowledge.

In addition, levels of EAL English morphological awareness may vary as a function of L1 morphological transparency. This is a reasonable assertion, as it is likely that EAL pupils with more morphologically transparent L1s have more practice at morphologically decomposing multimorphemic words, compared to EAL pupils with more morphologically opaque L1s (Marinova-Todd et al., 2013). Consequently, it is suggested that L1 morphological transparency is measured as a continuous covariate when investigating the association between morphological awareness and vocabulary. Similarly, as morphemic analysis may vary as a function of morphological transparency of the target language, measurement of the morphological transparency of the target language is also recommended.

One way of measuring morphological transparency is detailed by Juola (1998) and is based on the notion of Kolmogorov complexity (Vetulani, 2011, p. 569):

> For any sequence of symbols, the Kolmogorov complexity of the sequence is the length of the shortest algorithm that will exactly generate the sequence (and then stop). In other words, the more predictable the sequence, the shorter the algorithm needed is and thus the Kolmogorov complexity of the sequence is also lower.

For example, the sequence ababababab is 10 characters long and the shortest algorithm that can generate this sequence is ab*5 (4 characters). In contrast, the sequence dfth654mbs is 10 characters long and the shortest algorithm that can generate this sequence is dfth654mbs (10 characters). As the first sequence can be stored as a shorter algorithm than the second it has lower Kolmogorov complexity. Electronic compression programs such as *gzip* can take advantage of this discrepancy by storing sequences of symbols in the form of their shortest algorithms. As such programs initially load a certain amount of text, and then create a temporary lexicon, they can then identify recurring strings and compress the text by eliminating redundancy. Due to this compression, the size of the file is decreased (Ehrer, in preparation).

Of relevance to measuring morphological transparency, therefore, is the identification of recurring strings, or affixes, in written language. For example, given a sample of written language the suffix 'er' may appear several times as in the words 'builder', 'minder', and 'loader'. Consequently, it follows that samples of written language from more morphologically transparent languages will have more affixes, and therefore more redundancy, than text from more morphologically opaque languages. By comparing the file sizes of compressed and uncompressed sequences of text, a ratio can be determined which represents a quantitative estimate of the level of morphological transparency of a language.

In addition, depth of morphological awareness is likely an important variable in predicting vocabulary. As discussed above (c.f. 6.2.2), strength of morphemic analysis across languages may vary as a function of depth of morphological awareness. However, despite the plethora of instruments which have been used to measure both receptive and expressive facets of morphological awareness (c.f. section 2.4) no one instrument has been used to measure depth of morphological awareness. When constructing such an instrument, the use of pseudowords as well as real words is recommended in order to investigate possible effects of cognates, and vocabulary size. In addition, as receptive and expressive facets of vocabulary may be considered as two points on a continuous scale representing depth of word knowledge (Henriksen, 1999), the same may also be true of morphological awareness. Consequently, tasks which tap into both receptive and expressive facets of morphological awareness are welcomed. One possible starting point may be a task based on the Vocabulary Knowledge Scale (VKS) (Paribakht & Wesche, 1997) and adapted for assessment of morphological awareness.

In conjunction with the development of such an instrument, however, it is also accepted that there is a need for standardised instruments which measure aspects of morphological awareness. Whilst researcher-made instruments may have good validity for specific populations, there is an urgent need for standardised instruments which would greatly facilitate cross-study comparisons and allow for greater generalisability of results.

6.5 Conclusion

This study investigated within and cross-language predictions of morphological awareness and language status (EL1, EAL) to vocabulary, in English (native/additional language context) and French (modern foreign language context). The prediction of vocabulary by morphological awareness was explored on the basis of the mechanism of morphemic analysis. The prediction of vocabulary by language status was investigated on the basis of ambiguous theoretical and empirical data which indicated a possible advantage for EAL pupils over their EL1 peers in foreign language vocabulary acquisition, and an advantage for EL1 pupils over their EAL peers in English vocabulary. Furthermore, due to a lacuna in empirical data, this study investigated the possibility of a moderator effect of language status between morphological awareness and vocabulary.

To this end, the study employed a cross-sectional, correlational design with 2x2 between-participant factors. The between-participant factors were language status (EAL, EL1), and year group (year 8, year 10). The response variable was vocabulary (English receptive, English expressive, French receptive), the predictor variable was morphological awareness (English, French), and the moderator variable was language status. Due to systematic variance on the dependent variables by year group, and differential L1 profiles, separate analyses were carried out by year group.

The results reinforced the importance of morphological awareness to native and additional language receptive vocabulary, whilst extending its importance to foreign language vocabulary for older pupils. Whilst main effects of morphological awareness to English expressive vocabulary did not hold, a fully mediated model between English morphological awareness, English receptive vocabulary, and English expressive vocabulary, was proposed to explain the data. With regard to cross-language effects, a main effect of English morphological awareness on French receptive vocabulary was replicated. No moderator effects of language status between any measure of morphological awareness and any measure of vocabulary were found.

Overall, the results of this study indicated the need for a new theoretical model as the basis for investigating predictions of morphological awareness to vocabulary. In addition, the study highlighted the possible usefulness of a morphology-based approach to vocabulary instruction in the MFL context for older pupils. Moreover, this study has demonstrated that EAL pupils learn similar amounts of modern foreign language vocabulary to their EL1 peers whilst also providing evidence that EAL pupils apply the mechanism of morphemic analysis in a similar way to their EL1 peers, when acquiring both English and MFL vocabulary. Considering these findings, it is suggested that EAL pupils with a variety of language backgrounds may reasonably benefit from the same foreign language instruction, and to a similar degree, as their EL1 peers.

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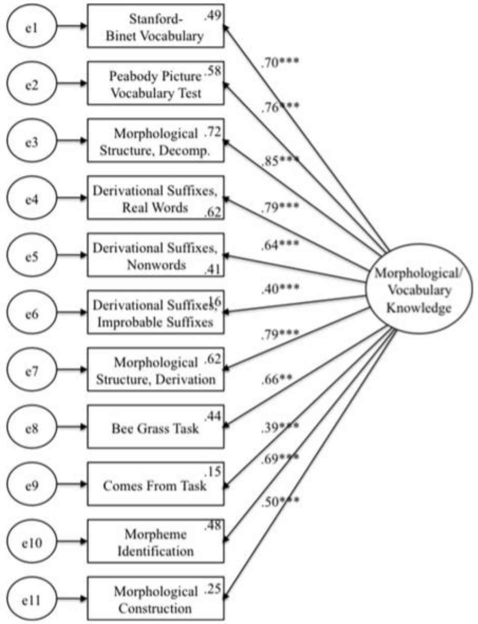
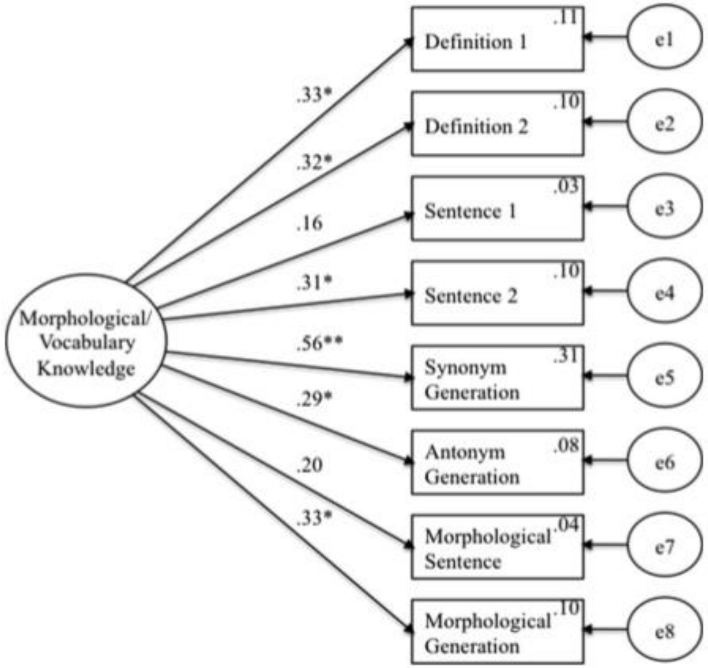
Appendices

Appendix 2.1: Main characteristics of entries identified by the literature review (N=66)

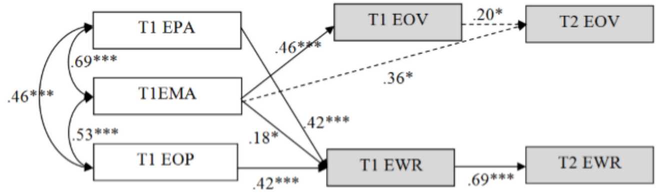
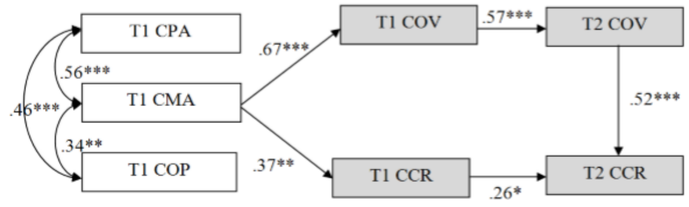
N.o	Reference (Author(s), date, title, publication)	Recruitment	Languages of participants			Sample	Relationship between variables measured (Instruments)			Analytic strategy	Country
			L1	L2	L3		Dependent	Independent	Covariate		
1	Xue, J., & Jiang, X. (2016). The developmental relationship between bilingual morphological awareness and reading for Chinese EFL adult learners: a longitudinal study. *Reading and Writing*, 1–22. https://doi.org/10.1007/s11145-016-9683-3	Chinese university students learning English at university	Chinese	English	n/a	One group of 136 Chinese NS	1. English word reading (Woodcock Reading Mastery Test-Revised Subtest (WRMT-R)) 2. English reading comprehension (proxy for English vocabulary) (Gates Macginitie Reading Comprehension (Form 4, Level F)) 3. Chinese charactering reading (experimental measure) 4. Chinese reading comprehension (experimental measure based on Gates Macginitie Reading Comprehension (Form 3, Level F))	1. English morphological awareness (English derivational awareness task adapted from Carlisle (2000), English compound morphological awareness task adapted from McBride-Chang, Wagner, Muse, Chow, and Shu (2005)) 2. Chinese morphological awareness (Chinese homographic morpheme identification task experimental measure. Chinese compound production task experimental measure)		Bivariate correlation Multiple regression	China
2	Rothou, K. M., & Padeliadu, S. (2015). Inflectional morphological awareness and word reading and reading comprehension in Greek. *Applied Psycholinguistics*, *36*(4), 1007–1027. https://doi.org/10.1017/S0142716414000022	19 mainstream primary schools	Greek	n/a	n/a	369 Greek NS (120 Grade 1, 123 Grade 2, 126 Grade 3)	1. Inflectional morphological awareness (Experimental oral task based on the morphological generation task (Muter et al. 2004) to assess noun-adjective inflections, Experimental oral task based on the morphological generation task (Muter et al. 2004) to assess verb inflections) 2. Receptive vocabulary (Greek standardisation of the PPVT) 3. Expressive vocabulary (Greek standardisation of the vocabulary subtest of the WISC – third edition)			Bivariate correlation	Greece

3	Spencer, M., Muse, A., Wagner, R. K., Foorman, B., Petscher, Y., Schatschneider, C., Tighe, E., Bishop, M. D. (2015). Examining the underlying dimensions of morphological awareness and vocabulary knowledge. *Reading and Writing*, *28*(7), 959–988. https://doi.org/10.1007/s11145-015-9557-0	Mainstream primary school	English	n/a	n/a	99 EL1 9-12 years old	1. Receptive vocabulary (PPVT) 2. Expressive vocabulary (Vocabulary subtest of the Stanford-Binet, 4th edition) 3. Derivational morphological awareness (Test of morphological structure: decomposition (Carlisle, 2000), Test of morphological structure: derivation (Carlisle, 2000), Experimental measure. Derivational suffix choice: real words, Experimental measure. Derivational suffix choice: nonwords, Experimental measure. Derivational suffix choice: improbable suffixes) 4. Compound morphological awareness (Experimental measure. Bee grass task, Experimental measure. Comes from task, Morpheme identification (McBride-Chang et al. 2005)) 5. Inflectional morphological awareness (morphological construction (McBride-Chang et al. 2005)) 	Structural equation modelling Bivariate correlation	USA

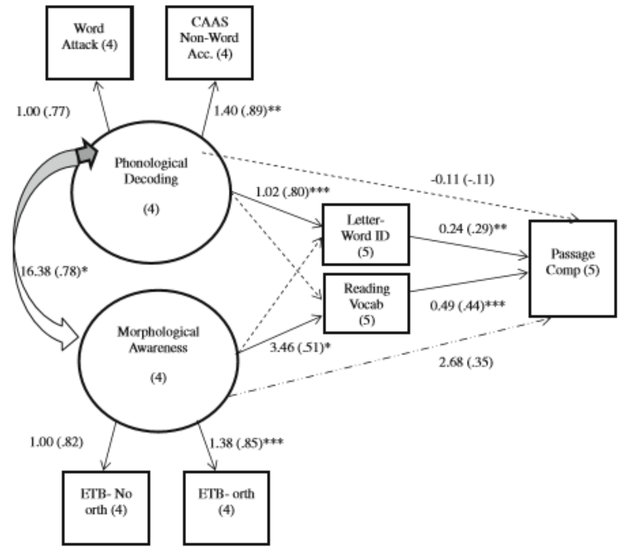
		Mainstream secondary school	English	n/a	n/a	90 EL1 in Grade 8	1. Vocabulary breadth and depth (Experimental measure of definitional knowledge, word usage, and word relatedness) 2. Morphological awareness (Experimental measure of morpheme manipulation, and morpheme generation) 			Structural equation modelling Bivariate correlation	USA
4	Sparks, E., & Deacon, S. H. (2015). Morphological awareness and vocabulary acquisition: A longitudinal examination of their relationship in English-speaking children. *Applied Psycholinguistics*, *36*(2), 299–321.	7 Rural mainstream primary school	English	n/a	n/a	100 EL1 in Grades 2 and 3	1. Receptive vocabulary (M-PPVT)	1. Morphological awareness (Experimental word analogy task based on Nunes, Bryant, and Bindman 1997))	1. Phonological awareness (Elision task adapted from Rosner and Simon (1971)) 2. Real word reading (Word identification subtest of the Woodcock	Bivariate correlation Multiple regression	Canada

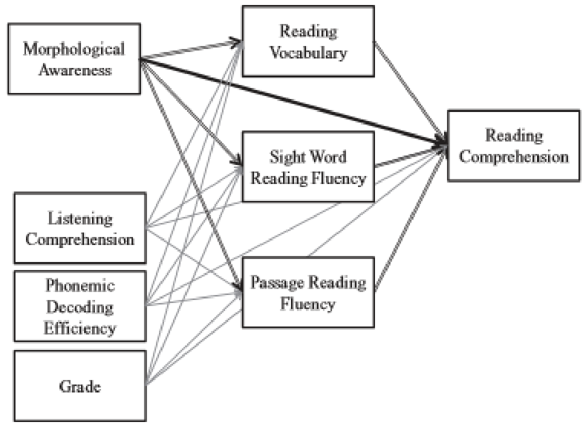
	https://doi.org/10.1017/S0142716413000246								Reading Mastery Test-Revised)) 3. Pseudoword reading (Word attack subtest of the Woodcock Reading Mastery Test-Revised) 4. Nonverbal IQ (The matrix reasoning subtest of the WISC)		
5	Zhang, H. (Stanley). (2015). Morphological Awareness in Vocabulary Acquisition Among Chinese-Speaking Children: Testing Partial Mediation via Lexical Inference Ability. *Reading Research Quarterly*, *50*(1), 129–142. https://doi.org/10.1002/rrq.89	3 Mainstream primary schools	Chinese	n/a	n/a	288 Grade 2 Chinese NS	1. Reading vocabulary (Vocabulary task from Anderson and Freebody, 1983)	1. Derivational awareness (Experimental morpheme recognition task adapted from Ku and Anderson (2003)) 2. Compound awareness (Experimental morpheme discrimination task adapted from Ku and Anderson (2003)) 3. Compound structure awareness (Experimental compound structure awareness task modelled on Chen et al. (2009), Liu and McBride-Chang (2010), and Nagy, Berninger, Abbott, Vaughn, and Vermeulen (2003))		Bivariate correlation Multiple regression Structural equation modelling	China

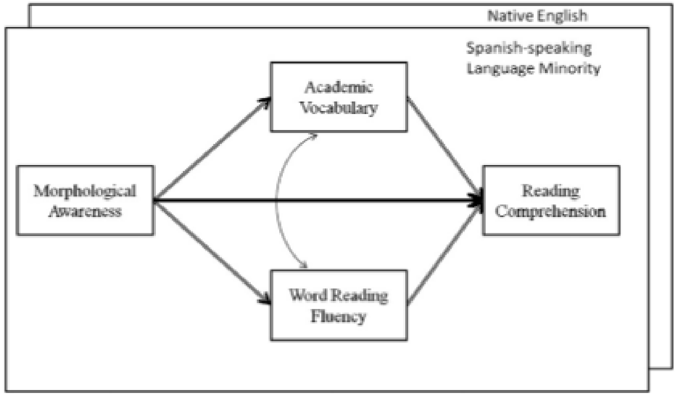
								4. Lexical inference ability (Experimental reading passages)			
6	Dallasheh-Khatib, R., Ibrahim, R., & Karni, A. (2014). Longitudinal Data on the Relations of Morphological and Phonological Training to Reading Acquisition in First Grade: The Case of Arabic Language. *Psychology*, *5*(8), 918. https://doi.org/10.4236/psych.2014.58103	1 private primary school	Arabic	n/a	n/a	31 Arabic NS in phonological group, 31 Arabic NS in morphological group, 27 Arabic NS control group	1. Receptive vocabulary PPVT first 50 items translated into literary Arabic) 2. Morphological awareness (morphological analysis test, morphological synthesis test (both based on Lyster, 2002))			Bivariate correlation	Israel
7	Luo, Y. (2013, August 8). *Biliteracy Development in Chinese and English: The Roles of Phonological Awareness, Morphological Awareness, and Orthographic Processing in Word-level Reading and Vocabulary Acquisition* (Thesis). Retrieved from https://tspace.library.utoronto.ca/handle/1807/35889	Chinese heritage language classes in Canada. All participants attended mainstream primary schools.	Chinese	English	n/a	91 Chinese-English bilinguals (56 in kindergarten, 35 in Grade 1)	1. English word reading (Letter-Word Identification Subtest of the Woodcock-Johnson III Tests of Achievement) 2. English oral vocabulary (PPVT-III A) 3. Chinese character reading (Experimental measure) 4. Chinese oral vocabulary (Translated form of PPVT-III A, Experimental measure adapted from Snodgrass and Vanderwart (1980)) 5. English phonological awareness (Elision subtest of the Comprehensive Test of Phonological Processing (CTOPP) 6. English morphological awareness (experimental task adapted from Carlisle, 2000, experimental task adapted from McBride-Chang et al. (2005)) 7. English orthographic processing (judgment task) 8. Chinese phonological awareness (experimental task, onset and syllable deletion task) 9. Chinese morphological awareness (experimental task adapted from McBride-Chang et al. 2005) 10. Chinese orthographic processing (experimental task) 11. Home language use (questionnaire) 12. SES (mother’s education level)			Bivariate correlation Structural equation modelling	Canada

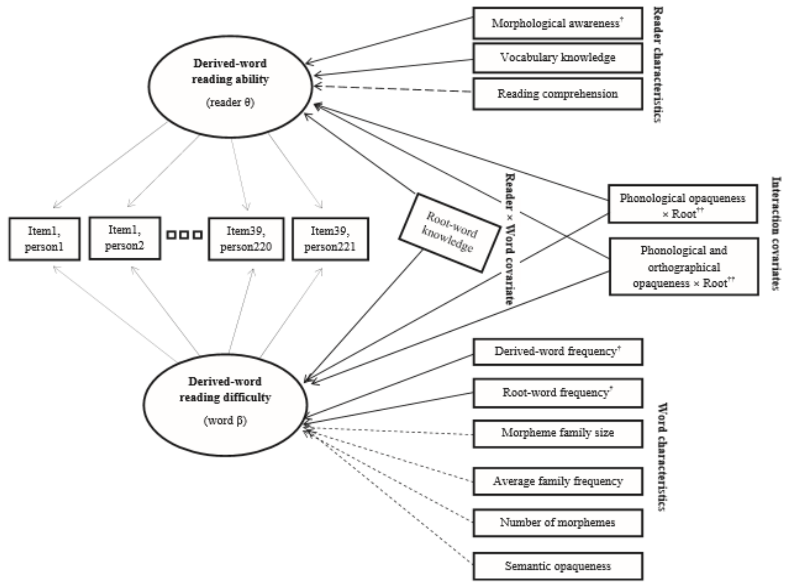
							13. Raven Standard Progressive Matrices  		
8	Deacon, S. H., Kieffer, M. J., & Laroche, A. (2014). The Relation Between Morphological Awareness and Reading Comprehension: Evidence From Mediation and Longitudinal Models. *Scientific Studies of Reading*, *18*(6), 432–451. https://doi.org/10.1080/10888438.2014.926907	7 mainstream rural primary schools	English	n/a	n/a	100 EL1 tracked from Grade 1 to 4	1. Morphological awareness (Experimental word analogy task) 2. Receptive vocabulary (M-PPVT)	Bivariate correlation	Canada
9	Ramirez, G., Walton, P., & Roberts, W. (2014). Morphological	4 mainstream primary	English	n/a	n/a	108 kindergartners,	1. Morphological awareness (experimental measure called Making Words (Ramírez, Chen-Baumgardner, Geva, & Kieffer, 2010))	Bivariate correlation	Canada

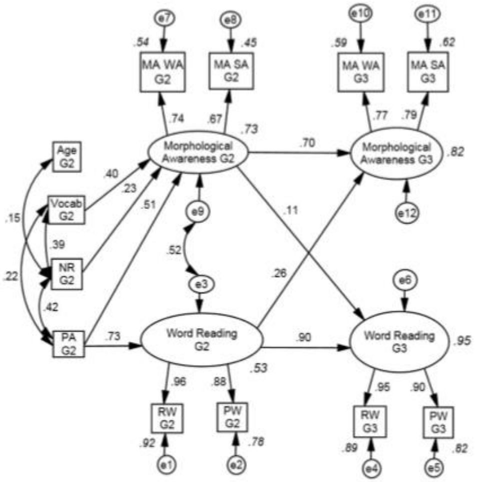
	Awareness and Vocabulary Development Among Kindergarteners With Different Ability Levels. *Journal of Learning Disabilities*, *47*(1), 54–64. https://doi.org/10.1177/0022219413509970	schools in low SES areas				mostly EL1	2. Expressive vocabulary (Expressive Vocabulary Test, Second Edition (EVT-2))				
10	Liu, P. D., Mcbride-Chang, C., Wong, T. T.-Y., Shu, H., & Wong, A. M.-Y. (2013). Morphological awareness in Chinese: Unique associations of homophone awareness and lexical compounding to word reading and vocabulary knowledge in Chinese children. *Applied Psycholinguistics*, *34*(4), 755–775. https://doi.org/10.1017/S014271641200001X	Part of ongoing study	Chinese	n/a	n/a	154 Chinese NS aged 9 years old	1. Chinese word reading (Hong Kong Test of specific learning difficulties (Ho, Chan, Tsang, & Lee, 2000) 2. Vocabulary definitions (modelled after the Stanford-Binet Intelligence Scale vocabulary subtest)	1. Morphological awareness (experimental measure homophone production task, experimental measure morphological construction task)	1. Phonological awareness (experimental measure from McBride-Chang et al. 2008) 2. Nonverbal IQ (Raven's Standard Progressive Matrices) 3. Socioeconomic status (7-point scale of mother's educational level)	Bivariate correlation Multiple regression	China (Hong Kong)
11	Goodwin, A. P., Huggins, A. C., Carlo, M. S., August, D., & Calderon, M. (2013). Minding morphology: How morphological awareness relates to reading for English language learners. *Reading and Writing*,	Mainstream primary schools with high concentrations of EAL and low SES pupils	Spanish	English	n/a	157 Grade 5 Spanish EAL pupils	1. Letter-word identification (Woodcock Language Proficiency Battery subtest) 2. Reading vocabulary (Woodcock Language Proficiency Battery subtest) 3. Passage comprehension (Woodcock Language Proficiency Battery subtest) 4. Morphological awareness (experimental measure Extract the Base, validated by Goodwin et al. 2012) 5. Phonological decoding (Word Attack, and Computer based academic system subtests of Woodcock Language Proficiency Battery)			Bivariate correlation Structural equation modelling	USA

	26(9), 1387–1415. https://doi.org/10.1007/s11145-012-9412-5								
12	Kieffer, M. J., Biancarosa, G., & Mancilla-Martinez, J. (2013). Roles of morphological awareness in the reading comprehension of Spanish-speaking language minority learners: Exploring partial mediation by vocabulary and reading fluency. *Applied Psycholinguistics*, *34*(4), 697–725. https://doi.org/10.1017/S0142716411000920	Mainstream urban kindergarten to Grade 8 school with a high proportion of Latino EAL pupils	Spanish	English	n/a	101 L1 Spanish EAL pupils (41 in Grade 6, 35 in Grade 7, 25 in Grade 8)	1. Reading comprehension (Group Reading Assessment and Diagnostic Evaluation (GRADE)) 2. Morphological awareness (derivational decomposition task based on Carlisle, 2000) 3. Reading vocabulary (GRADE reading vocabulary subtest) 4. Sight word reading fluency (sight word efficiency subtest of the Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner, & Rashotte, 1999) 5. Passage reading fluency oral reading fluency subtest of the Dynamic Indicators of Basic Early Literacy Skills (Good & Kaminski, 2002) 6. Listening comprehension (GRADE listening comprehension subtest)	Bivariate correlation Structural equation modelling	USA

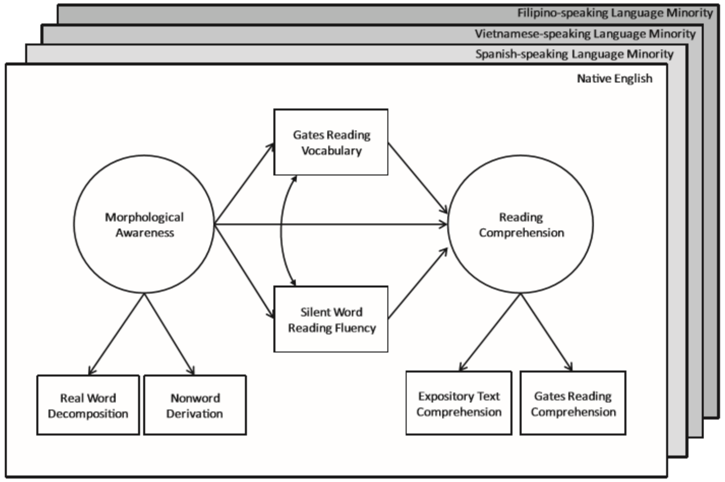
							7. Phonemic decoding efficiency (phonemic decoding efficiency subtest of the TOWRE (Torgesen et al., 1999)  		
13	Kieffer, M. J., & Box, C. D. (2013). Derivational morphological awareness, academic vocabulary, and reading comprehension in linguistically diverse sixth graders. *Learning and Individual Differences*, *24*, 168–175. https://doi.org/10.1016/j.lindif.2012.12.017	English NS and EAL pupils in Grade 6 mainstream classes	English and Spanish	English	n/a	137 Grade 6 pupils (55 EL1, 82 EAL)	1. Reading comprehension (Grade six reading comprehension subtest from the Gates-MacGinitie Reading Test, 4th Edition (MacGinitie, MacGinitie, Maria, & Dreyer, 2000)) 2. Academic vocabulary (Experimental measure based on Lesaux and Kieffer, 2010) 3. Word reading fluency (Test of Silent Word Reading Fluency (TOSWRF; Mather, Hammill, Allen, & Roberts, 2004)) 4. Derivational morphological awareness (Non-word suffix choice task, developed based on previous research (Nagy et al., 2006; Singson et al., 2000)	Bivariate correlation Structural equation modelling	USA

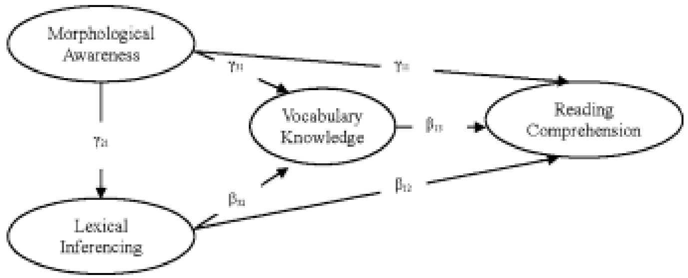
									
14	Goodwin, A. P., Gilbert, J. K., & Cho, S.-J. (2013). Morphological Contributions to Adolescent Word Reading: An Item Response Approach. *Reading Research Quarterly*, *48*(1), 39–60. https://doi.org/10.1002/rrq.037	2 mainstream secondary schools	English	n/a	n/a	221 EL1 (193 in Grade 7, 28 in Grade 8)	1. Derived-word reading ability 2. Derived-word reading difficulty 3. Morphological awareness (experimental measure adapted from Mahony, 1994, pseudoword written section of the Derivational Suffix Test from Singson el al. 2000, experimental measure adapted from Mahony's (1994) Syncat-real Test 4. Reading comprehension (Gates–MacGinitie Standardized Test of Reading Comprehension) 5. Reading vocabulary knowledge (Gates–MacGinitie Standardized Test of Reading Vocabulary) 6. Word characteristics (various experimental measures) 7. Interaction covariates (various experimental measures)	Bivariate correlation Structural equation modelling	USA

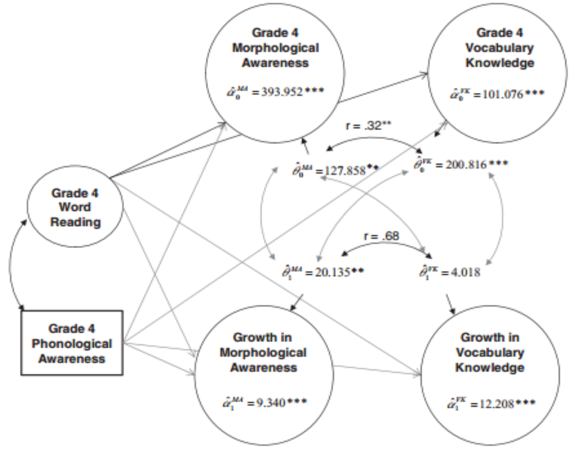
							8. Reader×word covariate (experimental measure)  		
15	Kruk, R. S., & Bergman, K. (2013). The reciprocal relations between morphological processes and reading. *Journal of Experimental Child Psychology*, *114*(1), 10–34. https://doi.org/10.1016/j.jecp.2012.09.014	12 public primary schools	English	n/a	n/a	157 pupils tracked from Grade 1 to Grade 3, mostly EL1	1. Receptive morphological awareness (experimental measure based on Carlisle, 2000) 2. Expressive morphological awareness (experimental measure based on Carlisle, 2000) 3. Expressive vocabulary (vocabulary subtest of WASI)	Bivariate correlation	Canada
16	Deacon, S. H., Benere, J., & Pasquarella, A. (2013). Reciprocal relationship: Children's morphological awareness and their reading accuracy across grades 2 to 3. *Developmental*	7 rural mainstream primary schools	English	n/a	n/a	100 EL1 tracked from Grade 2 to Grade 3	1. Reading accuracy (word identification subtest and word attack subtest of WRMT-R) 2. Morphological awareness (experimental measure sentence analogy task based on Nunes et al. 1997, experimental measure word analogy task) 3. Receptive vocabulary (M-PPVT) 4. Phonological awareness (elision task based on Rosner and Simons (1971))	Bivariate correlation Structural equation modelling	Not specified (North America)

	Psychology, *49*(6), 1113–1126. https://doi.org/10.1037/a0029474						5. Nonverbal IQ (matrix reasoning subtest of the WASI)  		
17	Thompson, D. M. (2011). *Contributions of prosodic sensitivity and morphological awareness to word level reading: A perceptual task development study*. Middle Tennessee State University. Retrieved from http://gradworks.umi.com/34/84/3484705.html	Undergraduate psychology students	English	n/a	n/a	79 EL1 undergraduate students	1. Reading vocabulary (WJ-III Synonym, Antonyms, and Analogies subtests) 2. Morphological awareness (morphological awareness task (MAT) adapted from Rubin (1988), Rubin, Patterson, and Kantor (1991), and Carlisle and Fleming (2003))	Bivariate correlation	USA
		EL1, EAL, and atypical pupils in a mainstream primary school	English	n/a	n/a	157 pupils (62 in Grade 3, 40 in Grade 4, 55 in Grade 5) of which 130 EL1, 12 EAL, 15 atpyical learners	1. Reading vocabulary (WJ-III Synonym, Antonyms, and Analogies subtests) 2. Morphological awareness (morphological awareness task (MAT) adapted from Rubin (1988), Rubin, Patterson, and Kantor (1991), and Carlisle and Fleming (2003))	Bivariate correlation	USA

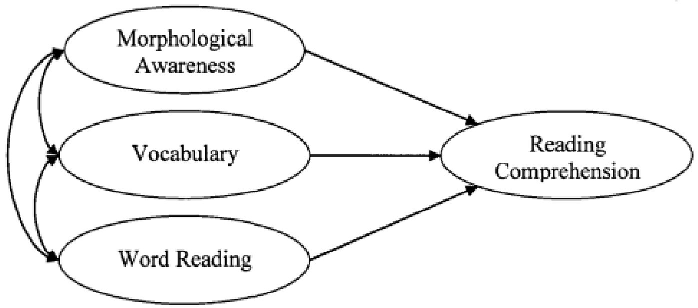
18	Liu, D. (2009). *Morphological Sensitivity, Morphological Awareness and Their Role on Third Grade Chinese Children's Character Reading and Vocabulary*. PhD thesis. The Chinese University of Hong Kong. Retrieved from http://search.proquest.com/docview/888203585/	Mainstream primary school	Chinese	n/a	n/a	121 Chinese NS pupils in Grade 3	1. Chinese character reading (based on McBride-Chang et al.) 2. Vocabulary definitions (taken from McBride-Chang et al. 2008)	1. Morphological awareness (homophone awareness task taken from Shu et al. (2006), morphological construction task, compounding production task	1. Nonverbal IQ (Raven's Standard Progressive Matrices) 2. Phonological awareness (experimental measures phoneme rhyme production task, phoneme onset deletion task)	Bivariate correlation Multiple regression	China
19	Sanchez, M., Ecalle, J., & Magnan, A. (2012). L'influence précoce des connaissances morphologiques et orthographiques sur l'apprentissage de la lecture : une étude longitudinale de la GSM au CE1. *Psychologie Française*, *57*(4), 277–290. https://doi.org/10.1016/j.psfr.2012.05.001	Mainstream kindergarten and primary school	French	n/a	n/a	64 French NS pupils tracked from kindergarten to Grade 2	1. Receptive vocabulary (échelle vocabulaire en images Peabody (EVIP)) 2. Derivational morphological awareness (experimental measures, judgement of relational morphological, extract the base)			Bivariate correlation	France
20	Kieffer, M. J., & Lesaux, N. K. (2012b). Direct and Indirect Roles of Morphological Awareness in the English Reading Comprehension of Native English, Spanish, Filipino, and Vietnamese Speakers.	14 mainstream urban secondary schools	English, Spanish, Vietnamese, Filipino	English	n/a	952 Grade 6 pupils (323 EL1, 499 Spanish EAL, 48 Vietnamese EAL,	1. Reading comprehension (reading comprehension subtest from the Gates-MacGinitie Reading Test, Fourth Edition, experimental measure Expository Text Comprehension Task) 2. Morphological awareness (experimental measures, Real Word Decomposition Task based on Carlisle, 2000, Nonword Derivation Task, based on Nagy et al. 2006) 3. Reading vocabulary (Reading Vocabulary subtest of the Gates-MacGinitie Reading Test, Fourth Edition)			Bivariate correlation Structural equation modelling	USA

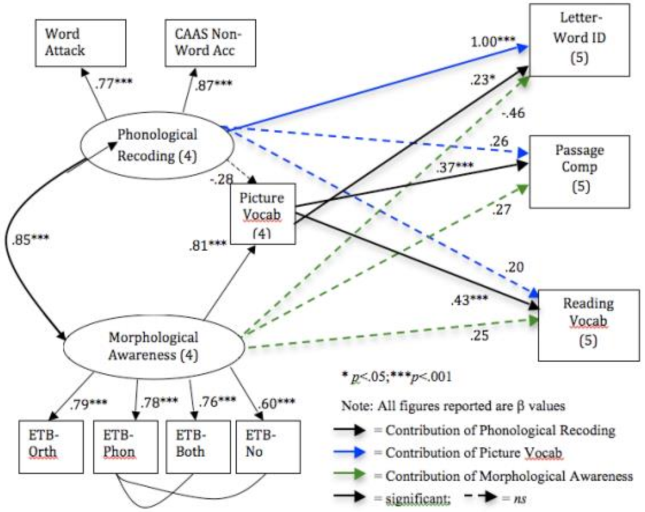
	Language Learning, *62*(4), 1170–1204. https://doi.org/10.1111/j.1467-9922.2012.00722.x					82 Filipino EAL)	4. Silent word reading fluency (Test of Silent Word Reading Fluency (Mather, Hammill, Allen, & Roberts, 2004)) 				
21	Deacon, S. H. (2012). Sounds, letters and meanings: the independent influences of phonological, morphological and orthographic skills on early word reading accuracy. *Journal of Research in Reading*, *35*(4), 456–475. https://doi.org/10.1111/j.1467-9817.2010.01496.x	7 mainstream rural primary schools	English	n/a	n/a	202 EL1 (123 Grade 1, 79 Grade 3)	1. Morphological awareness (experimental measure based on Nunes et al. 1997) 2. Receptive vocabulary (PPVT-R)			Bivariate correlation	Canada
22	Lam, K., Chen, X., Geva, E., Luo, Y. C., & Li, H. (2012). The role of morphological awareness in reading achievement among	Public Chinese heritage language schools	Chinese	English	n/a	80 Chinese NS (46 kindergarten, 34 Grade 1)	1. English receptive vocabulary (shortened form of PPVT-III A) 2. English reading comprehension (Reading Comprehension subtest of	1. Morphological awareness (Derivational Awareness task adapted from Carlisle (2000), Compound	1. Nonverbal IQ (Raven's Standard Progressive Matrices)	Bivariate correlation 2×2 repeated	Canada

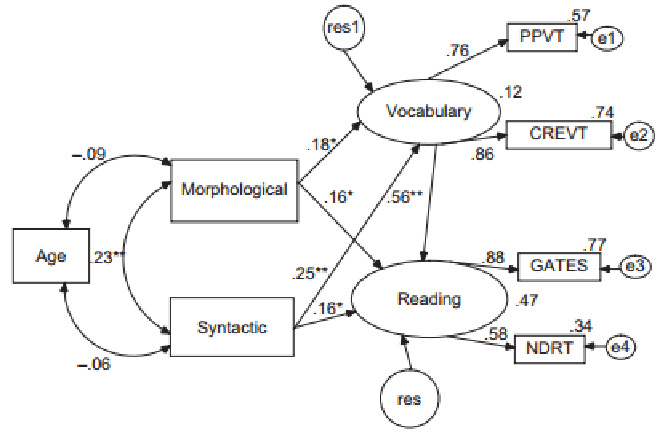
	young Chinese-speaking English language learners: a longitudinal study. *Reading and Writing*, *25*(8), 1847–1872. https://doi.org/10.1007/s11145-011-9329-4						the Peabody Individual Achievement Test—Revised (PIAT-R) (Markwardt, 1998))	Awareness task adapted from McBride-Chang et al. 2005)	2. Phonological awareness (elision subtest of CTOPP) 3. Word reading (Letter-Word Identification subtest from the Woodcock Language Proficiency Battery (WLPB)) 4. Age	measures ANOVA Multiple regression	
23	Zhang, D., & Koda, K. (2012). Contribution of morphological awareness and lexical inferencing ability to L2 vocabulary knowledge and reading comprehension among advanced EFL learners: testing direct and indirect effects. *Reading and Writing*, *25*(5), 1195–1216. https://doi.org/10.1007/s11145-011-9313-z	Adult EFL learners from a university in Shanghai	Chinese	English	n/a	130 adult Chinese NS	1. Morphological awareness (experimental measure) 2. Lexical inferencing (experimental measure) 3. Vocabulary breadth (adapted version of Nation's (1990) VLT) 4. Vocabulary depth (Read's (1993) Word Associates Test (WAT)) 5. Reading comprehension (a word supply task, a conjunction task, a co-reference task, a textual inference task, and a gist task)  			Bivariate correlation Structural equation modelling	China
24	Kieffer, M. J., & Lesaux, N. K. (2012a). Development of morphological awareness and vocabulary knowledge in Spanish-speaking language minority learners: A parallel process latent	Transitional bilingual program in primary school, and mainstream classroom in secondary school	Spanish	English	n/a	77 Spanish EAL followed from grade 4 to 7	1. Receptive vocabulary (PPVT-R) 2. Morphological awareness (experimental measure based on Carlisle (2000)) 3. Word reading accuracy (Letter-word Identification subtest of WLPB-R) 4. Nonword decoding accuracy (Word Attack subtest of WLPB-R) 5. Word reading efficiency (Test of Oral Word Reading Efficiency) 6. Phonological awareness (elision subtest of CTOPP)			Bivariate correlation Structural equation modelling	USA

	growth curve model. *Applied Psycholinguistics*, *33*(1), 23–54. https://doi.org/10.1017/S0142716411000099										
25	Gómez, G. (2010, February 25). *The Role of Morphological Awareness in Bilingual Children's First and Second Language Vocabulary and Reading* (Thesis). The University of Toronto. Retrieved from https://tspace.library.utoronto.ca/handle/1807/19160	22 mainstream secondary schools in a large multicultural City	English, Chinese, Spanish	English	n/a	244 total. 90 Spanish EAL (39 Grade 4, 51 Grade 7), 76 Chinese EAL (36, 40) 78 EL1 (39, 39)	1. English and Spanish derivational morphological awareness (Test of Morphological Structure adapted from Carlisle (2000), Test of Morphological Sensitivity (Mahony et al., 2000). Both tests had English and Spanish versions) 2. English compound morphological awareness (test based on Nagy et al. (2003))	1. Months in Canada (family questionnaire) 2. First language (family questionnaire) 3. Interaction between months in Canada and first language	1. Nonverbal IQ (Raven's Standard Progressive Matrices) 2. Socioeconomic status (Mother's education level from family questionnaire) 3. Grade (family questionnaire)	Bivariate correlation Multiple regression	Canada
							1. English word reading (Letter-word Identification subtest of WLPB) 2. Spanish word reading (Letter-word Identification subtest ((Woodcock & Muñoz-Sandoval, 1995))	1. English and Spanish derivational morphological awareness	1. Grade 2. Nonverbal IQ 3. Working memory (Digit Span subtest of WISC-R) 4. English receptive vocabulary		

									(shortened version of PPVT-R) 5. Phonological awareness (elision subtest of CTOPP)		
							1. English receptive vocabulary 2. Spanish receptive vocabulary (Spanish shortened version of PPVT-R)	1. English and Spanish derivational morphological awareness	1. Grade 2. Nonverbal IQ 3. English word reading 4. Spanish word reading		
							1. English reading comprehension (English modified version of the Peabody Achievement Test (Markwardt, 1989)) 2. Spanish reading comprehension (Spanish modified version of the Peabody Achievement Test)	1. English and Spanish derivational morphological awareness	1. Grade 2. Nonverbal IQ 3. Working memory 3. English and Spanish word reading 4. English and Spanish receptive vocabulary 5. Phonological awareness		
26	Logan, B. (2010). *The role of morphological awareness in the reading development of English language learners* (Ph.D.). University of Washington, United States -- Washington. Retrieved from	Grade 2 and Grade 3 EL1 and EAL pupils in mainstream primary school classes	Spanish, English	English	n/a	292 total. 124 Grade 2 (52 EL1, 72 EAL), 168 Grade 3 (77 EL1, 91 EAL)	1. Word reading (Word Identification and Word Attack subtests of the WRMT-R) 2. Expressive Vocabulary (The Picture Vocabulary Subtest, and The Verbal Analogies Subtest of the Woodcock Mufioz Language Survey-Revised (WMLS) (Woodcock, Mufioz-Sandoval, Ruef, & Alvarado, 2005)) 3. Passage comprehension (Passage comprehension subtest of the WRMT-R, The Comprehension score for the Gray Oral Reading Test-4th Edition (GORT) (Wiederhold & Bryant, 2001))			Bivariate correlation Structural equation modelling	USA

	http://search.proquest.com/docview/756262709/abstract/EFEAC762E3F24DCBPQ/1?accountid=13042						4. Morphological awareness (Decomposition measure based on Carlisle (2000), and Kieffer and Lesaux (2008)) 		
27	Goodwin, A. P. (2010). *Does Meaning Matter For Reading Achievement? Untangling the Role of Phonological Recoding and Morphological Awareness in Predicting Word Decoding, Reading Vocabulary, and Reading Comprehension Achievement for Spanish-Speaking English Language Learners*. University of Miami, Miami. Retrieved from http://www.academia.edu/6743625/Does_Meaning_Matter_For_Reading_Achievement_Untangling_the_Role_of_Phonological_Recoding_and_Morphological_Awareness_	Spanish speaking EAL pupils from primary school. Some pupils received English only instruction and other received various amounts of formal Spanish instruction as part of different bilingual programs	Spanish	English	n/a	197 Spanish EAL pupils tracked from Grade 2 to 5	1. Morphological awareness (Four morphological production tasks adapted from Carlisle's (1988) Extract the Base (ETB) task.) 2. Reading achievement (The Letter-word Identification subtest, the Passage Comprehension subtest, and the Reading Vocabulary subtest of the WLPB (Woodcock, 1991)) 3. Expressive vocabulary (The Picture Vocabulary subtest of the WLPB (Woodcock, 1991) 4. Phonological recoding (The Word Attack subtest of the WLPB and the Computer Based Academic Assessment System Nonword Accuracy Task (CAAS, Sinatra & Royer, 1993))	Bivariate correlation Structural equation modelling	USA

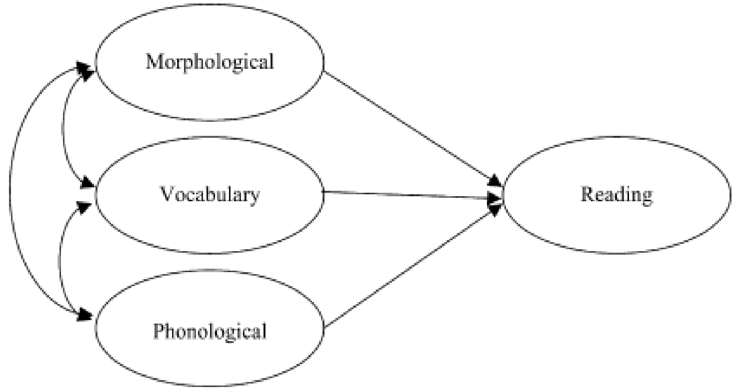
	in_Predicting_Word_Decoding_Reading_Vocabulary_and_Reading_Comprehension_Achievement_for_Spanish-Speaking_English_Language_Learners								
28	Guo, Y., Roehrig, A. D., & Williams, R. S. (2012). The Relation of Morphological Awareness and Syntactic Awareness to Adults' Reading Comprehension: Is Vocabulary Knowledge a Mediating Variable? *Journal of Literacy Research*, *43*(2), 159–183. https://doi.org/10.1177/1086296X11403086	Undergraduate and graduate students recruited from one historically Black university and one private college	English	n/a	n/a	151 EL1	1. Receptive vocabulary (PPVT) 2. Expressive vocabulary (The Expressive Vocabulary subtest of Comprehensive Receptive and Expressive Vocabulary Test (2nd ed.) (CREVT; Wallace & Hammill, 2002)) 3. Morphological awareness (Grammatical Application Test–Revised Wug Test based on Berko (1958) 4. Syntactic awareness (The Syntactic Awareness Questionnaire based on Layton et al. (1998) 5. Reading comprehension (The Nelson-Denny Reading Test–Form G (NDRT; J. I. Brown, Fischo, & Hanna, 1993, Gates-MacGinitie Reading Test (4th ed.))	Bivariate correlation Structural equation modelling	USA

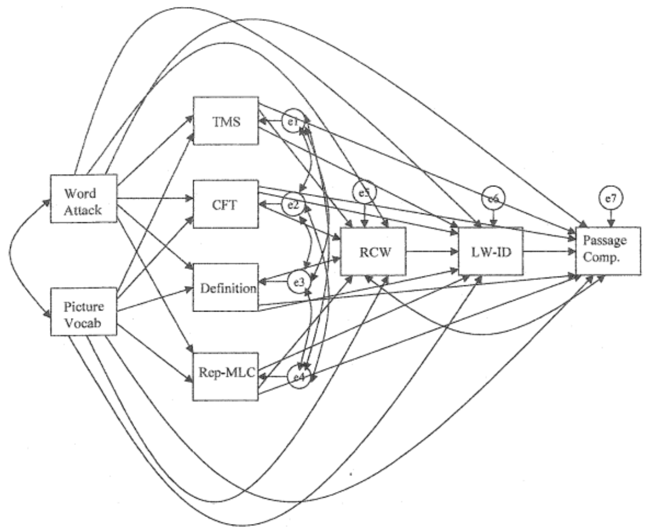
									
29	Jeon, E. H. (2011). Contribution of Morphological Awareness to Second-Language Reading Comprehension. *The Modern Language Journal*, *95*(2), 217–235. https://doi.org/10.1111/j.1540-4781.2011.01179.x	Grade 10 pupils from a private secondary school	Korean	English	n/a	188 Korean NS in Grade 10	1. Morphological awareness (Test of morphological structure – revised, based on Carlisle (2000), Verbal Suffix Knowledge Test – Revised, based on Schmitt and Meara (1997)) 2. Korean expressive vocabulary (Word Knowledge Test)	Bivariate correlation	South Korea
30	Bowers, P. N., & Kirby, J. R. (2009). Effects of morphological instruction on vocabulary acquisition. *Reading and Writing*, *23*(5), 515–537. https://doi.org/10.1007/s11145-009-9172-z	Grade 4 and Grade 5 pupils from two public Catholic schools	English	n/a	n/a	81 EL1 in Grades 4 and 5. (38 in experimental, 43 in control)	1. Base identification (ability to identify base in multimorphemic words) 2. Morphological vocabulary (ability to explain the meanings of the words used for the Base Identification task) 3. Receptive vocabulary (PPVT-III)	Bivariate correlation	Canada
31	Wang, M., Yang, C., & Cheng, C. (2009). The contributions of	Chinese EAL in grades 2 and 4	Chinese	English	n/a	64 Chinese EAL (38	1. English oral vocabulary (PPVT-III) 2. English compound awareness task (experimental measure adapted from Berninger and Nagy (1999))	Bivariate correlation	USA

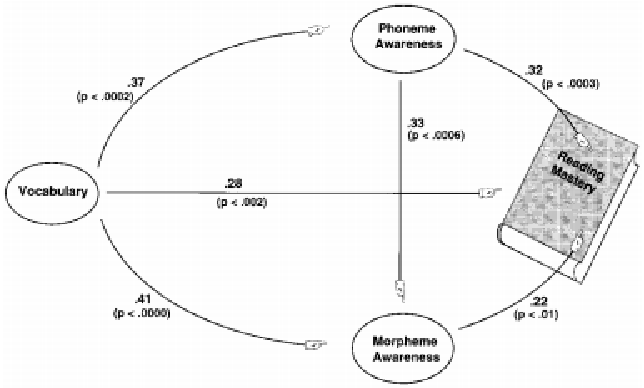
	phonology, orthography, and morphology in Chinese-English biliteracy acquisition. *Applied Psycholinguistics*, *30*(2), 291–314. https://doi.org/10.1017/S0142716409090122	attending mainstream public school during the week and Chinese classes on the weekend				Grade 2, 26 Grade 4)	3. Chinese compound structure task (experimental measure adapted from Wang, Park et al. (2006) 4. Chinese oral vocabulary (PPVT-III translated)				
32	Kieffer, M. J., & Lesaux, N. K. (2008). The role of derivational morphology in the reading comprehension of Spanish-speaking English language learners. *Reading and Writing*, *21*(8), 783–804. https://doi.org/10.1007/s11145-007-9092-8	Grade 4 and 5 Spanish EAL pupils from 3 urban schools. Pupils instructed in both English and Spanish for a portion of the day	Spanish	English	n/a	87 Spanish EAL tracked from Grade 4 to 5	1. Derivational morphological awareness (decomposition task based on Carlisle (2000), and Carlo et al. (2004)) 2. Receptive vocabulary (PPVT)			Bivariate correlation	USA
33	McBride-Chang, C., Tardif, T., Cho, J., Shu, H., Fletcher, P., Stokes, S. F., … Leung, K. (2008). What's in a word? Morphological awareness and vocabulary knowledge in three languages. *Applied Psycholinguistics*, *29*(3). https://doi.org/10.1017/S014271640808020X	Kindergartners from Hong Kong and Beijing who were part of an ongoing study. Kindergartners from 3 kindergartens in South Korea	Cantonese, Putonghua, Korean	n/a	n/a	663 kindergartners (211 from Hong Kong, 288 from Beijing, 164 from South Korea)	1. Expressive vocabulary in Cantonese, Putonghua, Korean (experimental measure similar to Anglin, 1993)	1. Compound morphology (experimental measure)	1. Age 2. Nonverbal IQ (Raven's Progressive Matrices, visual discrimination and visual spatial relationships subtests of Gardner's Test of Visual–Perceptual Skills (Non-motor) Revised (Gardner, 1996)) 3. Phonological processing (syllable deletion, phoneme	Bivariate correlation Multiple regression	China (Hong Kong, Beijing,) South Korea

									onset deletion, phoneme coda deletion, nonword repetition)		
34	Rispens, J. E., McBride-Chang, C., & Reitsma, P. (2008). Morphological awareness and early and advanced word recognition and spelling in Dutch. *Reading and Writing*, *21*(6), 587–607. https://doi.org/10.1007/s11145-007-9077-7	Grade 1 pupils from 4 mainstream primary schools	Dutch	n/a	n/a	104 Grade 1 Dutch NS	1. Morphological awareness: lexical compounding (experimental measure) 2. Morphological awareness: noun inflection (Dutch version of WUG Test (Berko, 1958)) 3. Morphological awareness: verb inflection (Dutch version of WUG test) 4. Receptive vocabulary (experimental measure)			Bivariate correlation	The Netherlands
		Grade 6 pupils from 4 mainstream primary schools	Dutch	n/a	n/a	112 Grade 6 Dutch NS	1. Morphological awareness: lexical compounding (experimental measure based on McBride-Chang, Cho, et al. (2005)) 2. Morphological awareness: verb inflection (Dutch version of WUG test) 3. Morphological awareness: derivations (experimental measure) 4. Receptive vocabulary (receptive vocabulary test (Woordenschattest—groep 8; Aarnoutse, 2002))			Bivariate correlation	
35	Sénéchal, M., Pagan, S., Lever, R., & Ouellette, G. P. (2008). Relations Among the Frequency of Shared Reading and 4-Year-Old Children's Vocabulary, Morphological and Syntax Comprehension, and Narrative Skills. *Early Education and Development*, *19*(1), 27–44. https://doi.org/10.1080/10409280701838710	Kindergartners recruited from public kindergartens in a large city	English	n/a	n/a	106 EL1 kindergartners	1. Expressive vocabulary (Expressive Vocabulary Test (Williams, 1997)) 2. Morphological comprehension: Comprehension of morphologically complex words in sentences (Grammatical Morphemes subtest of the Test for Auditory Comprehension of Language–3rd Edition (TACL-3; Carrow-Woolfolk, 1999)			Bivariate correlation	Canada
36	Maag, L. (2007). *Measuring morphological*	Undergraduate students in psychology	English	Spanish	n/a	106 adult EL1	1. Receptive vocabulary (vocabulary subtest of the Nelson-Denny Reading Test (ND))			Bivariate correlation	USA

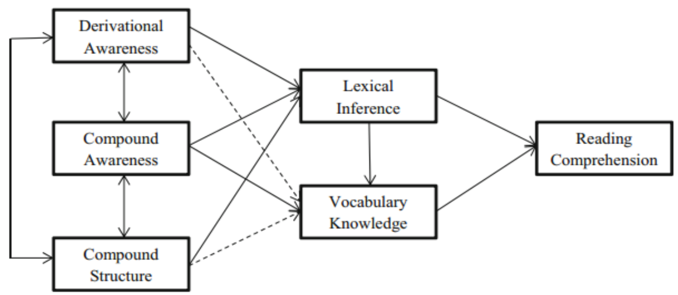
	awareness in adult readers: Implications for vocabulary development. University of Florida. Retrieved from http://search.proquest.com/docview/304880665/	courses at the University of Florida					2. Morphology skill (experimental measure comprised of 3 subtests, checklist, morphology skill, and definitions) 3. Morphological awareness (number of items which received a positive response for subtests 1 and 2 of morphology skill instrument) 4. Morphological accuracy (number of items which received a positive response for subtests 2 and 3 of morphology skill instrument)		
37	Deacon, S. H., Wade-Woolley, L., & Kirby, J. (2007). Crossover: the role of morphological awareness in French immersion children's reading. *Developmental Psychology*, *43*(3), 732–746. https://doi.org/10.1037/0012-1649.43.3.732	Pupils in Grades 1 to 3 in French immersion classrooms in 6 primary schools	English	French	n/a	58 pupils tracked from Grade 1 to 3	1. English receptive vocabulary (PPVT-III) 2. French receptive vocabulary (EVIP) 3. Morphological awareness in French (sentence analogy task based on Nunes et al. (1997) 4. Morphological awareness in English (sentence analogy task based on Nunes et al. (1997)	Bivariate correlation	Canada
38	McBride-Chang, C., Cho, J.-R., Liu, H., Wagner, R. K., Shu, H., Zhou, A., … Muse, A. (2005). Changing models across cultures: Associations of phonological awareness and morphological structure awareness with vocabulary and word recognition in second graders from Beijing, Hong Kong, Korea, and the United States. *Journal of Experimental Child Psychology*, *92*(2), 140–160. https://doi.org/10.1016/j.jecp.2005.03.009	Grade 2 pupils in 3 primary schools in Hong Kong. Grade 2 pupils in 2 primary schools in Beijing. Grade 2 pupils from one public primary school in South Korea. Grade 2 pupils from the USA.	Cantonese, Mandarin, Korean, English	n/a	n/a	405 Grade 2 pupils (100 Cantonese NS, 100 Mandarin NS, 100 Korean NS, 105 EL1)	1. Word recognition (3 experimental measures, for English the Letter-word identification subtest of the Woodcock Johnson III Test of Achievement was used) 2. Expressive vocabulary (vocabulary subtest of Stanford-Binet Intelligence Scale translated for Hong Kong and Beijing participants, vocabulary subtest of the WISC-III in Korean, Expressive One-Word Picture Vocabulary Test-Revised for USA participants) 3. Phonological awareness (syllable and phoneme deletion task for Chinese, Hong Kong, and Korean participants, phoneme elision subtest of the CTOPP for USA participants) 4. Morphological structure awareness (morphological construction test administered in all 4 locations)	Bivariate correlation Structural equation modelling	China (Hong Kong, Beijing,), USA, South Korea

											
39	McBride-Chang, C., Wagner, R. K., Muse, A., Chow, B. W.-Y., & Shu, H. (2005). The role of morphological awareness in children's vocabulary acquisition in English. *Applied Psycholinguistics*, *26*(3), 415–435. https://doi.org/10.1017/S014271640505023X	Kindergartners and Grade 2 pupils from local primary schools	English	n/a	n/a	220 EL1 (115 kindergartners, 105 Grade 2)	1. Expressive vocabulary (Expressive One-Word Picture Vocabulary Test—Revised (Gardiner, 2000))	1. Morphological awareness (morpheme identification test, morphological structure awareness test)	1. Age 2. Word identification (letter–word identification subtest of the Woodcock–Johnson III Test of Achievement (Woodcock, McGrew, & Mather, 2001)) 3. Phonemic decoding (Word Attack subtest of the Woodcock–Johnson III Test of Achievement) 4.Phonological awareness (elision subtest of CTOPP) 5. Rapid automatized naming (Rapid Object-Naming Test, Rapid Number-Naming Test) 6. Nonword repetition (experimental measure)	Bivariate correlation Multiple regression	n/a
40	Katz, L. (2004). *An investigation of the*	3 primary schools from a	English	n/a	n/a	147 EL1 (77	1. Morphological relatedness (Comes from Test) 2. Lexical inferencing (Defining Complex Words)			Bivariate correlation	USA

	relationship of morphological awareness to reading comprehension in fourth and sixth graders. University of Michigan. Retrieved from http://search.proquest.com/docview/305181723/	low SES urban area				Grade 4, 70 Grade 6)	3. Overall reading accuracy (QRI-3 Oral Reading Miscues) 4. Reading of morphologically complex words (ORI-3, Reading Complex Words) 5. Implicit syntactic, explicit syntactic, and distributional knowledge, and metalinguistic control (Repetition of ungrammatical sentences) 6. Relational, syntactic, and distributional knowledge (Test of Morphological Structure) 7. Expressive vocabulary (Picture Vocabulary subtest of the WJPB-III) 8. General word recognition (Letter-Word Identification subtest of WJPB-III) 9. Word decoding (Word Attack subtest of WJPB-III) 10. Reading comprehension (Passage Comprehension subtest of WJPB-III) 	Structural equation modelling	
41	Singson, M., Mahony, D., & Mann, V. (2000). The relation between reading ability and morphological skills: Evidence from	1 mainstream primary school	English	n/a	n/a	98 EL1 (25 in Grade 3 27 in Grade 4, 24 in	1. Derivational morphological awareness (Derivation Suffix Test, adapted from Mahony (1994)) 2. Expressive vocabulary (Vocabulary subtest of WISC-R)	Bivariate correlation	USA

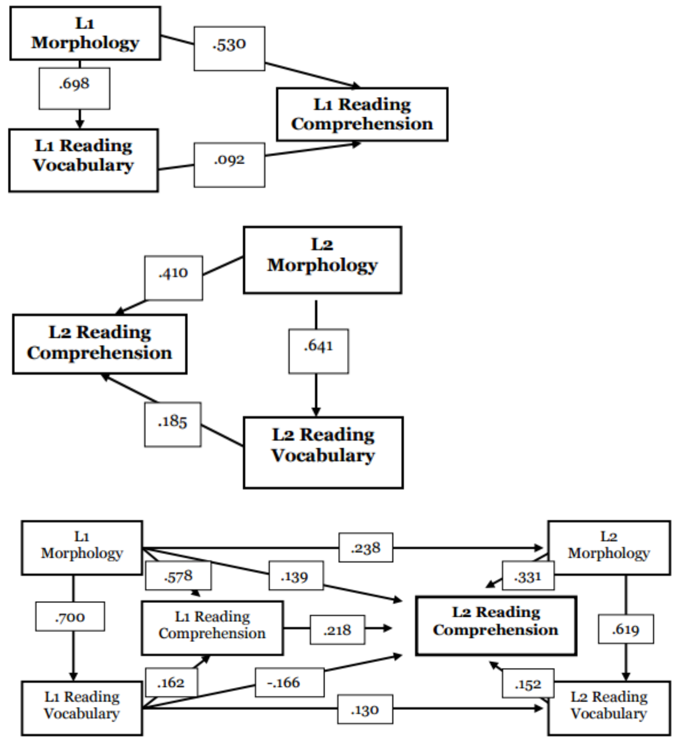
	derivational suffixes. *Reading and Writing*, *12*(3), 219–252. https://doi.org/10.1023/A:1008196330239					Grade 5, 22 in Grade 6)			
		1 mainstream primary school	English	n/a	n/a	101 EL1 (25 in Grade 3 25 in Grade 4, 26 in Grade 5, 25 in Grade 6)	1. Derivational morphological awareness (Derivation Suffix Test, adopted from Mahony (1994)) 2. Phonological awareness (adapted measure of Auditory Analysis Test by Rosner and Simon (1971)) 3. Receptive vocabulary (PPVT-R) 4. Reading measure (Word Identification, and Word Attack subtests of the WRMT)  	Bivariate correlation Structural equation modelling	USA
42	Carlisle, J. F. (2000). Awareness of the structure and meaning of morphologically complex words: Impact on reading. *Reading and Writing*, *12*(3), 169–190. https://doi.org/10.1023/A:1008131926604	Grade 3 and Grade 5 pupils from a private primary school	English	n/a	n/a	60 EL1 (34 Grade 3, 26 Grade 5)	1. Receptive vocabulary (vocabulary subtest of Comprehensive Testing Program III) 2. Reading Comprehension (Reading Comprehension subtest of Comprehensive Testing Program III) 1. Test of Morphological Structure (TMS) 2. Ability to read morphologically complex words (Word Reading Test) 3. Defining morphological complex words (Test of Absolute Vocabulary Knowledge, Anglin 1993)	Bivariate correlation Multiple regression	USA

43	Sénéchal, M. (2000). Morphological effects in children's spelling of French words. *Canadian Journal of Experimental Psychology/Revue Canadienne de Psychologie Expérimentale*, *54*(2), 76–86.	Grade 2 and Grade 4 French mainstream primary schools	French	n/a	n/a	112 French L1 (57 in Grade 2, 55 in Grade 3)	1. Morphological awareness (Word analogy task) 2. Receptive vocabulary (Echelle de vocabulaire en images Peabody)	Bivariate correlation	Canada
44	Smith, M. (1998). *Sense and sensitivity: An investigation into fifth-grade children's knowledge of English derivational morphology and its relationship to vocabulary and reading ability*. Harvard University. Retrieved from http://search.proquest.com/docview/304443669/	Grade 5 pupils from 15 classes in schools in a large Canadian city	English	n/a	n/a	294 Grade 5 EL1	1. Receptive oral vocabulary (Auditory Vocabulary Subtest of Stanford Diagnostic Reading Test, 3rd edition, receptive vocabulary (PPVT-R)) 2. Morphological awareness (extracting bases, producing derived forms, nonsense word production task, nonsense word judgment task)	Bivariate correlation	Canada
45	Tong, X., McBride-Chang, C., Shu, H., & Wong, A. M. Y. (2009). Morphological Awareness, Orthographic Knowledge, and Spelling Errors: Keys to Understanding Early Chinese Literacy Acquisition. *ResearchGate*, *13*(5), 426–452.	Children in their third year of kindergarten in several schools across Hong Kong	Cantonese	n/a	n/a	196 third year kindergarten Cantonese L1	1. Expressive vocabulary (vocabulary definitions task) 2. Morphological awareness (morphological construction, homophone knowledge)	Bivariate correlation	China (Hong Kong)

	https://doi.org/10.1080/10888430903162910										
46	Zhang, H. (Stanley). (2016a). Does Morphology Play an Important Role in L2 Chinese Vocabulary Acquisition? *Foreign Language Annals*, *49*(2), 384–402. https://doi.org/10.1111/flan.12193	Study-abroad students enrolled in university-level programs in Beijing and Shanghai	Various, mainly English (56), Thai (24), Indonesian (16), Korean (14), Tagalog (13), and Turkish (10)	Chinese	n/a	171 Chinese as an additional language students	1. Vocabulary knowledge (word meaning knowledge, character knowledge)	1. Language-universal morphological awareness (morpheme recognition, morpheme discrimination) 2. Language-specific morphological awareness (compound structure analysis, compound structure discrimination)		Bivariate correlation Multiple regression	China
47	Zhang, H. (Stanley). (2016b). Morphological Awareness in Literacy Acquisition of Chinese Second Graders: A Path Analysis. *Journal of Psycholinguistic Research*, *45*(1), 103–119. https://doi.org/10.1007/s10936-014-9327-1	Grade 2 pupils from a mainstream primary school	Chinese	n/a	n/a	123 Grade 2 Chinese L1	1. Derivational awareness (morpheme recognition task, morpheme discrimination task) 2. Compound awareness (morpheme recognition task, morpheme discrimination task) 3. Compound structure awareness (task modelled after Nagy et al. (2003), Chen et al. (2009), and Liu and McBride-Chang (2010)) 4. Vocabulary knowledge (select vocabulary task (Anderson and Freebody 1983; Meara 1992) 5. Lexical inference ability and reading comprehension (reading ability test) 			Bivariate correlation Structural equation modelling	China

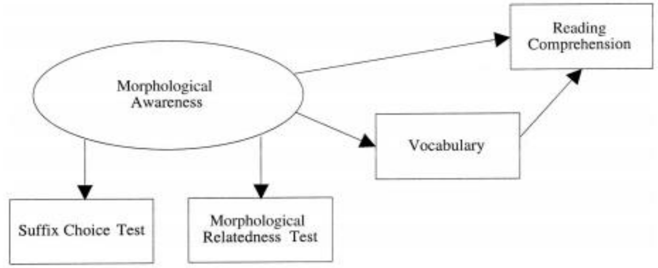
48	Schwiebert, C., Green, L., & McCutcheon, D. (2002). The Contribution of Morphology to Reading and Spelling Achievement. Retrieved from https://eric.ed.gov/?id=ED465986	EL1 pupils from mainstream and private primary schools	English	n/a	n/a	58 Grade 4 EL1	1. Word reading (Word Identification subtest of the WTRM) 2. Spelling (spelling subtest of the WIAT) 3. Reading comprehension (reading comprehension subtest of The Gates-MacGinitie Reading Test) 4. Receptive vocabulary (vocabulary subtest of The Gates-MacGinitie Reading Test) 5. Orthographic fluency (Alphabet Task, Berninger et al., 1992)	1. Oral morphological awareness (derivational suffixes, plausible words, comes from tasks) 2. Written morphological accuracy (experimental measure based on The Expression Connection: A Structured Approach to Teaching Storytelling for School-Aged Children (Klecan-Aker & Brueggman, 1991))	1. Phonological awareness (Segmenting Nonwords subtest of the CTOPP)	Bivariate correlation Multiple regression	USA
49	Wolter, J. A., & Pike, K. (2015). Dynamic Assessment of Morphological Awareness and Third-Grade Literacy Success. *Language, Speech, and Hearing Services in Schools*, *46*(2), 112–126. https://doi.org/10.1044/2015_LSHSS-14-0037	Typically developing Grade 3 pupils from one primary school	English	n/a	n/a	54 Grade 3 EL1	1. Receptive vocabulary (PPVT-4) 2. Morphological awareness (Dynamic Assessment of Primary Morphological Awareness, DAPMA) 3. Ability to define morphemes (morphological awareness strategy of DAPMA 4. Ability to define morphologically complex words (vocabulary strategy of DAPMA)			Bivariate correlation	USA
50	Tabatabaei, O., & Yakhabi, M. (2011). The Relationship between Morphological Awareness and	EFL learners in secondary school	Iranian	English	n/a	50 adolescent Iranian L1 EFL learners	1. Receptive vocabulary (VLT, 2000, 3000, and 5000 items) 2. Morphological awareness (Morpheme Identification Awareness, Morphological Structure Awareness, both subtests of the Morphological Awareness Test (Chang et al., 2005))			Bivariate correlation	Iran

	Vocabulary Size of EFL Learners. *English Language Teaching*, *4*(4), 262. https://doi.org/10.5539/elt.v4n4p262								
51	Curinga, R. (2014). The Effect Of Morphological Awareness On Reading Comprehension: A Study With Adolescent Spanish-English Emergent Bilinguals. *All Graduate Works by Year: Dissertations, Theses, and Capstone Projects*. Retrieved from http://academicworks.cuny.edu/gc_etds/30	Emergent bilinguals from one secondary school	Spanish	English	n/a	88 Grade 9 and 10 Spanish L1 EAL pupils	1. Demographic background (questionnaire) 2. Spanish syntactic knowledge (Test of syntactic structures) 3. Expressive Spanish oral vocabulary (vocabulary subtest from Batería III) 4. Test of working memory (reverse number recall task from Batería III) 5. Spanish reading comprehension (subtest of Academic Language and Literacy Diagnostic (ALLD)) 6. English reading comprehension (subtest of Academic Language and Literacy Diagnostic (ALLD)) 7. Spanish reading vocabulary (subtest of Academic Language and Literacy Diagnostic (ALLD)) 8. English reading vocabulary (subtest of Academic Language and Literacy Diagnostic (ALLD)) 9. Morphological awareness: Morpho-semantic (ALLD word study, Morphological Relatedness Task) 10. Morphological awareness: Morpho-syntactic (Test of Morphological Structure, Test of Syntactic Categories)	Bivariate correlation Structural equation modelling	USA

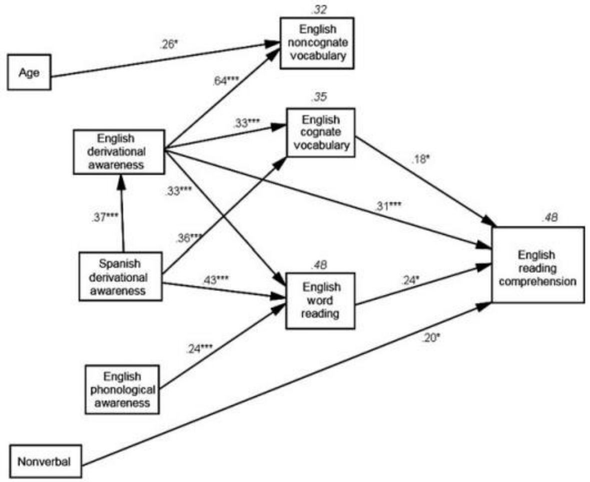
											
52	Marinova-Todd, S. H., Siegel, L. S., & Mazabel, S. (2013). The Association Between Morphological Awareness and Literacy in English Language Learners From Different Language Backgrounds: *Topics in Language Disorders*, *33*(1), 93–107.	EL1 and EAL pupils from 30 schools in one urban district	English, German, Afrikaans, Swedish, Norwegian, Danish, Dutch, Cantonese,Mandarin,Pilipino,	English	n/a	1132 Grade 6 pupils (888 EL1, 244 EAL)	1. Vocabulary knowledge (Reading subtest of WRAT-3, Word Identification, and Word Attack subtests of WRMT-R)	1. Morphological awareness (two tasks developed by Singson et al., 2000)	1. Phonological awareness (experimental measure of pseudoword sound deletion)	Bivariate correlation Multiple regression	Canada

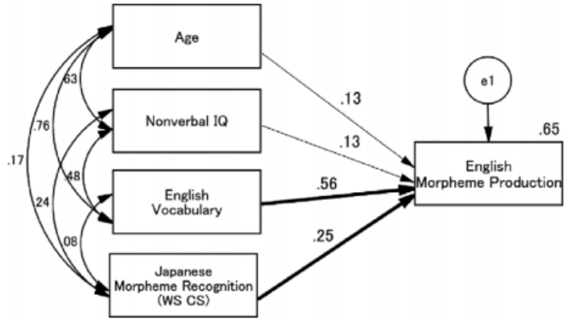
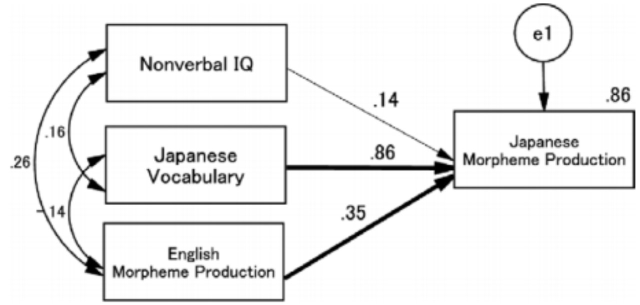
	https://doi.org/10.1097/TLD.0b013e318280f5d5		Tagalog, Spanish, Italian, French, Serbian, Croatian, Czech, Polish, Slovak, Bulgarian, Russian, Korean, and Persian.								
53	Cho, J.-R., Chiu, M. M., & McBride-Chang, C. (2011). Morphological Awareness, Phonological Awareness, and Literacy Development in Korean and English: A 2-Year Longitudinal Study. *Scientific Studies of Reading*, *15*(5), 383–408. https://doi.org/10.1080/10888438.2010.487143	Korean L1 pupils tracked from Grade 4 to 6 from one mainstream primary school	Korean	English	n/a	81 L1 Korean EFL pupils in Grade 4 followed to Grade 5 (79) and Grade 6 (73)	1. Korean expressive vocabulary (vocabulary subtest of WISC in Korean) 2. Korean morphological awareness (morpheme production task)			Bivariate correlation	South Korea
54	Wu, X., Anderson, R. C., Li, W., Wu, X., Li, H., Zhang, J., … Gaffney, J. S. (2009). Morphological Awareness and Chinese Children's Literacy Development: An Intervention Study. *Scientific Studies of*	Pupils from six classrooms in four mainstream primary schools	Chinese	n/a	n/a	169 Chinese L1 pupils in Grade 1 (84 control, 85 experimental),	1. Vocabulary test (vocabulary checklist task) 2. Morphological awareness (interpret novel words test, discriminate morphemes test, radical meaning judgment test, make words test, make characters test)			Bivariate correlation	China

	Reading, *13*(1), 26–52. https://doi.org/10.1080/10888430802631734					tracked to Grade 2 (154 total, 80, 74) and to Grad 3 (146 total, 72, 74)			
55	Apel, K., & Thomas-Tate, S. (2009). Morphological awareness skills of fourth-grade African American students. *Language, Speech, and Hearing Services in Schools*, *40*(3), 312–324. https://doi.org/10.1044/0161-1461(2009/08-0015)	Grade 4 African American pupils enrolled in an afterschool program	English	n/a	n/a	30 Grade 4 EL1	1. Morphological awareness (Part A and Part B of the Derivational Suffix Test (DST; Green, 2004)) 2. Receptive vocabulary (PPVT-III)	Bivariate correlation	USA
56	McCutchen, D. (2008). Children's Morphological Knowledge: Links to Literacy. *Reading Psychology*, *29*(4), 289–314.	Typically developing pupils from Grade 4 and 6 from four mainstream primary schools	English	n/a	n/a	72 EL1 (36 Grade 4, 36 Grade 6)	1. Receptive vocabulary (PPVT-III) 2. Morphological awareness (composite morphological scale tapping relational, syntactic, and distributional morphology)	Bivariate correlation	USA
57	Nagy, W., Berninger, V. W., & Abbott, R. D. (2006). Contributions of morphology beyond phonology to literacy outcomes of upper elementary and middle-school students. *Journal of Educational Psychology*, *98*(1), 134–	Pupils in Grades 4 to 9	English	n/a	n/a	607 total (96 Grade 4, 86 Grade 5, 116 Grade 6, 102 Grade 7, 105 Grade 8,	1. Morphological awareness (Suffix choice test, Nagy et al., 2003, Morphological relatedness test, adaptation of measure used in Nagy et al., 2003) 2. Reading vocabulary (Vocabulary subtest of the Stanford Diagnostic Reading Test 4th edition)	Bivariate correlation Structural equation modelling	USA

	147. https://doi.org/10.1037/0022-0663.98.1.134					102 Grade9)	3. Reading comprehension (Comprehension subtest of the Stanford Diagnostic Reading Test 4th edition) 		
58	Roth, L. (2007). *Orthographic and morphological processing as predictors of reading achievement in grade 3 children*. Queen's University, Ontario, Canada. Retrieved from http://search.proquest.com/docview/304784311/	Grade 3 pupils from a variety of primary schools	English	n/a	n/a	182 Grade 3 pupils	1. Expressive vocabulary (vocabulary subtest of WASI) 2. Morphological awareness (Word analogy task, sentence completion task)	Bivariate correlation	Canada
59	Wang, Y. (2014). *Early Literacy Intervention in Chinese: The Relative Role of Copying Activity, and Its Combination with Morphological Awareness and Pinyin Knowledge*. Chinese University of Hong Kong. Retrieved from http://search.proquest.com/docview/1662485838/	Children from a private kindergarten	Chinese	n/a	n/a	127 kindergarten children in 3 intervention groups and one control group (30, 35, 32, 30)	1. Expressive vocabulary (vocabulary subtest of the Stanford-Binet Intelligence Scale) 2. Morphological awareness (morphological construction and radical judgment)	Bivariate correlation	China
60	Cheng, Y., Zhang, J., Wu, X., Liu, H., & Li, H.	Part of an ongoing study.	Chinese	n/a	n/a	149 Grade 1	1. Morphological awareness: Compounding awareness (compound production task)	Bivariate correlation	China

	(2016). Cross-Lagged Relationships between Morphological Awareness and Reading Comprehension among Chinese Children. *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.01379	Grade 1 pupils from 2 urban primary schools				Chinese L1	2. Morphological awareness: Homophone awareness (homophone awareness task) 3. Morphological awareness: Homonym awareness (morpheme production task) 4. Expressive vocabulary (adapted vocabulary definitions task based on vocabulary subtest of the Stanford-Binet Intelligence Scale)		
61	Ramírez, G., Chen, X., & Pasquarella, A. (2013). Cross-Linguistic Transfer of Morphological Awareness in Spanish-Speaking English Language Learners: The Facilitating Effect of Cognate Knowledge. *Topics in Language Disorders*, *33*(1), 73–92. https://doi.org/10.1097/TLD.0b013e318280f55a	EAL pupils from 11 schools in a large multicultural city	Spanish	English	n/a	90 Spanish L1 EAL pupils (39 Grade 4, 51 Grade 7)	1. English morphological awareness (The morphological production test adapted from Carlisle, 2000, The morphological structure test, adapted from Singson et al., 2000. 2. Spanish morphological awareness (parallel versions of the two measures of English morphological awareness) 3. English receptive vocabulary (modified PPVT-III split into cognate and non-cognate items) 4. English reading comprehension (modified version of the Peabody Individual Achievement Test (Markwardt, 1989)) 5. English word reading (Letter-Word Identification Subtest from the Woodcock Language Proficiency Battery (Woodcock, 1984)) 6. Nonverbal IQ (Raven's Standard Progressive Matrices) 7. Phonological awareness (Elision subtest of the CTOPP)	Bivariate correlation Structural equation modelling	Canada

									
62	Hayashi, Y., & Murphy, V. A. (2011). An investigation of morphological awareness in Japanese learners of English. *Language Learning Journal*, *39*(1), 105–120. https://doi.org/10.1080/09571731003663614	Japanese ESL students from a language school, 20 adult EL1	English, Japanese	English	n/a	42 total (22 Japanese ESL learners, 20 EL1)	1. English receptive morphological awareness (word segmentation task) 2. English productive morphological awareness (affix elicitation task) 3. English receptive vocabulary (vocabulary levels test) 4. English productive vocabulary (productive version of the vocabulary levels test)	Bivariate correlation	United Kingdom
63	Hayashi, Y., & Murphy, V. A. (2013). On the nature of morphological awareness in Japanese–English bilingual children: A cross-linguistic perspective. *Bilingualism: Language and Cognition*, *16*(1), 49–67.	Japanese ESL and Japanese Heritage Learners (JHLs) attending mainstream primary and secondary schools. Recruited	Japanese	English	n/a	45 total (24 Japanese ESL, 21 JHL). Participants aged 7-14	1. Non-verbal IQ (Raven's Educational – Standard Progressive Matrices Plus (SPM+) (Raven, Rust & Squire, 2008)) 2. English morpheme recognition (Word segmentation task) 3. English morpheme production (Word analogy task) 4. Japanese morpheme recognition (Japanese word segmentation task) 5. Japanese morpheme production (Japanese word analogy task) 6. English receptive vocabulary (BPVS-II) 7. English expressive vocabulary (TOWK) 8. Japanese receptive vocabulary (Test of Japanese Language Abilities (TJLA; Ono et al., 1989))	Bivariate correlation Structural equation modelling	United Kingdom

	https://doi.org/10.1017/S1366728912000181	from multiple sources including Saturday schools, Japan- related organisations, societies, and word-of-mouth					9. Japanese expressive vocabulary (experimental measure, Test of Japanese Expressive Vocabulary (TJEV))  		
64	Carlo, M. S., August, D., Mclaughlin, B., Snow, C. E., Dressler, C., Lippman, D. N., … White, C. E. (2004). Closing the gap: Addressing the vocabulary needs of English-language learners in bilingual and mainstream classrooms. *Reading Research Quarterly*, *39*(2), 188–215.	Grade 5 bilingual and monolingual pupils from mainstream and bilingual programs	English, Spanish	English	n/a	254 total (169 treatment of which 94 EAL, 75 EL1, 85 control, of which 48 EAL, 37 EL1)	1. Morphological awareness (adaptation of extract the base task, Carlisle, 1988) 2. Receptive vocabulary (PPVT-R)	Bivariate correlation	USA

	https://doi.org/10.1598/RRQ.39.2.3								
65	Wang, M., Cheng, C., & Chen, S.-W. (2006). Contribution of Morphological Awareness to Chinese-English Biliteracy Acquisition. *Journal of Educational Psychology*, *98*(3), 542–553.	Chinese immigrant children living in the USA in grades 2 and 4 who attend mainstream public school during the week and Chinese classes on the weekend	Chinese, English	English	n/a	64 Chinese EAL (38 Grade 2, 26 Grade 4)	1. English morphological awareness (compound structure task, derivational morphology task) 2. English receptive vocabulary (PPVT-III) 3. Chinese morphological processing (Chinese compound structure task, Chinese derivational morphology task, homophone identification task) 4. Chinese receptive vocabulary (translated form of PPVT-III)	Bivariate correlation	USA
66	Wang, M., Ko, I. Y., & Choi, J. (2009). The importance of morphological awareness in Korean–English biliteracy acquisition. *Contemporary Educational Psychology*, *34*(2), 132–142. https://doi.org/10.1016/j.cedpsych.2008.12.002	Korean children attending mainstream schools as well as Korean heritage language schools	Korean	English	n/a	65 Korean L1 EAL (22 Grade 2, 19 Grade 3, 24 Grade 4)	1. English morphological awareness (derivational morphology task based on Carlisle, 2000) 2. Korean morphological awareness (Korean equivalent of English morphological awareness task) 3. English receptive vocabulary (PPVT-III) 4. Korean receptive vocabulary (translated items from PPVT-III)	Bivariate correlation	USA

Appendix 2.2: Chance analysis on Nation's (1990) Levels Test as used in Cameron (2002)

Response 1	**C (1/6)**	I_0 (3/6)	I_2 (1/6)	I_3 (1/6)
Response 2	**C (1/5)** I_0 (3/5) I_3 (1/5)	**C (1/5)** I_0 (2/5) I_1 (1/5) I_3 (1/5)	I_0 (3/5) I_1 (1/5) I_3 (1/5)	**C (1/5)** I_0 (3/5) I_1 (1/5) **Key** Correct = C Incorrect and no other answer = I_0 Incorrect and answer 1 = I_1 Incorrect and answer 2 = I_2 Incorrect and answer 3 = I_3
Response 3	**C (1/4)** I_0 (3/4) **C (1/4)** I_2 (1/4) I_0 (2/4) I_2 (1/4) I_0 (3/4)	**C (1/4)** I_1 (1/4) I_0 (2/4) **C (1/4)** I_2 (1/4) I_1 (1/4) I_0 (1/4) **C (1/4)** I_2 (1/4) I_0 (2/4) I_0 (2/4) I_1 (1/4) I_2 (1/4)	**C (1/4)** I_0 (2/4) I_1 (1/4) **C (1/4)** I_0 (3/4) I_1 (1/4) I_0 (3/4)	I_1 (1/4) I_0 (3/4) I_0 (2/4) I_1 (1/4) I_2 (1/4) I_2 (1/4) I_0 (3/4)
Unweighted formula	(1/6*1/5*1/4)+(1/6*1/5*3/4)+ (1/6*3/5*1/4)+(1/6*3/5*1/4)+ (1/6*3/5*2/4)+(1/6*1/5*1/4)+ (1/6*1/5*3/4) +	(3/6*1/5*1/4)+(3/6*1/5*1/4)+ (3/6*1/5*2/4)+(3/6*2/5*1/4)+ (3/6*1/5*1/4) +	(1/6*3/5*1/4)+ (1/6*1/5*1/4) +	(1/6*1/5*1/4)+ (1/6*1/5*3/4) **=49/120**
Weighted formula	**3**(1/6*1/5*1/4)+**2**(1/6*1/5*3/4)+ **2**(1/6*3/5*1/4)+(1/6*3/5*1/4)+ (1/6*3/5*2/4)+(1/6*1/5*1/4)+ (1/6*1/5*3/4) +	**2**(3/6*1/5*1/4)+(3/6*1/5*1/4)+ (3/6*1/5*2/4)+(3/6*2/5*1/4)+ (3/6*1/5*1/4) +	(1/6*3/5*1/4)+ (1/6*1/5*1/4) +	(1/6*1/5*1/4)+ (1/6*1/5*3/4) **=60/120**
Final formula	**6(60/120) = 3**			

Appendix 3.1: Piloting phase

Pilot study one

The first pilot study was carried out in November 2014 in an all-boys grammar school in the south of England. There were a total of 12 participants 6 of whom were EL1 year 8 pupils and 6 of whom were EAL year 8 pupils. The aim of the first pilot study was to increase familiarity with the timing, administration, and scoring of all but one of the standardised instruments, the Phonological Assessment Battery (PhAB) (Frederickson et al., 1997). This test was not available at the time.

As the aim of this pilot study was not to statistically analyse any data generated by these instruments, it is not considered of consequence that the participants of this study did not include any year 10 pupils, nor that they were taken from a grammar school where characteristics such as IQ and socioeconomic status were likely to be statistically significantly different to participants included in the main study.

Pilot study two

The second pilot study took place in January 2015 in a mixed-sex state school in the south east of England. There were a total of 45 participants, 28 of whom were in one year 8 class (15 EL1 and 13 EAL), and 17 of whom were in one year 10 (9 EL1 and 8 EAL) class. The aim of this pilot study was twofold. One objective was to increase familiarity with the administration and scoring of the Phonological Assessment Battery (PhAB) (Frederickson et al., 1997), as this was not available during pilot study one. Specifically, the aim was to discover which, if any, of the three subtests of phonological awareness (Alliteration, Rhyme, and Spoonerisms) would be appropriate to administer to year 10 participants. This step was necessary as the manual of the PhAB states that the test is designed for pupils aged up to 14 years old and some year 10 participants may be 15 years old at the time of administration.

Furthermore, this pilot study aimed to administer to participants with similar characteristics to those in the main study (year 8 EL1 and EAL, and year 10 EL1 and EAL) two unstandardised instruments designed to test morphological awareness in English and morphological awareness in French (Morphological Decomposition test- English and Morphological Decomposition test- French). This step was of paramount importance so that any problematic items in these two tests, including practice items, could be identified. Moreover, the piloting of these instruments ensured that an effective and standardised way to explain the two tests to pupils in a class setting could be developed. In addition, the time to administer each test could be determined, and the data generated by these tests could be analysed to see if they would produce enough statistical variability to discern between different levels of morphological awareness with these participants. All 45 participants were administered the two tests of morphological awareness, however due to time constraints the PhAB was only administered to 10 year 8 pupils (5 EL1 and 5 EAL), and 11 year 10 pupils (6 EL1, and 5 EAL).

Changes made to tests as a result of pilot study two

As a result of this pilot study, several changes were made to the Morphological Decomposition test-English. Firstly, one practice item which included the prefix 'post' was deleted. This step was taken as 'post' can either be a prefix or a base in itself, and therefore was deemed to be an item which hindered the understanding of the task. Furthermore, there were many items which were changed as they included a string of letters which when viewed in the written mode resembled real bases in English. These included item 17 'sharpeen' which was changed to 'marpeen', item 16 'dottle' which was changed to 'fottle' item 19 'bindowe' which was changed to 'cindow', item 22 'oversploathe' which was changed to 'overspleet', item 2 'unstrench' which was changed to 'untench', item 6 'disphlaunch' which was changed to ‘disphaunch’, and item 29 ‘ultrasplaunch’ which was changed to ‘ultramaunch’.

With regard to the Morphological Decomposition test-French, the acute accent on the first e of item 8 ‘remone’ was removed, as was the acute accent on the first e of item 11 ‘replone’. This step was taken as an e acute accent would only have been phonologically legal in these two cases if the initial e had been followed by a vowel, as in the word ‘réaliser’ for example.

Lastly, with regard to both morphological decomposition tests, the task was changed slightly in order to require participants to circle potential affixes instead of underlining them. Moreover, the presentation of practice and test items on the page was altered slightly to include 4-point spacing between characters. These steps were taken as during the pilot study it was found that the underlining of letters in words which had single spacing between characters led to ambiguity with regard to the choice of letters which make up an affix. By taking these steps it became much clearer to see which letters participants selected as part of the affix, thereby reducing measurement error.

With regard to explaining the task to pupils, all 45 participants were administered the two tests of morphological awareness. After administration, any questions were answered and pupils were asked about the best way to explain the task. The teachers of the year 8 and year 10 classes were also involved in this discussion. This process resulted in the instructions seen in the present form of the two tests of morphological awareness.

Results of pilot study two

Table 1: Mean (standard deviations) for the raw scores of the subtests of the Phonological Assessment Battery (PhAB) in pilot study two

Group	Alliteration (10)	Rhyme (21)	Spoonerisms (30)
Year 8 English NS (5)	7.80 (1.30)	16.80 (1.64)	19.00 (1.64)
Year 8 English EAL (5)	7.80 (0.84)	15.60 (2.07)	18.00 (2.74)
Year 8 total (10)	7.80 (1.03)	16.20 (1.87)	18.50 (3.24)
Year 10 English NS (6)	9.83 (0.41)	20.67 (0.82)	22.33 (2.16)
Year 10 EAL (5)	10.00 (0.00)	20.60 (0.55)	21.60 (1.34)
Year 10 total (11)	9.91 (0.30)	20.64 (0.67)	22.00 (1.79)

Table 1 presents the means and standard deviations of 10 year 8 pupils (5 English NS and 5 EAL), and 11 year 10 pupils (6 English NS, and 5 EAL), as tested on all subtests of the PhAB. As shown by the standard deviations and raw scores, there is a clear ceiling effect apparent at year 10 for the alliteration and rhyme subtests. As a result, only the spoonerisms subtest of the PhAB was used as a measure of phonological awareness in this study.

Table 2: Mean (standard deviations) for the Morphological Decomposition test English and the Morphological Decomposition test-French in pilot study two

Group	Morphological Decomposition test English (30)	Morphological Decomposition French (30)
Year 8 English NS (15)	16.73 (5.20)	9.20 (2.46)
Year 8 English EAL (13)	19.69 (5.54)	12.08 (2.93)
Year 8 total (28)	18.11 (5.47)	10.54 (3.01)
Year 10 English NS (9)	20.33 (3.28)	13.11 (2.47)
Year 10 EAL (8)	23.63 (4.14)	12.88 (8.35)
Year 10 total (17)	21.88 (3.97)	13.00 (2.87)

As Table 2 shows, there was good variability on both tests for both age groups and across language status with no discernible ceiling or floor effect. As a result of this finding, both tests were used in the main study.

Pilot study three
The third pilot study took place in March 2015 at School 1. There were a total of 10 participants, 5 of whom were year 8 pupils and 5 of whom were year 10 pupils. There were four aims of this pilot study, the first of which was to discover if an unstandardised test of French receptive vocabulary knowledge, the French 1k Levels test, would produce data with enough variability which could discern between the different levels of receptive French vocabulary knowledge represented by year 8 and year 10 participants taken from the same population as participants in the main study.

Moreover, this pilot study allowed for the identification of any problematic items, including practice items. It also allowed a determination of how long the test would take. Lastly, there was an opportunity to observe French classes and converse with teachers of participants who would make up the main study. This was done in order to discover more about the amount of French vocabulary learning which happened within a school year.

Changes made to tests and research design as a result of pilot study three
As a result of piloting the French 1k Levels test, two items were changed. Firstly, the multimorphemic verb 'prévendre' (to pre-sell) was changed. This step was taken as even though 'prévendre' is attested to in French, it is more usually seen in the nominal form 'prévente'. Consequently, in order to increase content validity, the multimorphemic verb 'préchauffer' (to pre-heat) was used instead. Secondly, the monomorphemic noun 'nuit' (night) was changed as it was considered an English cognate. This item was replaced with another monomorphemic noun, 'bois' (wood).

Furthermore, as a result of observations and conversations it was decided that a two time-point longitudinal research design would not be appropriate for this study as there would likely be no significant difference between the two time points on any measure of receptive French vocabulary knowledge. Consequently, the research design was changed to a cross-sectional one so that the strength of association between morphological awareness in English and French receptive vocabulary knowledge could be analysed with year group (year 8 and year 10) as the between-participant factor.

Results of pilot study three

Table 3: Mean (standard deviations) for the test of French receptive vocabulary in pilot study three

Group	**French 1k levels test (30)**
Year 8 (5)	11.00 (4.09)
Year 10 (5)	20.50 (2.41)

As Table 3 shows, there was good variability for both age groups with no discernible ceiling or floor effect. Therefore, the French 1k levels test was used in the main study.

Summary of piloting phase

Table 4 summarises the piloting phase of this study:

Table 4: A summary of the aims, sites, participants, and instruments of the piloting phase

Pilot study	Aims	Site	Participants	Instruments
One – November 2014	Familiarisation with administration, scoring, and timing of standardised instruments	All boys' grammar school in south of England	12 year 8 participants (6 EL1, 6 EAL)	Backwards digit recall subtest of Wechsler Intelligence Scale for Children Revised (WISC-R) Pseudoword decoding subtest of Wechsler Individual Achievement Test – Second UK Edition (WIAT-II UK) Non-verbal IQ subtest of Wechsler Abbreviated Scale of Intelligence 2nd Edition (WASI II) British Picture Vocabulary Scale third edition (BPVS3) Productive vocabulary subtest of Test of Word Knowledge (TOWK)
Two – January 2015	Determining suitability of tests of phonological awareness and unstandardised tests of English and French morphology. Familiarisation with administration, scoring, and timing of these tests	Mixed-sex state school in the south east of England	45 participants, 28 of whom were in year 8 (15 EL1 and 13 EAL), and 17 of whom were in year 10 (9 EL1 and 8 EAL)	Phonological assessment battery (PhAB) Morphological Decomposition test-English Morphological Decomposition test-French
Three – March 2015	Determining suitability of unstandardised test of French receptive vocabulary. Familiarisation with administration, scoring, and timing of this test	Large mixed-sex state school in East Anglia	10 participants, 5 of whom were in year 8 and 5 of whom were in year 10	French 1k Levels test

Appendix 3.2: Letter to schools

University of Oxford
Department of Education
15 Norham Gardens, Oxford OX2 6PY
Director: Professor Ernesto Macaro
Tel: +44 (0)1865 274024   Fax: +44 (0)1865 274027

[Head teacher name]
[School name and address]

[Date]

Dear [Head teacher name],

My name is Adam Unthiah and I am a doctoral research student at the University of Oxford in the Department of Education supervised by Professor Victoria Murphy (Professor in Applied Linguistics and Second Language Acquisition). I am writing to enquire about conducting some research in your school during this academic year. In my research project, “The role of crosslinguistic morphological awareness in predicting French vocabulary knowledge for learners of English as an Additional Language (EAL) and English native speakers in the modern foreign language (MFL) classroom in England”, I will explore the role of one aspect of word recognition, morphological awareness, in predicting French vocabulary knowledge in the modern foreign language classroom.

The research will take place with year 8 and year 10 classes learning French which have a high proportion of pupils whose first language is not English. By participating in the research, your school would be contributing to a project that will deepen our knowledge of French vocabulary learning, for both English native speakers and EAL pupils. Consequently, this research could prove to be extremely useful for schools and classrooms which have a large diversity of languages, cultures, and ethnicities. In addition, when carrying out this research I will be more than happy to give back any time to teachers that they spend working with me by carrying out any jobs that may be of help, or by presenting my research at a staff meeting.

If you decide to take part in this study, consent letters will be sent to the parents or guardians of all year 8 and year 10 pupils excluding those who have a statement of SEN, and those EAL pupils who did not arrive in the country before year 7. For those pupils whose parents return consent forms they will be administered two group tests in one of their French lessons which should last about 30 to 40 minutes in total. After the group tests each pupil whose parents have consented will also be administered a battery of tests during a one-on-one testing session which will last approximately 50 minutes. The whole testing period should run from January to the end of the school year, however I would of course be open to flexibility in the administration of tests due to exams for example.

Oxford University has strict ethical procedures on conducting ethical research with teachers and young people, consistent with current British Educational Research Association guidelines. Before beginning the research, I would inform parents and guardians about the research and offer the students, parents and guardians the opportunity to refuse to participate. Throughout the research students, parents and guardians will be able to refuse to participate at any time.

All participants, including students, teachers and the school, would be made anonymous in all research reports. The data collected would be kept strictly confidential, available only to my supervisor and myself, and not used other than specified without the further consent of all involved being obtained. I have an enhanced DBS (formerly known as CRB) check from March 2014 but this could be renewed in January if you felt it appropriate.

If you feel you would like to take part in the study, or need more information about what is involved, please feel free to contact either myself (mobile number: 07958707907, email: adam.unthiah@education.ox.ac.uk) or my supervisor, Professor Victoria Murphy (phone number: 01865 274042, email: victoria.murphy@education.ox.ac.uk).

Thank you for your time and attention. I look forward to hearing from you.

Yours sincerely,

Adam Unthiah

Appendix 3.3: Information for parents and guardians

University of Oxford
Department of Education
15 Norham Gardens, Oxford OX2 6PY
Director: Professor Ernesto Macaro
Tel: +44 (0)1865 274024   Fax: +44 (0)1865 274027

[Date]

Dear Parent or Guardian,

Your child's school has agreed to take part in a research study. I am writing to invite your child to take part in my research project with the rest of his of her French class. I hope that your child will want to take part in the research, but before you decide, it is important that you understand what it will involve. Please take some time to read through the information on this sheet.

What is the research project about and who is running the project?
The project is about how pupils in year 8 and year 10 learn French vocabulary.
I am a research student studying a PhD at the Department of Education, University of Oxford. A more experienced researcher, Professor Victoria Murphy, who is Lecturer in Applied Linguistics at the Department of Education, is supervising my research.

What will my child be asked to do?
Your child will be asked to fill in a questionnaire about their demographic and language background. Your child will be asked to perform a series of verbal and non verbal IQ tests individually, and two written tests in a French class. The normal classroom teacher will oversee the administration of the tests in the French class. The results of these tests will not affect your child's education in any way and the results will not be used by your child's French teacher.

Ethics
Any research with young people needs to be conducted with care and sensitivity. My research will follow the strict guidelines required by the University of Oxford and the British Educational Research Association. Your child's school has agreed to participate in the research. Taking part in this research is completely voluntary. You and your child are free to say you do not want to participate. Your child will be free to withdraw from the research at any point, without giving any reason. This would not affect your child's education in any way. All the data collected in the study will be made anonymous. No one will see the data other than me and my supervisor. My notes and all other data will be stored in a locked office at Oxford University and on a password-controlled server.

I will send a brief report on the research to your child's school at the end of the project, and you are welcome to see this. I will not identify the school, teacher or any students in any reports of the research. I will write the research up for my PhD thesis. Once I have submitted it, the University library will hold a print copy. In addition, a digital copy may be held in the University's online archives.

What next?

If you would like to ask any questions about the project before and during the study, please contact me. My email address is adam.unthiah@education.ox.ac.uk My mobile phone number is 07958707907. I will be happy to talk with you in more detail. You may also contact my supervisor Professor Victoria Murphy by email at victoria.murphy@education.ox.ac.uk or by phone on 01865 274042.

If you would like your child to be included in the research, please sign and return the attached form. The form should be returned to your child's French teacher.

Thank you for your help,
Yours sincerely,

Adam Unthiah

Appendix 3.4: Consent form

University of Oxford
Department of Education
15 Norham Gardens, Oxford OX2 6PY
Director: Professor Ernesto Macaro
Tel: +44 (0)1865 274024 Fax: +44 (0)1865 274027

OPT IN FORM

If you want your child to participate in this research, please fill out the form below and return it to the school. If we do not receive an opt-in form from you, your child will not be included in the study.

I give permission for my child to take part in the above study.

Name of child:

____

Name of parent/guardian:

____

Signature: ______________________________________

Date:________________________

Appendix 3.5: Language Background Questionnaire (LBQ)	
What languages can you speak? **Who else lives with you at home?** Mum/Caregiver 1 Dad/Caregiver 2 Brothers Sisters Anybody else? Tick:	
A. INTERPERSONAL INTERACTION	
A1. Which language does your Mum/Caregiver 1 speak at home?	**Score (circle)**
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
A2. Which language does your Dad/Caregiver 2 speak at home?	
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
A3. Which language do you use when you talk with your Mum/Caregiver 1?	
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
A4. Which language do you use when you talk with your Dad/Caregiver 2?	
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
(If any other adults reported to live with the child answer A5. If not, go to Question A6).	

A5. Which language do you use when you talk with any other adults who live at home?	
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
A6. What language do you use when you talk with your brothers and sisters?	
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
A7. Overall, what language do you hear the most in your home?	
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
A8. Are there any other children in this school who speak (insert L1)? Yes No (If Yes, complete Question A8a. If No, go to Question A8b).	
A8a. Which language do you use in the playground with other children who speak (insert L1)?	
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
A8b. Do you know any other children outside your family who speak (insert L1)? Yes No (If Yes, complete Question A8c. If No, go to Section B).	

A8c. Which language do you speak with these children?	
i. Always/Mostly English	1
ii. English and L1 equally	2
iii. Mostly L1	3
Other	
Section A Total: Total Score/(Number of Times Points Awarded x 3) =	
B: L1 MEDIA EXPOSURE	
B1. Do you ever watch television or films in (insert L1)? Yes No (If Yes, complete Question B1a. If No, go to Question B2).	
B1a. Do you watch more English or (insert L1) television and films?	
i. More English	1
ii. Both Equally	2
iii. More L1	3
B2. Do you ever hear the radio in (insert L1) Yes No (If Yes, complete Question B2a. If No, go to Question B3).	
B2a. Do you hear more English or (insert L1) radio?	
i. More English	1
ii. Both Equally	2
iii. More L1	3
B3. Do you ever listen to music in (insert L1) Yes No (If Yes, complete Question B3a. If No, go to Section C).	
B3a. Do you listen to more English or (insert L1) music?	
i. More English	1
ii. Both Equally	2
iii. More L1	3
Section B Total: Score / 9 =	
SECTION C: COMPUTER USE	
C1. Do you ever use a computer outside school?	

Yes No (If Yes, complete Question C1a, b and c. If No, go to Question D1.)	
C1a. Do you ever use a computer for computer games? Yes No (If Yes, complete Question C1a1 and C1a2. If No, go to Question C1b.)	
C1a1. Do you ever play English computer games?	
i. Never	0
ii. Sometimes iii. Often	1 2
C1a2. Do you ever play (insert L1) computer games?	
i. Never	0
ii. Sometimes	1
iii. Often	2
C1b. Do you ever use a computer for staying in touch with family? (e.g. email; social networking; skype) Yes No (If Yes, complete Question C1b1 and C1b2. If No go to question C1c).	
C1b1. When you use a computer to stay in touch with family, do you ever use English?	
i. Never	0
ii. Sometimes	1
iii. Often	2
C1b2. When you use a computer to stay in touch with family, do you ever use (insert L1)?	
i. Never	0
ii. Sometimes	1
Iii. Often	2
C1c. Do you ever use a computer for staying in touch with friends? Yes No (If Yes, complete Question C1c1. If No, go to Question C1d).	
C4c1. When you use a computer to stay in touch with friends, do you ever use English?	

i. Never	0
ii. Sometimes	1
iii. Often	2
C4c2. When you use a computer to stay in touch with friends, do you ever use (insert L1)?	
i. Never	0
ii. Sometimes	1
iii. Often	2
C1d. Do you ever use a computer for looking at websites (e.g. youtube)? Yes No (If Yes, complete Questions C1d1 and C1d2. If No, go to Section D).	
C1d1. Do you ever look at websites in English?	
i. Never	0
ii. Sometimes	1
iii. Often	2
C1d2. Do you ever look at websites in (insert L1)?	
i. Never	0
ii. Sometimes	1
iii. Often	2
Section C. English: Score = Light Grey Score/8=	
Section C. L1: Score = Dark Grey Score/8 =	
Section Total: (Light Grey + Dark Grey Score)/16=	

SECTION D. HOME PRINT EXPOSURE

D1. Do your parents ever buy any newspapers or magazines? Yes No (If Yes, complete Question D1a and D1b. If No go to Question D2).	
D1a.Do your parents ever buy English newspapers or magazines?	
i. Never	0
ii. Sometimes	1
iii. Often	2

D1b.Do your parents ever buy (insert L1) newspapers or magazines?	
i. Never	0
ii. Sometimes	1
iii. Often	2
D2. Are there any books in your home? Yes No (If Yes complete Questions D2a and D2b. If No go to Section E).	
D2a. Are there any books in English at home? Yes No (If Yes go to Question D2a1. If No go to Question D2b).	
D2a1. How many books in English are in your home?	
Less than 10	1
More than 10	2
D2b. Are there any books in (insert L1) at home? Yes No (If Yes go to Question D2b1. If No go to Section E).	
D2b1. How many books in (insert L1) are in your home?	
Less than 10	1
More than 10	2
Section D. English: Score = Light Grey Score/4 =	
Section D. L1: Score = Dark Grey Score/4 =	
Section D. Total: (Light Grey + Dark Grey Score)/8 =	
SECTION E. NON-ENGLISH LITERACY	
E1. Are you learning to read (insert L1)? Yes No (If Yes complete Questions E1a and E1b. If No, ask whether child is learning to read in any other language apart from English and L1. If Yes, complete sections E1a and b/F where appropriate. If no, finish here).	
E1a. Who teaches you?	
i.Family member	
ii.Non family member who comes to the home	
iii.Other language class (provide explanation)	
E1b. How often do they teach you?	
i.More than once a week	4
ii.Once a week	3

iii.Once a month or more	2
iv.Less than once a month	1
Section E Total: Total Score/4 =	
SECTION F: LANGUAGE FOR RELIGIOUS PURPOSES	
Language being learned:	
F1a. Who teaches you?	
i.Family member	
ii.Someone who comes to the home	
iii.Other language class (provide explanation)	
F1b. How often do they teach you?	
i.More than once a week	4
ii.Once a week	3
iii.Once a month or more	2
iv.Less than once a month	1
Section F Total: Total Score/4 =	

Appendix 3.6: Background Information Questionnaire

Name: **Date of birth:** **Today's date:** **Postcode:**

Boy/girl: **Class:** **Teacher:**

Did you learn French before year 7? Yes ____ No_____

If yes, how many years did you learn French before year 7? ______

Do you have any help with French at home? Yes ____ No_____

Have you ever visited France or a French-speaking country? Yes ____ No_____

Was it a school trip? Yes ____ No_____

Was it family holidays? Yes ____ No_____

Do you know any French people outside school who you can speak a little French with? Yes ____ No_____

Are you learning another foreign language besides French at school?
Yes ____ No_____

If so, which one? ____________________

Do you plan to continue with French to GCSE? Yes ____ No_____ Not sure _____

For the following questions please place an x in the box that best represents your opinion for example, |__|_X_|__|__|__|__| or |__|__|__|__|__|_X_|

In French classes

I have fun I |__|__|__|__|__|__| get bored

I learn a lot |__|__|__|__|__|__| I don't learn much

Appendix 3.7: Morphological Decomposition test-English Name:

You will be presented with a list of words which are not real. Some of the words are formed of one part and some words are formed of two parts. For the words which are formed of two parts, one part of the word will carry the main meaning of the word. This is called the **base**. The second part will modify the meaning of the word. This is called the **affix**. The affix can appear **either at the beginning or at the end** of the word. All of the affixes in this test are real affixes so you will be able to recognise them.

For each word, I would like you to firstly decide how many parts each word has by identifying if an affix is present. Secondly, I would like you to circle the affix if it is present. If no affix is present, leave the word as it is. Before you decide if a word has an affix or not I will read the word out aloud so you can hear what it sounds like.

Practice questions

a. c o r u t e

b. s t r o a t h m e n t

c. s t r o p e e t

d. d r a i t e r

e. l e n u r e

Test questions

1. d i s p h r a s q u e
2. u n t e n c h
3. s p l e e t h i n g
4. p h e a l i r e
5. u n s p l o u r s e
6. d i s p h a u n c h
7. m e p r o a n
8. s p e a d o w
9. s t r u i k t i o n
10. t h r a u n t s h i p
11. o v e r s p r o i g n
12. p h r y m p h t i o n
13. m e r i c k e l l
14. d o a r s t u r k e
15. s p l o l v e n c e
16. f o t t l e
17. m a r p e e n
18. s p l e e c e n c e
19. c i n d o w
20. a n t i s p r e e c h
21. p h r o u n t a t e
22. o v e r s p l e e t
23. a n t i t h r u l g e
24. s t r o t c h a t e
25. f e n t g i d
26. u l t r a s p l a u n c e
27. m e p r a d e
28. s c r e r s i n g
29. u l t r a m a u n c h
30. s c r a u l t s h i p

Appendix 3.8: Development, reliability, and validity statistics of the Morphological Decomposition test-English

Development

There were four main stages to the development of the Morphological Decomposition test-English. Firstly, the mode of the task was chosen. It was decided that the task should be a written one with instructions given both on the task sheet and orally. This ensured not only that any misunderstandings with regard to task demands were minimised, but also that the task had ecological validity as participants at School 1 were used to receiving instructions and completing tests both in the written and in the oral mode. Furthermore, the combination of written and oral instructions minimised the prospect of a reliance on either phonological awareness or decoding skills whilst also allowing the task to be administered in a group setting.

Secondly, the format of the task was chosen. Although there exist some morphological decomposition tasks which have used sentences to prime participants' responses (e.g. Carlisle, 2000; Kieffer & Lesaux, 2012a), the presence of a sentence may introduce error into the measurement of derivational morphological awareness by providing participants with clues about the type of word which is required. For example, when a blank is preceded by the indefinite article, this indicates that the required word is most probably a noun. Moreover, the use of a sentence in a morphological decomposition task does not make theoretical sense as the purpose of the instrument is to test the ability of a participant to identify the component morphemes of a multimorphemic word, not to test the ability of a participant to respond to clues outwith the word in order to identify separate morphemes. Furthermore, the inclusion of sentences might involve the confounding variable of memory as participants who remember certain sentences they have heard, or seen written down, might be at an advantage to those who do not remember or have not been exposed to the same sentences. Consequently, only single word items were used.

Thirdly, test items were chosen. A selection of monomorphemic as well as multimorphemic words was required in a test of derivational morphological awareness, in order to assess the ability of participants to determine the segmentability of words. Furthermore, a mixture of prefixed and suffixed words was required in order to reflect the reality of the English language having two positions where an affix can join the base. Consequently, a total of 30 items were chosen, 10 of which were prefixed, 10 of which were suffixed, and 10 of which were monomorphemic (c.f. Appendix 3.9).

Moreover, as demonstrated in other tests of morphological decomposition (e.g. Kieffer & Box, 2013; Kieffer & Lesaux, 2012b), the use of pseudowords negates the confound variables of cognates and semantic knowledge in tests of morphological awareness. Therefore, items composed of a pseudo-base and a real affix were chosen. Bases were chosen using the ARC Nonword Database (Rastle, Harrington, & Coltheart, 2002). This database was chosen as it produced a phonetic output of each pseudo-base thereby serving as a pronunciation guide. In addition, all pseudo-bases in monomorphemic words (i.e. pseudo-base only words) were di- or trisyllabic in order to negate the possibility of correctly identifying a monomorphemic word by syllabification.

With regard to the choice of affixes, five prefixes and five suffixes were chosen. The prefixes chosen were: i dis; ii un; iii over; iv anti; v ultra. The suffixes chosen were: i ing; ii tion; iii ship; iv ate; v ence. Each affix was then used in two separate items to make 10 prefixed words and 10 suffixed words. An affix was chosen if it was deemed to still be productive in contemporary English and so that there was no overlap with affixes used in the practice items of the Morphological Decomposition test-English or in any of the items used in the Morphological Decomposition test-French (c.f. section 3.4.10). This last step was taken in order to minimise any practice effect. There was, however, one affix ('co') that was used as a practice item in both versions of the Morphological Decomposition tests.

Lastly, the test was piloted. The pilot acted as a check to determine whether there was a problem with any particular item, to approximate the length of time participants would take to complete the test, to discover a standardised way of explaining and administering the test to participants of a similar age group to the ones who took part in the main study, and to choose practice items. For a description of the changes which were made to the test after it was piloted, see Appendix 3.1.

Reliability and validity

After administering the Morphological Decomposition test English to all 177 participants, Cronbach's alpha coefficients were calculated for each of the four groups in this study. These values are shown in Table 1:

Table 1: Cronbach's alpha coefficients for the Morphological Decomposition test English

Group	Cronbach's alpha coefficient
Year 8 EL1 (n=49)	0.75
Year 8 EAL (n=47)	0.72
Year 10 EL1 (n=41)	0.75
Year 10 EAL (n=40)	0.80

As Table 1 shows, all of the four standardised Cronbach's alpha coefficients are greater than 0.7 and for the Year 10 EAL group it is 0.80. A cut off value of 0.7 is generally considered to be acceptable for ability tests (Kline, 2000) such as this one and consequently the Morphological Decomposition test English is deemed to have good reliability.

With regard to validity, the test has good ecological validity as participants in School 1 were used to receiving instructions and completing tests both in the oral and in the written mode. Furthermore, in order to assess divergent validity, a Pearson product-moment correlation coefficient was computed based on the results from all 177 participants in the main study in order to assess the relationship between the Morphological Decomposition test-English and the Morphological Decomposition test-French.

It was expected that for EAL pupils there would be a strong positive correlation between both tests of morphological awareness due to a similar level of morphological awareness across two languages which are not their L1. In contrast, for EL1 participants a weak correlation was expected between the two tests due to differing levels of morphological awareness between a modern foreign language and their L1. The Pearson product-moment correlation coefficient for the two tests of morphological awareness are shown in Table 2:

Table 2: Pearson's product-moment correlation coefficients for the Morphological Decomposition test – English and Morphological Decomposition test – French

Group	Pearson's coefficient
Year 8 EL1 (n=49)	-.24
Year 8 EAL (n=47)	-.12
Year 10 EL1 (n=41)	.19
Year 10 EAL (n=40)	.33*

*Correlation coefficient is significant at the .05 level (2-tailed)

Table 2 shows that there was a positive and significant correlation between scores on the two tests of morphological awareness for year 10 EAL pupils only. Consequently, in the case of year 10 EAL pupils there is some evidence of convergent validity, whilst the lack of significant correlation for EL1 pupils may be interpreted as evidence for divergent validity. However, the non-significant correlation for year 8 EAL pupils, indicates that these two tests may be measuring different constructs.

On the other hand, it is accepted that the Morphological Decomposition test-English is an unstandardised test, and these reliability and validity statistics have only been calculated on a relatively small, unstratified sample. Therefore, any conclusions made from data generated by these instruments will take this into account.

Appendix 3.9: Categorisation of items in Morphological Decomposition test- English

Monomorphemic	**Prefixed**	**Suffixed**
phealire	disphrasque	spleething
meproan	disphaunch	scrersing
speadow	unsplourse	thrauntship
merickell	untench	scraultship
doarsturke	oversproign	splolvence
fottle	overspleet	spleecence
marpeen	antispreech	phrountate
cindow	antithrulge	strotchate
fentgid	ultrasplaunce	struiktion
meprade	ultramaunch	phrymphtion

Appendix 3.10: Morphological Decomposition test French **Name:**

Practice questions

a. cotroude

b. coubreuse

c. troussein

d) strufesque

e) demiblus

Test questions

1. précône
2. démane
3. shonage
4. féllocke
5. békdas
6. tronage
7. chomipé
8. remone
9. fiscère
10. boloube
11. replone
12. sanneur
13. mécoune
14. prépone
15. pantisme
16. hornuge
17. bédoin
18. boncisme
19. béroude
20. soubouve
21. fidible
22. dérande
23. souplond
24. bouvible
25. douveur
26. méfame
27. birique
28. dovène
29. moutord
30. valique

Appendix 3.11: Development, reliability, and validity statistics of the Morphological Decomposition test-French

Development

Development of this test was carried out in conjunction with the development of the Morphological Decomposition test-English (c.f. section 3.4.9.1) and the French 1k Levels test (c.f. section 3.4.11.1). As a result, the modality and format of the Morphological Decomposition test-French were developed based on the same reasoning as these tests. With regard to test items, this test is composed of the same ratio of multimorphemic to monomorphemic items, and prefixed to suffixed items, as the Morphological Decomposition test-English, in order to avoid task effects. Therefore, a total of 30 items were chosen, 10 of which were prefixed, 10 of which were suffixed, and 10 of which were monomorphemic (c.f. Appendix 3.12).

Furthermore, as with the Morphological Decomposition test-English, multimorphemic items were composed of a pseudo-base and a real affix. Bases were chosen using the multilingual pseudoword generator Wuggy (Keuleers & Brysbaert, 2010). This database was chosen as it enabled the production of di- or trisyllabic pseudo-bases, and was comprised of a French-specific language module which meant that all of the pseudo-bases produced by the program were phonologically legal in the French language. As with the Morphological Decomposition test-English all pseudo-bases in monomorphemic words were di- or trisyllabic in order to negate the possibility of correctly identifying a monomorphemic word by syllabification.

With regard to the choice of affixes, five prefixes and five suffixes were chosen. The prefixes chosen were: i pré; ii dé; iii re; iv mé; v sou. The suffixes chosen were: i age; ii eur; iii isme; iv ible; v ique. Each affix was then used in two separate items to make 10 prefixed words and 10 suffixed words. Affixes were chosen after discussions with French teachers at School 1 about the most common affixes represented in any vocabulary input given to pupils. Furthermore, affixes were chosen so that there was no overlap with affixes used in the practice items of this test or in any of the items used in the Morphological Decomposition test-English (c.f. section 3.4.9). This last step was taken in order to minimise any practice effect. There was, however, one affix ('co') that was used as a practice item in both versions of the Morphological Decomposition tests.

Lastly, the test was piloted. For a description of the changes which were made to the test after it was piloted, see Appendix 3.1.

Reliability and validity of the Morphological Decomposition test-French

After administering the Morphological Decomposition test-French to all 177 participants, Cronbach's alpha coefficients were calculated for each of the four groups in this study. These values are in Table 1:

Table 1: Cronbach's alpha coefficients for the Morphological Decomposition test-French

Group	Cronbach's alpha coefficient
Year 8 EL1 (n=49)	0.75
Year 8 EAL (n=47)	0.65
Year 10 EL1 (n=41)	0.71
Year 10 EAL (n=40)	0.63

As Table 1 shows, both of the EAL groups present Cronbach's alpha coefficients which are below the 0.7 threshold. As a cut off value of 0.7 is generally considered to be acceptable for ability tests (Kline, 2000) the data generated by this instrument will be interpreted with caution.

With regard to validity, this test has good ecological validity, for the same reasons as were presented for the Morphological Decomposition test-English (c.f. Appendix 3.8). Moreover, the content validity of this test is deemed to be further enhanced by the choice of affixes, the selection of which was governed by a judgement of their prevalence in the vocabulary input given to the participants of the current study.

On the other hand, as with the English version of this test it is accepted that the Morphological Decomposition test-French is an unstandardised test, and the aforementioned reliability and validity statistics have only been calculated on a relatively small, unstratified sample. Therefore, any conclusions made by data generated from this instrument will have to take this into account.

Appendix 3.12: Categorisation of items in Morphological Decomposition test-French

Monomorphemic	Prefixed	Suffixed
féllocke	précône	shonage
békdas	prépone	tronage
chomipé	démane	sanneur
fiscère	dérande	douveur
boloube	remone	pantisme
hornuge	replone	boncisme
bédoin	mécoune	fidible
béroude	méfame	bouvible
dovène	soubouve	birique
moutord	souplond	valique

Appendix 3.13: **French vocabulary size test**

In this vocabulary test you should find the word which corresponds to the correct word in English. There are 10 blocks of words. I will read each word from a block out loud. After I have read out each word please write the correct number next to the definition you have chosen. We will then move on to the next block. For example:

1. Argent	
2. Enfant	_______child
3. Monsieur	_______head
4. Soir	_______work
5. Tête	
6. Travail	

You should write your answer in the following way:

1. Argent	
2. Enfant	____2___child
3. Monsieur	____5___head
4. Soir	____6___work
5. Tête	
6. Travail	

1. beau	
2. bien	________good, well
3. chaud	________chemical
4. faillible	________imperfect
5. grand	
6. chimique	

1. église	
2. divers	_________digital
3. numérique	_________church
4. fort	_________strong
5. propre	
6. vieux	

1. année	
2. eau	_________runner
3. époque	_________washing
4. étatisme	_________government control
5. lessivage	
6. coureur	

1. heureux	
2. petit	___________small
3. crédible	___________English
4. plein	___________believable
5. sale	
6. anglais	

1. amour	
2. pays	___________wood
3. bois	___________country
4. frère	___________wrongdoing
5. maison	
6. méfait	

1. fils	
2. jardinage	___________son
3. début	___________self-centredness
4. mois	___________gardening
5. sang	
6. égotisme	

1. jour	
2. père	___________day
3. vie	___________coldness
4. lendemain	___________life
5. femme	
6. froideur	

1. être	
2. voler	___________to speak badly about someone
3. démêler	___________to come back
4. médire	___________to separate
5. jouer	
6. revenir	

1. prévoir	
2. rencontrer	___________to go out again
3. quitter	___________to foresee
4. soutenir	___________to support
5. donner	
6. resortir	

1. gagner	
2. sourire	__________to heat in advance
3. déconseiller	__________to smile
4. manquer	__________to advise against
5. préchauffer	
6. fermer	

Appendix 3.14: Development, reliability, and validity statistics of the French 1k Levels test

Development

The French 1k Levels test is a substantially modified version of the Test de la taille du vocabulaire (TTV) (Batista, 2014). The TTV was chosen as a starting point as it was an easy-to-administer test of receptive French vocabulary which would not take much time, and which had been validated on a sample of non-native speakers of French (*ibid*.). Furthermore, the format of the test was deemed to be a more appropriate measurement of French vocabulary knowledge than a Yes/No (Meara & Buxton, 1987) test which is not an objective measurement of vocabulary knowledge but instead a self-report measure.

The TTV was itself modelled on Nation's (1990) Vocabulary Levels Test (VLT) and requires participants to match French words to French definitions. In addition, the TTV is divided into 5 sections, with each section presenting participants with increasingly rare words. The sections range from a selection of words which fall within the top 2,000 most common French words, to a selection of words which fall within the top 10,000 most common French words.

After observations of pupils at School 1 in pilot study three (c.f. Appendix 3.1), a variety of changes were made to this test. Firstly, any ecologically valid test of French vocabulary knowledge of the participants in this study must involve the matching of French vocabulary items to English vocabulary items. This was due to the fact that all of the pupils observed in French classes in School 1 kept a vocabulary book where they wrote down direct translations in English of vocabulary items in French. Furthermore, direct translations in English of items in French were preferable to definitions in French, in order to avoid floor effects which would likely occur due to the extremely limited vocabulary of both year 8 and year 10 participants at

School 1.

Secondly, the test was administered orally as well as in a written format so that there was no overreliance on decoding skills. Furthermore, as participants at School 1 were used to receiving instructions to tests both orally and on paper the dual modality of the test was deemed to have ecological validity.

Moreover, after observations of pupils in School 1 the vast majority of items in the TTV were deemed to be too difficult. Consequently, a process of item selection occurred which was based on several criteria. Firstly, all monomorphemic items and the bases of all multimorphemic items were chosen only from the top 1,000 most common French words as selected from a French corpus (Baudot, 1992) or from commonly used words provided by teachers at School 1 in French lessons. This was done in order to ensure that the test would not be subject to floor effects. Secondly, a combination of multimorphemic and monomorphemic items were used so that the test had good content validity. In addition, the same prefixes and suffixes were used as in the Morphological Decomposition test-French (c.f. Appendix 3.12 for a categorisation of items by morphemes). This was done as one of the aims of this study was to investigate the mechanism by which knowledge of morphemes leads to receptive vocabulary knowledge. By using the same affixes as in the Morphological Decomposition test-French, knowledge of other affixes was not a confound variable.

In addition, in terms of distractor items, some multisyllabic monomorphemic distractors were used so that participants could not identify correct multimorphemic items by syllabification. Furthermore, the number of French-English cognates were minimised as far as possible so that knowledge of cognates was not a confound variable. When an item did have a direct cognate equivalent in English, a non-cognate English translation was provided which preserved as far as possible the semantic content of the French item but which did not provide the cognate to the participants. For example, the translation given for the item ‘égotisme’ was ‘self-centredness’ and not ‘egotism’. In such instances it is accepted that the English cognate may better fit the semantic content of the French item, however such discrepancies were deemed to be preferable to providing participants with cognate translations.

Moreover, multimorphemic items were only chosen where there was a transparent link between the semantic content of the item as a whole and the semantic content of its component parts (c.f. Appendix 3.16). For example, the meaning of the word ‘repère’ (landmark) cannot be deduced via the meaning of the prefix ‘re’ and the base ‘père’. Indeed, such items are best considered to be a single base. Although such a step reduced the content validity of the test, this step was taken as items which are not semantically transparent necessarily do not play a role in the acquisition of French receptive vocabulary knowledge via morphological awareness.

Lastly, the ratio of nouns, verbs, and adjectives represented by the items of the test, was based on Batista’s (2014) analysis of the composition of the lexical content of French. This analysis, which was itself based on three word lists produced from the French frequency list by Lonsdale and Le Bras (2009), and one word list produced from the French frequency list by Baudot (1992), determined that the ratio of nouns to verbs to adjectives in French is 2:1:1. This ratio was adhered to a closely as possible in order to increase the content validity of the test. Consequently, test items were comprised of 14 nouns, 9 verbs, and 8 adjectives (c.f. Appendix 3.17). The aforementioned numbers add up to 31 as the item ‘anglais’ (English) is both a noun and an adjective.

Reliability and validity of the French 1k Levels Test

After administering the French 1k Levels Test to all 177 participants, Cronbach's alpha coefficients were calculated for each of the four groups in this study. These values are shown in Table 1:

Table 1: Cronbach's alpha coefficients for the French 1k Levels Test

Group	Cronbach's alpha coefficient
Year 8 EL1 (n=49)	0.71
Year 8 EAL (n=47)	0.78
Year 10 EL1 (n=41)	0.75
Year 10 EAL (n=40)	0.69

Table 1 shows that all of the four standardised Cronbach's alpha coefficients either are greater than or approach the 0.7 threshold. As a cut off value of 0.7 is generally considered to be acceptable for ability tests (Kline, 2000) the data generated by this instrument will be interpreted with some caution, although the above data indicate that this test has an acceptable level of reliability.

With regard to validity, the French 1k Levels test has good ecological validity due to the dual modality of administration of the test. Moreover, the matching of French vocabulary items to English ones enhances the ecological validity of the test as this process reflects a major method of vocabulary acquisition in French classrooms in School 1.

Furthermore, this test has good content validity as the ratio of nouns to verbs to adjectives of test items closely reflects that present in the French language as determined by analysis of French word frequency lists (c.f. section 3.4.11.1). However, it is also true that semantically opaque items are not present in this test (*ibid.*) and the omission of such items greatly harms the content validity of this test.

Lastly, as with the Morphological Decomposition test-English, and the Morphological Decomposition test-French it is accepted that the French 1k Levels test is an unstandardised test, and the aforementioned reliability have only been calculated on a relatively small, unstratified sample. Therefore, any conclusions made from the data generated by this instrument will have to take this into account.

Appendix 3.15: Categorisation of items in French 1k Levels test

Monomorphemic	**Prefixed**	**Suffixed**
bien	méfait	chimique
anglais	médire	numérique
fort	soutenir	faillible
petit	sourire	crédible
église	prévoir	lessivage
fils	préchauffer	jardinage
pays	revenir	étatisme
bois	resortir	égotisme
jour	déconseiller	coureur
vie	démêler	froideur

Appendix 3.16: Breakdown of the semantic content of multimorphemic items in the French 1k Levels test[a]

	Prefixed			Suffixed			
Item	**Prefix**	**Verb or base**	**Prefix+ verb or base**	**Item**	**Verb or base**	**Suffix**	**Base+suffix**
démêler	dé – cessation, antonym	mêler – to mix	to separate	chimique	chimie - chemistry	ique – suffix added to nouns to make adjectives	chemical
déconseiller		conseiller – to advise	to advise against	numérique	numéro - number		numerical, digital
soutenir	sou – alternative form of sous. Under or beneath, subordination, subdivision, inferiority, insufficiency	tenir – to hold	to support	faillible	faillir – to fail, to almost do something	ible – suffix added to verbs or nouns to make adjectives expressing possibility	capable of failing, imperfect
sourire		rire – to laugh	to smile	crédible	crédit - believability		capable of being trusted, believable
prévoir	pré – spatial or temporal anteriority	voir – to see	to foresee	lessivage	lessive - laundry	age – suffix added to verbs or nouns to create nouns expressing an action or a state	washing
préchauffer		chauffer – to heat	to heat in advance	jardinage	jardin - garden		gardening
resortir	re or ré – repetition, return to a previous state, emphasis	sortir – to go out	to go out again	étatisme	état – state, government	isme – suffix added to nouns to create masculine nouns expressing an ideology or belief	belief in central government
revenir		venir – to come	to come back	égotisme	égo – ego, self		egotism, self-centredness
médire	mé – alternative form of més. Indicating negativity	dire – to say	to speak badly about someone	coureur	courir – to run	eur – suffix expressing the masculine agent of the base or verb, or the spirit of the base or verb	runner
méfait		fait – an occurrence	a wrongdoing	froideur	froid - cold		coldness

a) All meanings taken from Le Trésor de la Langue Française informatisé (Université de Lorraine, 1994)

Appendix 3.17: Categorisation of items in French 1k Levels test by part of speech

Noun	**Adjective**	**Verb**
anglais	bien	prévoir
église	anglais	préchauffer
fils	fort	déconseiller
pays	petit	démêler
bois	chimique	soutenir
jour	numérique	sourire
vie	faillible	médire
méfait	crédible	revenir
lessivage		resortir
jardinage		
étatisme		
égotisme		
coureur		
froideur		

Appendix 5.1: Descriptive statistics for year 8 participants when answering Research Question 1

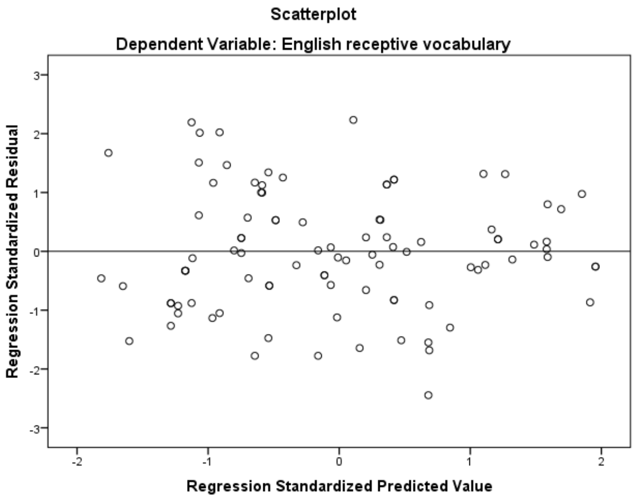
Table 1: Descriptive statistics for year 8 participants (n=96)

Variable	Mean	Std. Deviation
English receptive vocabulary	133.88	9.92
Working memory	4.97	1.40
Nonverbal IQ	15.71	3.74
English expressive vocabulary	18.98	2.73
Pseudoword decoding	46.81	4.47
Word segmentation	20.74	4.00
Socioeconomic status	8520.30	4018.03
Morphological awareness in English	13.78	3.88

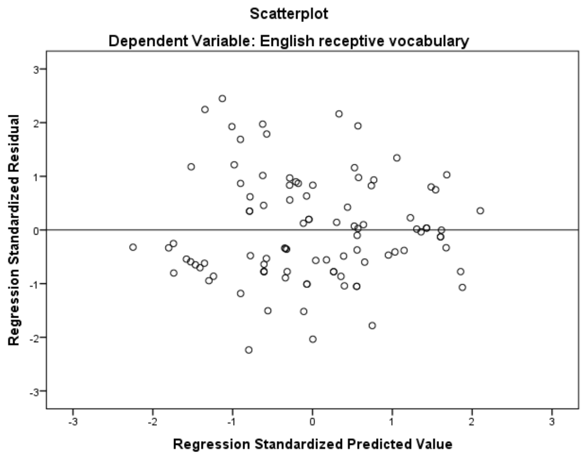
Table 2: Correlations for year 8 participants

n=96	English receptive vocabulary	Working memory	Nonverbal IQ	English expressive vocabulary	Pseudoword decoding	Word segmentation	Socioeconomic status	Morphological awareness in English
English receptive vocabulary	1	.326**	.345**	.504**	.040	.525**	.144	.312**
		.001	.001	.000	.702	.000	.160	.002
Working memory	.326**	1	.066	.280**	.258*	.376**	.168	.103
	.001		.520	.006	.011	.000	.102	.318
Nonverbal IQ	.345**	.066	1	.210*	.164	.428**	.285**	.121
	.001	.520		.040	.110	.000	.005	.240
English expressive vocabulary	.504**	.280**	.210*	1	.176	.349**	.286**	-.008
	.000	.006	.040		.087	.000	.005	.935
Pseudoword decoding	.040	.258*	.164	.176	1	.237*	.173	-.112
	.702	.011	.110	.087		.020	.091	.276
Word segmentation	.525**	.376**	.428**	.349**	.237*	1	.219*	.278**
	.000	.000	.000	.000	.020		.032	.006
Socioeconomic status	.144	.168	.285**	.286**	.173	.219*	1	-.045
	.160	.102	.005	.005	.091	.032		.660
Morphological awareness in English	.312**	.103	.121	-.008	-.112	.278**	-.045	1
	.002	.318	.240	.935	.276	.006	.660	

Appendix 5.2: Evaluation of assumptions when selecting predictor variables for Research Question 1 Year 8 participants

Assumption	**Test**	**Outcome**	**Transformation**
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.27, no tolerance statistics <.2	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness=0.41 Kurtosis/std error of kurtosis=-0.67	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.44	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook’s distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.3: Evaluation of assumptions of multiple regression Research Question 1 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 7.33, tolerance statistic of language status and language status*morphological awareness in English <.2.	Assumption violated	Morphological awareness in English> morphological awareness in English centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.89, tolerance statistic of language status and language status*morphological awareness in English centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 1.73 Kurtosis/std error of kurtosis= -0.16	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.59	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effects found	Assumption upheld	-

Appendix 5.4: Descriptive statistics for year 10 participants when answering Research Question 1

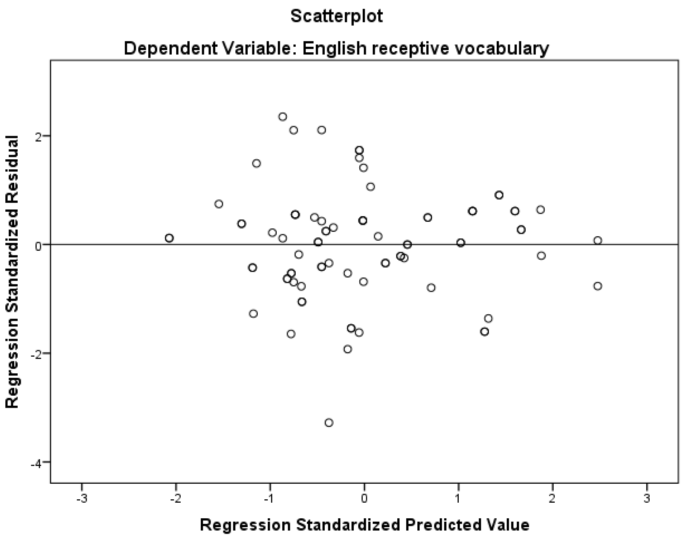
Table 1: Descriptive statistics for year 10 participants (n=81)

Variable	Mean	Std. Deviation
English receptive vocabulary	144.96	1.08
Working memory	5.77	1.85
Nonverbal IQ	17.42	3.89
English expressive vocabulary	21.40	0.36
Pseudoword decoding	46.48	3.95
Word segmentation	23.53	4.08
Socioeconomic status	11438.77	4593.20
Morphological awareness in English	24.14	3.48

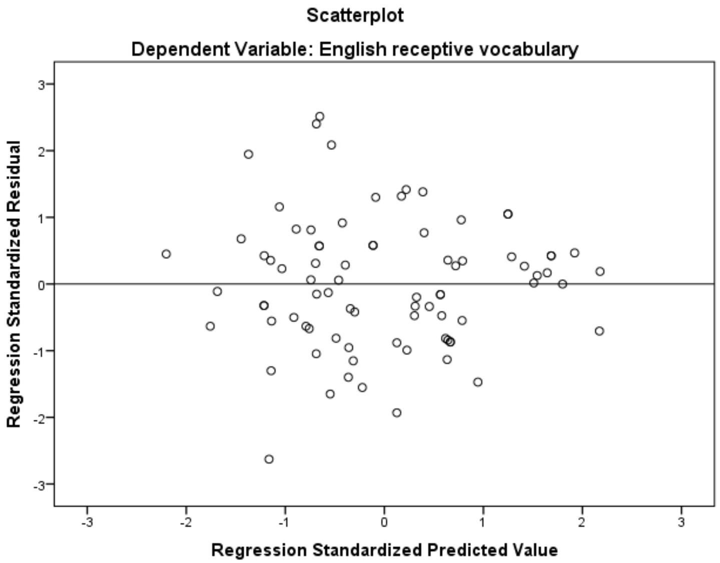
Table 2: Correlations for year 10 participants

n=81		English receptive vocabulary	Working memory	Nonverbal IQ	English expressive vocabulary	Pseudoword decoding	Word segmentation	Socioeconomic status	Morphological awareness in English
English receptive vocabulary		1	.236*	.300**	.571**	.275*	.459**	.192	.393**
			.034	.007	.000	.013	.000	.086	.000
Working memory		.236*	1	.338**	.162	-.041	.279*	-.128	.108
		.034		.002	.150	.717	.012	.255	.337
Nonverbal IQ		.300**	.338**	1	.182	-.049	.006	-.052	.002
		.007	.002		.104	.663	.956	.648	.984
English expressive vocabulary		.571**	.162	.182	1	.296**	.264*	.182	.194
		.000	.150	.104		.007	.017	.104	.082
Pseudoword decoding		.275*	-.041	-.049	.296**	1	.151	-.057	.210
		.013	.717	.663	.007		.180	.610	.060
Word segmentation		.459**	.279*	.006	.264*	.151	1	.103	.197
		.000	.012	.956	.017	.180		.359	.078
Socioeconomic status		.192	-.128	-.052	.182	-.057	.103	1	.024
		.086	.255	.648	.104	.610	.359		.829
Morphological awareness in English		.393**	.108	.002	.194	.210	.197	.024	1
		.000	.337	.984	.082	.060	.078	.829	

Appendix 5.5: Evaluation of assumptions when selecting predictor variables for Research Question 1 Year 10 participants

Assumption	**Test**	**Outcome**	**Transformation**
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.27, no tolerance statistics <.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= -0.96 Kurtosis/std error of kurtosis= 1.98	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.08	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effects found	Assumption upheld	-

Appendix 5.6: Evaluation of assumptions of multiple regression Research Question 1 Year 10 participants

<table>
<tr><th>Assumption</th><th>Test</th><th>Outcome</th><th>Transformation</th></tr>
<tr><td rowspan="2">Multicollinearity</td><td>VIF and tolerance statistics. $\overline{\text{VIF}}$ = 18.29, two tolerance statistics <.2.</td><td>Assumption violated</td><td>Morphological awareness in English > morphological awareness in English centred</td></tr>
<tr><td>VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.23, tolerance statistic of language status and language status×morphological awareness in English centred >.2.</td><td>Assumption upheld</td><td>-</td></tr>
<tr><td>Normality of residuals</td><td>Skewness/std error of skewness= 0.62
Kurtosis/std error of kurtosis= 0.08</td><td>Assumption upheld</td><td></td></tr>
<tr><td>Linearity</td><td>
</td><td>Assumption upheld</td><td>-</td></tr>
<tr><td>Independence of errors</td><td>Durbin-Watson = 2.15</td><td>Assumption upheld</td><td>-</td></tr>
<tr><td>Outliers</td><td>No standardised residuals outside of +/-3.29</td><td>Assumption upheld</td><td>-</td></tr>
<tr><td>Influential cases</td><td>No Cook’s distance values greater than 1</td><td>Assumption upheld</td><td>-</td></tr>
<tr><td>Homoscedasticity of residuals</td><td>Breusch-Pagan test – significant effect found at step 4 (F (1, 74) = 5.01, p<.05)</td><td>Assumption violated</td><td>-</td></tr>
</table>

Appendix 5.7: Descriptive statistics for year 8 participants when answering Research Question 2

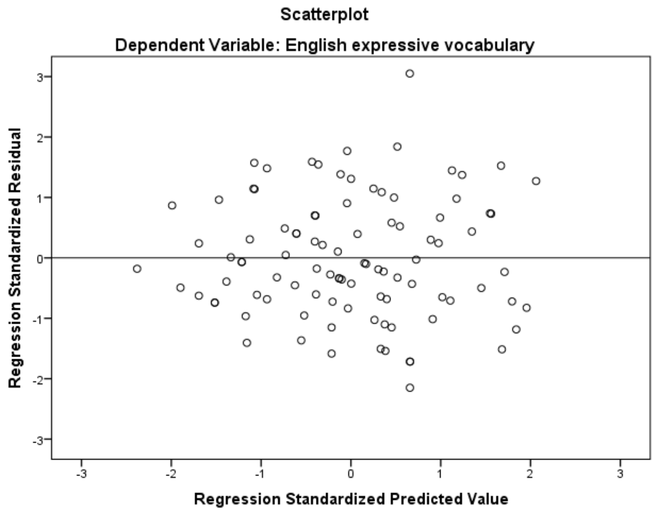
Table 1: Descriptive statistics for year 8 participants (n=96)

Variable	Mean	Std. Deviation
English receptive vocabulary	144.96	1.08
Working memory	5.77	1.85
Nonverbal IQ	17.42	3.89
English expressive vocabulary	21.40	0.36
Pseudoword decoding	46.48	3.95
Word segmentation	23.53	4.08
Socioeconomic status	11438.77	4593.20
Morphological awareness in English	24.14	3.48

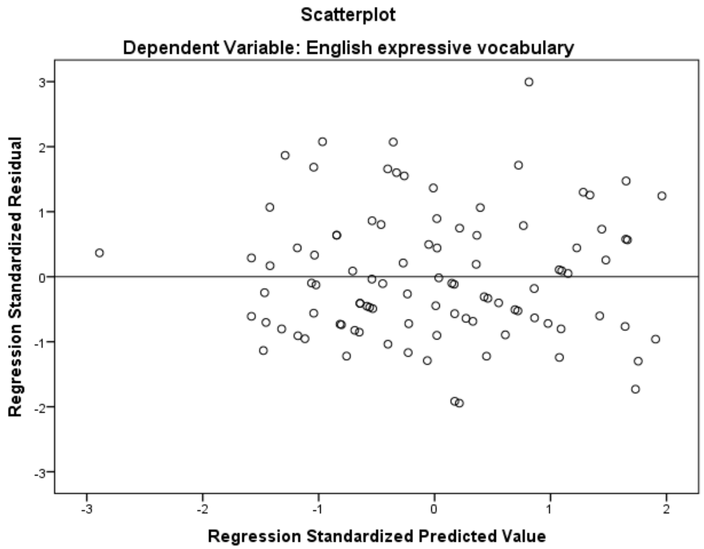
Table 2: Correlations for year 8 participants

n=96		English receptive vocabulary	Working memory	Nonverbal IQ	English expressive vocabulary	Pseudoword decoding	Word segmentation	Socioeconomic status	Morphological awareness in English
English receptive vocabulary		1	.326**	.345**	.504**	.040	.525**	.144	.312**
			.001	.001	.000	.702	.000	.160	.002
Working memory		.326**	1	.066	.280**	.258*	.376**	.168	.103
		.001		.520	.006	.011	.000	.102	.318
Nonverbal IQ		.345**	.066	1	.210*	.164	.428**	.285**	.121
		.001	.520		.040	.110	.000	.005	.240
English expressive vocabulary		.504**	.280**	.210*	1	.176	.349**	.286**	-.008
		.000	.006	.040		.087	.000	.005	.935
Pseudoword decoding		.040	.258*	.164	.176	1	.237*	.173	-.112
		.702	.011	.110	.087		.020	.091	.276
Word segmentation		.525**	.376**	.428**	.349**	.237*	1	.219*	.278**
		.000	.000	.000	.000	.020		.032	.006
Socioeconomic status		.144	.168	.285**	.286**	.173	.219*	1	-.045
		.160	.102	.005	.005	.091	.032		.660
Morphological awareness in English		.312**	.103	.121	-.008	-.112	.278**	-.045	1
		.002	.318	.240	.935	.276	.006	.660	

Appendix 5.8: Evaluation of assumptions when selecting predictor variables for Research Question 2 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.36, no tolerance statistics <.2	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness=1.27 Kurtosis/std error of kurtosis=-0.38	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.68	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.9: Evaluation of assumptions of multiple regression for Research Question 2 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 7.46, two tolerance statistics <.2.	Assumption violated	Morphological awareness in English > morphological awareness in English centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.85, tolerance statistic of language status and language status×morphological awareness in English centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 2.26 Kurtosis/std error of kurtosis= 0.07	Assumption upheld	
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.77	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.10: Descriptive statistics for year 10 participants when answering Research Question 2

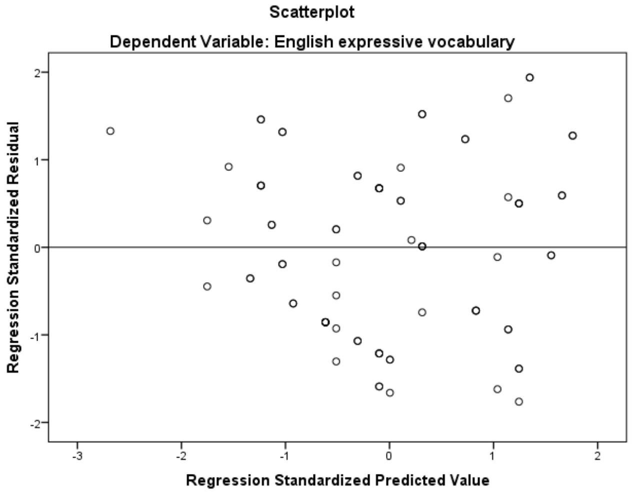
Table 1: Descriptive statistics for year 10 participants (n=81)

Variable	Mean	Std. Deviation
English receptive vocabulary	144.96	1.08
Working memory	5.77	1.85
Nonverbal IQ	17.42	3.89
English expressive vocabulary	21.40	0.36
Pseudoword decoding	46.48	3.95
Word segmentation	23.53	4.08
Socioeconomic status	11438.77	4593.20
Morphological awareness in English	24.14	3.48

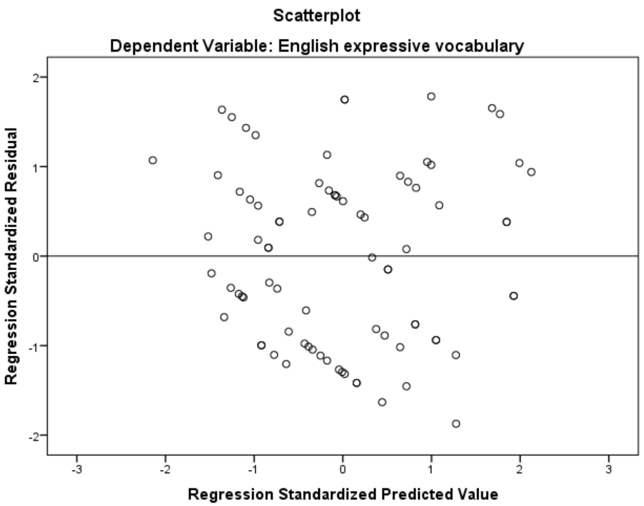
Table 2: Correlations for year 10 participants

n=81	English receptive vocabulary	Working memory	Nonverbal IQ	English expressive vocabulary	Pseudoword decoding	Word segmentation	Socioeconomic status	Morphological awareness in English
English receptive vocabulary	1	.236*	.300**	.571**	.275*	.459**	.192	.393**
		.034	.007	.000	.013	.000	.086	.000
Working memory	.236*	1	.338**	.162	-.041	.279*	-.128	.108
	.034		.002	.150	.717	.012	.255	.337
Nonverbal IQ	.300**	.338**	1	.182	-.049	.006	-.052	.002
	.007	.002		.104	.663	.956	.648	.984
English expressive vocabulary	.571**	.162	.182	1	.296**	.264*	.182	.194
	.000	.150	.104		.007	.017	.104	.082
Pseudoword decoding	.275*	-.041	-.049	.296**	1	.151	-.057	.210
	.013	.717	.663	.007		.180	.610	.060
Word segmentation	.459**	.279*	.006	.264*	.151	1	.103	.197
	.000	.012	.956	.017	.180		.359	.078
Socioeconomic status	.192	-.128	-.052	.182	-.057	.103	1	.024
	.086	.255	.648	.104	.610	.359		.829
Morphological awareness in English	.393**	.108	.002	.194	.210	.197	.024	1
	.000	.337	.984	.082	.060	.078	.829	

Appendix 5.11: Evaluation of assumptions when selecting predictor variables for Research Question 2 Year 10 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.33, no tolerance statistics <.2	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness=0.19 Kurtosis/std error of kurtosis=-2.01	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.91	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook’s distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.12: Evaluation of assumptions of multiple regression for Research Question 2 Year 10 participants

Assumption	**Test**	**Outcome**	**Transformation**
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 26.37, two tolerance statistics <.2.	Assumption violated	Morphological awareness in English > morphological awareness in English centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.72, tolerance statistic of language status and language status×morphological awareness in English centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 0.32 Kurtosis/std error of kurtosis= -2.10	Assumption upheld	
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.05	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.13: Descriptive statistics for year 8 participants when answering Research Question 3

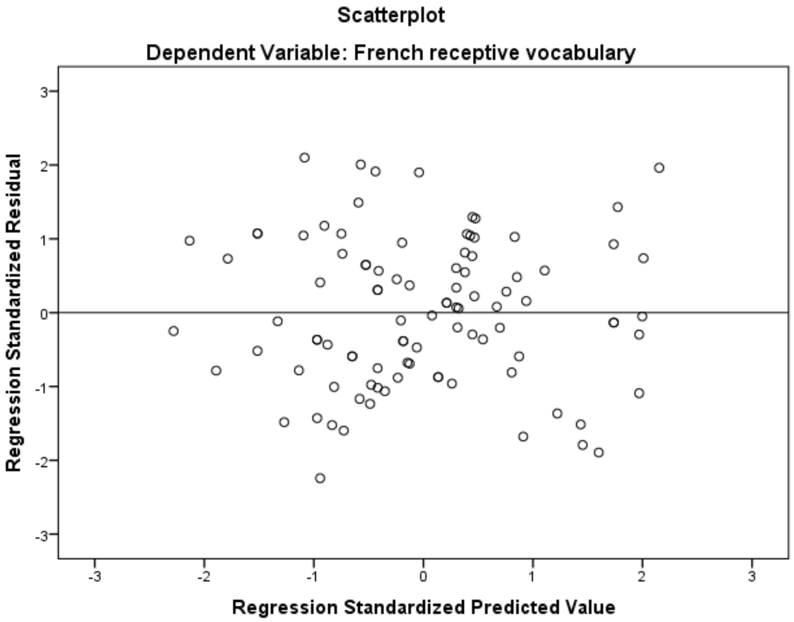
Table 1: Descriptive statistics for year 8 participants (n=96)

Variable	Mean	Std. Deviation
Working memory	5.77	1.85
Nonverbal IQ	17.42	3.89
French receptive vocabulary	12.45	3.79
Pseudoword decoding	46.48	3.95
Word segmentation	23.53	4.08
Socioeconomic status	11438.77	4593.20
Morphological awareness in French	9.38	2.63

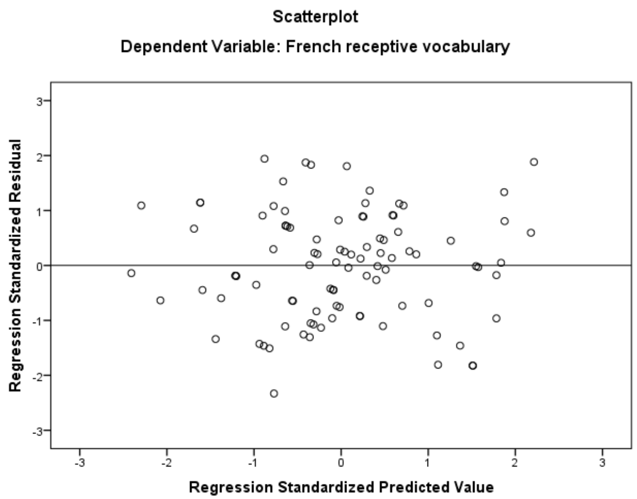
Table 2: Correlations for year 8 participants

n=96	Working memory	Nonverbal IQ	French receptive vocabulary	Pseudoword decoding	Word segmentation	Socioeconomic status	Morphological awareness in French
Working memory	1	.066	.255*	.258*	.376**	.168	-.051
		.520	.012	.011	.000	.102	.621
Nonverbal IQ	.066	1	.440**	.164	.428**	.285**	.074
	.520		.000	.110	.000	.005	.471
French receptive vocabulary	.255*	.440**	1	.320**	.478**	.194	.009
	.012	.000		.001	.000	.058	.930
Pseudoword decoding	.258*	.164	.320**	1	.237*	.173	-.063
	.011	.110	.001		.020	.091	.542
Word segmentation	.376**	.428**	.478**	.237*	1	.219*	-.126
	.000	.000	.000	.020		.032	.222
Socioeconomic status	.168	.285**	.194	.173	.219*	1	-.084
	.102	.005	.058	.091	.032		.415
Morphological awareness in French	-.051	.074	.009	-.063	-.126	-.084	1
	.621	.471	.930	.542	.222	.415	

Appendix 5.14: Evaluation of assumptions when selecting predictor variables for Research Question 3 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.25, no tolerance statistics <.2	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness=0.12 Kurtosis/std error of kurtosis=-1.21	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.16	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.15: Evaluation of assumptions of multiple regression for Research Question 3 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 6.76, two tolerance statistics <.2.	Assumption violated	Morphological awareness in French > morphological awareness in French centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.41, tolerance statistic of language status and language status×morphological awareness in French centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= -0.30 Kurtosis/std error of kurtosis= -1.23	Assumption upheld	
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.18	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – significant effect found at step 2 (F (4, 90) = 3.20, p<.05) and at step 3 (F (1, 89) = 4.29, p<.05)	Assumption violated	-

Appendix 5.16: Descriptive statistics for year 10 participants when answering Research Question 3

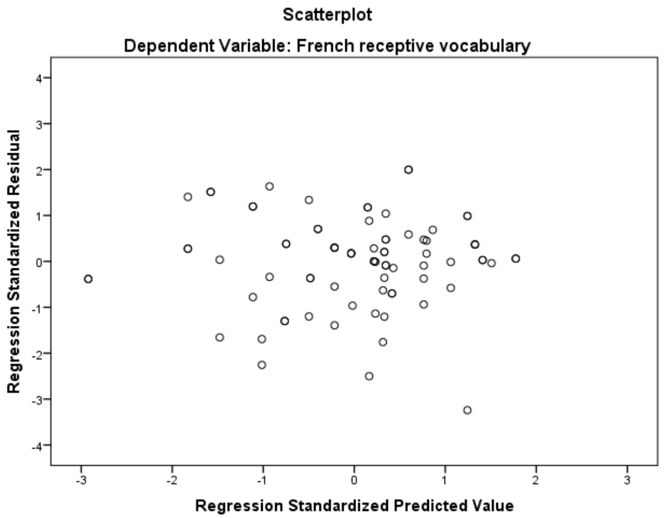
Table 1: Descriptive statistics for year 10 participants (n=81)

Variable	Mean	Std. Deviation
Working memory	5.77	1.85
Nonverbal IQ	17.42	3.89
French receptive vocabulary	19.56	3.55
Pseudoword decoding	46.48	3.95
Word segmentation	23.53	4.08
Socioeconomic status	11438.77	4593.20
Morphological awareness in French	18.27	4.67

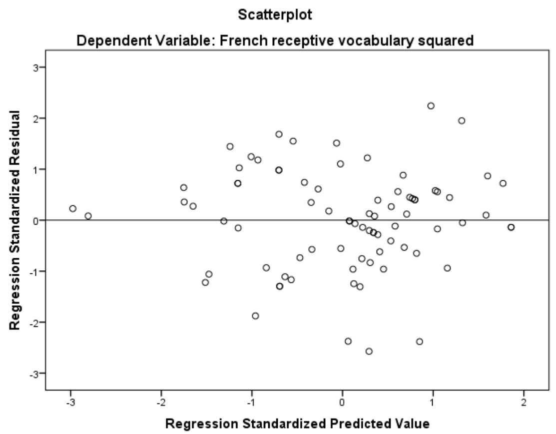
Table 2: Correlations for year 10 participants

n=81	Working memory	Nonverbal IQ	French receptive vocabulary	Pseudoword decoding	Word segmentation	Socioeconomic status	Morphological awareness in French
Working memory	1	.338**	.399**	-.041	.279*	-.128	.015
		.002	.000	.717	.012	.255	.896
Nonverbal IQ	.338**	1	.118	-.049	.006	-.052	-.171
	.002		.292	.663	.956	.648	.127
French receptive vocabulary	.399**	.118	1	.085	.503**	-.024	.336**
	.000	.292		.450	.000	.830	.002
Pseudoword decoding	-.041	-.049	.085	1	.151	-.057	-.047
	.717	.663	.450		.180	.610	.676
Word segmentation	.279*	.006	.503**	.151	1	.103	.161
	.012	.956	.000	.180		.359	.151
Socioeconomic status	-.128	-.052	-.024	-.057	.103	1	.116
	.255	.648	.830	.610	.359		.303
Morphological awareness in French	.015	-.171	.336**	-.047	.161	.116	1
	.896	.127	.002	.676	.151	.303	

Appendix 5.17: Evaluation of assumptions when selecting predictor variables for Research Question 3 Year 10 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.13, no tolerance statistics <.2	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness=-2.34 Kurtosis/std error of kurtosis=1.83	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.00	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.18: Evaluation of assumptions of multiple regression for Research Question 3 Year 10 participants

Assumption	**Test**	**Outcome**	**Transformation**
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 11.74, two tolerance statistics <.2.	Assumption violated	Morphological awareness in French > morphological awareness in French centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.31, tolerance statistic of language status and language status×morphological awareness in French centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= -2.55 Kurtosis/std error of kurtosis= 1.06	Assumption violated	French receptive vocabulary > French receptive vocabulary squared
	Skewness/std error of skewness= -1.23 Kurtosis/std error of kurtosis= 0.50	Assumption upheld	
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.22	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.19: Descriptive statistics for year 8 participants when answering Research Question 4

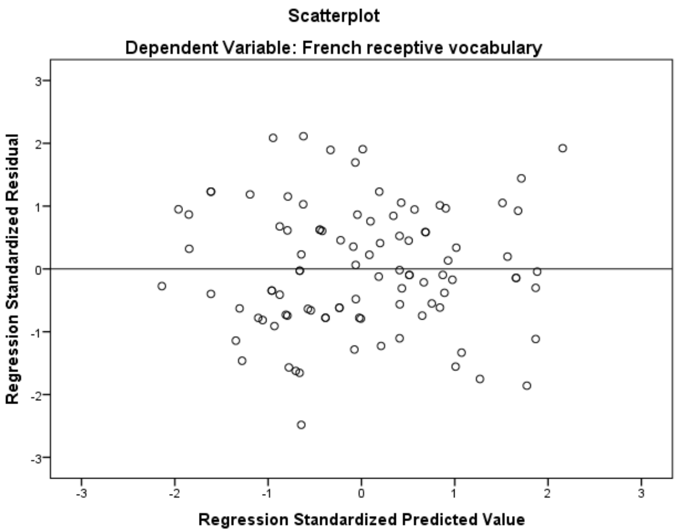
Table 1: Descriptive statistics for year 8 participants (n=96)

Variable	Mean	Std. Deviation
French receptive vocabulary	12.45	3.79
Working memory	4.97	1.40
Non-verbal IQ	15.71	3.74
Pseudoword decoding	46.81	4.47
Word segmentation	20.74	4.00
Socioeconomic status	8520.30	4018.03
English receptive vocabulary	133.88	9.92
English expressive vocabulary	18.98	2.73
Morphological awareness in French	9.38	2.63
Morphological awareness in English	13.78	3.88

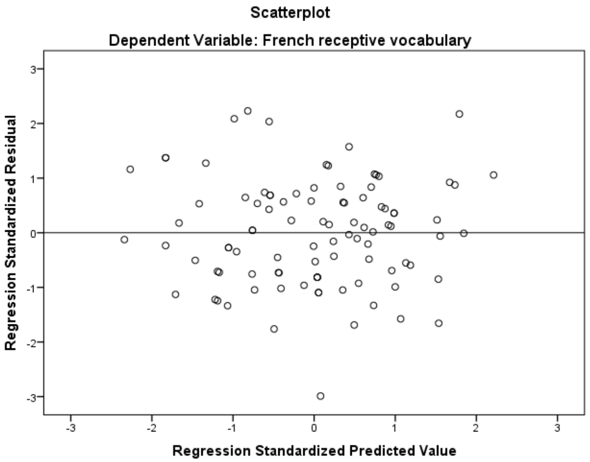
Table 2: Correlations for year 8 participants

n=96	French receptive vocabulary	Working memory	Non-verbal IQ	Pseudoword decoding	Word segmentation	Socioeconomic status	Receptive vocabulary in English	Expressive vocabulary in English	Morphological awareness in French	Morphological awareness in English
French receptive vocabulary	1	.255*	.440**	.320**	.478**	.194	.428**	.333**	.009	.157
		.012	.000	.001	.000	.058	.000	.001	.930	.128
Working memory	.255*	1	.066	.258*	.376**	.168	.326**	.280**	-.051	.103
	.012		.520	.011	.000	.102	.001	.006	.621	.318
Non-verbal IQ	.440**	.066	1	.164	.428**	.285**	.345**	.210*	.074	.121
	.000	.520		.110	.000	.005	.001	.040	.471	.240
Pseudoword decoding	.320**	.258*	.164	1	.237*	.173	.040	.176	-.063	-.112
	.001	.011	.110		.020	.091	.702	.087	.542	.276
Word segmentation	.478**	.376**	.428**	.237*	1	.219*	.525**	.349**	-.126	.278**
	.000	.000	.000	.020		.032	.000	.000	.222	.006
Socioeconomic status	.194	.168	.285**	.173	.219*	1	.144	.286**	-.084	-.045
	.058	.102	.005	.091	.032		.160	.005	.415	.660
Receptive vocabulary in English	.428**	.326**	.345**	.040	.525**	.144	1	.504**	-.110	.312**
	.000	.001	.001	.702	.000	.160		.000	.284	.002
Expressive vocabulary in English	.333**	.280**	.210*	.176	.349**	.286**	.504**	1	-.232*	-.008
	.001	.006	.040	.087	.000	.005	.000		.023	.935
Morphological awareness in French	.009	-.051	.074	-.063	-.126	-.084	-.110	-.232*	1	-.182
	.930	.621	.471	.542	.222	.415	.284	.023		.077
Morphological awareness in English	.157	.103	.121	-.112	.278**	-.045	.312**	-.008	-.182	1
	.128	.318	.240	.276	.006	.660	.002	.935	.077	

Appendix 5.20: Evaluation of assumptions when selecting predictor variables for Research Question 4 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.40, no tolerance statistics <.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 0.18 Kurtosis/std error of kurtosis= -0.81	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.22	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook’s distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.21: Evaluation of assumptions of multiple regression for Research Question 4 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 6.86, two tolerance statistics <.2.	Assumption violated	Morphological awareness in English> morphological awareness in English centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.82, tolerance statistic of language status and language status×morphological awareness in English centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= -0.15 Kurtosis/std error of kurtosis= 0.26	Assumption upheld	
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.38	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – significant effect found at step 3 (F (3, 90) = 3.43, p<.05)	Assumption violated	-

Appendix 5.22: Descriptive statistics for year 10 participants when answering Research Question 4

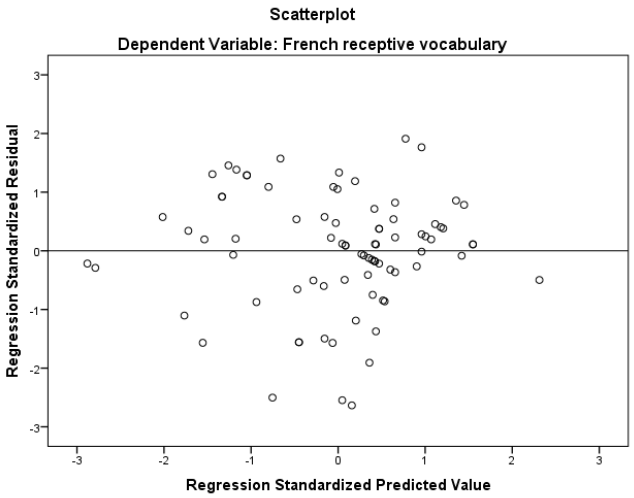
Table 1: Descriptive statistics for year 10 participants (n=81)

Variable	Mean	Std. Deviation
French receptive vocabulary	19.56	3.55
Working memory	5.77	1.85
Non-verbal IQ	17.42	3.89
Pseudoword decoding	46.48	3.95
Word segmentation	23.53	4.08
Socioeconomic status	11438.77	4593.20
English receptive vocabulary	144.96	9.68
English expressive vocabulary	21.40	3.21
Morphological awareness in French	18.27	4.67
Morphological awareness in English	24.14	3.48

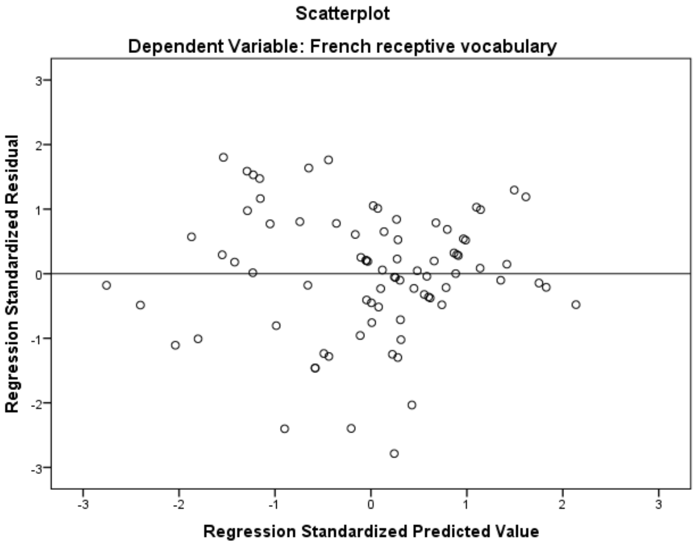
Table 2: Correlations for year 10 participants

n=81	French receptive vocabulary	Working memory	Non-verbal IQ	Pseudoword decoding	Word segmentation	Socioeconomic status	Receptive vocabulary in English	Expressive vocabulary in English	Morphological awareness in French	Morphological awareness in English
French receptive vocabulary	1	.399**	.118	.085	.503**	-.024	.400**	.110	.336**	.324**
		.000	.292	.450	.000	.830	.000	.330	.002	.003
Working memory	.399**	1	.338**	-.041	.279*	-.128	.236*	.162	.015	.108
	.000		.002	.717	.012	.255	.034	.150	.896	.337
Non-verbal IQ	.118	.338**	1	-.049	.006	-.052	.300**	.182	-.171	.002
	.292	.002		.663	.956	.648	.007	.104	.127	.984
Pseudoword decoding	.085	-.041	-.049	1	.151	-.057	.275*	.296**	-.047	.210
	.450	.717	.663		.180	.610	.013	.007	.676	.060
Word segmentation	.503**	.279*	.006	.151	1	.103	.459**	.264*	.161	.197
	.000	.012	.956	.180		.359	.000	.017	.151	.078
Socioeconomic status	-.024	-.128	-.052	-.057	.103	1	.192	.182	.116	.024
	.830	.255	.648	.610	.359		.086	.104	.303	.829
Receptive vocabulary in English	.400**	.236*	.300**	.275*	.459**	.192	1	.571**	.167	.393**
	.000	.034	.007	.013	.000	.086		.000	.137	.000
Expressive vocabulary in English	.110	.162	.182	.296**	.264*	.182	.571**	1	-.108	.194
	.330	.150	.104	.007	.017	.104	.000		.336	.082
Morphological awareness in French	.336**	.015	-.171	-.047	.161	.116	.167	-.108	1	.167
	.002	.896	.127	.676	.151	.303	.137	.336		.136
Morphological awareness in English	.324**	.108	.002	.210	.197	.024	.393**	.194	.167	1
	.003	.337	.984	.060	.078	.829	.000	.082	.136	

Appendix 5.23: Evaluation of assumptions when selecting predictor variables for Research Question 4 Year 10 participants

Assumption	**Test**	**Outcome**	**Transformation**
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.42, no tolerance statistics <.2	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness=-2.23 Kurtosis/std error of kurtosis=0.71	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.09	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.24: Evaluation of assumptions of multiple regression for Research Question 4 Year 10 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 18.31, two tolerance statistics <.2.	Assumption violated	Morphological awareness in English > morphological awareness in English centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.55, tolerance statistic of language status and language status×morphological awareness in English centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= -2.00 Kurtosis/std error of kurtosis= 0.89	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.25	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.25: Descriptive statistics for year 8 participants when answering Research Question 5

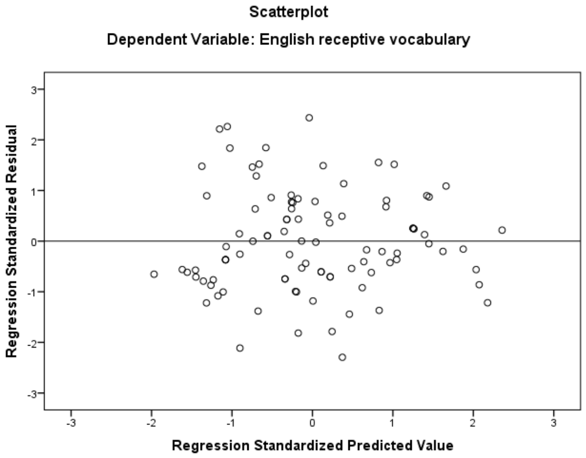
Table 1: Descriptive statistics for year 8 participants (n=96)

Variable	**Mean**	**Std. Deviation**
French receptive vocabulary	12.45	3.79
Working memory	4.97	1.40
Non-verbal IQ	15.71	3.74
Pseudoword decoding	46.81	4.47
Word segmentation	20.74	4.00
Socioeconomic status	8520.30	4018.03
English receptive vocabulary	133.88	9.92
English expressive vocabulary	18.98	2.73
Morphological awareness in French	9.38	2.63
Morphological awareness in English	13.78	3.88

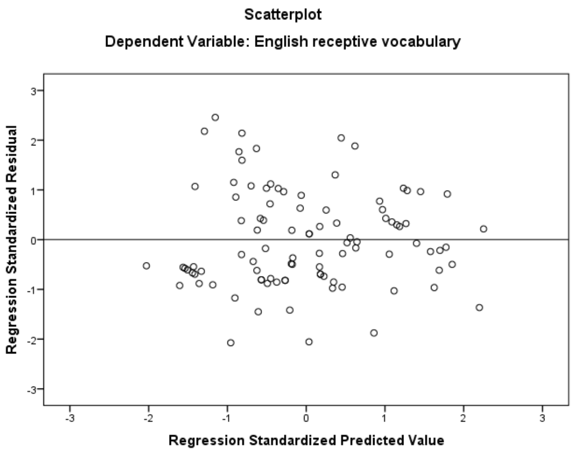
Table 2: Correlations for year 8 participants

n=96	French receptive vocabulary	Working memory	Non-verbal IQ	Pseudoword decoding	Word segmentation	Socioeconomic status	Receptive vocabulary in English	Expressive vocabulary in English	Morphological awareness in French	Morphological awareness in English
French receptive vocabulary	1	.255*	.440**	.320**	.478**	.194	.428**	.333**	.009	.157
		.012	.000	.001	.000	.058	.000	.001	.930	.128
Working memory	.255*	1	.066	.258*	.376**	.168	.326**	.280**	-.051	.103
	.012		.520	.011	.000	.102	.001	.006	.621	.318
Non-verbal IQ	.440**	.066	1	.164	.428**	.285**	.345**	.210*	.074	.121
	.000	.520		.110	.000	.005	.001	.040	.471	.240
Pseudoword decoding	.320**	.258*	.164	1	.237*	.173	.040	.176	-.063	-.112
	.001	.011	.110		.020	.091	.702	.087	.542	.276
Word segmentation	.478**	.376**	.428**	.237*	1	.219*	.525**	.349**	-.126	.278**
	.000	.000	.000	.020		.032	.000	.000	.222	.006
Socioeconomic status	.194	.168	.285**	.173	.219*	1	.144	.286**	-.084	-.045
	.058	.102	.005	.091	.032		.160	.005	.415	.660
Receptive vocabulary in English	.428**	.326**	.345**	.040	.525**	.144	1	.504**	-.110	.312**
	.000	.001	.001	.702	.000	.160		.000	.284	.002
Expressive vocabulary in English	.333**	.280**	.210*	.176	.349**	.286**	.504**	1	-.232*	-.008
	.001	.006	.040	.087	.000	.005	.000		.023	.935
Morphological awareness in French	.009	-.051	.074	-.063	-.126	-.084	-.110	-.232*	1	-.182
	.930	.621	.471	.542	.222	.415	.284	.023		.077
Morphological awareness in English	.157	.103	.121	-.112	.278**	-.045	.312**	-.008	-.182	1
	.128	.318	.240	.276	.006	.660	.002	.935	.077	

Appendix 5.26: Evaluation of assumptions when selecting predictor variables for Research Question 5 Year 8 participants

Assumption	**Test**	**Outcome**	**Transformation**
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.36, no tolerance statistics <.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 1.09 Kurtosis/std error of kurtosis= -0.30	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.47	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effects	Assumption upheld	-

Appendix 5.27: Evaluation of assumptions of multiple regression for Research Question 5 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 6.76, tolerance statistic of language status and language status*morphological awareness in French <.2.	Assumption violated	Morphological awareness in French > morphological awareness in French centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.44, tolerance statistic of language status and language status*morphological awareness in French centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 1.68 Kurtosis/std error of kurtosis= -0.32	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.59	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – significant effect found at step 3 (F (1, 89) = 5.98, p<.05).	Assumption violated	-

Appendix 5.28: Descriptive statistics for year 10 participants when answering Research Question 5

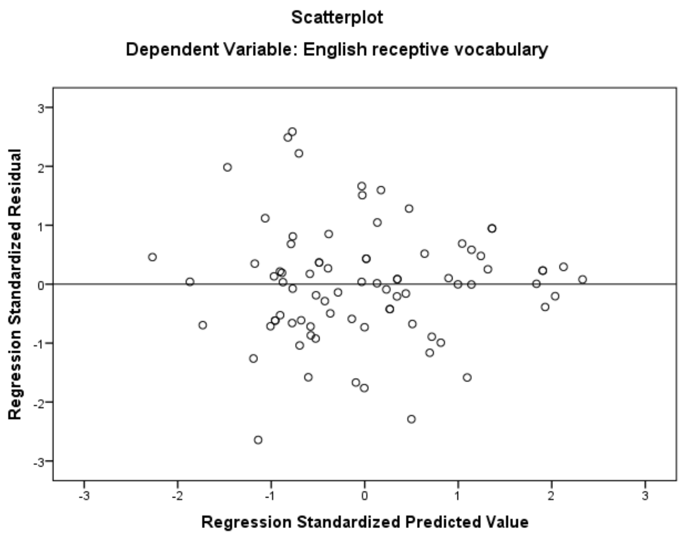
Table 1: Descriptive statistics for year 10 participants (n=81)

Variable	Mean	Std. Deviation
French receptive vocabulary	19.56	3.55
Working memory	5.77	1.85
Non-verbal IQ	17.42	3.89
Pseudoword decoding	46.48	3.95
Word segmentation	23.53	4.08
Socioeconomic status	11438.77	4593.20
English receptive vocabulary	144.96	9.68
English expressive vocabulary	21.40	3.21
Morphological awareness in French	18.27	4.67
Morphological awareness in English	24.14	3.48

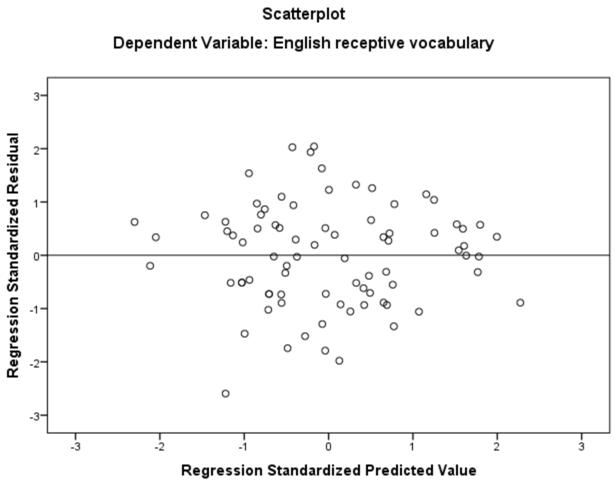
Table 2: Correlations for year 10 participants

n=81	French receptive vocabulary	Working memory	Non-verbal IQ	Pseudoword decoding	Word segmentation	Socioeconomic status	Receptive vocabulary in English	Expressive vocabulary in English	Morphological awareness in French	Morphological awareness in English
French receptive vocabulary	1	.399**	.118	.085	.503**	-.024	.400**	.110	.336**	.324**
		.000	.292	.450	.000	.830	.000	.330	.002	.003
Working memory	.399**	1	.338**	-.041	.279*	-.128	.236*	.162	.015	.108
	.000		.002	.717	.012	.255	.034	.150	.896	.337
Non-verbal IQ	.118	.338**	1	-.049	.006	-.052	.300**	.182	-.171	.002
	.292	.002		.663	.956	.648	.007	.104	.127	.984
Pseudoword decoding	.085	-.041	-.049	1	.151	-.057	.275*	.296**	-.047	.210
	.450	.717	.663		.180	.610	.013	.007	.676	.060
Word segmentation	.503**	.279*	.006	.151	1	.103	.459**	.264*	.161	.197
	.000	.012	.956	.180		.359	.000	.017	.151	.078
Socioeconomic status	-.024	-.128	-.052	-.057	.103	1	.192	.182	.116	.024
	.830	.255	.648	.610	.359		.086	.104	.303	.829
Receptive vocabulary in English	.400**	.236*	.300**	.275*	.459**	.192	1	.571**	.167	.393**
	.000	.034	.007	.013	.000	.086		.000	.137	.000
Expressive vocabulary in English	.110	.162	.182	.296**	.264*	.182	.571**	1	-.108	.194
	.330	.150	.104	.007	.017	.104	.000		.336	.082
Morphological awareness in French	.336**	.015	-.171	-.047	.161	.116	.167	-.108	1	.167
	.002	.896	.127	.676	.151	.303	.137	.336		.136
Morphological awareness in English	.324**	.108	.002	.210	.197	.024	.393**	.194	.167	1
	.003	.337	.984	.060	.078	.829	.000	.082	.136	

Appendix 5.29: Evaluation of assumptions when selecting predictor variables for Research Question 5 Year 10 participants

Assumption	**Test**	**Outcome**	**Transformation**
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.30, no tolerance statistics <.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 0.67 Kurtosis/std error of kurtosis= -1.67	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.04	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.30: Evaluation of assumptions of multiple regression for Research Question 5 Year 10 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 9.37, tolerance statistic of language status and language status*morphological awareness in French <.2.	Assumption violated	Morphological awareness in French > morphological awareness in French centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.33, tolerance statistic of language status and language status*morphological awareness in French centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= -0.54 Kurtosis/std error of kurtosis= -0.27	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 2.18	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.31: Descriptive statistics for year 8 participants when answering Research Question 6

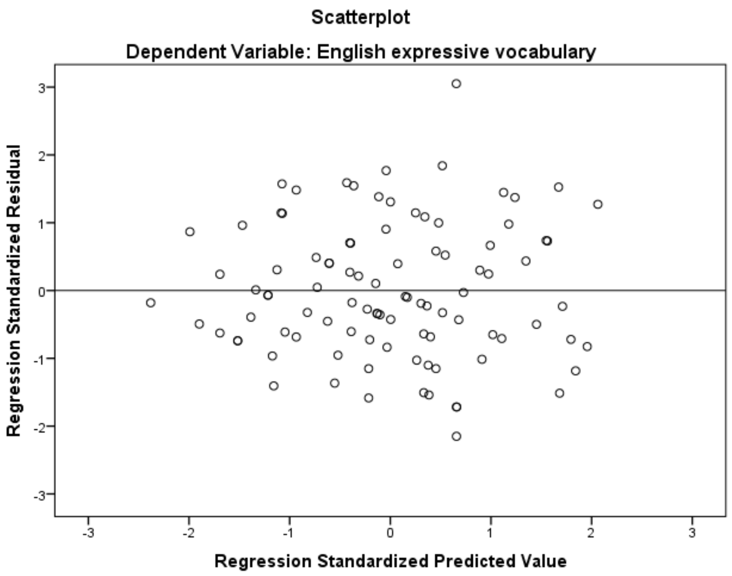
Table 1: Descriptive statistics for year 8 participants (n=96)

Variable	Mean	Std. Deviation
French receptive vocabulary	12.45	3.79
Working memory	4.97	1.40
Non-verbal IQ	15.71	3.74
Pseudoword decoding	46.81	4.47
Word segmentation	20.74	4.00
Socioeconomic status	8520.30	4018.03
English receptive vocabulary	133.88	9.92
English expressive vocabulary	18.98	2.73
Morphological awareness in French	9.38	2.63
Morphological awareness in English	13.78	3.88

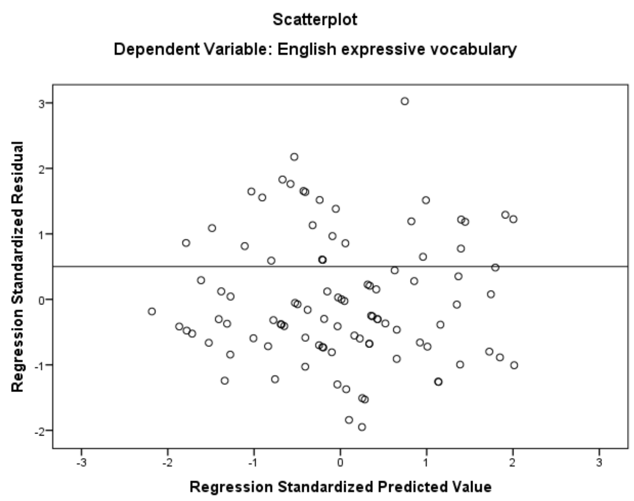
Table 2: Correlations for year 8 participants

n=96	French receptive vocabulary	Working memory	Non-verbal IQ	Pseudoword decoding	Word segmentation	Socioeconomic status	Receptive vocabulary in English	Expressive vocabulary in English	Morphological awareness in French	Morphological awareness in English
French receptive vocabulary	1	.255*	.440**	.320**	.478**	.194	.428**	.333**	.009	.157
		.012	.000	.001	.000	.058	.000	.001	.930	.128
Working memory	.255*	1	.066	.258*	.376**	.168	.326**	.280**	-.051	.103
	.012		.520	.011	.000	.102	.001	.006	.621	.318
Non-verbal IQ	.440**	.066	1	.164	.428**	.285**	.345**	.210*	.074	.121
	.000	.520		.110	.000	.005	.001	.040	.471	.240
Pseudoword decoding	.320**	.258*	.164	1	.237*	.173	.040	.176	-.063	-.112
	.001	.011	.110		.020	.091	.702	.087	.542	.276
Word segmentation	.478**	.376**	.428**	.237*	1	.219*	.525**	.349**	-.126	.278**
	.000	.000	.000	.020		.032	.000	.000	.222	.006
Socioeconomic status	.194	.168	.285**	.173	.219*	1	.144	.286**	-.084	-.045
	.058	.102	.005	.091	.032		.160	.005	.415	.660
Receptive vocabulary in English	.428**	.326**	.345**	.040	.525**	.144	1	.504**	-.110	.312**
	.000	.001	.001	.702	.000	.160		.000	.284	.002
Expressive vocabulary in English	.333**	.280**	.210*	.176	.349**	.286**	.504**	1	-.232*	-.008
	.001	.006	.040	.087	.000	.005	.000		.023	.935
Morphological awareness in French	.009	-.051	.074	-.063	-.126	-.084	-.110	-.232*	1	-.182
	.930	.621	.471	.542	.222	.415	.284	.023		.077
Morphological awareness in English	.157	.103	.121	-.112	.278**	-.045	.312**	-.008	-.182	1
	.128	.318	.240	.276	.006	.660	.002	.935	.077	

Appendix 5.32: Evaluation of assumptions when selecting predictor variables for Research Question 6 Year 8 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.42, no tolerance statistics <.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 1.27 Kurtosis/std error of kurtosis= -0.38	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.68	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook’s distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test –significant effect found at step one (F (8, 87) = 2.09, p<.05).	Assumption violated	-

Appendix 5.33: Evaluation of assumptions of multiple regression for Research Question 6 Year 8 participants

Assumption	**Test**	**Outcome**	**Transformation**
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 7.77, tolerance statistic of language status and language status*morphological awareness in French <.2.	Assumption violated	Morphological awareness in French > morphological awareness in French centred
	VIF and tolerance statistics after centering. $\overline{\text{VIF}}$ = 1.42, tolerance statistic of language status and language status*morphological awareness in French centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 2.29 Kurtosis/std error of kurtosis= -0.01	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.84	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test –significant effect found at step four (1, 90) = 4.29, *p*<.05)	Assumption violated	-

Appendix 5.34: Descriptive statistics for year 10 participants when answering Research Question 6

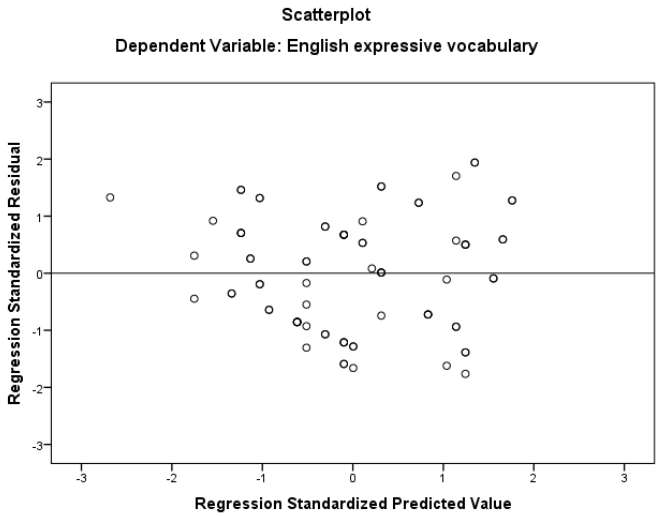
Table 1: Descriptive statistics for year 10 participants (n=81)

Variable	Mean	Std. Deviation
French receptive vocabulary	19.56	3.55
Working memory	5.77	1.85
Non-verbal IQ	17.42	3.89
Pseudoword decoding	46.48	3.95
Word segmentation	23.53	4.08
Socioeconomic status	11438.77	4593.20
English receptive vocabulary	144.96	9.68
English expressive vocabulary	21.40	3.21
Morphological awareness in French	18.27	4.67
Morphological awareness in English	24.14	3.48

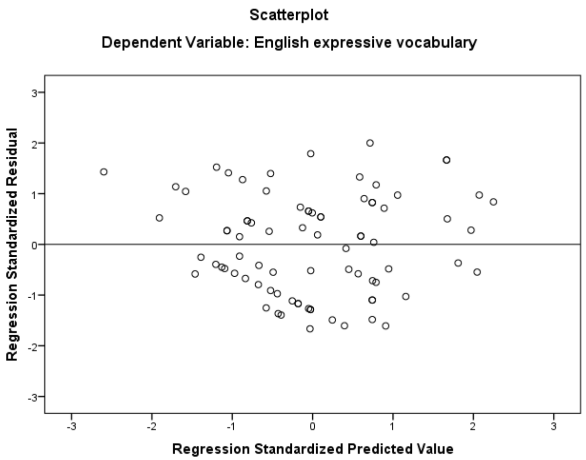
Table 2: Correlations for year 10 participants

n=81	Receptive vocabulary in French	Working memory	Non-verbal IQ	Pseudoword decoding	Word segmentation	Socioeconomic status	Receptive vocabulary in English	Expressive vocabulary in English	Morphological awareness in French	Morphological awareness in English
Receptive vocabulary in French	1	.399**	.118	.085	.503**	-.024	.400**	.110	.336**	.324**
		.000	.292	.450	.000	.830	.000	.330	.002	.003
Working memory	.399**	1	.338**	-.041	.279*	-.128	.236*	.162	.015	.108
	.000		.002	.717	.012	.255	.034	.150	.896	.337
Non-verbal IQ	.118	.338**	1	-.049	.006	-.052	.300**	.182	-.171	.002
	.292	.002		.663	.956	.648	.007	.104	.127	.984
Pseudoword decoding	.085	-.041	-.049	1	.151	-.057	.275*	.296**	-.047	.210
	.450	.717	.663		.180	.610	.013	.007	.676	.060
Word segmentation	.503**	.279*	.006	.151	1	.103	.459**	.264*	.161	.197
	.000	.012	.956	.180		.359	.000	.017	.151	.078
Socioeconomic status	-.024	-.128	-.052	-.057	.103	1	.192	.182	.116	.024
	.830	.255	.648	.610	.359		.086	.104	.303	.829
Receptive vocabulary in English	.400**	.236*	.300**	.275*	.459**	.192	1	.571**	.167	.393**
	.000	.034	.007	.013	.000	.086		.000	.137	.000
Expressive vocabulary in English	.110	.162	.182	.296**	.264*	.182	.571**	1	-.108	.194
	.330	.150	.104	.007	.017	.104	.000		.336	.082
Morphological awareness in French	.336**	.015	-.171	-.047	.161	.116	.167	-.108	1	.167
	.002	.896	.127	.676	.151	.303	.137	.336		.136
Morphological awareness in English	.324**	.108	.002	.210	.197	.024	.393**	.194	.167	1
	.003	.337	.984	.060	.078	.829	.000	.082	.136	

Appendix 5.35: Evaluation of assumptions when selecting predictor variables for Research Question 6 Year 10 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{\text{VIF}}$ = 1.41, no tolerance statistics <.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 0.19 Kurtosis/std error of kurtosis= -2.01	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.91	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 5.36: Evaluation of assumptions of multiple regression for Research Question 6 Year 10 participants

Assumption	Test	Outcome	Transformation
Multicollinearity	VIF and tolerance statistics. $\overline{VIF}$ = 15.40, tolerance statistic of language status and language status*morphological awareness in French <.2.	Assumption violated	Morphological awareness in French > morphological awareness in French centred
	VIF and tolerance statistics after centering. $\overline{VIF}$ = 1.40, tolerance statistic of language status and language status*morphological awareness in French centred >.2.	Assumption upheld	-
Normality of residuals	Skewness/std error of skewness= 0.28 Kurtosis/std error of kurtosis= -2.01	Assumption upheld	-
Linearity		Assumption upheld	-
Independence of errors	Durbin-Watson = 1.92	Assumption upheld	-
Outliers	No standardised residuals outside of +/-3.29	Assumption upheld	-
Influential cases	No Cook's distance values greater than 1	Assumption upheld	-
Homoscedasticity of residuals	Breusch-Pagan test – no significant effect found	Assumption upheld	-

Appendix 6.1: Interpretation of findings in the light of previous research

Research Question	Hypotheses	Empirical Evidence	Prediction from theory	Findings	Interpretation
Within-language relationships					
1. Is English receptive vocabulary predicted by English morphological awareness and language status?	H_0: There is no main effect of English morphological awareness	Study 4: EL1 Grade 3: 2.4^{ns} Study 22: EL1 Younger cohort (kindergarten) time 1: 10.1^{ns} Study 22: EAL Grade 1 time 2: 9.8^{ns}	Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP.		Replication of significant results demonstrates mechanism of morphemic analysis and concurs with prediction from Dual Iceberg Model. Older pupils with higher vocabulary levels have higher levels of morphological awareness. Low effect sizes associated with number of covariates measured, including English expressive vocabulary and oral word segmentation. Low effect sizes associated with measure of English morphological awareness using pseudowords in isolation.
	H_1: There is a main effect of English morphological awareness	Study 4: EL1 Grade 2: 13.1^{**} Study 7: EL1 Kindergarten and Grade 1: 21.0^{***} Study 48: EL1 Grade 4: 17.9^{***} Study 22: Chinese EAL kindergarten time 2: 14.0^{*} Study 22: Chinese EAL Grade 1 time 1: 17.8^{*} Study 24: Spanish EAL Grade 4: 10.2^{**} Study 61: Spanish EAL Grade 4 cognates: 11.0^{***} Study 61: Spanish EAL Grade 4 noncognates: 41.0^{***} Study 52: Combined EAL Grade 6 English syntactic awareness covariate: 14.7^{***} Study 52: Combined EAL Grade 6 phoneme elision covariate: 12.8^{***}	Main effect of CUP on surface feature. Main effect greater for older pupils.	Year 8: 4.4^{**} Year 10: 7.0^{**}	
	H_2: There is no main effect of language status	Study 64: Grade 5 pupils: No main effect of language status on Word Mastery (experimental measure) Cameron (2002): Pupils aged 13-14: No main effect on 10K items Cameron (2002): Pupils aged 13-14: No main effect on academic items		Year 10: ns	Replication of main effect of language status in favour of EL1 reinforces established view that EAL pupils have lower levels of vocabulary than their EL1 peers.

	H_3: There is a main effect of language status	Study 52: Grade 6 pupils. Main effect of 1.9^{**} in favour of English and Slavic groups (language status categorical variable on 8 levels) Study 64: Grade 5 pupils: Main effect in favour of EL1 on PPVT-R. No effect size reported. Bialystok, Luk, Peets, and Yang (2010): Pupils aged 3-10: Main effect of $.35^{***}$ in favour of EL1 Cameron (2002): Pupils aged 13-14: Main effect of 1.2^{**} in favour of EL1 on 3K items Cameron (2002): Pupils aged 13-14: Main effect of 6.8^{**} in favour of EL1 on 5K items		Year 8: 3.3^{*}	Nonsignificant effect for year 10 pupils may be associated with number of years of residence in the country. A weakness of the present study, and of others, is the lack of measurement of years of residence in the UK for EAL pupils. Previous studies did not measure main effect of language status in the presence of covariates. Lack of sub-analyses on EAL pupils with different L1s is a weakness in this study.
	H_4: There is no moderator effect of language status between English morphological awareness and English receptive vocabulary	Study 13: Nonsignificant likelihood ratio test: $\Delta\chi 2$ (Δdf) = 1.89 (1), p>.05		Year 8: ns Year 10: ns	The literature presents implicit evidence that strength of association between morphological awareness and vocabulary may vary as a function of extent of morphological transparency of L1. Lack of measurement of morphological transparency of the L1 is a weakness in this study and in the literature. Possibility of type II error. EL1 pupils may have similar CUP profile to EAL peers. Possibility of measurement error of CUP.
	H_5: There is moderator effect of language status between English morphological awareness and English receptive vocabulary	Study 20: Significant log likelihood ratio test: (Δ-2LL=6.321; df = 3; p<.05). No effect size reported.	EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.		
	H_0: There is no main effect of English morphological awareness	Study 3: EL1 9-12 years old Comes From Test: 4.0^{ns} Study 39: EL1 Grade 2: 2^{ns} Study 62: EL1 Adult crude marking system receptive task: 5.1^{ns}	Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP.	Year 8: ns Year 10: ns	Nonsignificant effects explained by measurement of several covariates, the most important of which is English receptive vocabulary.

2. Is English expressive vocabulary predicted by English morphological awareness and language status?		Study 62: EL1 Adult productive task: 18.2^{ns} Study 62: Japanese EAL Adult crude marking system receptive task: 0.05^{ns} Study 62: Japanese EAL Adult sensitive marking system receptive task: 0.4^{ns}			A fully mediated model between receptive English morphological awareness, English receptive vocabulary, and English expressive vocabulary, explains current data. Effects on English expressive vocabulary may also vary as a function of task type of morphological awareness (receptive, expressive). One weakness of the present study is lack of measurement of expressive morphological awareness. Possibility of measurement error of CUP, as CUP is at least partially cognitive in nature, and is rarely used to explain within-language associations. Dual Iceberg Model does not account for relationships between surface features of language.
	H_1: There is a main effect of English morphological awareness	Study 3: EL1 Grade 4, four tasks of derivational awareness: 10.2**-38.4** Study 39: EL1 Kindergarten: 3* Study 39: EL1 Kindergarten and grade 2: 2** Study 40: EL1 Grade 4, three tasks of derivational awareness: 7.3*-37.2** Study 40: EL1 Grade 6, three tasks of derivational awareness: 7.3*-23.0* Study 58: EL1 Grade 3: 22.8** Study 62: EL1 Adult Word segmentation sensitive: 33.1** Study 27: Spanish EAL Grade 5, four tasks of derivational awareness: 8.4**-25.0** Study 26: EL1 + EAL Grade 2 and 3: 42.3** Study 62: Japanese EAL Adult productive task: 69.2**	Main effect of CUP on surface feature. Main effect greater for older pupils.		
	H_2: There is no main effect of language status			Year 10: ns	As for English receptive vocabulary, the replication of main effect of language status in favour of EL1 reinforces established view that EAL pupils have lower levels of vocabulary than their EL1 peers. Nonsignificant effect for year 10 pupils may be associated with number of years of residence in the country.
	H_3: There is a main effect of language status	Study 26: Grade 2: 37.5*** in favour of EL1 Study 26: Grade 3: 31.4*** in favour of ELI Burgoyne et al., (2009): Year 3: 21.9*** in favour of EL1 Burgoyne et al., (2011): Year 3: 45*** in favour of EL1		Year 8: 3.7*	

		McKendry (2013): Year 5: 9** in favour of EL1			A weakness of the present study, and of others, is the lack of measurement of years of residence in the UK for EAL pupils. Previous studies did not measure main effect of language status in the presence of covariates.
	H_4: There is no moderator effect of language status between English morphological awareness and English expressive vocabulary	Nonsignificant likelihood ratio test: $\Delta\chi2$ (Δdf) = 11.46 (10), *p*>.05		Year 8: ns Year 10: ns	Possibility of type II error. EL1 pupils may have similar CUP profile to EAL peers in that they have similar levels of English morphological awareness. Possibility of measurement error of CUP. Level of English vocabulary may vary as a function of amount of exposure to English.
	H_5: There is moderator effect of language status between English morphological awareness and English expressive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.		
3. Is French receptive vocabulary predicted by French morphological awareness and language status?	H_0: There is no main effect of French morphological awareness	Study 37: EL1 Grade 1 French immersion pupils: 1.7^{ns}	No main effect due to underdeveloped surface feature which may not be able to draw on CUP. Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP.	Year 8: ns	Nonsignificant result with year 8 pupils confirmed the only other result in the literature with a more reliable measure of French morphological awareness. Morphological awareness does not contribute to receptive vocabulary acquisition for pupils who have started learning a foreign language within the last two years due to lack of multimorphemic input. Possible influence of GCSE syllabus encouraging rote memorisation over word-analytical skills.
	H_1: There is a main effect of French morphological awareness	Study 1: Chinese undergraduate EFL students Pretest: 10.5** Study 1: Chinese undergraduate EFL students Posttest: 12.5** Study 23: Chinese undergraduate students: 18.4***	Main effect of CUP on surface feature. Main effect greater for older pupils.	Year 10: 5.0*	

<table>
<tr><td rowspan="5"></td><td></td><td></td><td></td><td></td><td>Results with year 10 pupils provide first piece of evidence that morphological awareness can lead to receptive vocabulary acquisition in the foreign language context at school.

Positive correlation between effect size of morphological awareness on foreign language receptive vocabulary, and time spent learning the target foreign language.

Greater intrinsic motivation for year 10 pupils compared to year 8 pupils.

Nonsignificant result may be due to underdeveloped surface feature, and/or underdeveloped CUP.</td></tr>
<tr><td>H_2: There is no main effect of language status</td><td></td><td>No main effect of language status due to time spent learning foreign language.</td><td>Year 8: ns
Year 10: ns</td><td rowspan="2">Nonsignificant effect may not be comparable to previous literature as Strand et al. (2015) may have been measuring competencies other than foreign language vocabulary.

Possibility of type II error.</td></tr>
<tr><td>H_3: There is a main effect of language status</td><td>Strand, Malmberg, and Hall (2015): Main effect of 1.4^{***} in favour of EAL</td><td>Main effect of language status due to more developed CUP for EAL pupils.</td><td></td></tr>
<tr><td>H_4: There is no moderator effect of language status between French morphological awareness and French receptive vocabulary</td><td></td><td></td><td>Year 8: ns
Year 10: ns</td><td rowspan="2">Nonsignificant effects were puzzling as EAL pupils have significantly higher levels of French morphological awareness compared to EL1 peers in both year groups.

Possible influence of GCSE syllabus encouraging rote memorisation over word-analytical skills.

Possibility of type II error.

A richer CUP may not necessarily facilitate language surface features.</td></tr>
<tr><td>H_5: There is moderator effect of language status between French morphological awareness and French receptive vocabulary</td><td></td><td>EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.</td><td></td></tr>
</table>

Cross-language relationships					
4. Is French receptive vocabulary predicted by English morphological awareness and language status?	H_0: There is no main effect of English morphological awareness	Study 1: No main effect of L1 Chinese morphological awareness on EFL for undergraduate students on pretest Study 1: No main effect of L1 Chinese morphological awareness on EFL for undergraduate students on posttest	No main effect due to underdeveloped surface feature which may not be able to draw on CUP. Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP. No main effect due to shared variance between morphological awareness measures.	Year 8: ns	Year 8 nonsignificant effect may be due to covariates, especially English receptive vocabulary. Presence of a minimum level of foreign language vocabulary, below which morphemic analysis does not apply. Instead, pupils may be memorising foreign language vocabulary in rote fashion. Main effect found in sample of year 10 pupils provides first piece of evidence that a cross-linguistic effect of morphological awareness on foreign language receptive vocabulary exists in the MFL context in England. Main effect found in sample of year 10 pupils provides evidence of facilitation of a surface feature of language by the CUP. Nonsignificant effect found in sample of year 8 pupils may be due to lack of motivation and/or multimorphemic input.
	H_1: There is a main effect of English morphological awareness	Study 37: Main effect of 26.0^{***} of L1 English morphological awareness on French foreign language receptive vocabulary for Grade 1 pupils	Main effect of CUP on surface feature. Main effect greater for older pupils.	Year 10: 4.2^{*}	
	H_2: There is no main effect of language status		No main effect of language status due to time spent learning foreign language.	Year 8: ns Year 10: ns	Nonsignificant effect may not be comparable to previous literature as Strand et al. (2015) may have been measuring competencies other than foreign language vocabulary. Possibility of type II error.
	H_3: There is a main effect of language status	Strand, Malmberg, and Hall (2015): Main effect of 1.4^{***} in favour of EAL	Main effect of language status due to more developed CUP for EAL pupils.		
	H_4: There is no moderator effect of language status between English morphological			Year 8: ns Year 10: ns	Possibility of type II error.

	awareness and French receptive vocabulary				
	H_5: There is moderator effect of language status between English morphological awareness and French receptive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.		
5. Is English receptive vocabulary predicted by French morphological awareness and language status?	H_0: There is no main effect of French morphological awareness	Study 25: No main effect of L1 Spanish morphological sensitivity on English receptive vocabulary (cognates + noncognates) for Grade 4 and 7 Spanish EAL pupils Study 25: No main effect of L1 Spanish morphological sensitivity on English receptive vocabulary (cognates) for Grade 4 and 7 Spanish EAL pupils Study 25: No main effect of L1 Spanish morphological sensitivity on English receptive vocabulary (noncognates) for Grade 4 and 7 Spanish EAL pupils Study 25: No main effect of L1 Spanish morphological structure on English receptive vocabulary (noncognates) for Grade 4 and 7 Spanish EAL pupils Study 65: No main effect of L1 Chinese morphological awareness on English receptive vocabulary for Grade 2 and Grade 4 Chinese EAL	Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP. No main effect due to shared variance between morphological awareness measures.	Year 8: ns Year 10: ns	Nonsignificant effects may be explained by nature of language in which morphological awareness is measured (foreign language context). Due to limited multimorphemic input pupils may not have enough vocabulary to use morphemic analysis. In year 10 sample the nonsignificant effect of French morphological awareness may be due to relatively lower level of French morphological awareness compared to English, as well as shared variance between these two measures. Cross-linguistic effect may vary as a function of task type of morphological awareness (receptive, expressive), with expressive tasks being a better indicator of cross-linguistic effects.
	H_1: There is a main effect of French morphological awareness	Study 25: Main effect of 14.7^{*} of L1 Spanish morphological structure on English receptive vocabulary (cognates + noncognates) for Grade 4 and 7 Spanish EAL pupils Study 25: Main effect of 15.6^{**} of L1 Spanish morphological structure on	Main effect of CUP on surface feature. Main effect greater for older pupils.		

		English receptive vocabulary (cognates) for Grade 4 and 7 Spanish EAL pupils Study 51: Main effect of 15.1^{**} of L1 Spanish morphological awareness on English receptive vocabulary for Grade 9 and 10 Spanish EAL pupils Study 61: Main effect of 9.6^{**} of L1 Korean morphological awareness on English receptive vocabulary for Grade 2, 3, and 4 Korean EAL pupils			
	H_2: There is no main effect of language status	Study 64: Grade 5 pupils: No main effect of language status on Word Mastery (experimental measure) Cameron (2002): Pupils aged 13-14: No main effect on 10K items Cameron (2002): Pupils aged 13-14: No main effect on academic items		Year 10: ns	Replication of main effect of language status in favour of EL1 reinforces established view that EAL pupils have lower levels of vocabulary than their EL1 peers. Nonsignificant effect for year 10 pupils may be associated with number of years of residence in the country. A weakness of the present study, and of others, is the lack of measurement of years of residence in the UK for EAL pupils. Previous studies did not measure main effect of language status in the presence of covariates. Lack of sub-analyses on EAL pupils with different L1s is a weakness in this study.
	H_3: There is a main effect of language status	Study 52: Grade 6 pupils. Main effect of 1.9^{**} in favour of English and Slavic groups (language status categorical variable on 8 levels) Study 64: Grade 5 pupils: Main effect in favour of EL1 on PPVT-R. No effect size reported. Bialystok, Luk, Peets, and Yang (2010): Pupils aged 3-10: Main effect of $.35^{***}$ in favour of EL1 Cameron (2002): Pupils aged 13-14: Main effect of 1.2^{**} in favour of EL1 on 3K items Cameron (2002): Pupils aged 13-14: Main effect of 6.8^{**} in favour of EL1 on 5K items		Year 8: 4.0^{*}	
	H_4: There is no moderator effect of language status			Year 8: ns Year 10: ns	Possibility of type II error.

	between French morphological awareness and English receptive vocabulary				
	H_5: There is moderator effect of language status between French morphological awareness and English receptive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.		
6. Is English expressive vocabulary predicted by French morphological awareness and language status?	H_0: There is no main effect of French morphological awareness		Main effect may diminish to nonsignificance for younger pupils due to underdeveloped CUP. No main effect due to shared variance between morphological awareness measures.	Year 8: ns Year 10: ns	Nonsignificant effects may be explained by nature of language in which morphological awareness is measured (foreign language context). Due to limited multimorphemic input pupils may not have enough vocabulary to use morphemic analysis. In year 10 sample the nonsignificant effect of French morphological awareness may be due to relatively lower level of French morphological awareness compared to English, as well as shared variance between these two measures. Cross-linguistic effect may vary as a function of task type of morphological awareness (receptive, expressive), with expressive tasks being a better indicator of cross-linguistic effects.
	H_1: There is a main effect of French morphological awareness		Main effect of CUP on surface feature. Main effect greater for older pupils.		
	H_2: There is no main effect of language status			Year 10: ns	As for English receptive vocabulary the replication of main effect of language status in favour of EL1 reinforces

	H_3: There is a main effect of language status			Year 8: 2.9*	established view that EAL pupils have lower levels of vocabulary than their EL1 peers. Nonsignificant effect for year 10 pupils may be associated with number of years of residence in the country. A weakness of the present study, and of others, is the lack of measurement of years of residence in the UK for EAL pupils. Previous studies did not measure main effect of language status in the presence of covariates.
	H_4: There is no moderator effect of language status between French morphological awareness and English expressive vocabulary			Year 8: ns Year 10: ns	Possibility of type II error.
	H_5: There is moderator effect of language status between French morphological awareness and English expressive vocabulary		EAL pupils expected to use richer CUP to promote surface feature growth, compared to EL1 pupils.		