BOOK REVIEW

I.S.P. Nation & A. Coxhead. *Measuring Native-Speaker Vocabulary Size*. John Benjamins Publishing Company. 2021. Pp. XIV + 160.

Language assessment progresses almost parallel to language education. Language testing is a similarly evolving discipline, with many shifts and extensive progress in different aspects over the years. More than four decades have passed since Meara (1980) declared that "vocabulary acquisition" was "a neglected aspect of language learning [lowercase letters added]" (p. 221). However, followers of vocabulary studies have witnessed many developments that have increasingly shaped the mentality of the stakeholders. Accordingly, *Measuring native-speaker vocabulary size*, authored by two leading scholars in the field, presents ideas and notions from the related native-speaker studies to further the knowledge of the vocabulary learning researchers and teachers for non-native-speakers. The intention is to help non-native-speakers reach native- or near-native-speaker vocabulary proficiency. Nation and Coxhead have dedicated the volume to John Read, their long-time colleague and supportive friend as well as an influential scholar in the field of language testing and vocabulary assessment.

Measuring native-speaker vocabulary size establishes a clear status quo of productive/receptive vocabulary sizes of native-speakers (Chapter 1). It reviews related studies on vocabulary size and rate of vocabulary growth (Chapters 2–8), its influential factors (Chapters 7), and types of measures/items in estimating native-speaker vocabulary size (Chapter 9). Chapter 10 provides a guide for vocabulary test development. The volume concludes with final thoughts on gaps in vocabulary size research and recommendations for future/further research (Chapter 11).

In Chapter 1, Nation and Coxhead introduce the key themes of the volume and touch on the importance and history of vocabulary size measurement of native-speakers, and methodological decisions at work in estimating vocabulary size and growth rate. The authors describe the lessons learned from a few studies conducted in the past and their contributions despite their flaws.

Chapter 2, partly based on Nation and Anthony (2016), focuses on the productive vocabulary sizes of young native-speakers of English. The authors cite the earliest studies in which the researcher(s), who are mainly children's parent(s), record(s) the words children produce, adopting word type with singular and plural forms as the unit of counting. Nation and Coxhead contemplate whether spoken output can be used to measure vocabulary knowledge, and whether the cumulative number of word types and data-gathering at various intervals can accurately measure vocabulary growth in native-speakers of English. Reviewing the main studies in the early 20th century and more recent ones, the authors highlight several problems with the methodology. They argue against counting word types in output as a measure of vocabulary size and growth since several factors influence what words are produced. First and most important is the number of tokens; as children produce more tokens, the number of different words, or types, will respectively increase. Even if the number of tokens is controlled, the following factors will affect the number of word types: topic variation, quality of interactions, number of words known and produced, data-gathering situation/atmosphere, and unit of word counting.

Chapter 3, largely based on Nation (1993), deals with using dictionaries as word sources to estimate vocabulary size. It argues that the studies he surveyed chronologically have not taken previous research into account and, thus, rediscovered similar problematic principles and produced misleading estimates. Therefore, Nation and Coxhead only describe the procedures to be followed in using dictionaries as the basis for estimating vocabulary size. Notably, they discuss reviews by Thorndike (1924) and Lorge and Chall (1963), and add and refine sampling procedures to follow in conducting an appropriate dictionary-based study of vocabulary size. The chapter compares several studies. An illustrative study applied the following procedure: 1) choose a big dictionary, 2) estimate the number of words in the dictionary, 3) use criteria to include/exclude words from a word family, 4) use a non-biased sampling procedure towards space-occupying entries, 5) choose a large sufficient sample, 6) check the application of criteria in excluding and including items, 7) check the sample against the bias for high-frequency words, 8) describe the seven steps and procedures used in details for replication purposes. Alternatively, a review of the literature revealed "the very rough rule of thumb that", by age 18, "we can multiply [peoples'] age in years minus 2 by 1,000 base words or less per year" to estimate "probable vocabulary size in word families" (p. 29).

Chapter 4, partially based on Coxhead et al. (2015, 2018), discusses the studies on receptive vocabulary size of young school children, which sampled words from word lists, *not* dictionaries. The Picture Vocabulary Size Test, a receptive listening vocabulary size test, developed by Paul Nation, can be used to both estimate children's total vocabulary size and compare different learners although it uses lists under the 6,000 word-family level. Data from this test revealed that primary school children's productive vocabulary size and their vocabulary growth were in line with the rough rule of thumb given above. That is, prior to secondary school, at around ages 12–13, native-speakers know around 10,000–11,000 word families.

Chapter 5 estimates the vocabulary size of secondary school children (13–17-years-old). The authors administered two versions of the Vocabulary Size Test, developed from frequency-based lists of word families. Participants received both versions randomly in different order and testing condition: group testing condition and individual testing condition. They found that teenagers' vocabulary size continually increases. Compared with primary school children, secondary learners' individual differences in vocabulary size are larger, with big differences at the extreme ranges in the rule-of-thumb (age minus 2, times 1,000). Interestingly, there is an effect of test administration, with especially low-proficiency students scoring higher (around 1,700 word families) when tested one-on-one than in a group, noting that although these differences are large, even these students know several thousand words (group condition). Organizationally, Chapter 3, placed after Chapter 5, would have given a more logical and smoother order to the flow of the material in terms of the nature of the study and age groups involved (12-13, 13-17, 18 and above).

Chapter 6 addresses native-speakers' non-technical vocabulary size, estimated through three frequency-list based studies with different units of counting word families and different formats; they used 36,000, 20,000 (Coxhead et al., 2014) and 18,299 word families respectively. This discrepancy in using different word count units compelled Nation and Coxhead to suggest Bauer and Nation's (1993) level 7 to also use bound stems for some word families and the word list of around 25,000 words. For adult native-speakers with tertiary education, based on the findings of these studies, Nation and Coxhead estimate general vocabulary knowledge of around 20,000 word families, plus knowledge of further discipline-specific vocabulary.

Quality of meetings with vocabulary is associated with learning condition levels (Webb & Nation, 2017) that aid the cumulative process of learning pieces of word knowledge. The levels include repetition, noticing, retrieval, varied meetings and use, and elaboration, which depend upon other factors, discussed in Chapter 7. They affect vocabulary size and growth of native-speakers. In a model of causally related factors, Nation and Coxhead consider age and the statistical nature of vocabulary (e.g., type/token features) to have the most influence on the average rate of native-speaker vocabulary growth. They also provide evidence that a set of factors (e.g., social and personal, life experience, opportunities for input and use, and learning conditions) determine individual variation in vocabulary development. Further, the authors mention five causal chains, linking these factors to vocabulary size and growth: the 30-million-word gap, role of education, parental skills and habits, guessing the meaning of words from context, and knowledge of additional languages. These chains have roots in the former set of factors. For instance, the 30-million-word gap is rooted in socio-economic factors. That is, children in low socio-economic homes hear 30-million words fewer than their counterparts in better-off homes. Or social and personal factors affect education, which in turn affect opportunities for language input and use, leading to ideal conditions for learning vocabulary. Consequently, all of these factors interact with vocabulary size and growth.

Native-speakers learn vocabulary incidentally. Chapter 8, therefore, addresses how to support their vocabulary growth by parents, teachers, and individuals themselves, based on age and education level. Firstly, the amount and variety of interaction with toddlers and preschoolers can be critically enhanced through interventions. Secondly, at primary school, vocabulary growth is mainly supported through oral interaction with teachers and other children. Thirdly, for secondary school, where language skills, especially reading, is more involved, Nation and Coxhead offer useful suggestions for boosting vocabulary learning. Fourthly, useful suggestions are given to support vocabulary growth in adults. Adults should read persistently and widely on different topics. There are, however, several common themes in activities or suggestions on vocabulary growth that apply to native-speakers across different ages or education levels. That is, vocabulary growth can be supported through interaction on challenging and topic-related issues, sustained and varied reading, thoughtful listening activities with

language use, discovery writing, development of word consciousness, and other learning activities.

Vocabulary tests do not measure all aspects of word knowledge. Moreover, measures and test items themselves affect native-speaker vocabulary size measurement. Therefore, Chapter 9 critically discusses the common measures and item types, and their strengths and weaknesses, in relation to the age and education of native-speakers being tested. Nation and Coxhead first mention single-person output studies and small-amount output studies and how to overcome the problems with such outputs to measure vocabulary size and growth. They then mention the most popular test item formats used to measure receptive vocabulary size. Different test and item formats (e.g., multiple-choice, Yes/No, and meaning-recall) tap into different degrees and aspects of vocabulary knowledge. Test-taker age and attitude, and test administration (i.e., one-on-one, group) will play a role, too.

Based on previous good and bad word list examples, their experience in word list creation, and research in assessing vocabulary, the authors offer steps, in Chapter 10, similar to a checklist, for developing an effective vocabulary test. For instance, test designers should consider age and test purpose, describe the kind of vocabulary knowledge being tested and its importance, specify the words to be measured and unit of word counting, avoid errors and make more transparent decisions about words and word family members in sampling from word lists, use a representative word list, justify the selection of the test item type, develop the test, and validate it through informal checking (pre-piloting), item analysis, and trialing, before the test is ready to be used to estimate vocabulary size.

In Chapter 11, Nation and Coxhead synthesize earlier findings and discussions to argue that we now have a realistic picture of vocabulary size, length and complexity of effective vocabulary learning tasks for native-speakers and EFL learners, and estimated number of word families learned in a year or day. Given this understanding, rigorous interventions to enhance vocabulary size would be more effective. With more knowledge about high-, mid-, and low-frequency, and technical words, the growth and size of native-speaker vocabulary has been revealed to follow a predictable order though they are affected by different factors. The vocabulary gap between high- and low-socio-

economic learners in high-frequency words may be linked with faulty measurement of vocabulary knowledge, which might affect interventions, hence neglecting the vocabulary that deserves attention. The authors thus recommend future research areas, such as developing a picture-based total vocabulary size test, improving research methodology, investigating further questions on native-speaker growth, and using evidence from vocabulary size tests to enhance our knowledge boundaries. Computer-adaptive testing can now help yield truer estimates.

I believe another area for further research is to compare the vocabulary growth of native-speakers with non-native-speakers for the purpose of verification and generalizability since native-speaker research is often extended to non-native contexts. Moreover, the authors or future researchers might consider sampling a sufficient collection of books normally read by or written for people at any age (i.e., preschool, primary, secondary, and high school or university level or any adult age), develop a word list based on the procedures recommended in this book, and use it to estimate the vocabulary size of native-speakers as this may produce a truer reflection of vocabulary size.

An advantage of the volume is that it presents evidence-based theoretical discussion that results in clear recommendations for teachers to follow in their respective language classrooms. Indeed, the discussions can be extended to non-native-speakers. Moreover, the writing is informative and easy-to-follow. The issues are not presented too theoretically for the volume to be kept sitting on the bookshelves gathering dust, but are presented so skillfully that the book will find its way into many language classrooms. Additionally, second language researchers will equally benefit from the volume for both replicating the studies and/or applying the findings and recommendations.

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