

An Experimental Approach to the Conrad Phenomenon

Camilla Søballe Horslund

University of Amsterdam¹

Abstract

This study adopts an experimental approach to the Conrad Phenomenon, i.e. the phenomenon that second language (L2) learners can perform remarkably better in some aspects of their L2 while performing poorly at others. L2 performance in syntax, phonetics and phonology, and the lexicon in four L2 learner groups differing in L2 experience and native language background was examined and correlations between L2 performance in the three domains revealed a general trend of positive relations between domains, thus suggesting that the Conrad Phenomenon is uncommon. The strongest between-domain relation was observed between the lexicon and phonetics and phonology, thus supporting the notion of lexical facilitation in L2 speech acquisition.

1. Introduction²

Second language acquisition (SLA) studies most often investigate learning of different linguistic domains, e.g. syntax, phonology, or the lexicon. Comparisons between these domains, which are the aim of this study, are rare. Anecdotal evidence suggests that second language (L2) learners may do remarkably better at some language aspects than at others. One famous example is the Polish-British author Joseph Conrad, who wrote English remarkably well and with an, in many respects, native-like mastery of English grammar (Morzinski, 1994:24), but spoke English with a strong,

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apparently unintelligible, Polish accent (Lucas, 1998), suggesting that he had been successful in his acquisition of English morphosyntax and lexicon, but not in his acquisition of the English sound system. This study adopts an experimental approach to the *Conrad phenomenon* (Scovel, 1978) by investigating whether Joseph Conrad was a special L2 learner or whether it is common among L2 learners to perform well within one linguistic domain and poorly within another.

The Conrad phenomenon is in line with the results of Snow and Hoefnagel-Höhle's (1979) study of native (L1) English speaking learners of Dutch, in which two separate factors of L2 ability were identified, i.e. lexical and morphosyntactic ability on the one hand and phonological ability on the other hand. The present study differs from Snow and Hoefnagel-Höhle's study in a number of ways. First, the subjects in Snow and Hoefnagel-Höhle's study were fully immersed in the L2 country, whereas the participants of this study are learners whose L2 exposure is largely through formal instruction. Second, Snow and Hoefnagel-Höhle investigated L2 learners from various age groups, whereas this study is concerned with adult L2 learners only. Third, this study investigates another L1-L2 combination than the one investigated in Snow and Hoefnagel-Höhle, namely L1 Danish and L1 Finnish learners of L2 English. Finally, some of the tasks used to measure syntactic L2 ability in Snow and Hoefnagel-Höhle's study confound variables and hence measure more than L2 syntactic ability. The tasks used in the present study clearly separate different variables in L2 performance.

A number of more recent linguistic studies also point to interesting differences in the acquisition of different linguistic domains. Age of acquisition has been found to constrain the learning of L2 phonology to a greater extent than the learning of L2 morphosyntax (Flege, Yeni-Komshian, & Liu, 1999). Likewise, Granena and Long (2012) found that age of acquisition affects L2 performance differently within pronunciation, morphosyntax, and lexicon. Specifically, Granena and Long reported that the age effect starts earlier for pronunciation with a cut-off point for reaching native-like pronunciation at five years of age compared to nine years for lexicon and twelve years for morphosyntax. The authors take these results as evidence for the existence of multiple sensitive periods in second language acquisition.

Age effects have also been studied by Knightly, Jun, Oh, and Au (2003), who tested production benefits of overhearing normal conversation during childhood, comparing childhood overhearers and late L2 learners

with respect to phonology and morphosyntax. Their results suggest an advantage of childhood overhearing in phonology but not in morphosyntax. The results of a study on retention of L1 remnants in international adoptees, who had been exposed to their native language for the first three months of their life (Hyltenstam, Bylund, Abrahamsson, & Park, 2009), also point to a qualitative difference in the acquisition of phonology and morphosyntax, since an advantage in phonological relearning was observed for international adoptees compared to regular L2 learners, while such an advantage was not observed in morphosyntactic relearning.

Moreover, results from studies of neural processing within different linguistic domains for L1 and L2 speakers (e.g. Bowden, Steinhauer, Sanz, & Ullman, 2013) suggest a difference between L2 processing of syntax and lexicon. While L2 semantic/lexical processing relies on native-like neural cognitive mechanisms, L2 syntactic processing seems to depend on degree of L2 experience or L2 proficiency, with advanced L2 learners showing native-like processing and less advanced L2 learners relying on semantic processing for syntax (Bowden et al., 2013).

Neither of these studies, however, compared performance between linguistic domains directly, which is the aim of this study. The present study investigates the Conrad phenomenon experimentally by examining L2 performance within three linguistic domains, syntax, phonetics and phonology, and the lexicon, in order to examine whether L2 learners' performance within one linguistic domain is related to their performance within other linguistic domains or whether it is possible to perform well within one domain of one's L2 while performing poorly within others.

1.2 The modularity approach

The modularity approach presents a theoretical perspective on the Conrad phenomenon by viewing linguistic domains as modules, i.e. as partly separate entities in line with Elsabbagh and Karmiloff-Smith's view that 'modularity concerns the degree to which cognitive domains can be thought of as separable, i.e., whether they function independently of one another' (2006, p. 218).

The modularity debate is in part based on a number of different definitions of the term *module*. Some of these definitional disagreements may stem from the fact that the modularity approach encompasses several academic disciplines. While there is general consensus regarding the existence of modularity in highly specialised areas of vision, for instance, the question of modularity for higher order cognitive functions, such as

language, is much more controversial. One important distinction is the one between functional (or cognitive) modularity on the one hand and anatomical (or neural) modularity on the other hand (Elsabbagh & Karmiloff-Smith, 2006). According to the Functional Modularity Assumption, human cognition consists of several cognitive modules, which, in line with Fodor (1984), are characterised as being domain-specific, innately specified, and informationally encapsulated. The Anatomical Modularity Assumption builds on the Functional Modularity Assumption and adds that cognitive modules each reside in specific brain areas (Bergeron, 2007). As this study deals with behavioural data only, the present discussion is limited to functional modularity. A modularity approach to language adopts this idea of separation of cognitive domains either as a separation between language and general cognition (Chomsky, 1986, p. xxvi; 1988, p. 161) or as a subdivision within the language module such that separate submodules deal with different linguistic domains (Chomsky, 1965: 16; Sharwood Smith, 1994, pp. 17-18). The former is called external modularity and the latter is called internal modularity. Since the topic of this study is second language performance in different linguistic domains, this study is concerned with internal modularity only.

A modularity approach to L2 performance thus predicts that an L2 learner's performance in one linguistic domain is independent from the learner's performance in other linguistic domains. According to this approach, the Conrad phenomenon is accounted for by independence between the modules within which Joseph Conrad performed well, i.e. syntax and the lexicon, on the one hand and the module within which he performed poorly, i.e. phonetics and phonology, on the other hand.

1.3 Relations between domains in first language acquisition

In first language acquisition research, the relationship between linguistic domains is the topic of an ongoing debate. In particular, the relationship between the development of lexical and morphosyntactic knowledge has been widely debated within different linguistic frameworks. The debate is motivated by a strong positive correlation between lexical and morphosyntactic knowledge and centres on the relative autonomy or interdependence of these two linguistic domains, i.e. the degree of internal modularity in first language acquisition (Marchman, Martínez-Sussmann, & Dale, 2004). This strong positive correlation between lexical and morphosyntactic knowledge in children is explained by the hypothesis that

lexical knowledge is a prerequisite for morphosyntactic knowledge (e.g. Marchman & Bates, 1994). However, others argue that morphosyntactic knowledge facilitates word learning (e.g. Anisfeld, Rosenberg, Gasparini, & Hoberman, 1998).

The idea that lexical acquisition drives morphosyntactic acquisition is often presented within a Single Mechanism Account. Marchman and Bates (1994), for instance, argue that the correlation between lexical and morphosyntactic acquisition is due to both domains being acquired by the same learning mechanism, which starts out as a rote learning mechanism that handles individual mappings but develops into a system building mechanism that both handles individual mappings and organises these mappings according to general patterns, e.g. regular verbs and irregular verbs. Importantly, this qualitative change in the learning mechanism comes about when the vocabulary reaches a critical mass, since the child's "dataset" needs to reach a certain size to support the extraction of general classifications. Marchman and Bates' study shows a significant positive non-linear relationship between vocabulary growth (number of verbs in particular) and the appearance of correct past tense formations as well as the onset of overregularisation errors, which the authors take as evidence for the Single Mechanism Account. Once the vocabulary reaches a critical mass, incremental increases in the number of verbs acquired result in qualitative shifts in the treatment of both previously acquired forms and novel forms.

A Dual Mechanism Account is known from the Words and Rules Theory, developed by Prince and Pinker (e.g. Pinker, 2006). The Words and Rules Theory holds that language acquisition relies on two qualitatively different learning mechanisms, namely associative memory of arbitrary sound-meaning relationships (the principle underlying the lexicon) and symbol-manipulating rules (the principle underlying the mental grammar). Hence, words must be rote learned, while the acquisition of grammar is subject to rule learning (Pinker, 1998). Pinker argues that, as children's memory retrieval is less reliable than adults', overregularisation errors in child speech serves as a compensation strategy for children when their memory fails them. Importantly, overregularisation errors in past tense formation start when the child acquires the regular rule, which is evident from the observation that the onset of overregularisation co-occurs with the point at which the child starts inflecting past tense forms more often than not (Pinker, 2006).

Regarding the proposed morphosyntactic facilitation of vocabulary acquisition, Anisfeld et al. (1998) argue that the onset of combinatorial speech may facilitate vocabulary acquisition in two ways. First, combinatorial speech calls for specificity of expression, which motivates word learning. Specifically, when children stop using words holophrastically (using a single word to express a complex idea), a need for more words arises. The observation of a car and the request to go for a car ride, for instance, which were both earlier expressed with the single word 'car', may now elicit two words each and thus become distinguishable, e.g. 'car there' and 'Johnny car'. Second, grammatical context helps children identify the meaning of words, especially relational words such as verbs. Anisfeld et al. do not explicitly propose any theoretical account of their findings in terms of single or dual mechanisms, but their argumentation seems to be more compatible with a dual mechanism account than with a single mechanism account, as lexical and grammatical acquisition are presented as qualitatively different.

The modularity debate in L1 acquisition does not seem to be on the verge of settlement, which may in part be due to the lack of clear empirical results favouring either modularity or non-modularity. A factor contributing to this lack of empirical decisiveness may be the unavoidable confound in L1 acquisition between linguistic development and the development of world knowledge; a confound that seems particularly relevant in lexical development. This problem is not present in adult L2 acquisition, as adult L2 learners' world knowledge is highly developed before language acquisition even begins. Hence, an examination of modularity in L2 acquisition may inform the modularity debate in L1 acquisition.

1.4 Domain interdependence in SLA: The Vocab Model

To my knowledge, only one theoretical account of L2 performance in different linguistic domains exists, namely the Vocabulary-Tuning Model of L2 Rephonologisation (the Vocab Model) (Bundgaard-Nielsen, Best, & Tyler, 2011a). Interestingly, the Vocab Model presents a counter-hypothesis to the modularity assumption by claiming that L2 vocabulary performance affects performance in L2 phonetics and phonology. Specifically, the Vocab Model posits that the impact of L2 vocabulary acquisition on L2 speech perception is analogous to the impact of L1 vocabulary acquisition on L1 speech perception (Bundgaard-Nielsen et al., 2011a).

Developed within the framework of the Perceptual Assimilation Model (Best, 1995), the Vocab Model claims that the language learning

processes and mechanisms applied in L1 acquisition remain available at all points in life, making L1 and L2 acquisition essentially similar processes with different starting points. Both L1 and L2 learners must learn to attend to those phonetic differences that are phonemic in the language of acquisition (phonological distinctiveness) while ignoring those differences that are not phonemic (phonological constancy). However, whereas the starting point for L1 speech acquisition is the abstract organisation of phones, L2 acquisition takes prior linguistic experience as its starting point. Consequently, early L2 perception is based on the learner's native language (Bundgaard-Nielsen, Best, & Tyler, 2011b).

Central to the Vocab Model is the Lexical Growth Hypothesis claiming that initial lexical growth facilitates L2 rephonologisation in much the same way as the lexical spurt facilitates the establishment of phonological constancy in L1 acquisition. Infants show phonological distinctiveness for vowels (Kuhl, Williams, Lacerda, Stevens, & Lindholm, 1992) around the age of six months and for consonants around the age of 10-12 months (Best & McRoberts, 2003). However, they do not show phonological constancy until the age of 19 months (Best, Tyler, Gooding, Orlando, & Quann, 2009), i.e. around the onset of the lexical spurt, typically between the ages of 14 months and 22 months (Reznick & Goldfield, 1992). This argument may be extended to L2 acquisition; L2 comprehension requires L2 learners to differentiate between an increasing number of contrasting L2 words, some of which initially sound homophonous to the L2 learner, that is, the need for successful L2 comprehension drives the need to rephonologise.

In two studies of vowel perception and vocabulary size in L1 Japanese learners of Australian English, Bundgaard-Nielsen et al. (2011a, b) found empirical support for the Vocab Model. Specifically, L1 Japanese learners with vocabularies above 6,000 word families³ were found to be more consistent in their assimilation of Australian English vowels to Japanese (Bundgaard-Nielsen et al., 2011a; 2011b) and more accurate in discriminating phonemic vowel contrasts in Australian English. Moreover, increased L2 exposure was not found to improve L2 vowel perception for L2 learners whose vocabularies were above 6,000 word families at the first point of testing (Bundgaard-Nielsen et al., 2011b), suggesting that increased vocabulary facilitates L2 rephonologisation up to the point of 6,000 word families, above which point L2 vocabulary size does not impact L2 speech perception further.

³ A word family consists of a lexical root along with its derivations and inflections (Schmitt, 2010, p. 8).

This study extends the empirical test of the Vocab Model to L1 Danish and L1 Finnish learners of English, investigating identification of both vowels and consonants. Differences in the acquisition trajectories of vowels and consonants are expected, since perceptual attunement to vowels in L1 acquisition happens four months earlier than to consonants (Kuhl et al., 1992; Best & McRoberts, 2003).

1.5 Aim and scope

The study adopts an experimental approach to the Conrad Phenomenon by examining the relationship between L2 performance within the three linguistic domains; syntax, phonetics and phonology, and the lexicon. These domains have been chosen for three reasons. First, syntax, phonetics and phonology, and the lexicon are considered crucial domains to master for L2 learners of English. For some languages, morphology would also be considered crucial for L2 learners, but for English, morphology is arguably less important than the other three domains. Second, syntax, phonetics and phonology, and the lexicon differ in a number of ways suggesting qualitative differences in processing; syntax and phonology are primarily rule-based while the lexicon is item-based, syntax and phonology are purely linguistic and present a finite set of entities, while the lexicon is related to world-knowledge and presents an open-ended learning task, and finally, phonetics and phonology, contrary to the other two domains, contains a physiological motor-aspect. Third, the prior research motivating this study all centres on two or three of the following domains: morphosyntax, phonology, and the lexicon. Yet, adopting a modularity approach, morphosyntax seems problematic as one domain, because linguistics traditionally views morphology and syntax as two separate though connected domains of language (e.g. McCabe, 2011, p. 169; Akmajian, Demers, Farmer, & Harnish, 2010, pp. 3-4; Morrish, 2015, p. 18). This study therefore examines syntax instead of morphosyntax.

As outlined above, the Modularity Account holds that there is modularity in L2 performance related to linguistic domains, so that an L2 learner's performance in one linguistic domain is independent from the learner's performance in other linguistic domains, hence accounting for the discrepancy between Joseph Conrad's written and spoken English by claiming independence between L2 performance within syntax and the lexicon on the one hand and phonetics and phonology on the other hand. However, one can also imagine an alternative account of the Conrad Phenomenon, one that I will call the Inverse Relation Account. Imagine

that L2 learners who perform well in domain X, tend to perform poorly in domain Y and vice versa. Following this line of thought, the Conrad Phenomenon can be accounted for by claiming an inverse relationship between L2 performance within syntax and the lexicon on the one hand and L2 performance within phonetics and phonology on the other hand. These two alternative accounts of the Conrad Phenomenon are investigated.

If domain-related modularity or inverse relationships are observed, this study examines whether it may be specific to the learners' native language or directly caused by the characteristics of the L2. A further question of interest is whether such modularity or inverse relationships, if existing, vary with degree of L2 experience, such that, e.g. domains for which performance is independent for Less Experienced L2 learners show related performance for More Experienced L2 learners. Moreover, the study investigates the possibility of an interaction between degree of L2 experience and L1 background, such that modularity or inverse relationships in L2 performance depend on the combination of second language experience and native language. The study moreover examines whether the present data support the Lexical Growth Hypothesis from the Vocab Model, a model claiming that the Conrad Phenomenon is uncommon among L2 learners.

The relationship between L2 performance in the different domains may show a number of different patterns. First, performance in the three domains may not be correlated, suggesting that performance within different domains is independent, i.e. suggesting modularity in L2 performance. However, the lack of a statistically significant correlation does not imply independence, since absence of evidence is not evidence of absence⁴, and clear non-correlational patterns must be observed in the data in order to argue for modularity. One such pattern could be a complete lack of systematicity, i.e. data showing a large number of different scores on domain X for any score on domain Y and vice versa. Alternatively, the score on domain Y could be almost constant for different scores on domain X, which would be the case if a ceiling or a floor effect is observed.

Second, performance within the three domains may be positively correlated, suggesting a positive relationship between linguistic domains in L2 acquisition, so that performing well in one domain positively affects performance in other domains. Hence, a statistically significant positive correlation between L2 performance in all three domains could be evi-

⁴ The failure to reject a null hypothesis does not imply the acceptance of the null hypothesis. Hence non-significant results are inconclusive (Altman & Bland, 1995).

dence for some degree of interdependence between all three domains, i.e. evidence against modularity. Alternative accounts of positive correlations between domains include general intelligence or language aptitude, which have been found to be related but different constructs (Li, 2015). Studies on the effect of intelligence on second language learning are scarce and intelligence have been found to be a poor predictor of L2 performance (e.g. Sparks, Patton, Ganshow, & Humbach, 2009; Ganschow, Sparks, Javorsky, Pohlman & Bishop-Marbury, 1991). The very few existing studies that examine the effect of intelligence on different aspects of language show evidence that general intelligence affect some, but not all, aspects of foreign language learning. Genesee (1976) found that general intelligence is positively correlated with scores on academic L2 skills but shows no relationship with interpersonal communication skills. More recently, Sparks et al. (2009) found that, among a list of different L2 skills, general intelligence affected L2 word decoding only. Language aptitude, defined as ‘a number of cognitive factors making up a composite measure that can be referred to as the learner’s overall capacity to learn a foreign language’ (Dörnyei, 2005, pp. 33-34), is generally accepted to be componential rather than unitary (e.g. Dörnyei, 2005, p. 33) and research has found that different components of language learning aptitude impact L2 performance in different linguistic domains (e.g. Sparks, Patton, Ganschow & Humbach, 2011; Saito, 2017). Moreover, research (Li, 2015) shows that overall language aptitude has no impact on L2 vocabulary acquisition. Unfortunately, the roles of intelligence and language learning aptitude are outside the scope of this study.

Third, performance within two of the domains may be positively correlated but uncorrelated with performance in the third domain, suggesting some degree of interdependence between these two domains but providing no conclusion regarding the interdependence between the two correlated domains on the one hand and the third domain on the other hand. Such a finding would call for further research into the aspects that are shared between the two correlated domains but not shared with the third domain in order to better understand what drives the correlation.

Finally, performance within two domains may be inversely or negatively correlated, suggesting an inverse interdependence between these two domains, so that learners who perform well within one of the domains tend to perform poorly within the other domain and vice versa. Such a negative correlation is evidence against modularity, since it suggests some sort of interdependence between domains. However, such a result

might offer an alternative account of the Conrad Phenomenon, namely the Inverse Relation Account; if a negative correlation is observed between phonetics and phonology on the one hand and syntax and the lexicon on the other.

1.6. L1 Danish and L1 Finnish learners of English

L1 Danish and L1 Finnish learners of English were chosen because Denmark and Finland offer similar learning environments while the linguistic differences between Danish and Finnish vis-à-vis English are considerable. Observed difference in L2 performance between L1 Danish and L1 Finnish learners are therefore likely to be due to language background rather than differences in learning environment.

When the L1 Danish participants went to school, English instruction was obligatory from 3rd to 9th grade of elementary school (Ministry for Children, Education and Gender Equality 2014) and in the first two years of upper-secondary school (Ministry for Children, Education and Gender Equality 2013). The Finnish participants were taken from the 91% of students who choose English as their first second language and received English instruction from 3rd to 9th grade in elementary school and in upper-secondary school (Leppänen, Pitkänen-Huhta, Nikula, Kytölä, Törmäkangas, Nissinen, and Kääntä, 2011). Moreover, the inhabitants in both countries are exposed to a fair amount of anglophone media on a daily basis, as foreign TV programs are interlingually subtitled rather than dubbed in both countries, and as anglophone soap operas, films, and pop music are pervasive, especially in youth culture (Preisler, 1999; Leppänen and Nikula, 2007).

Within all three domains of interest, Danish shows a fair amount of similarities with English, while Finnish has comparatively few similarities with English. This is in part due to historical relatedness. Old English and the ancestor of Danish, Old Norse, both descend from Proto-Germanic (Strang, 1970, p. 376; Herslund, 2002, p. 1). Consequently, Danish and English share a substantial number of common Germanic words, most of which are still alike in both meaning and form. As a Finno-Ugric language, Finnish shares no real cognates with English, and the only lexical similarities between English and Finnish are due to direct and indirect (primarily via Swedish) borrowings (Pulkkinen, 1989; Karlsson, 1999, p. 7). Broadly speaking, the syntax of Danish is very similar to that of English, as both are highly analytical languages (van Gelderen, 2006, pp. 214-220; Herslund, 2002, p. 79). Finnish, on the other hand, is a synthetic language with

an extensive case system (Karlsson 1999, pp. 4-6). With respect to the sound system, the difference in sheer size is noteworthy. At the phonemic level, English has 15 or 16 stressed vowels, of which 10 or 11 are monophthongs, depending on the variety (Ladefoged and Disner 2012, pp. 29-30, 133-134). Most varieties of English have 24 consonant phonemes, of which 23 occur in initial position (Cruttenden 2014, pp. 161, 211). The Danish vowel inventory is extensive and complex with at least 20 stressed phonemic monophthongs, organised into 10 short-long pairs, and extended allophonic variation, and Danish has 16 initial consonant phonemes (Basbøll, 2005, pp. 50, 64; Grønnum, 1998). Finnish has 16 phonemic monophthongs, which can be organised into eight short-long pairs. (Wiik, 1965, pp. 40-44), while the reported range of initial consonants is between 11 and 17, depending on how loaned phones are treated (see Suomi, Toivanen, and Ylitalo 2008, pp. 24-25 for an overview).

2. Methods

Modularity in L2 performance was examined by having More Experienced and Less Experienced L1 Danish and L1 Finnish learners of English and a group of L1 English speakers complete a set of tasks measuring performance in English syntax, phonetics and phonology, and lexicon.

2.1 Participants

Three groups of participants were tested; 41 L1 Finnish learners of English (6 males, 35 females, mean age = 25.17 years), 41 L1 Danish learners of English (8 males, 33 females, mean age = 24.71 years), and 14 native English speakers functioning as a baseline group (2 males, 12 females, mean age = 20.65 years).

The L1 Finnish learners of English all lived in and around Jyväskylä, Central Finland. The L1 Finnish participants were divided into two groups: 1) 21 More Experienced Learners: students of English who had lived in an English-speaking country for a longer period (range: 2.5 months to 3 years, mean = 10.02 months), and 2) 20 Less Experienced Learners: students of Finnish who had not lived in an English-speaking country for a longer period.

The L1 Danish learners of English all lived in and around Aarhus, East Jutland, Denmark. The L1 Danish participants were also divided into two groups: 1) 20 More Experienced Learners: participants who had lived in an English-speaking country for a longer period (range: 4 months to

2.17 years, mean = 10.73 months), and 2) 21 Less Experienced Learners: participants who had not lived in an English-speaking country for a longer period. 14 of the L1 Danish More Experienced Learners and 15 of the L1 Danish Less Experienced Learners were students of English at Aarhus University. The remaining participants were students of other subjects at Aarhus University or non-students.

The native English speaker baseline group consisted of students at Bangor University, Wales, who were speakers of standard Southern British English.

None of the subjects reported any hearing problems.

2.2 Tasks

The study consisted of five tasks: 1) a delayed repetition task, 2) a vowel identification test, 3) a consonant identification test, 4) a Grammaticality Judgement test, and 5) a vocabulary test. The aims and forms of the five tasks are briefly outlined below.

The delayed repetition task

The delayed repetition task aimed at assessing the subjects' production of English. Subjects were asked to repeat five sentences spoken by a native speaker of Southern British English (SBE) in a question-answer framework, as illustrated in (1).

- (1) SBE speaker: *What did Paul eat?*
SBE speaker: *Paul ate carrots and peas.*
SBE speaker: *What did Paul eat?*
Subject: *Paul ate carrots and peas.*

Recordings were rated twice for degree of foreign accent on a Likert-scale ranging from 1 (*No foreign accent*) to 9 (*Heavy foreign accent*), by six native speakers of English (2 male and 1 female speakers of American English, and 1 male and 2 female speakers of British English, mean age 26.2 years), who had no prior training in linguistics. Foreign accent was defined for the raters as *non-native accents of English*.

The vowel identification test

The vowel identification test aimed at assessing the subjects' perception of SBE vowels. The TP stimulus presentation software (Rato, Rauber,

Kluge, & Santo, 2013) was used to present listeners with 2 randomizations of the 11 monophthongs of SBE in a /hVt/ context. Vowel stimuli were recorded from two male, native speakers of SBE. Subjects were asked to identify the vowel among the 11 options given by the 11 monophthongs of SBE, presented orthographically as <heat, hit, het (up)⁵, hat, heart, hoot, hUt, haught(y), hot, hurt, hut>. Since no real /hut/ word exists in English, participants were introduced to the non-word <hUt>.

The consonant identification test

The consonant identification test is similar to the vowel identification test. The TP stimulus presentation software was used to present listeners with 2 randomizations of the 20 initial consonants of English in a /Ca/ context. Consonant stimuli were taken from a corpus of American English /Ca/ syllables made available by Shannon, Jensvold, Padilla, Robert, and Wang (1999). Three tokens of each consonant were selected from two male, native speakers of American English. Subjects were asked to identify the consonant among the 20 options given by the 20 English initial consonants, presented orthographically as <P, B, T, D, K, G, F, V, Think, Them, S, Z, Ship, Genre, Chin, Joke, W, L, R, Yes>.

The Grammaticality Judgement test⁶

The grammaticality judgement accessed the participants' intuitions on English syntax in embedded and main clause negations, *wh*-questions, and *yes-no* questions. The test consisted of a corresponding set of grammatical and ungrammatical sentences, which the subjects were asked to judge as *Correct* or *Incorrect* with respect to grammar.

The vocabulary test

The Vocabulary Size Test (Nation & Beglar, 2007; Nation, 2012) was used as an indicator of the subjects' vocabulary size. It is a multiple-choice definition test, in which the tested word is presented in a simple, non-defining context, and four different but semantically related definitions are supplied, of which one is correct. The subjects' task is to choose the right definition among the four options. (2) shows an item from the vocabulary test.

⁵ *Het up* means *anxious, exited or slightly angry* (Deuter, Bradbery, & Turnbull, 2015).

⁶ The results of the Grammaticality Judgement test are presented in Horslund (2016), which also outlines and motivates the structure of the test.

- (2) soldier: He is a **soldier**.
- a. person in a business
 - b. person who studies
 - c. person who uses metal
 - d. person in the army

Correct answer: d

2.3 Procedure

For practical reasons, the five tasks were divided into two sessions, one consisting of the three sound-related tasks and another consisting of the Grammaticality Judgment task and the vocabulary test. The two sessions were conducted on different days or with a couple of hours in between for all participants in Jyväskylä and for the majority of participants in Bangor. The remaining participants in Bangor and all participants in Aarhus completed both sessions in one go with a short break between the two sessions. The order of the two sessions as well as of the tasks within them were counterbalanced across participants, except for the delayed repetition task, which always preceded the phoneme identification tasks in order to obtain speech recordings that were unaffected by the focus on segmentals possibly induced by the phoneme identification tests.

All participants participated voluntarily, and the participants in Jyväskylä and Bangor received lunch coupons, a movie ticket, or a monetary compensation for participating in the study. Subjects in Aarhus received no compensation for participating in the study.

2.4 Statistical analyses

Relationship between performance in different domains was tested by means of Pearson correlation tests. The Vocab Model was tested by means of Mixed effect models. Mixed effect models are regression models that model the random variation between participants and items, thus dealing with the dependencies between observations in the model rather than by taking means. Mixed effect models constitute an alternative to both ANOVA and ordinary regression and offers a number of advantages to these models (see Jaeger, 2008; Cunnings, 2012). All p-values are Holm corrected (Holm, 1979) to avoid inflating the Type I error rate (the rate of false positives) by multiple comparisons.

All statistical analyses were conducted in the software program R (R Core Team, 2015). The R packages used were *lme4* (Bates, Maechler, Bolker, Walker, Christensen, Singmann, Dai, & Grothendieck, 2015) and *optimx* (Nash, 2014) for the construction of mixed effects models, *multcomp* (Hothorn, Bretz, & Westfall, 2008) for pairwise comparisons of parameters in mixed effects models, and *Hmisc* (Harrell, 2013) for correlations. Graphs were also constructed in R, by means of the package *ggplot2* (Wickham, 2009).

3. Results

This section first presents data on between-domain relations and subsequently a test of the Vocab Model.

3.1 Between-domain relations

Between-domain relations are examined by means of Pearson correlation tests between Phoneme Identification scores (vowels and consonants combined) and mean Foreign Accent ratings representing L2 speech perception and production in the domain of phonetics and phonology, scores on the Grammaticality Judgement test representing L2 performance in the domain of syntax, and scores on the Vocabulary Size test representing L2 performance in the lexical domain. The scores for vowel and consonant identification are combined, since these are both measures of L2 speech perception. Foreign Accent ratings are kept separate from the perception scores, since Foreign Accent ratings measure production.

Pearson correlation tests on the L2 learner data for Foreign Accent, Phoneme Identification, Grammaticality Judgement, and Vocabulary revealed significant across-group correlations between all tasks. All correlations were positive except those with Foreign Accent, which were all negative, since high Foreign Accent scores indicate poor pronunciation and low Foreign Accent scores indicate good pronunciation. This suggests that all relationships between tasks are positive. Correlations across all L2 groups thus indicate that performance in one linguistic domain generally goes hand in hand with performance in other linguistic domains. However, there were considerable differences in the strength of the correlations between different tasks, and correlation tests within L2 groups did not always reach significance. Table 1 provides an overview over the between-domain correlations across and within L2 groups.

	L1 Danish learners		L1 Finnish learners		Across L2 groups
	More Experienced	Less Experienced	More Experienced	Less Experienced	
Phon by Vocab	0.6309 (0.0171)	0.7751 (0.0002)	0.3481 (0.7324)	0.5658 (0.0466)	0.6118 (<0.0001)
FA by Vocab	-0.3720 (0.3187)	0.1898 (0.3452)	-0.2860 (1.0000)	-0.4354 (0.1650)	-0.6075 (<0.0001)
Phon by GJ	0.6303 (0.0171)	0.3816 (0.3452)	-0.0148 (1.0000)	0.5397 (0.0562)	0.4896 (<0.0001)
Phon by FA	-0.1429 (1.0000)	-0.4409 (0.2271)	-0.0618 (1.0000)	-0.6030 (0.0293)	-0.4016 (0.0006)
Vocab by GJ	0.5073 (0.0897)	0.1898 (0.8198)	0.2069 (1.0000)	0.3385 (0.2887)	0.3559 (0.0021)
FA by GJ	-0.0774 (1.0000)	-0.1388 (0.8198)	-0.0324 (1.0000)	-0.3303 (0.2887)	-0.2191 (0.0480)

Phon: Phoneme Identification, FA: Foreign Accent, GJ: Grammaticality Judgment Test, Vocab: Vocabulary Test

Table 1. Between-task correlations for More Experienced and Less Experienced L1 Danish and L1 Finnish learners of English and native English speakers. Pearson correlation coefficients and Holm adjusted p-values in parenthesis. Significant (at the 0.05 level) correlations are highlighted in light blue. Marginally significant ($p < 0.1$) correlations are highlighted in light pink.

The strongest across-group correlations were between Vocabulary and Phoneme Identification (Pearson's $r=0.6118$, $p < 0.0001$) and between Vocabulary and Foreign Accent (Pearson's $r=-0.6075$, $p < 0.0001$). Pearson correlation test for the separate L2 groups support the relationship between Phoneme Identification and Vocabulary. The within-group tests revealed significant, positive correlations between Phoneme Identification and Vocabulary for More Experienced L1 Danish learners (Pearson's $r=0.6309$, $p < 0.0171$), Less Experienced L1 Danish learners (Pearson's $r=0.7751$, $p < 0.0002$), and Less Experienced L1 Finnish learners (Pearson's $r=0.5658$, $p=0.0466$), suggesting that it is common among L2 learners to exhibit a positive relationship between L2 speech perception and L2 vocabulary. The correlation between Foreign Accent ratings and Vocabulary scores did not approximate significance within any of the L2 groups. Figure 1 shows a scatterplot of the relationship between Phoneme Identification scores and Vocabulary scores, separately for each group, and Figure 2

shows a scatterplot of the relationship between Foreign Accent ratings and Vocabulary scores, separately for each group.

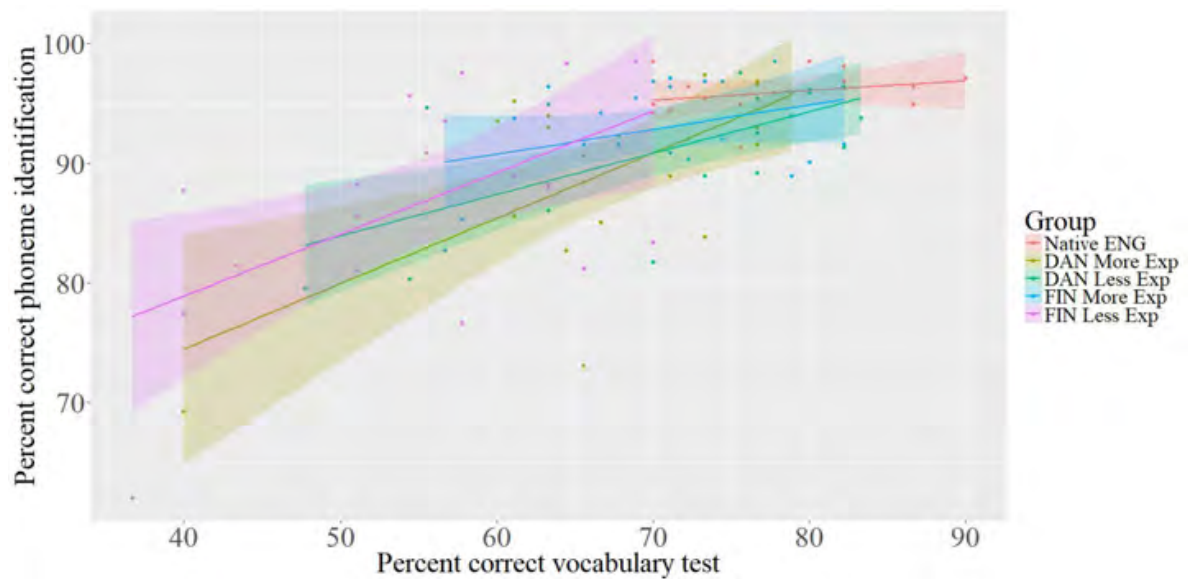


Figure 1. Scatterplot of percent correct in the Vocabulary Test and percent correct Phoneme Identification (vowels and consonants combined) for More Experienced and Less Experienced L1 Danish and L1 Finnish learners of English and the native speaker baseline with 95% confidence intervals (shaded areas) for each group.

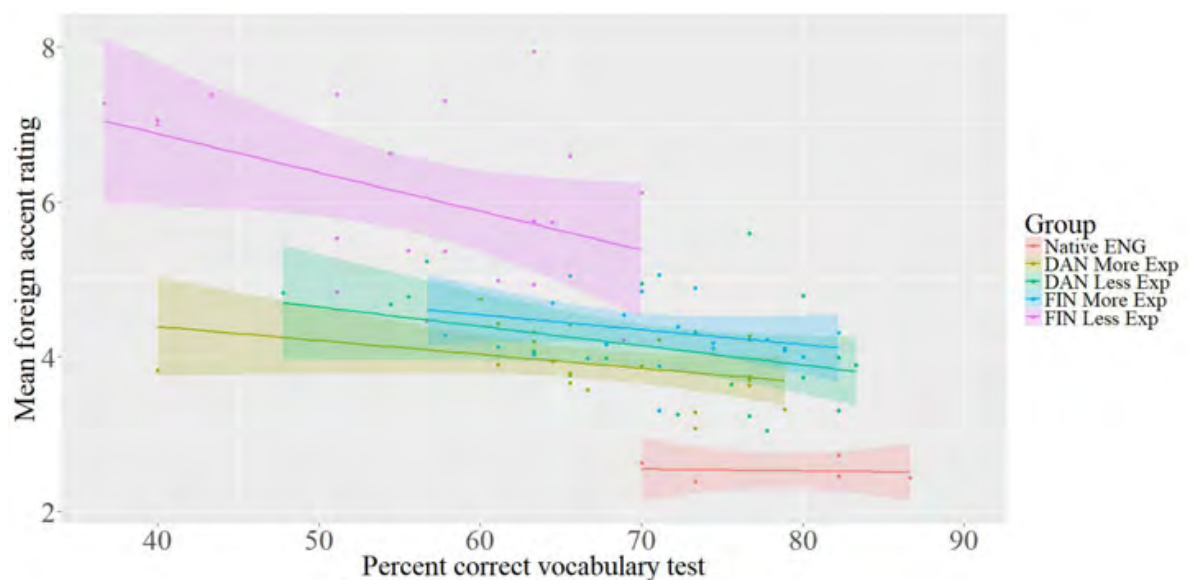


Figure 2. Scatterplot of percent correct in the Vocabulary Test and mean Foreign Accent rating for More Experienced and Less Experienced L1 Danish and L1 Finnish learners of English and the native English speaker baseline with 95% confidence intervals (shaded areas) for each group.

Interestingly the across-group correlations between Phoneme Identification and Foreign Accent on the one hand and Vocabulary on the other hand were both stronger than the correlation between Phoneme Identification and Foreign Accent (Pearson's $r=-0.4016$, $p=0.0006$), despite the fact that Phoneme Identification scores and Foreign Accent ratings represent tasks within the same linguistic domain. However, within-group tests revealed a significant, strong, negative correlation between Phoneme Identification and Foreign Accent for Less Experienced L1 Finnish learners (Pearson's $r=-0.6030$, $p=0.0293$), suggesting a positive relationship between L2 speech perception and production for Less Experienced L1 Finnish learners. Figure 3 shows a scatterplot of the relationship between Phoneme Identification scores and Foreign Accent ratings, separately for each group.

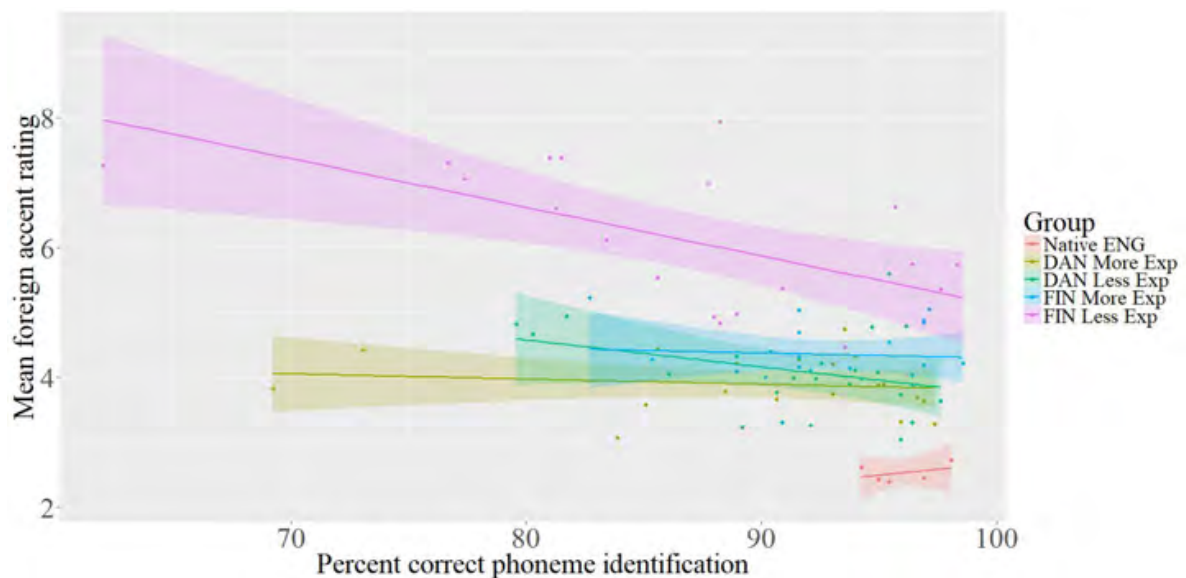


Figure 3. Scatterplot of percent correct Phoneme Identification (vowels and consonants combined) and mean Foreign Accent rating for More Experienced and Less Experienced L1 Danish and L1 Finnish learners of English and the native English speaker baseline with 95% confidence intervals (shaded areas) for each group.

Figure 4, Figure 5, and Figure 6 show scatterplots of the relationships between Grammaticality Judgement on the one hand and Phoneme Identification, Foreign Accent rating, and Vocabulary on the other hand, separately for each group. As is evident from Figure 4, Figure 5, and Figure 6 the amount of variation in the Grammaticality Judgement test is rather limited. The results show a ceiling effect with mean accuracy scores of 96.13% for

the native speaker baseline, 95.41% for L1 Danish learners, and 95.60% for L1 Finnish learners, which may in part explain why Grammaticality Judgement performance seems to be least related to performance on the other tasks. Across-group correlations between Grammaticality Judgement scores and performance on other tasks were moderate to weak (Pearson's $r \leq 0.489$, $p \leq 0.0480$). However, a significant, strong, positive correlation between Phoneme Identification and Grammaticality Judgement was observed for More Experienced L1 Danish learners (Pearson's $r=0.6303$, $p=0.0171$), suggesting that More Experienced L1 Danish learners exhibit a positive relationship between L2 speech perception and L2 syntax. Strong, marginally significant correlations were observed between Vocabulary and Grammaticality Judgement for More Experienced L1 Danish learners (Pearson's $r=0.5073$, $p=0.0897$), and between Phoneme Identification and Grammaticality Judgement for Less Experienced L1 Finnish learners (Pearson's $r=0.5397$, $p=0.0562$). Due to the ceiling effect in the GJ data, all correlations between performance on the GJ test and performance on other tests should be interpreted with caution and can only lead to preliminary conclusions.

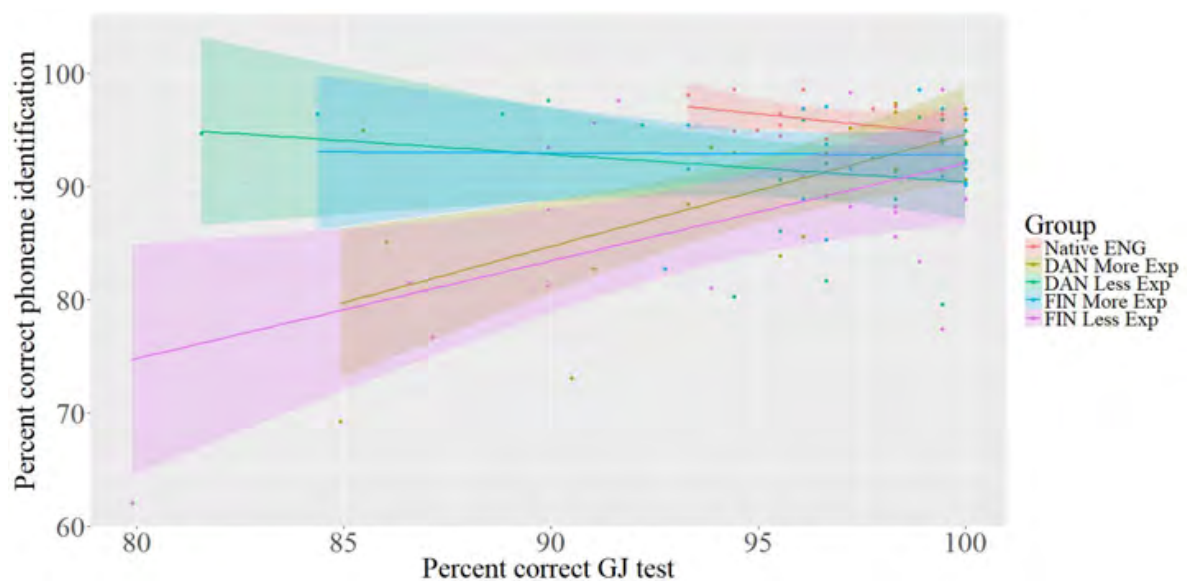


Figure 4. Scatterplot of percent correct Grammaticality Judgement and percent correct Phoneme Identification (vowels and consonants combined) for More Experienced and Less Experienced L1 Danish and L1 Finnish learners of English and the native speaker baseline with 95% confidence intervals (shaded areas) for each group.

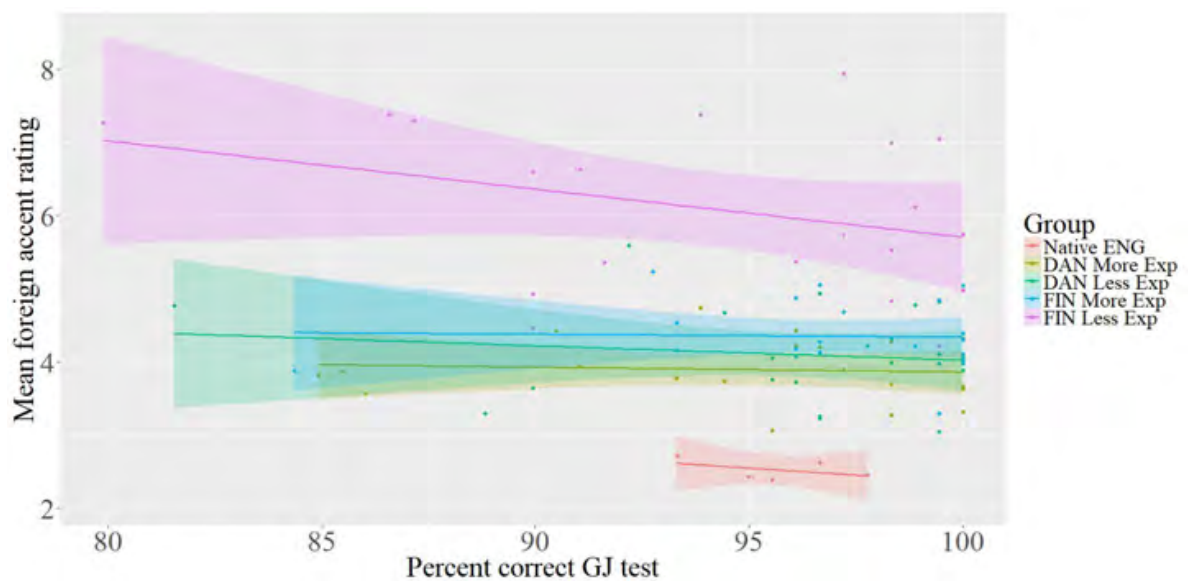


Figure 5. Scatterplot of percent correct Grammaticality Judgement and mean Foreign Accent rating for More Experienced and Less Experienced L1 Danish and L1 Finnish learners of English and the native speaker baseline with 95% confidence intervals (shaded areas) for each group.

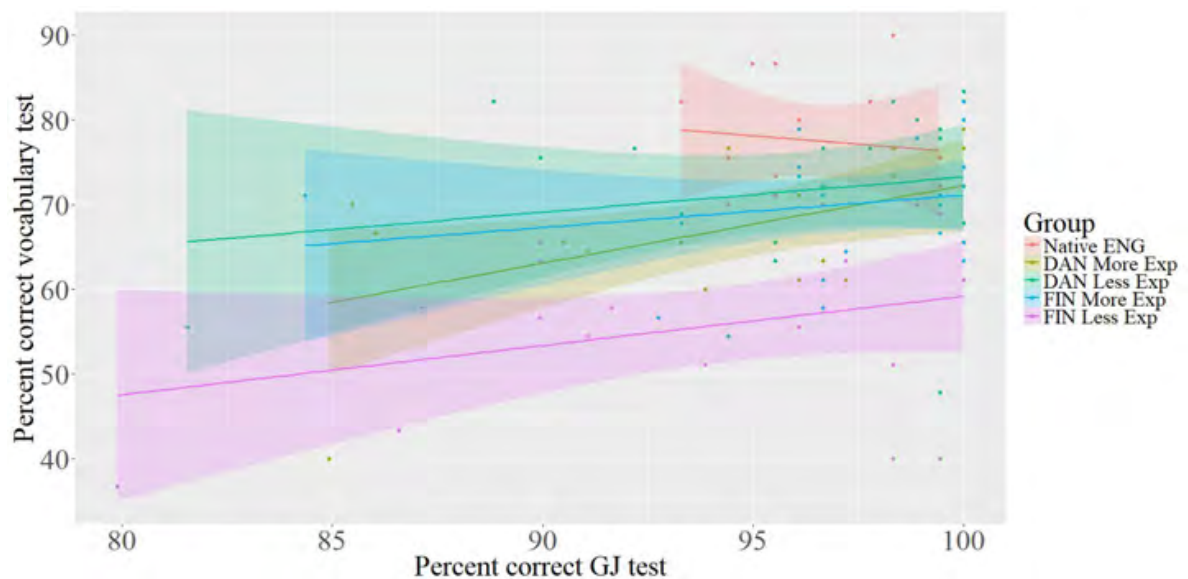


Figure 6. Scatterplot of percent correct Grammaticality Judgement and percent correct in the Vocabulary Test for More Experienced and Less Experienced L1 Danish and L1 Finnish learners of English and the native speaker baseline with 95% confidence intervals (shaded areas) for each group.

3.2 Test of the Vocab Model

In order to test the effect of vocabulary score on phoneme identification separately for consonants and vowels for L1 Finnish and L1 Danish learners respectively, a variable combining Category (Vowel/Consonant) and L1 was constructed. A logistic mixed effects model on the L2 learner data for Phoneme Perception with random intercepts for Item and Subject and with Vocabulary Score and the factor combining Category (Vowel/Consonant) and L1 as fixed effects⁷ revealed significant Vocabulary effects for L1 Danish learners for both vowels and consonants ($p \leq 0.0008$), and no significant Vocabulary effect for L1 Finnish speakers for either vowels or consonants. The model further revealed that the Vocabulary effect is significantly stronger for Vowels than for Consonants for L1 Danish learners ($p < 0.001$) and L1 Finnish learners ($p = 0.0226$). Table 2 shows an overview over the statistics of this model.

	Estimate	Std. Error	z-value	p-value
Vocab effect for L1 Danish for consonants	0.04631	0.01245	3.718	0.000803
Vocab effect for L1 Danish for vowels	2.84200	0.40936	6.942	2.31e-11
Vocab effect for L1 Finnish for consonants	-0.29299	1.01247	-0.289	1
Vocab effect for L1 Finnish for vowels	0.64531	1.04365	0.618	1
Difference in vocab effect for L1 Danish for consonants versus for vowels	-2.79569	0.41167	-6.791	5.56e-11
Difference in vocab effect for L1 Finnish for consonants versus for vowels	-0.93830	0.35121	-2.672	0.022645

Table 2. Estimates, standard error, z-values, and p-values (Holm adjusted) for the mixed effect model testing the effect of vocabulary score on phoneme perception. Significant effects (at the 0.05 level) are highlighted in light blue.

Figure 7 shows a scatterplot of the relationship between Vocabulary Scores and perception of vowels and consonants separately for L1 Danish learners and L1 Finnish learners.

⁷ Model: `glmer (Performance ~ CategoryL1 * VocabScore + (1|Subject) + (1|Item), family = "binomial", data = VocabModel)`.

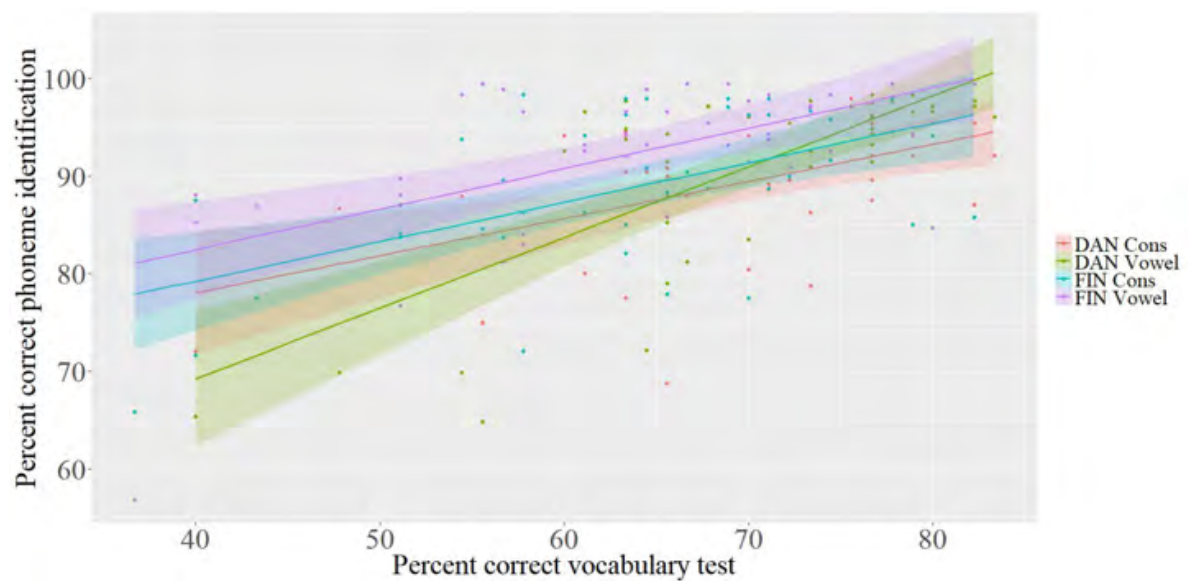


Figure 7. Scatterplot of percent correct Phoneme Identification and percent correct in the Vocabulary Test, divided by L1 and Category (consonant/vowel) with separate 95% confidence intervals (shaded areas) for L1 Danish learners' perception of consonants, L1 Danish learners' perception of vowels, L1 Finnish learners' perception of consonants, and L1 Finnish learners' perception of vowels.

4. Discussion

This study examined relationships between linguistic domains in L2 performance. The main focus of this study was to test whether there is domain-related modularity in L2 performance, that is whether L2 learners generally perform well in one linguistic domain while performing poorly in other linguistic domains. The study moreover asked if the nature of the between-domain relationships depends on the learner's L1, the learner's degree of L2 experience, and/or the combination of these two variables.

Across L2 groups, all correlations between performance on tasks in different linguistic domains were significant, suggesting some degree of interdependence between domains in L2 performance. However, the strength of these between-domain correlations varied, suggesting that some domains are more closely related than others. Specifically, these across-group correlations suggest that the interdependence between the lexical domain and the domain of phonetics and phonology is stronger than the interdependence between the domain of syntax and the other two domains. Yet, the low degree of interdependence between Grammaticality Judgement and the other three tasks may be partly due to the low degree of inter-subject variation in the GJ data (i.e. the ceiling effect).

Interestingly, the strength and significance of between-task correlations varied considerably among the four L2 groups, suggesting that between-domain patterns in L2 performance are affected by the combination of L1 background and degree of L2 experience. For More Experienced L1 Danish learners, all three domains seem to be related to some degree, though the production aspect of phonetics and phonology does not seem to be related to other linguistic tasks. For Less Experienced L1 Danish learners, there seems to be a relationship between phoneme perception and vocabulary. The data do not suggest any other relationships between tasks, suggesting that the domain of syntax is relatively independent from vocabulary as well as from phonetics and phonology in Less Experienced L1 Danish learners. However, the lack of a significant correlation between the syntax test and other tasks may in part be due to the ceiling effect in the GJ data. For More Experienced L1 Finnish learners the data do not suggest any relationships between tasks, suggesting that the four tasks are relatively independent in More Experienced L1 Finnish learners. Finally, for Less Experienced L1 Finnish learners, there seems to be a relationship between phoneme perception and foreign accent, between phoneme perception and vocabulary, and between phoneme perception and syntax, while syntax seems unrelated to vocabulary and foreign accent in Less Experienced L1 Finnish learners. Again, all interpretations involving the syntax test should be treated as tentative due to the ceiling effect in the syntax data. The observed pattern suggests that the amount of between-domain interdependence increases with L2 experience for L1 Danish learners and decreases with L2 experience for L1 Finnish learners. This difference in the relationship between L2 experience and between-domain interdependence may be related to the linguistic differences between Danish and Finnish vis-à-vis English, since learning context for the L1 Finnish and L1 Danish learners was similar. Perhaps some relationships between domains are not established until later stages of L2 acquisition, while other relationships dilute at later stages. This process may likely interact with the specific L1-L2 differences and similarities. Further studies are needed in order to confirm the observed group differences and further explore the interaction between L1 background and L2 experience in between-domain relationships. Importantly, such studies should include a syntax test that better distinguishes between different levels of performance in this domain. Figure 8 illustrates the observed between-task relationships across and within L2 groups.

As Figure 8 illustrates, there seem to be considerable differences among L2 groups with respect to the relationships between tasks with the exception of a general pattern suggesting some degree of interdependence between L2 Vocabulary and L2 Phoneme Identification and a less general pattern suggesting some degree of interdependence between Grammaticality Judgement and Phoneme Identification, which is uncertain given the ceiling effect. The observed relationships between the lexical domain and the syntactic domain on the one hand and the domain of phonetics and phonology on the other hand contradict the Modularity Account of the Conrad Phenomenon. The present data thus suggest that Joseph Conrad was an exceptional L2 learner in exhibiting such a low degree of interdependence between the lexical domain and the domain of phonetics and phonology and to a lesser extent in exhibiting such a low degree of interdependence between the syntactic domain and the domain of phonetics and phonology.

The study also considered an alternative account of the Conrad Phenomenon, i.e. the Inverse Relation account holding that the discrepancy observed in the level of Joseph Conrad's English syntax and vocabulary on the one hand and his pronunciation of English on the other hand is due to an inverse relation between L2 performance in the domains of syntax and the lexicon on the one hand and in the domain of phonetics and phonology on the other hand. The study therefore examined whether there are inverse relations between linguistic domains in L2 performance, and if so whether their nature depends on the learner's L1, the learner's degree of L2 experience, and/or the combination of these two variables. The present data revealed no inverse relations between L2 performance in different linguistic domains either across or within L2 groups, suggesting that domain-related inverse relationships are not the norm in L2 performance. However, as mentioned above, absence of evidence does not imply evidence of absence, and the present data cannot rule out the existence of domain-related inverse relations in L2 performance. Nevertheless, it is safe to assume that domain-related inverse relations are not common in L2 performance. Consequently, the Inverse Relation Account of the Conrad Phenomenon is not supported by the present data.

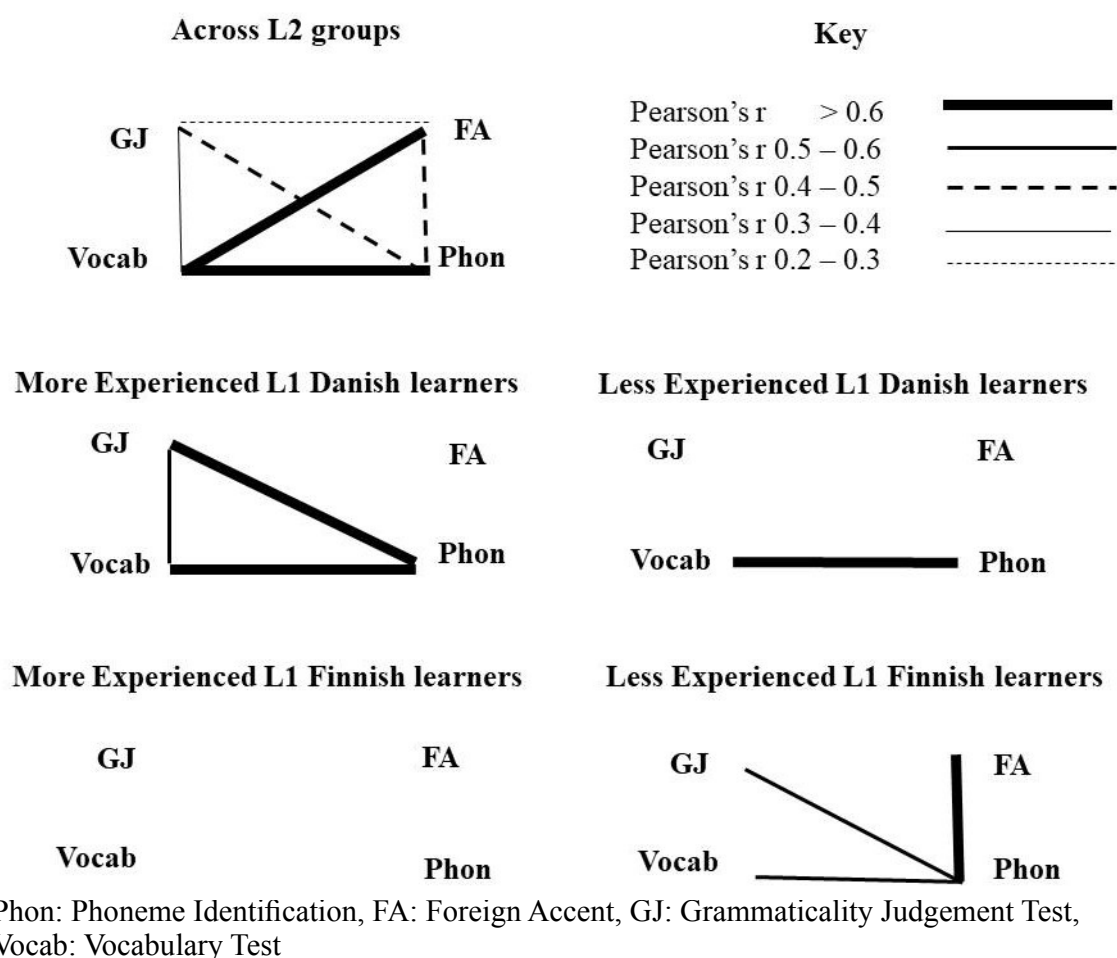


Figure 8. Illustration of between-task relationships. Significant (at the 0.05 level) and marginally significant ($p < 0.1$) between-task correlations across and within L2 groups are marked with lines corresponding to the strength of the correlation as measured by the correlation coefficient.

4.1. A test of the Lexical Growth Hypothesis of the Vocab Model

The study furthermore examined whether the present data support the Lexical Growth Hypothesis positing a positive relationship between L2 vocabulary size and L2 speech perception. The Lexical Growth Hypothesis is partly supported by the present data. A logistic mixed effects model revealed a significant effect of Vocabulary Score on Phoneme Identification in L1 Danish learners but not in L1 Finnish learners. For L1 Danish learners, the effect of Vocabulary Score on Phoneme Identification was significant for both Consonants and Vowels. In accordance with the Vocab Model, this effect of Vocabulary Score on Phoneme Identification may be interpreted

as lexical facilitation of L2 speech acquisition. However, the Vocab Model only predicts lexical facilitation in L2 speech acquisition for L2 learners with vocabularies below the cut-off point of approximately 6,000 word families, beyond which vocabulary size should no longer matter for L2 speech acquisition. Interestingly, it nevertheless seems to do so for the L1 Danish participants in the present study. All participants have estimated vocabulary sizes above approximately 6,000 word families. The present data thus suggest that lexical facilitation in L2 speech acquisition may persist beyond a vocabulary size of approximately 6,000 word families. Future research should investigate whether the cut-off point for lexical facilitation in L2 speech perception is dependent on the L1-L2 mapping, and if so how this variation may be explained, perhaps in terms of functional load, i.e. 'a measure of the work which two phonemes (or a distinctive feature) do in keeping utterances apart' (King, 1967, p. 831), of problematic contrasts. Moreover, a difference in strength of lexical facilitation was suspected for Consonants and Vowels, and this prediction was borne out by the present data. The logistic mixed effects model revealed a significantly stronger Vocabulary Score effect for Vowels than for Consonants in both L1 Danish and L1 Finnish learners.

4.2. Relations between domains in first language acquisition revisited

One of the motivations for investigating relations between linguistic domains in L2 performance was to inform the modularity debate in L1 acquisition, which is difficult to settle because language development and the development of world knowledge are naturally confounded in L1 acquisition. Since L2 acquisition does not suffer from this confound, L2 data on relations between linguistic domains may help illuminate whether the observed strong positive correlation between lexical and syntactic development in L1 acquisition is due to this confound. The present L2 data suggest that the observed correlation between syntax and lexicon in L1 acquisition may indeed be related to the co-development of language and world knowledge. A significant correlation between syntax and lexicon was observed in the across-group analyses, but this correlation was quite weak, and within-group analyses revealed a significant correlation between syntax and lexicon in one L2 group only, suggesting that a strong correlation between syntactic performance and lexical performance is not necessarily present in language acquisition, though the weakness of this correlation may in part be due to the low degree of inter-subject variability on the Grammaticality Judgement test (i.e. the ceiling effect). Consequently, in

order to argue for a linguistic account, in opposition to a world knowledge account, of the L1 correlation between syntax and lexicon, one has to claim a difference between L1 and L2 acquisition in this respect.

The weak relationship observed between L2 syntax and L2 lexicon may be interpreted as supporting a Dual Mechanism Account of L2 acquisition of these two domains. This would be in line with a previously mentioned study (Bowden, Steinhauer, Sanz, & Ullman, 2013) suggesting qualitative differences in neural processing of L2 syntax and L2 lexicon. Interestingly, the observed weak relationship between L2 syntax and L2 lexicon contradicts the results of Snow and Hoefnagel-Höhle (1979), who identified lexicon and morphosyntax as one single factor in L2 performance. This discrepancy between the present results and those of Snow and Hoefnagel-Höhle may be due to differences in L1-L2 mappings or to the ceiling effect in the present syntax test, but more research is required to settle this as the present study and that of Snow and Hoefnagel-Höhle are not directly comparable.

Along with the Vocab Model and its previous empirical support, (Bundgaard-Nielsen et al., 2011a; 2011b), the present data further suggests a relationship between L2 lexical development and the development of L2 speech acquisition. The Vocab Model is based on L1 acquisition patterns and supported for L2 acquisition in Bundgaard-Nielsen et al. (2011a; 2011b) and by the present data. Consequently, research on modularity in L1 and L2 acquisition might benefit from bringing phonetics and phonology into the equation.

5. Conclusion

This study examined relationships between L2 performance in the domains of syntax, the lexicon, and phonetics and phonology in order to explore whether Joseph Conrad was an exceptional L2 learner in performing well in syntax and the lexicon and poorly in phonetics and phonology. Two competing accounts of the Conrad Phenomenon were tested. The Modularity Account claims independence between L2 performance in different linguistic domains, and the Inverse Relation Account claims an inverse relation between L2 performance in the domains of syntax and the lexicon on the one hand and the domain of phonetics and phonology on the other hand. The present data found support for neither account. Some degree of domain-interdependence was observed, though this interdependence varied considerably among L2 groups differing in L1 background and degree

of L2 experience. Across L2 groups, the strongest between-domain relationship was observed between the lexical domain and the domain of phonetics and phonology. Though syntax exhibited the weakest relationships with other domains, which may in part be due to the ceiling effect in the syntax data, the study found a strong relationship between L2 syntax and L2 speech perception in two L2 groups and a moderately strong relationship between L2 syntax and L2 vocabulary in one L2 group. No inverse relations between linguistic domains were observed in the data. Hence, the present data suggest that Joseph Conrad was indeed an exceptional L2 learner in performing well in syntax and the lexicon and poorly in phonetics and phonology. The general trend in L2 performance shows some degree of positive relation between linguistic domains. Future research should further examine between-domain relationships in L2 learners differing in L1 and degree of L2 experience in order to better account for the between-group differences in between-domain relationships.

The study further tested the Vocabulary Growth Hypothesis from the Vocab Model, which claims a lexical facilitation effect in L2 speech perception. The present study found significant lexical facilitation in L1 Danish learners only. Interestingly, lexical facilitation was stronger for vowels than for consonants in both L1 Danish and L1 Finnish learners. Lexical facilitation is predicted to occur only with vocabularies below 6,000 word families, but the results of the present study suggest that lexical facilitation effects may persist beyond 6,000 word families. The results from the current study along with results from previous studies on the Vocab Model suggest a strong positive relationship between L2 vocabulary and L2 speech perception, and future studies on between-domain relations in L2 performance may therefore benefit from including the domain of phonetics and phonology instead of examining only syntax and the lexicon.

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