MICHAEL HARRINGTON

Lexical Facility

Size, Recognition Speed and Consistency as Dimensions of Second Language Vocabulary Knowledge

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This book is dedicated in loving memory to my parents, Frank and Dolores.

Front Cover

The image on the front cover is a stylized representation of what is known as 'Zipf's law', which states that the frequency with which a word is used is inversely proportional to its rank in a frequency table. The vertical *y*-axis represents the frequency with which a word is used, and its rank order is set out along the horizontal *x*-axis. The sloping function shows that a small number of words account for the majority of uses. The approach set out in this book assumes that frequency rank is a strong predictor of vocabulary learning.

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Introduction

Two bedrocks of fluent second language (L2) performance are an adequate stock of words and the ability to access those words quickly. Separately, the two have been shown to be reliable and sensitive correlates of L2 proficiency both across and within user levels. The two are examined here jointly as a property of L2 vocabulary skill called *lexical facility*. The book first makes the conceptual case for combining the two dimensions and then provides empirical evidence for the sensitivity of the combined measures to differences in proficiency and performance in common domains of academic English. The main focus is on lexical facility in written English, though some spoken language data are also presented.

Scope of the Book

The term *lexical facility* reflects how many words a learner knows and how fast these words can be recognized. The term *lexical* is used to denote the word-level focus, and the term *facility* the relative ease of accessing that knowledge. A sizeable literature exists that relates vocabulary size to L2 performance. Researchers, including Bhatia Laufer, Paul Meara, Paul Nation, and Norbert Schmitt, have sought to identify the kind and number of words an individual needs to function in various L2 domains, with

a particular interest in the vocabulary size needed for fluent performance and its assessment in domains of academic English. A foundation of vocabulary size research is the use of word frequency statistics as an index for estimating an individual user's vocabulary size. The resulting estimates are then related to performance in various domains (e.g., Laufer and Nation 1995). The vocabulary size research literature is the point of departure for the lexical facility approach presented in the book.

A smaller body of research has also examined how L2 word processing skill develops. Norman Segalowitz, Jan Hulstijn, and colleagues have investigated the role that word recognition speed and consistency play in fluent L2 performance, and in particular the development of automaticity. "Word recognition speed is expressed throughout this book as the mean recognition time (mnRT) it takes an individual to recognize a set of words presented separately." Faster recognition times have been shown to reliably correlate with better performance both within and between users. In addition to the relative speed with which words are recognized, the overall consistency of recognition speed is also of interest. Word recognition consistency is captured in the coefficient of variation (CV), which is the ratio of the standard deviation of the mnRT to the mnRT itself (SD_{mnRT}/mnRT). Segalowitz has proposed that the interaction of the mnRT and the CV over the course of proficiency development can serve as an indicator of automatization (Segalowitz and Segalowitz 1993). In the lexical facility account, the CV is examined as an index of proficiency by itself and in combination with the size and mnRT measures. As a measure of response variability, the CV is examined as a window on vocabulary skill development, as opposed to mere 'noise' that might otherwise obscure experimental effects of interest. The interest in variability as a characteristic of performance in its own right is attracting increasing attention in cognitive science (Balota and Yap 2011; Hird and Kirsner 2010).

The two research areas differ in goals and method, but are in accord that quantitative measures of vocabulary size and processing skill are important indicators of L2 proficiency. Proficient learners have bigger vocabularies and can access that knowledge more efficiently than their less proficient counterparts. The book explores how the empirically established—and intuitive—relationship between proficiency, and vocabulary size and processing skill is manifested in various domains of academic English.

The book is the first to investigate the value of treating vocabulary size and processing skill (recognition speed and consistency) as a unitary construct. The main empirical concern is the extent to which combined measures of vocabulary size and processing skill are more sensitive to performance differences than size alone. Sensitivity is reflected in how reliably (as reflected in statistical significance) the measures discriminate between levels in a given domain, and the magnitude of this difference as reflected in the effect size. Evidence for the efficacy of a composite measure combining static knowledge (size) and dynamic processing skill (speed and consistency)—that is, for lexical facility—has clear implications for L2 vocabulary research, testing, and assessment.

Lexical facility is a quantitative entity that captures a crucial facet of lower-level L2 vocabulary knowledge skill. It is approached as a trait, that is, as a user-internal, context-free property of L2 vocabulary knowledge that is developed as a result of experience with the language and is available for use across contexts (Read and Chapelle 2001).

Research Goals

This book has three goals. The first is to make the theoretical case for lexical facility. The validity of the construct is established in the first four chapters by first examining the crucial roles that vocabulary size (Chaps. 1 and 2) and word recognition skill (Chap. 3) play in L2 performance. The rationale for characterizing size and processing skill jointly as an L2 vocabulary construct, that is, for lexical facility, is then set out in Chap. 4. This chapter discusses key theoretical and methodological issues that arise from the proposal. Primary among these is the attempt to treat size and speed as parts of a unitary construct. Standard practice in the psychometric tradition has long been to treat the two as separate dimensions. Human performance has been characterized either as knowledge (also called *power*) or speed, the relative importance of each dependent on the kind of performance being measured. Knowledge is seen as the critical attribute of higher-level cognitive tasks such as educational testing, while speed is paramount for mechanical tasks such as typing. The lexical facility account proposes that size (knowledge) and processing skill (speed

and consistency) can be productively considered together as indices of L2 vocabulary proficiency. As a result, the proposal has implications for the broader incorporation of temporal measures in models of L2 learning and use.

The second and third goals concern the empirical case for the construct. The second goal is to assess the reliability and validity of an instrument to measure lexical facility, the Timed Yes/No Test. In Part 2, seven studies are presented that examine the sensitivity of the vocabulary size and processing skill measures (size and consistency), individually and in combination, to variability in proficiency and performance in various academic English domains. All seven studies measure lexical facility using the Timed Yes/No Test. The instrument is an online measure of recognition vocabulary knowledge based on the lexical decision task, a measure of lexical access widely used in cognitive psychology. Chapter 5 describes the Timed Yes/No Test and provides a rationale for its use. The use of speed and consistency as measures of proficiency raises methodological and technical issues. These are identified, and the implications for bringing time as a performance measure out of the laboratory and into classroom and testing contexts are discussed.

The third goal is to demonstrate the sensitivity of the lexical facility measures to proficiency and performance differences in academic English. Chapter 6 establishes the sensitivity of the size, speed, and consistency measures to differences in proficiency levels in university-age users. The chapter also demonstrates the validity of word frequency statistics to index individual vocabulary knowledge. In Chap. 7, the sensitivity of the measures to group differences in English entry standards used in an Australian university is examined. Written and spoken versions of the test are administered to evaluate differences in test performance due to language mode. Chapter 8 investigates the measures as predictors of performance by preuniversity students on one specific English entry standard, the International English Language Testing System (IELTS) test. Performance on the lexical facility measures is compared with placement

testing outcomes in language schools in Sydney and Singapore in Chap. 9. The last chapter, Chap. 10, investigates the measures as predictors of academic English grades and grade point average (GPA) in a university preparation program in Australia. Also discussed are findings from other studies that have addressed the same issues. Chapter 11 presents a summary of the findings from all the studies. The data reported in the various studies are drawn from published and unpublished research by the author and colleagues. Chapter 12 completes the book by considering the future of the lexical facility proposal in light of the findings.

In summary, this book attempts to establish lexical facility as a quantitative measure of L2 vocabulary proficiency that can serve as a context-independent index sensitive to learner performance in specific academic English settings. The studies in Part 2 aim to

1. *compare the three measures of lexical facility (vocabulary knowledge, mean recognition time, and recognition time consistency) as stable indices of L2 vocabulary skill;*
2. *evaluate the sensitivity of the three measures individually and as composites to differences in a range of academic English domains; and, in doing so,*
3. *establish the degree to which the composite measures combining size with processing skill (recognition speed and consistency) provide a more sensitive indicator of L2 proficiency and performance differences than vocabulary size alone.*

The book is in two parts. Part 1 presents the theoretical foundation and motivation for the lexical facility proposal. Part 2 reports on a set of studies that provide empirical evidence for lexical facility and concludes with a chapter that considers the place of lexical facility in the modeling and measurement of L2 vocabulary.

References

Balota, D. A., & Yap, M. J. (2011). Moving beyond the mean in studies of mental chronometry: The power of response time distributional analyses. *Current Directions in Psychological Science,* 20(3), 160–166.

Hird, K., & Kirsner, K. (2010). Objective measurement of fluency in natural language production: A dynamic systems approach. *Journal of Neurolinguistics, 23*(5), 518–530. doi:10.1016/j.jneuroling.2010.03.001.

Laufer, B., & Nation, P. (1995). Vocabulary size and use: Lexical richness in L2 written production. *Applied Linguistics, 16*(3), 307–322.

Read, J., & Chapelle, C. A. (2001). A framework for second language vocabulary assessment. *Language Testing, 18*(1), 1–32.

Segalowitz, N., & Segalowitz, S. J. (1993). Skilled performance, practice and differentiation of speed-up from automatization effects: Evidence from second language word recognition. *Applied Psycholinguistics, 14*(3), 369–385. doi:10.1017/S0142716400010845.

Part 1

Introduction

Part 1 (Chaps. 1, 2, 3, 4, and 5) introduces the theoretical and methodological foundations of the lexical facility account. Chapter 1 introduces the vocabulary size research program, including the frequency-based tests of vocabulary knowledge that are used to estimate second language (L2) vocabulary size in the individual user, which in turn has been related to differences in L2 performance. Chapter 2 then presents different types of vocabulary size tests, including the Vocabulary Levels Test (Nation 2013) and the Yes/No Test (Meara and Buxton 1987). Test assumptions and uses in testing and instruction are described and key findings surveyed. Research on the development of speed and consistency in L2 word recognition skill is examined in Chap. 3. The aims and methods of this research paradigm are then described, as are key research findings. These two independent lines of research provide the foundation for the lexical facility proposal introduced in Chap. 4, which sets out the rationale for combining the two dimensions and discusses the key issues related to this undertaking. Chapter 5 describes the Timed Yes/No Test, which is used in the studies in Part 2 that provide evidence for the lexical facility account.

References

Meara, P., & Buxton, B. (1987). An alternative to multiple choice vocabulary tests. *Language Testing, 4*(2), 142–145.

Nation, I. S. P. (2013). *Learning vocabulary in another language* (2nd ed.). Cambridge: Cambridge University Press

1

Size as a Dimension of L2 Vocabulary Skill

Aims

- Introduce the vocabulary size research literature.
- Describe how vocabulary size is counted.
- Describe the use of word frequency statistics to estimate vocabulary size.
- Relate vocabulary size measures to second language (L2) performance.

1.1 Introduction

This chapter introduces the field of what will be called *vocabulary size* research, an approach based on the simple assumption that the overall number of words a user knows—the *breadth* of an individual's vocabulary stock—provides an index of vocabulary knowledge. The focus on vocabulary breadth means that little attention is given to what specific words are known or the extent (or *depth*) to which any given word is used. Rather, researchers in the area are interested in estimating the vocabulary size needed to perform particular tasks in a target language. These tasks

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can range from reading authentic texts (Hazenberg and Hulstijn 1996) to coping with unscripted spoken language (Nation 2006). Size estimates are used to propose vocabulary thresholds for second language (L2) instruction, and more generally to provide a quantitative picture of an individual's L2 vocabulary knowledge (Laufer 2001; Laufer and Ravenhorts-Kalovski 2010). The focus here, and in the book in general, is on the size of recognition vocabulary and the role it plays in L2 use. The main focus is on the recognition of written language.

Recognition vocabulary is acquired before productive vocabulary and serves as the foundation for the learning of more complex language structures. The store of recognition vocabulary knowledge builds up over the course of an individual's experience with the language. This knowledge ranges from the most minimal, as in the case of knowing only that a word exists, to an in-depth understanding of its meaning and uses. A *sparkplug* may be a *thingamajig* found in a car or, according to Wikipedia, 'a device for delivering electric current from an ignition system to the combustion chamber of a spark-ignition engine to ignite the compressed fuel/air mixture by an electric spark, while containing combustion pressure within the engine'. Recognition vocabulary knowledge emerges from both intentional learning and implicit experience, and even the most casual experience can contribute to the stock of recognition vocabulary knowledge. Repeated exposure to a word also has a direct effect on how efficiently it is recognized.

The notion that knowing more words allows a language user to do more in the language hardly seems controversial. However, many apparently commonsensical assumptions in language learning are often difficult to specify in useful detail or to apply in practice (Lightbown and Spada 2013). Even when evidence lends support to the basic idea, specific findings introduce qualifications that often diminish the scope and power of the original insight. This chapter introduces and surveys the vocabulary size research literature to see how the 'greater size = better performance' assumption manifests itself. The methodology used for estimating vocabulary size is first described, and then findings from key studies are presented.

Size is a quantitative property and therefore requires some unit of measurement. In the vocabulary size approach, it is the single word. Size

estimates reflect vocabulary breadth and have been related to L2 performance in two ways. Researchers have sought to establish the minimum size thresholds needed to perform specific tasks, such as reading an academic text (Schmitt et al. 2011), or related size to performance outcomes in specific settings, as in placement testing (Meara and Jones 1988).

1.2 Estimating Vocabulary Size

The measurement of recognition vocabulary is a far more complex task than might first appear. The first difficulty involves defining what to count as a word. Criteria must also be established for deciding how a given word is recognized for counting. Finally, a practical means must be devised for obtaining a sufficient sample of the individual's language from which to make a valid size estimate. All three factors present challenges for the researcher.

What to Count

The vocabulary size approach quantifies vocabulary knowledge as a collection of single words. Characterizing vocabulary knowledge as a collection of individual words accords with how vocabulary knowledge is popularly viewed. Single words are the means by which children learn to spell and are the basis for dictionaries, spelling bees, and crossword puzzles. They also have a privileged place in vocabulary learning and teaching, where word lists are a staple feature of any language textbook. And, of course, multiword units (collocations, formulaic speech) are ultimately made up of single words. Learning these forms involves either associating a combination of known words to a new meaning or learning a new unit in which some or all of the words are unknown (Wray 2008). In either case, the single word represents a basic building block.

Single words are different from other kinds of language knowledge in how they are acquired and represented in the brain. The L2 learner learns a word (sound–meaning pair) consciously and that is stored as part of the declarative memory system, a system open to reflection and explicit

modification. But this knowledge is only part of the lexicon, which consists of these words in combination with the mostly implicit grammatical properties that constrain how the words are used. These properties reside in procedural memory, a system of implicit, unconscious knowledge. Paradis (2009) makes a distinction between *vocabulary* and the *lexicon* to capture this difference. Vocabulary is the totality of sound–meaning associations and is typical of L2 learner knowledge, particularly in the early stages. The lexicon characterizes the system of explicit and implicit knowledge that the first language (L1) user develops as a matter of course in development, and which is developed to varying degrees in more advanced L2 users. In Paradis's terms, the lexical facility account relates strictly to vocabulary knowledge, its measurement, and its relationship to L2 proficiency and performance.

Last, the pivotal role the single word plays in online processing also reflects its importance. The word serves as the intersecting node for a range of sentence and discourse processes that unfold in the process of reading (Andrews 2008). It is where the rubber meets the road, as it were, in text comprehension.

The focus on the recognition of single words means that the vocabulary size approach captures only a small part of L2 vocabulary knowledge, a multidimensional notion comprising knowledge of form, meaning, and usage. Each word is part of a complex web of relationships with other words, and this complex network is used to realize the wide range of expressive, communicative, and instrumental functions encountered in everyday use. Figure 1.1 depicts the basic elements of word knowledge in a three-part model adapted from Nation (2013); see also Richards (1976).

The vocabulary size account reduces vocabulary knowledge to the single dimension of the number of individual words a user knows, or more precisely, recognizes. It is about the user's ability to relate a form to a basic meaning, whether by identifying the meaning from among a set of alternatives, as in the Vocabulary Levels Test (VLT), or merely recognizing a word when it is presented alone, as in the Yes/No Test. This passive 'recognition knowledge' is assumed to be an internal property—a trait—of the L2 user's vocabulary stock that can be measured independently of a given context.