Pedro A. Fuertes-Olivera. *The Routledge Handbook of Lexicography*. 2018, 810 pp. ISBN: 978-1-138-94160-1. London/New York: Routledge. Price £165.00.

Theoretically and practically, lexicography has "come to a crossroads" (Bergenholtz, Nielsen and Tarp 2009: 8), and is experiencing "a Cambrian explosion driven by the coming of age of the Internet" (Fuertes-Olivera 2018: 37). However, so far no work has been dedicated to offering a comprehensive overview of lexicography in the Internet era. The appearance of *The Routledge Handbook of Lexicography* is timely. It serves as "a guide to what are the most significant contours in the lexicographical world", and offers "a series of possible developments that might be influencing the near future of the field" (ibid).

This book, with its six parts, an introduction and an index, offers "a balanced view of the main approaches to lexicography in general and to some of its specific aspects" (Fuertes-Olivera 2018: 38). The 47 chapters follow a unified format which consists of an introduction, a historical review of the specific topic, core issues, an indication of future developments, a conclusion, related topics, further reading and bibliographical references. Contributors to this book are scholars with theoretical or practical lexicographic background and insight into lexicography in the Internet era. Readers will find each contribution practical and inspiring, rather than abstract and tedious.

Among the recently published handbooks such as Jackson (2013), Durkin (2016) and Hanks and De Schryver (2016), this book is a comprehensive and most up-to-date contribution to lexicography in the Internet era. It differs from the above-mentioned handbooks in three aspects. Firstly, it focuses on lexicography in the Internet era, thus facilitating an overall understanding of the latest theoretical and practical developments in lexicography. Secondly, most of the contributions adopt function theory as a starting point, enabling the reader to form a better understanding of the theory and its application. Thirdly, "Further Reading", with a brief introduction to the related works, and a self-contained reference list, conveniently guides the interested reader to further exploration.

The introduction gives the reader a panoramic view of the book by summarizing the general idea of each part and each chapter, and organizing the chapters in an organic way. The readers can select what they are interested in for further reading in a convenient and time-saving way.

By establishing the position of lexicography as an independent discipline Part I could be seen as the basis for the whole book. Adopting the function theory of lexicography, the five chapters defend this position using the topics dictionary management, access structure, meaning explanation, and dictionary criticism. The status of lexicography as an independent science is defended in Chapter 1, and its five research areas are established accordingly, namely research into (1) the information-search process; (2) dictionary compilation; (3) dictionary form; (4) usefulness of dictionaries; and (5) history of lexicography, which later serve as the topics and issues for discussion in this book. Chapter 2 focuses on dictionary management which is considered to be a peripheral topic

in many lexicographic works. In comparison with other ideas on dictionary management, the author, Henning Bergenholtz, defends the necessity of appointing a professional lexicographer as dictionary project manager by referring to two dictionary projects. This provides quite convincing examples. Chapter 3 deals with the topic of access structure in a macroscopic way by introducing the interactive relations between access structure and other dictionary structures. It can be regarded as an introduction to further discussions on access structure in Chapters 41, 42, 43, etc. Definition is always regarded as the most important aspect in a dictionary. In Chapter 4, meaning explanation is proposed to substitute for definition, and the author, Heidi Agerbo, provides examples of meaning explanation from a functional perspective and suggests considering USER+SITUATION+LANGUAGE CONSTRUCTION as the determiner for selecting lexicographic data. Chapter 5 is innovative in providing a format for dictionary criticism by defining the object and purpose of criticism, proposing three approaches to the task, and examining the qualitative requirement of scientific criticism.

Part II discusses the relation between lexicography and other disciplines, ranging from the often discussed applied linguistics and terminology, to language policy and culture, and the comparatively newly emergent corpus linguistics, natural language processing, information science and domain ontologies. Practically and theoretically, lexicography is interdisciplinary and different stages of dictionary compilation require involvement from different domains (Chapter 6). To be more specific, the compilation of monolingual learners' dictionaries reflects the strong impact of applied linguistics in lexicography, as demonstrated in Chapter 7. Lexicography and terminology are fuzzy-boundary if their practitioners, tools and techniques, and data are taken into consideration (Chapter 9). A dictionary is also the product of language policy which in turn influences language policy, and it will remain a pronounced issue for countries to pursue national identity, as is the case of the African countries mentioned in Chapter 10. A dictionary is also the reflection of culture information, which should be included, especially in learners' dictionaries (Chapter 11). Practically, local and online corpus query tools can be utilized for lexicographic purposes (Chapter 8). Natural Language Processing techniques (NLP) and ontologies can also be used in lexicographic processes such as NLP techniques for collocation extraction, named entity recognition, word sense disambiguation, etc., and in the ontology editor "Protégé" and search engine "SWOOGLE" (Chapter 12, 14). The interdisciplinary nature of lexicography determines that its development will not only benefit from other disciplines, but will also contribute to the development of other disciplines, as is stated in Chapter 13 that information science and lexicography can learn from each other at the level of theory and practice.

Part III presents different types of dictionaries. Contributors to this part deal with different types of dictionaries within the function theory framework and pay close attention to electronic forms. In Chapter 15, Tarp re-defines the dictionary concept according to criteria of form, content and purpose, and pro-

poses four dictionary categories based on communicative, cognitive, operative and interpretive purposes. The dictionaries discussed later in part III fall within this framework, with dictionaries for text reception (Chapter 16), text production (Chapter 17) and translation (Chapter 18) belonging to the dictionary category based on communicative functions. Dictionaries to assist teaching and learning (Chapter 19) belong to the dictionary category based on cognitive functions; and specialized dictionaries (Chapter 20) belong to the dictionary category based on operative functions. Chapter 16 addresses a number of issues in text reception and some lexical categories which pose as challenges to text reception. Chapter 17 adopts a different approach by analyzing two dictionaries for text production and introducing a lexicographic project consisting of different dictionaries to illustrate how to improve current dictionaries for text production. Chapter 18 points out LSP e-lexicography, tailored monofunctional e-dictionaries and a comprehensive translation-oriented platform as the future for translation dictionaries. Chapter 19 gives a brief history of monolingual learners' dictionaries (MLDs) and discusses some core issues in MLDs, such as defining vocabularies, examples, grammatical information, collocations, etc., and special types of MLDs, e.g. electronic ones, bilingualized ones and those for specialized purposes. The author of this chapter, Reinhard Heuberger, points out that the future of MLDs should be electronic learners' dictionaries characterized by customization and user input. Chapter 20 focuses on the defining criteria for specialized dictionaries and examines some issues in the macro- and microstructure. Anne Condamines approaches the topic of terminological knowledge bases (TKBs) from a linguistic point of view, and gives detailed information of the tool-assisted linguistic methods for building TKBs. However, the aim of knowledge engineering has now evolved in building ontologies, as is discussed in more detail in Chapter 14.

Dictionary work mentioned in Part IV is characterized as innovative, whether it is the revision of a long existing monolingual learners' dictionary or the compilation of a new dictionary. Contributors to this part take different approaches to demonstrate the innovative characteristics of the dictionary or dictionaries studied. Chapter 22 examines the main features of online MLDs and points out that future MLDs will be innovative in incorporating material such as video clips. Teachers need to be aware of the advantages and disadvantages of current online MLDs in teaching dictionary use. Students could, for example, be allowed in class to search for a word and to compare entries in different dictionaries. Chapter 23 reports on the revision of a historical Canadian dictionary. The work is innovative not only in its guiding principles but also in its entry structure, applied typology of Canadian English and especially in its use of frequency charts. The *Online Dictionary of New Zealand Sign Language* is innovative in itself in addressing the deaf community's claim for identity recognition but also in utilising the advantages of linguistic research and the digital medium. It also features the use of video clips, corpus-based contents, users' needs studies and interactive user interfaces. The *Alicante Dictionaries*,

the *Oenolex Wine Dictionary* and the *Accounting Dictionaries* are specialized dictionaries adopting a functional theory approach. The author of Chapter 26, Jose Mateo, reports on issues concerning the compilation of the *Alicante Dictionaries*: the basic principles of relevance, clarity and economy, methodology, and data sources. The user-oriented approach requires the inclusion of the most relevant terms in the dictionaries, instead of the traditionally pursued "the more the better". The *Oenolex Wine Dictionary* is distinguished from others by its genuine purpose and by some elements in the construction process, including data generation and acquisition, the use of written and oral corpora, semi-automatic extraction of examples, improved search functionality and cooperative work and interdisciplinary management. Many of these innovative features are shared by the *Accounting Dictionaries* as mentioned in Chapter 28. The authors of this chapter, Pedro A. Fuertes-Olivera and Marta Niño Amo, propose online dictionaries to be regarded as services and not as products. Chapter 24 gives a brief introduction to *FrameNet* database which is innovative in its theoretical basis, different ways to access data, crowdsourcing to generate resources, etc. *Wordnik*, a bottom-up collaborative lexicographic work, features an innovative business model, data-mining and machine-learning techniques and a different technical system.

Part V, *World Languages, Lexicography and the Internet,* provides a panoramic view of world lexicography. Using the criteria of "world language", "dominant and appreciated lexicographic tradition", and "less-resourced languages" (Fuertes-Olivera 2018: 49), eleven languages, namely African, Arabic, Chinese, English, French, German, Hindi, Indonesian, Portuguese, Russian and Spanish, are selected to demonstrate the current situation of world lexicography and to indicate its future development in the Internet era. Although all the contributors to this part give a brief introduction of their lexicographical histories, they approach the core issue from different perspectives. Amongst the eleven languages, English and German lexicography are listed as the leaders in the innovation of world lexicography, e.g. in the use of corpora, the improvement of processing tools, integration of information science in dictionary compilation, etc. Chapter 33 focuses on the use of corpora and the improvement of processing tools in English online lexicography. After discussing general issues concerning online dictionaries like typology, search features, presentation, the use of multimedia, accessibility and customization, the author, Howard Jackson, explores topics for future development, such as the user center, adaptability, hybridization and collaborative lexicography. Besides paying attention to specific issues, Chapter 35 takes a more macroscopic approach. After a review of the different dictionary types, aspects such as user studies, new linguistic data, the exploiting of the Internet, etc. are discussed. The author, Petra Storjohann, points out the necessity of interaction between lexicography, corpora and information science, the integration of linguistic theory and lexicographic practice, and the raising of dictionary awareness. Amongst the other languages, Arabic lexicography made significant progress in modern development.

Despite uneven development in Arabic lexicography amongst language varieties, it has taken advantage of new technologies, methods and standards in saving the past and developing the new. This example is worth learning from, especially for those who have lagged behind in recent development, despite poor or rich lexicographic traditions. Danie Prinsloo et al. attribute the underdevelopment of African lexicography to the lack of dictionary culture and modern technology. The focus of this chapter is on examining the quality of online dictionaries for African languages, and the methods for improving them. Chapter 32 gives a brief introduction to the history of Chinese lexicography. The authors, however, overlook the recent development of electronic dictionaries by reasoning that the Internet is underused in Chinese lexicography and that both lexicographic theory and practice in China have followed a very different path from other traditions, especially Western ones. To change the status of Hindi lexicography as being underrepresented, the authors of Chapter 36 propose the raising of lexicographic awareness of both scholars and students, global vision of development in lexicography and information science, and to make the development of language policy and political planning a national strategy. Although Indonesian lexicography may be underrepresented, the author is quite optimistic about the future with joint efforts from the public, individual lexicographers and institutions, and about development in theories on corpora, dictionary typology, search capabilities, presentation and access, and the use of multimedia.

For other languages such as French, Portuguese, Russian and Spanish, the contributors approach from slightly different perspectives. Chapter 34 gives an overview of existing French electronic dictionaries and concludes that most of them are just digital versions of printed lexicographical reference works and calls for the improvement of a retrieval system. A history of Portuguese lexicography demonstrates that a dictionary is a cultural object. Besides issues mentioned by other contributors, the author, Teresa Lino, emphasizes the design and compilation of specialized dictionaries. In Chapters 39 and 40, in reviewing dictionaries, some innovations of global tendencies are offered e.g. Russian lexicographers focus on users' needs, the application of new technologies, the development of theoretical lexicography, etc., while their Spanish counterparts value lexical connectivity, personalization and integration.

Part VI, *Looking to the Future: Lexicography in the Internet Era*, focuses on specific issues on electronic lexicography, namely the use of the Web in the lexicographic process, information retrieval, usage research methods, user participation, dictionary portals and the international directory of lexicography. In Chapter 41, Anna Dziemianko lays the foundation for the discussion in this part. Based on De Schryver's definition and Tarp's typology of Internet dictionaries, the author reviews and comments on existing and future electronic dictionaries, stating "access" and "quality and usefulness" as core issues, pointing out that the future development of electronic lexicography should include the dictionary as digital assistant, automatic lexicographic compilation,

integration of corpora with dictionaries, usefulness research, user studies, more advanced study methods, etc. Chapter 42 explores the development of dictionaries as lexicographic tools in terms of "user", "data" and "access". Chapter 43 introduces some electronic data sources for lexicographers, namely Sketch Engine, Google NGrams Viewer and WordNets, and provides examples of their applications in accomplishing lexicographic tasks with defining words of different parts of speech. Chapter 44 demonstrates how to conduct empirical usage research with specific methods: questionnaires, eye tracking and log files. Chapter 45 illustrates three major types of user participation methods. After examining the types and functions of dictionary portals, the authors of Chapter 46 provide a list of 37 portals. They investigate the lexicographical features and propose the improvement of dictionary portals by augmented search and search in context. The last chapter of this handbook proposes the necessity of having an international directory of lexicography as a source of information on lexicographers, publishers, conferences, elements of the production process, publication information, etc.

In conclusion, some features are worth mentioning.

Firstly, this handbook distinguishes itself by covering a wide variety of lexicographical topics in the Internet era with each chapter following a unified format. In this way, the intended readers, especially inexperienced lexicographers, will have a full understanding of the topic: its history, present practice and future development. In spite of different backgrounds and nationalities, contributors to this book make their contributions accessible in plain and simple language. Besides, topics shared within different chapters are cross-referenced. It is convenient, especially for the electronic edition, which is just a click away. No doubt, with its comprehensiveness, convenience and reader-friendliness, it will qualify as a guidebook for inexperienced lexicographers to have a general and most up-to-date knowledge of lexicography in the digital age.

Secondly, this informative book is well-organized, from the most general to the most specific, guiding the readers to probe into more complex and concrete issues. The readers are guided gradually from general issues such as the nature of the discipline (Parts I and II), different types of dictionaries (Parts III and IV) and dictionaries in different countries (Part V), to specific issues in lexicography (Part VI) to gain an understanding of modern lexicography in both a detailed and comprehensive way.

Thirdly, another merit is its employment of ample examples in discussion, even if it concerns the practical application of theory or the introduction to cutting-edge technology. Adopting a functional theory approach, practical applications of this lexicographic theory are presented with examples of the *Alicante Dictionaries* (Chapter 26), the *Oenolex Wine Dictionary* (Chapter 27), the *Accounting Dictionaries* (Chapter 28), etc. It proves the feasibility of the function theory, but also serves as a good example of the integration of theory and practice. A wide range of resources is also provided for further research, learning and teaching. For instance, Sketch Engine, Google NGrams Viewer

and WordNets are treated as examples in their use in accomplishing lexico-graphic tasks (Chapter 43). Corpus tools for lexicography such as ANTConc and Corpus Query Processor (CQP) (Chapter 8) and lexical databases such as DANTE, OWID, Pralex, Cornetto and Aralex (Chapter 12) are also introduced. No book of this kind has ever offered so many up-to-date and cutting-edge resources.

Finally, this handbook also serves as a guide for future research by providing good examples of research topics and methodologies. In addition, the format in which research articles are presented is worth being copied/noticed by the readers, especially inexperienced lexicographers. Besides, some contributors also illustrate how to conduct research with specific methods. For example, Chapter 44 demonstrates how to conduct empirical usage research with questionnaires, eye-tracking and log files. Chapter 45 introduces user participation as a new field for lexicographic research.

It is impossible for such a book to cover the detail of lexicography, but as an introductory work, it would be more comprehensive if it could go beyond the functional approach and also cover other approaches such as the communicative and cognitive approaches, especially when dealing with some general issues. Even though such information could be offered in the historical review part of a specific topic, contributors can prefer to emphasize certain aspects. For example, when dealing with definition (Chapter 4), Heidi Agerbo just mentions the conventional practice of defining according to "necessary and sufficient conditions", omitting some important approaches like defining semantic prototypes.

Some gap exists when contributors take a specific perspective in his/her article, which in some cases gives the wrong impression. For instance, when introducing Chinese lexicography (Chapter 32), Heming Yong and Jing Peng give a panoramic view of its history in the past three millennia, omitting the recent development of electronic dictionaries. Readers will find it a pity if they want to know more about the latest development in China.

To summarize, this handbook is a valuable addition to existing books of this kind. It is a very practical introduction to lexicography. It will be useful not only for students and scholars of lexicography as intended by the editor, but also for anyone interested in this topic.

Scholars have different ideas on the substitution of a paper dictionary with an online-only dictionary, however it is quite clear that the online dictionary already has a great influence on lexicography. We should rather prepare ourselves for more changes in the Internet. Therefore, this is a valuable book worth consulting.

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