

## Creating talking and illustrated dictionaries: An example of Ọrọ

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### Abstract

Dictionaries are important linguistic products. In terms of functions and application, they are relevant for language teaching and learning as well as for language preservation. They vary in types, including general-purpose or specialized, monolingual or bilingual, illustrated or pictorial, print or electronic, talking, etc. This study created an online talking and illustrated dictionary of Ọrọ, a Lower Cross language in Nigeria which until now had no such resource. The research method adopted is qualitative descriptive while the sampling method combined both purposive and snowball techniques. Data for the study were collected from three native speakers of Ọrọ, with the lead consultant serving as a co-author of this article. Over 300 entries were made, sourced from the modified version of Swadesh Wordlist by the Nigerian Language Project. The online platform on which the dictionary was created is [www.livingdictionaries.app](http://www.livingdictionaries.app), a web portal dedicated to creation of dictionaries for endangered and low-resource languages. The study found that, today, linguists and community members can make web-based dictionaries for any language at no cost by using already available tools such as the Living Dictionaries platform.

**Keywords:** Ọrọ language, online dictionary, talking dictionary, illustrated dictionary, living dictionaries

### 1.1 Introduction

The dictionary is perhaps the most familiar and popular linguistic product among the general public. There are family dictionaries in some homes and, thanks to advancing technology, quite a number of smartphone users now have at least a dictionary on their devices. The reason for this is not far-fetched:

dictionaries serve a range of functions that meet the common needs of language users, such as giving the meanings, pronunciations, and usages of words. Technology, especially the Internet, has not only widened the reach of dictionaries, it has also influenced their design and production.

A typical definition of a dictionary used to portray it mainly as “a book”. Today, a dictionary can be captured as a book or electronic resource. The days of print dictionaries, like many other hardcopy books, are numbered. These days, most dictionaries are available in electronic formats, either online or as mobile applications. In fact, about twelve years ago, the publishers of the Oxford English Dictionary hinted at a possibility of publishing the next edition of their popular dictionary only in the electronic format, as printed editions — which were too expensive to produce and too bulky to carry — recorded low sales “due to the increasing popularity of online alternatives” (Telegraph, 2010). Two years after, the Macmillan Dictionary publishers also announced that the subsequent editions of their dictionary would no longer be published in print form; instead they would be available mainly in the “digital medium”, which its editor-in-chief, Michael Rundell, described as “the best platform for a dictionary” (Macmillan Dictionary Blog, 2012). This, however, does not undermine the importance of print dictionaries; there are certain situations where they are even more preferable than electronic versions, for instance, at remote language communities with no Internet connection.

Dictionaries also hold a special place in linguistics, although they are more significant in some areas than others. In language description, for example, one primary goal is production of dictionaries among other descriptive works such as orthographies and grammars (Udoh, 2021). In language documentation, on the other hand, dictionaries and other descriptive outputs are regarded as secondary, analytical, or “dependent products that annotate and comment on the documentary corpus” (Austin, 2006, p. 87). Besides, lexicography — the art and science of making dictionaries — is considered a branch of linguistics or a subfield of applied linguistics, although some scholars argue that it is an independent discipline (Bergenholtz and Gouws, 2012, p. 33). However, the scope of the current study does not include any argument on how or where to categorize lexicography; it is simply an exercise in lexicography.

Lexicography is one of the first areas of linguistics to adopt and adapt to computer technology. Since the 1980s, lexicographers have been compiling dictionaries based on corpora, which are large bodies of real-language data (spoken and written) stored in electronic databases; before the end of the decade,

the first corpus-based dictionary, Collins COBUILD English Dictionary (1987), had been published (Moon, 2009, p. 436). Today, the use of corpora has become a norm in lexicography, and has led to the emergence of corpus lexicography, a new interdisciplinary area of linguistics that is concerned with the design and construction of modern electronic dictionaries using sophisticated computer tools and large, electronic collections of written and/or spoken text (RCGL, 2015). Consequently, quite a number of dictionaries of major languages in the world are corpus-driven, although there are hardly any published dictionaries of Nigerian languages that have applied this computational approach. Similarly, “the Internet ... became a valid storage medium for electronic dictionaries in 1993”, a year after the first world wide web browser was released for general use (Nesi, 2009, p. 472). Today, there are hundreds of web-based dictionaries, some of which are on Nigerian languages such as Edo<sup>1</sup>, Hausa<sup>2</sup>, Ibibio<sup>3</sup>, Igbo<sup>4</sup>, Yorùbá<sup>5</sup>, etc.

Creating and maintaining online dictionaries can be expensive: it costs an average of \$10 per month to host a website, amounting to about ₦60,000 in a year aside charges for web development and maintenance. But it is now practically free for linguists and non-linguists to create Internet-based dictionaries, courtesy of the Living Tongues Institute for Endangered Languages, an international non-governmental organization whose “mission is to ensure language survival for generations to come” (Living Tongues Institute, 2022).

Dictionaries are important end products in linguistic studies and their usefulness spans language teaching/learning, language standardization, and language documentation, among others. The modern-day development in dictionary-making includes online dictionaries, i.e. dictionaries that are accessible via the Internet. Such dictionaries are in many ways more beneficial than their print alternatives. Dictionaries of a few Nigerian languages such as Edo, Hausa, Ibibio, Igbo, Olùkùmi, Owé, Tiv, and Yorùbá already exist in this electronic format either on their own independent websites or as interior pages/subsections on a mother portal webpage (such as Living Dictionaries,

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<sup>1</sup> E.g. <https://edofolks.com/words/index.htm>

<sup>2</sup> [www.hausadictionary.com](http://www.hausadictionary.com), [www.kamus.com.ng](http://www.kamus.com.ng)

<sup>3</sup> E.g. <https://glosbe.com/en/ibb>

<sup>4</sup> E.g. [www.igbotique.com](http://www.igbotique.com) (Audio supported), [www.igboguide.org/HT-vocabulary.html](http://www.igboguide.org/HT-vocabulary.html)

<sup>5</sup> E.g. [www.oyotunji.org/yoruba-dictionary.html](http://www.oyotunji.org/yoruba-dictionary.html) (perhaps the most comprehensive net-based Yorùbá dictionary), [www.lexilogos.com/english/yoruba\\_dictionary.html](http://www.lexilogos.com/english/yoruba_dictionary.html)

<https://livingdictionaries.app>). However, like most Nigerian languages, Ọrọ — the language of focus in this study — has no web-based dictionaries either on an independent website or as part of the collections of dictionaries on Living Dictionaries; it has no print dictionaries either, although Golden Ekpo is currently compiling one (Golden Ekpo, personal communication, December 27, 2022).

It is to this end that the present study aimed to create a talking bilingual dictionary of Ọrọ on the Living Dictionaries platform as a way of preserving and promoting the language as well as contributing to its development and standardization.

The specific objectives of this study are:

- i. To demonstrate a do-it-yourself approach for creating a talking dictionary on the Living Dictionaries portal
- ii. To create a bilingual Ọrọ-English dictionary of about 300 entries on the Living Dictionaries website
- iii. To include audio pronunciations from native speakers (rather than speech synthesis) for all entries
- iv. To include image illustrations for some of the entries, especially concrete nouns.

The present study is significant in a number of ways and for several reasons. For one, the dictionary created from it would be a useful resource in Ọrọ teaching and learning, especially for Ọrọ as a second language learners and Ọrọ people in diaspora who want their children to learn the language. Studies have confirmed that dictionaries in general are a helpful tool in vocabulary development of second language learners, and talking dictionaries, particularly the ones that provide recorded rather than synthesized pronunciations, can greatly help a learner to learn a new language’s pronunciations (Ezeh, Anyanwu, and Onunkwo, 2022; Somantri, Fitria, and Yusuf, 2021; Hakim, Aryati, and Kurniawan, 2020). Likewise, illustrated dictionaries have been found to aid meaning comprehension and “enhance information retrieval” for both young and adult learners of a language (Dziemianko, 2022, p. 218; Gangla-Birir, 2005). Second, it can serve and count as a descriptive output for the documentation and preservation of Ọrọ; and as an open and community-run dictionary, other users can expand the entries to include more Ọrọ lexical items. Moreover, this study can serve as a practical

guide for anyone who wishes to create a similar dictionary for any other language on the Living Dictionaries webpage.

Although there are other online platforms for dictionary creation, this present study was limited to Living Dictionaries. It is possible to include additional languages apart from English as target languages, but the scope of the study was to create a bilingual dictionary with Ọrọ as the source language and English as the target language.

### **1.1.1 Living Tongues Institute and living dictionaries**

The Living Tongues Institute for Endangered Languages is a nonprofit organization founded in 2005 by American linguist Gregory Anderson, with David Harrison as its research director. It is committed to documenting endangered languages around the world and training people on language documentation via webinars. One of the over 100 endangered languages which Living Tongues linguists have documented is Baan/Ogoi,<sup>6</sup> a Benue-Congo (Ogonoid) language spoken in Eleme Local Government Area of Rivers State.

Apart from documenting languages, Living Tongues also creates talking dictionaries for endangered languages. One of the over 80 dictionaries created by Living Tongues researchers is for Olùkùmi, a dialect of Yorùbá spoken by the Olukwumi, a people with Yorùbá ancestry living in Igbo-dominated Aniocha community of Delta State<sup>7</sup>; another is for Owé, a Yorùbá dialect spoken in Kwara State — both were spearheaded by Bolanle Arokoyo of the University of Ilorin. Launched in 2007, Living Dictionaries (<https://livingdictionaries.app>), an open access and community-run platform, is freely available for anyone (whether they are a Living Tongues researcher or not) to use and/or create dictionaries of any natural or constructed/invented languages. The dictionaries are mainly bilingual, with the native languages as source languages and English as the preferred and default target language, although it is possible to make a trilingual dictionary and select any other language, in addition to English, as the second target language. As at the time of writing this paper (December 23, 2022), just seven Nigerian languages (Ibibio, Igbo, Olùkùmi, Owé, Ọrọ, Tiv, and Yorùbá) were

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<sup>6</sup> See <https://livingtongues.org/eleme-baan/> and [www.eleme.org.uk](http://www.eleme.org.uk)

<sup>7</sup> See <http://talkingdictionary.swarthmore.edu/olukumi>

among the 147 dictionaries hosted on the platform. For the purpose of this study, the Oro Living Dictionary was created by the present researchers with support from the lead knowledge provider and other consultants.

### **The Ọrọ people and language**

The Ọrọ are a coastal people numbering about 415, 000 (according to 2006 national population census figures) and their homeland is in the southern Nigerian state of Akwa Ibom, where they occupy five local government areas — Oron, Mbo, Okobo, Udung Uko, and Urue Offong-Uruko. The Ọrọ are the third largest ethnic group in Akwa Ibom, after the neighbouring Ibibio and Anaan, with whom they share cultural practices and, according to a popular belief, ancestry as well, although some historical accounts claim that the Ọrọ are “a distinct group” with an ancestral link with the Bantu people in Cameroon (Uya, 1984). According to Uya, the Ọrọ together with their subgroups — the Ilue, Idua, Okobo, Efiat-Mbo, Ebughu, Enwang, and Ukpabang — migrated to their current location from Ramby, a region in the southwestern part of Cameroon between the 11th and 15th centuries. The traditional occupations of the people include fishing, farming, and boat building.

The Ọrọ language is a Lower Cross language in the Niger-Congo language family (Urua, 2004). The five local governments speak variants of the language which "are not just mutually intelligible but have no lexical or semantic difference except for Okobo", but the variety spoken in Oron is regarded as the Central or General Ọrọ (Ekpo, 2022, pp. 3-4). Compared to the neighbouring Ibibio and Efik languages, Ọrọ lacks extensive linguistic studies, particularly from a lexicographic point of view. Its orthography, which is used in this present study, was developed by Golden Ekpo, a linguist at the University of Uyo who has produced literary and academic works in/on the language. The Ọrọ Alphabet contains thirty-two letters:

Upper case:

A B D E Ɛ F G GB GH GW I J K KP KW L M N NW Ñ ÑY O Ọ P R S T U V W Y Z

Lower case:

a b d e Ɛ f g gb gh gw i j k kp kw l m n nw ñ ñy o ọ p r s t u v w y z

In terms of phonology, the phonemes of Ọrọ are forty-four (44): twenty-five (25) consonants and nineteen (19) vowels. The vowels are further divided into phonemic (7) and diphthongs (12).

Consonants: /p b t d k g kp gb k<sup>w</sup> g<sup>w</sup> l m n ɲ ɲ<sup>w</sup> f v s z ʎ ɟ r w j/

Phonemic vowels: /i u e ε ɔ o a/

Diphthongs: /ai ei ia ie ie̯ io oi ua ue uo uə/ (Ekpo, 2022)

### The vowels of Ọrọ

S/N	Orthographic Representation	Phonetic Representation	Example	Meaning
1.	a	[a]	ayak	fish
2.	e	[e]	eti	father
3.	ẹ	[ɛ]	ẹte	pepper
4.	i	[i]	iba	two
5.	o	[o]	oyo	child
6.	ọ	[ɔ]	ọbọk	monkey
7.	u	[u]	uku	leg

### The consonants of Ọrọ

S/N	Orthographic representation	Phonetic representation	Example	Meaning
1.	p	[p]	kep	see
2.	b	[b]	ibu	nose
3.	t	[t]	tei	sit
4.	d	[d]	dí	come
5.	k	[k]	oku	rat
6.	g	[g]	agañ	old

7.	kp	[kp]	kpa	die
8.	gb	[gb]	egbe	lion
9.	gh	[ɣ]	utighe	stone
10.	kw	[k <sup>w</sup> ]	ikwọ	song
11.	gw	[g <sup>w</sup> ]	ñgwa	beads
12.	ñw	[ŋ <sup>w</sup> ]	ñwe	drive
13.	f	[f]	fak	know
14.	v	[v]	ovu	you
15.	l	[l]	lọ	marry
16.	r	[r]	uruẹ	market
17.	j	[dʒ]	jañ	dribble
18.	z	[z]	uzei	crab
19.	w	[w]	awawa	green
20.	y	[j]	ayak	fish
21.	m	[m]	eme	egg
22.	n	[n]	nọ	give
23.	ñ	[ŋ]	afañ	path
24.	s	[s]	use	day

Ọrọ is a tonal language, consisting five phonemically distinctive tones:

High (ˊ) as in *dí* (come) — H

Low (ˋ) as in *kì* (one) — L

High-Low or Falling (^) as in *úfòñ* (feather) — HH-L or HF

Low-High or Rising (ˇ) as in *mọ* (see) — L-H or R

Downstepped (!) as in *ń/zí* (what) — HD (Ekpo, 2022).



## 2.1 Review and theoretical considerations

### 2.1.1 Review of related concepts

The dictionary is the most common kind of reference works, i.e. resources that contain useful facts and specially arranged information that are designed to be consulted rather than read from beginning to end, e.g. encyclopaedias, bibliographies, almanacs, directories, atlases, and handbooks. Many common definitions of a dictionary describe it as “a kind of reference book, usually a work devoted to the definition of words entered in alphabetic order” (McArthur, 2018, p. 306; also Uguru and Okeke, 2020, p. 525; Landau, 2001, p. 5). Tarp (2018, pp. 241-242) criticizes the inadequacy of such definitions for excluding modern digital dictionaries as well as dictionaries that have non-alphabetical arrangement. For not restricting dictionaries to printed and/or alphabetically ordered books, the definitions given by Burkhanov and Zgusta are preferred for the purpose of this study:

any reference work intended to provide linguistic information: pronunciation, spelling, lexical meaning, etymology, various aspects of usage and/or encyclopedic information: biographical, geographical and historical, scientific concepts and taxonomies, and so on.

(Burkhanov 1998, pp. 64–65)

a systematically arranged list of socialized linguistic forms compiled from the speech-habits of a given speech community and commented on by the author in such a way that the qualified reader understands the meaning . . . of each separate form, and is informed of the relevant facts concerning the function of this form in its community.

(Zgusta 1971, in Tarp, 2018, p. 242)

In terms of typology, dictionaries can be categorized into various classifications. Two broad categories are general/linguistic and specialized dictionaries. A general dictionary, otherwise known as general-purpose dictionary, presents a comprehensive description of the general vocabulary that is understood and accepted by all native speakers of a language, giving information on spelling, meaning, word class, idiomatic usage, collocation, etc. (Hartman and James, 2002; Burkhanov, 1998).

According to Hartman and James (p. 61), “though the general dictionary shares many features with the bilingual dictionary, ... it is typically monolingual”. We can therefore assert that Nigerian languages lack general dictionaries as no monolingual dictionaries have been compiled in any of them. A specialized dictionary or special purpose dictionary focuses on the vocabulary used in “restricted information, such as idioms or names, or on the language of a particular subject field, such as the jargon of the drug scene or the technical terms of mechanical engineering” (Hartman and James, p. 129); and it aims at “helping the user to acquire specialized knowledge, read specialized texts or engage in specialized translation” (Humbley, 2018, p. 346). Specialized dictionaries in Nigerian languages are few, mainly onomastic (giving meanings and/or pronunciations of native names); besides, they mostly exist in electronic format e.g. YorubaName<sup>8</sup> and MyIgboName<sup>9</sup>; apart from metalanguage books that provide native terms used in linguistics, language teaching and learning, and communication, there are no tangible specialized dictionaries of technical terms in Nigerian languages.

Dictionaries can also be classified based on the number of languages the lemmata/headwords (i.e. entry words) are translated into: monolingual, bilingual, trilingual, or multilingual. A monolingual dictionary presents the words of a language and explains them by means of that same language. Although there have been calls for monolingual dictionaries of Nigerian languages since the 1980s, linguists and lexicographers have yet to compile any (e.g. Ekundayo, 1982). A bilingual dictionary or translation dictionary uses two languages: the meanings or equivalents of words from one language (called the source/object language) are provided in another language (called the target language). Making bilingual dictionaries can pose some challenges which include lack of absolute lexical equivalents between languages, especially culture-bound words in a pair of languages that belong in different language families and cultures: some words in the source language may have no equivalents at all in the target language, or the equivalents may not be totally suitable (Gauton, 2008). Nonetheless, bilingual dictionaries are good for language learning and translation (Gauton, p. 116). Majority of dictionaries of Nigerian languages are bilingual and English is the typical target language.

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<sup>8</sup> <https://yorubaname.com> was founded by linguist Kola Olatunbosun and launched in 2016 as a project to document Yoruba names; it currently contains over 6000 entries. Its database is located at the University of Ibadan.

<sup>9</sup> <https://myigboname.com>

A trilingual dictionary relates the vocabularies of three languages together by translation equivalents while a multilingual dictionary contains several languages.

Another pair of classifications relevant in this study are illustrated and picture dictionaries. In a picture dictionary, vocabulary is exclusively depicted by illustrations such as diagrams, tables, charts, or maps. In an illustrated dictionary, in contrast, pictorial material is supplementary as illustrations are provided only for selected words or phrases (Hartman and James, p. 71). The current study creates an illustrated dictionary. Studies have confirmed that illustrated dictionaries enhance understanding of word meanings by language learners (e.g. Dziemianko, 2022; Gangla-Birir, 2005).

A further categorization is in terms of form — print and electronic dictionaries. A print or paper dictionary is the traditional dictionary that is produced in book form. An electronic dictionary is a dictionary whose data exist in digital form and can be accessed through a number of different media such as software, mobile apps, web applications, or a built-in function of e-reader (Nesi, 2009); or a dictionary which “utilises computers and associated technology to present information on-screen” (Hartman and James, p. 47). Nesi (2009) and Dziemianko (2018) recognize several subcategorizations of electronic dictionaries:

- A. handheld electronic dictionaries or pocket electronic dictionaries (PEDs)
- B. CD-ROM dictionaries, with disks to use with a desktop computer or a portable electronic book
- C. dictionary software for use on a desktop or laptop computer
- D. Mobile apps dictionaries, compatible with smartphones and tablets
- E. Online dictionaries

As at the time of this study, the researcher could not find any electronic dictionaries of Nigerian languages that have been created in the first two formats. Apart from Hausa, Igbo, and Yorùbá which are included in Microsoft Translator software for windows computers<sup>10</sup>, no other Nigerian language dictionary has been created or converted to the category C format. However, many Nigerian language dictionaries are available in the category D format, although some of them contain fewer than a

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<sup>10</sup> Available on <https://microsoft.com/en-us/p/hausa-dictionary> (for Hausa); <https://microsoft.com/en-us/p/english-to-igbo-translator> (for Igbo); <https://microsoft.com/en-us/p/yoruba-dictionary> (for Yorùbá)

thousand entries. Such dictionaries are available on Google Play Store and other platforms for downloading mobile apps, e.g. Itumo (for Yorùbá), Efik & Ibibio Names, Tete Efik Dictionary, English to Igbo Translator, English Hausa Dictionary, etc. (The dictionary listed here for each language was the one with most downloads among other dictionaries of the same language currently available on Google Play Store.) An online dictionary is a dictionary that is available on the Internet and accessed through a web browser on a computer or a mobile device. The Internet has revolutionized dictionary making; Nesi (p. 473) claims that as at 2005, English dictionaries on the Internet were 992. One of the revolutions that electronic technology has brought to dictionary-making is the talking dictionary.

The term “talking dictionary” was coined in 2004 by the Living Tongues’ Director of Research, David Harrison to refer to a device or program that provides spoken pronunciations of words in addition to word meaning and other normal information provided by conventional dictionaries (Mandis, 2020; Liden, 2022). The pronunciations of words in a talking dictionary can be speech synthesis (i.e. artificial production by computer) or recording (i.e. real human production usually by a native speaker). Liden notes that the most common use for a talking dictionary is language education and that a talking dictionary, “particularly one that provides recorded rather than synthesized pronunciations, can greatly help a learner to learn a new language’s pronunciation”.

The heavy deployment of technology in modern dictionaries has led to the emergence of a new subfield of lexicography called electronic lexicography, which is concerned with the use of computer and its tools in the planning, writing, creation, and dissemination of dictionaries (Granger and Paquot, 2012). However, the electronic medium has not been adequately utilized for creation of dictionaries of Nigerian languages. In response to the low presence of African language dictionaries in digital formats, scholars have expressed their “disappointment in respect to the pace of development of electronic dictionaries and non-utilization or under-utilization of innovative technology” (Prinsloo, Prinsloo, and Prinsloo, 2018, p. 487).

To create a dictionary, data (i.e. words) can be collected from personal lexicon (word stock), by using one’s knowledge of the language if one is a native or competent user of the language — this technique is called introspection. Another method is informant-testing, which involves consulting some speakers of the language and asking them what certain words mean in their language. Both

introspection and informant-testing and referred to as subjective evidence in lexicography. Lexicographic data can also be collected through observation of how people actually use words in authentic communicative situations or events, or through citation, by citing how the words are used by writers or speakers of the language. Both observation and citation are referred to as objective evidence in lexicography (Willie, 2017).

### **2.1.2 Theoretical considerations**

The framework adopted for this study is compiling dictionaries of endangered languages, proposed by Kenneth Rehg (2018) as a model of dictionary design for endangered languages. This is not a theory per se, but a practical guide to dictionary compilation for low-resource languages. It spans five steps or phases: research, preliminary planning, design and construction, distribution and support, and legal and ethical issues. Rehg notes that “dictionaries ... integrate nearly all of the major fields of linguistics, providing information about orthography (through spellings), phonology (in the form of pronunciation guides), morphosyntax (by providing parts of speech labels), inflectional morphology (for example, *walked*, *walking*, *walks*), derivational morphology (*walker*), semantics (in the form of one or more definitions), sociolinguistics (for example, by specifying levels of usage), historical linguistics (in the form of etymologies), and more.” Rehg therefore suggests that it is necessary for a dictionary compiler to familiarize themselves with all these areas of the language in question by conducting basic and applied research.

Planning involves determining “what kind of a dictionary you are going to build, how you are going to do it, and what it will contain”; other considerations here include who the dictionary is meant for (i.e. the audience or users), what scope to adopt (e.g. thematic, corpus-based, or general-purpose), what tools to use (e.g. FLEx, Toolbox, etc), how the project is going to be funded, as well as how the final product will be distributed (Rehg, pp. 308-313). Dictionary design and construction involves the kind of dictionary one wants to build (e.g. monolingual or bilingual), its macrostructure (i.e. arrangement of headwords in alphabetical or thematic order), and its microstructure (i.e. internal composition such as headwords, alternate spellings, pronunciations, usage labels, parts of speech, etymologies, semantic domains, etc). Distribution and support includes archiving (backing up data files), field testing (testing the dictionary while on the field), and publishing (placing the dictionary

in the hands of the general public via hard copies, CDs or DVDs, cell phones, a web-based version, or some combination of the above). Finally, legal and ethical issues involve determining copyright or ownership and making sure that “your work reflects, or at least does not violate, the values of the community in which you are working” (p. 324).

Applying these guidelines, the present study fills a gap in Ọrọ language studies and education, particularly in providing an electronic dictionary, which hitherto was nonexistent for the language.

### **3.1 Research methodology**

The study was designed to take place both online and offline. The platform on which the dictionary was created is on the Internet while the data serving as entries for the dictionary had to be collected from native speakers. For this purpose, the researcher had to open a new dictionary page on Living Dictionaries portal and also had to go for data collection. The relevant data were then uploaded onto the dedicated dictionary’s URL (universal resource locator) page, which is <http://livingdictionaries.app/oron/entries/list>.

The method adopted for the research is descriptive, an approach which identifies and describes events such as language usage as they naturally occur without any manipulations of data. This method was chosen because the information to be collected was primarily linguistic, one of the kinds of data which this research method is principally applied to.

The 2006 population census figure gives the Oron population as 415,935 people. It would be rather unrealistic to consult each of the over 400,000 indigenes. Thus, the study combined and modified purposive and snowball sampling methods. In a purposive sampling, the researcher uses their expertise to select a sample or consultant that is most useful for the purpose of the research. As the researcher is not an Oron indigene or a native speaker of the Ọrọ language, I consulted Dr Golden Ekpo, whom I know as a native of Oron and an authority linguist on the Ọrọ language. In a snowball sampling, an existing sample or consultant provides referrals to recruit other samples or consultants required for a research study. In this case, the existing consultant recommended two other native and competent speakers of Ọrọ who were then used as co-consultants for the study. The co-consultants were Ms Victoria Idung and Ms Patience Christopher Udofia (both were university students and were

in their late twenties). The lexicographic technique of informant-testing was adopted: data (i.e. entries and example sentences) were elicited from the consultants.

The main technique used to collect information from consultants was elicitation. Elicitation is a kind of data collection method in which knowledge/information is sought directly from human beings rather than from written or other sources.

The elicited words were sourced from the Swadesh Wordlist, a collection of words common to and existing in all languages as opposed to borrowed vocabulary items. There are various versions of the wordlist, but the one chosen for this study is the modified version by the Nigerian Language Project. This version was chosen for two reasons. One, unlike some other versions which are arranged in alphabetical order, this is arranged according to semantic domains. And more importantly, some items in the list have been modified to suit Nigerian languages. There are 108 lexical items in the list. However, the aim of the study was to include up to 300 words in the dictionary; therefore, some other words which are not in the Swadesh List were included. Another modification to the questionnaire was that the researcher provided example sentences for a number of entries, which the consultants had to translate from English to Oṛọ. Words collected were from various semantic domains such as body parts, universe and the natural world, animals, kinship and relationships, numerals, colours, and daily life; and they span parts of speech such as nouns, verbs, adjectives, pronouns, prepositions, adverbs, numerals etc.

Both survey and electronic tools were used for data collection and processing. The survey tool used was the Swadesh Wordlist (see 3.1.4). The electronic tools utilized were Wavepad, Semdom, and Living Dictionaries web portal. Wavepad is a mobile app digital audio recorder; this came in handy as the researcher could not afford a digital recorder gadget. Semdom<sup>11</sup>, SIL International's website for semantic domains was consulted to ascertain semantic domains of some words. Living Dictionaries portal (<https://livingdictionaries.app>) is where the elicited data were deposited and processed into a talking and illustrated dictionary.

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<sup>11</sup> <https://semdom.org>. The website contains a list of about 1800 semantic domains.

## 4. Data Presentation, Results, and Discussion of Findings

### 4.1 Creating a User Account on Living Dictionaries

Before one can create a dictionary on Living Dictionaries, it is important, though not necessary if one chooses to be anonymous, to first create a personal account. The first step is to log on to <https://livingdictionaries.app>, then sign up with one's email address. A confirmation message will be sent to the email address which, when clicked, redirects one to the newly created account on the portal.

### 4.2 Creating a New Dictionary on Living Dictionaries Portal

After creating an account and logging in to it, one can then click on the **create a new dictionary** icon and fill out the necessary information, such as the name of the language for which one wants to create a dictionary, its alternative name, location of its users, etc.

#### 4.2.1 Language Metadata: Required Information about the Language

##### i. Dictionary Name

This is the slot to input the name of the dictionary's source language, which in this case is "Oro". Oro rather than Orọ was chosen for a couple of reasons. One, the recognized spelling by ISO 639 and Glottocode language identification systems is Oro. Two, Living Dictionaries platform is not well responsive to accents, diacritics, and special characters as part of a dictionary name. (For instance, when the researcher reported a difficulty encountered in uploading images on a private Yorùbá dictionary earlier created on the platform, the portal's Program Director, Anna Daigneault, suggested that the error occurred because accents were used on the language's name.) The designated URL for the present dictionary is <http://livingdictionaries.app/oron/entries/list>.



## ii. Make the dictionary available in a target language

This is another piece of information to provide. Here, the dictionary creator is expected to select the target language(s). English is the default target language on the portal, but other languages can also be chosen in addition to English. The scope of the present study was a bilingual Ọrọ-English dictionary; hence no other target language was picked.

## iii. Alternate names

In case the source language is known by other names, these names are to be inserted in the **Alternate Names** box. This information is useful in cases when someone searches for the dictionary using any of the other names instead of the one the creator uses. Two alternate names were provided for the dictionary: “Ọrọ” and “Oron”. “Ọrọ” is an endonym, the name by which the Ọrọ people refer to themselves and their language; “Oron” is an exonym, the name by which non-Ọrọ people call the Ọrọ people and their language.

## iii. ISO 639-3

This is optional information. ISO 639 is a set of standards by the International Organization for Standardization for representing names of languages and language groups. This labels each language with a two-letter (639-1) and three-letter (639-2 and 639-3) lowercase abbreviation. For example, ISO 639-1 code for Igbo is *ig* and its ISO 639-3 code is *ibo*. Although some languages have no ISO 639-1 code (e.g. Ibibio, Ọrọ), each language is assigned an ISO 639-3 code (that of Ibibio is *ibb*). This, perhaps, accounts for why the platform requires only the ISO 639-3 code, and the ISO 639-3 code for Ọrọ is *orx*. The ISO 639 of all languages are available on the website of the Summer Institute of Linguistics (SIL) International.<sup>12</sup>

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<sup>12</sup> <https://iso639-3.sil.org>

#### iv. Glottocode

This is another optional piece of metadata about the language. A glottocode is a unique and stable identifier for each languoid (i.e. language family), language, and dialect. Glottocodes complement three-letter ISO 639-3 language identification codes, but unlike ISO 639 which applies only to language families and individual languages, glottocodes cover dialects as well. The requirement for a glottocode is an indication that Living Dictionaries is not restricted to languages; it is equally receptive to dialects. A glottocode consists of four alphanumeric characters (i.e. lowercase letters and numbers). The glottocode for Ọrọ is *oroo1241*. A comprehensive catalogue of the world's languages, language families, and dialects with their glottocodes is available on the Glottolog website<sup>13</sup>.

#### v. Where is this language spoken?

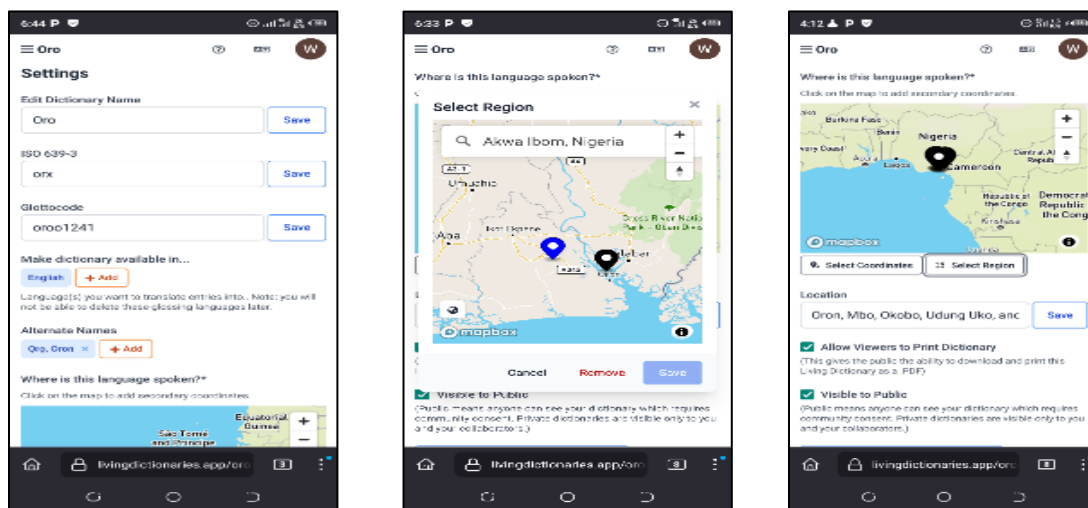
This is another piece of information to include. The speech community can be specified in two ways: location and primary coordinates/secondary coordinates. **Location** dialogue box is for inputting the names of communities where the source language for the dictionary is spoken, especially as a mother tongue or native language. **Primary** and **secondary coordinates** are the locations of the speech community which can be selected on a web-embedded digital map. These features were difficult to load on a mobile web browser; they responded better on a PC browser. For location, the researcher inserted the five local government areas, state, and country where Ọrọ is primarily spoken: Oron, Mbo, Okobo, Udung Uko, and Urue Offong-Uruko Local Government Areas of Akwa Ibom State, Nigeria. On the embedded digital map, Oron and Akwa Ibom were selected as the primary and secondary coordinates.

Other information required includes a brief description of the language, the kind of language (spoken, sign, or constructed), and permission from the speech community, each of which the researcher provided for the present dictionary.

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<sup>13</sup> <https://glottolog.org/glottology/language>

## Language metadata



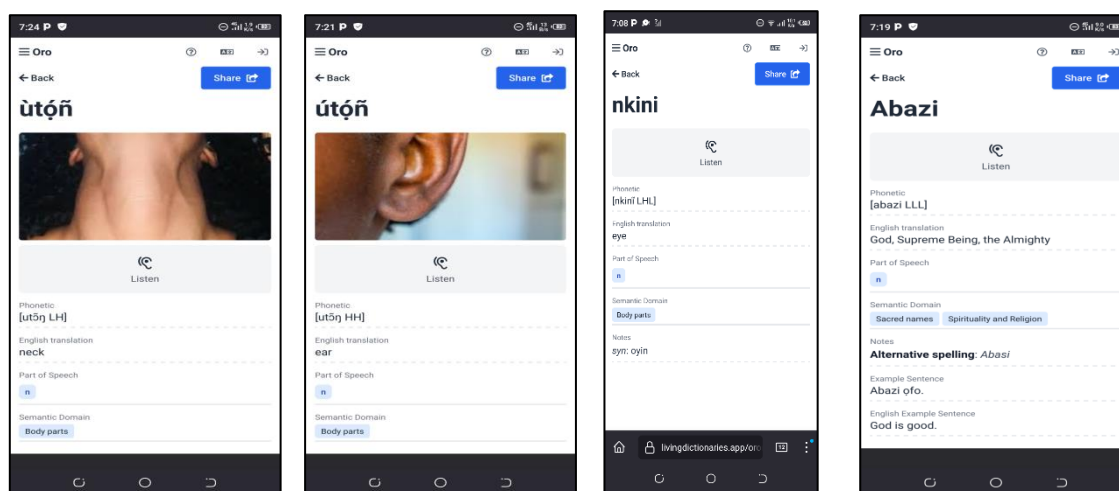
### 4.2.2 Making entries

Inputting entries in the created dictionary is perhaps the most important and the most informative phase. Here, the dictionary creator is expected to enter a headword from the source language, provide its English equivalent(s) or meaning(s), its spoken pronunciation, its phonetic transcription, its word class, its semantic domain, an example sentence, a note, etc.

#### i. The headword

To input a headword, the **Entry** icon was clicked. The entries were made using the Ọrọ orthography devised by Golden Ekpo, an adaptation of the Latin alphabet which contains some letters that do not occur in the English alphabet (e.g. ẹ, ñ, ọ). As the English alphabet is inadequate for writing Ọrọ and there was no Ọrọ keyboard yet, the researcher had to use a combination of Ibibio and Igbo Google keyboards to type such diacritic-inflected letters; Ọrọ shares a similar alphabet with Ibibio and Igbo. A number of headwords were tone-marked, especially, but not limited to, words that share the same spellings but different tones and meanings (e.g. útọń {ear} and ùtọń {neck}). There were some words with alternative spellings but same meaning, e.g. Abazi/Abasi (God); to incorporate such words in a

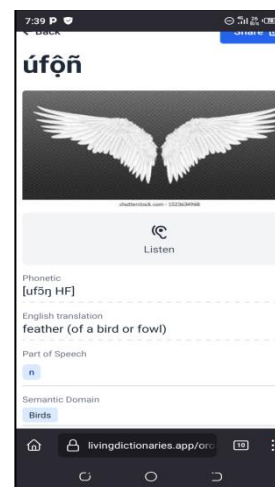
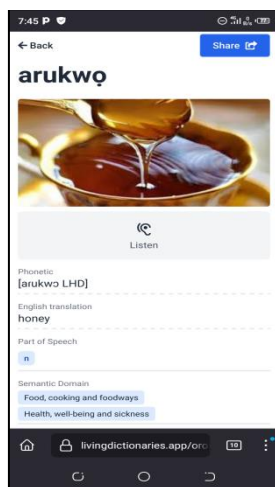
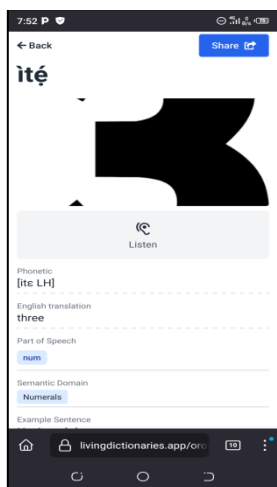
single entry, the researcher made a request to the portal’s technical crew to include an **Alternative spelling** dialogue box which was not part of the original dictionary template on the portal. The request was granted, thanks to Anna Daigneault and Living Tongues’ technical crew. Another kind of variants are words with same meaning but entirely different spellings and pronunciations; these are regarded as synonyms and thus given different entries (e.g. *nkini* and *oyin*, both of which mean ‘eye’). In the first case, variant spellings of words were inserted in the provided **Alternative Spellings** box. In the other case, synonym were inserted in **Notes** box.



## ii. Phonetic transcription

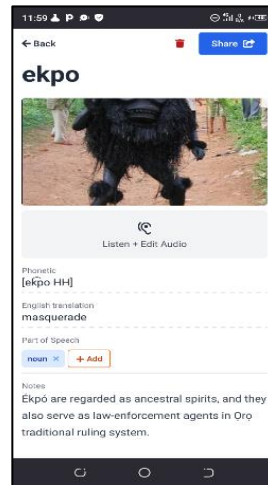
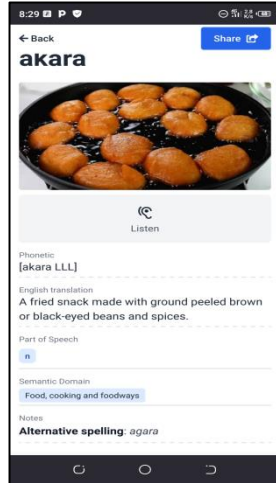
There is provision for phonetic transcription for each headword using the International Phonetic Alphabet (IPA), which is already embedded on the portal. It is, however, not mandatory to provide the phonetic transcriptions of any or all entries; Living Dictionaries is not exclusive to linguists, it is equally open to non-linguists who may possess little or no knowledge of the IPA or phonetic transcriptions. Entries in the dictionary were transcribed, following the Urua tone set pattern of not placing tone marks on transcriptions but signaling them with letters: H (high), L (low), F (falling or high-low), D (downstepped), and R (rising or low-high) (Eno-Abasi Urua, Moses Ekpeyong, and

Dafydd Gibbon, 2004, p. 4). However, the diacritic tilde (~) was placed on nasalized vowels. Examples: ìtẹ́ [itɛ LH], arukwọ́ [arukwɔ́ LHD], úfọ̀n̄ [ufɔ̀n̄ HF].



### iii. English translation

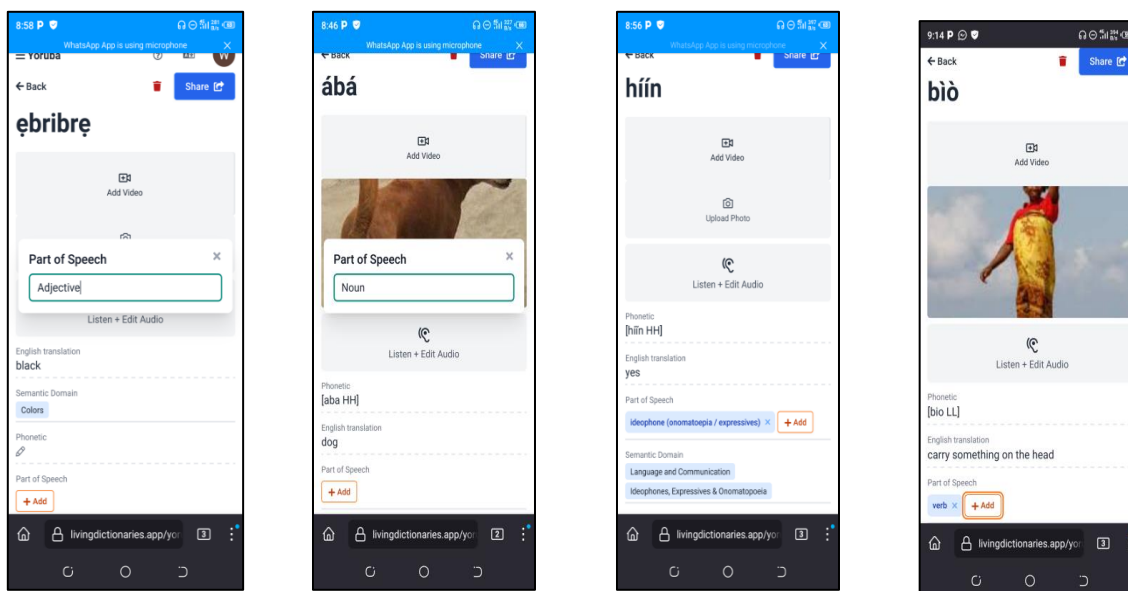
The Ọ̀rọ̀ dictionary created is bilingual, having English as its target language. Therefore, all the entries were translated into English. A couple of challenges were encountered in the course of translating a few of the headwords. First, there were some lexical gaps, i.e. some Ọ̀rọ̀ words do not have one-to-one equivalents in English, particularly culture-bound words denoting native foods, plants, animals, practices/beliefs, etc. In such a situation, a sentence-length definition was provided in English to explain what the headword means and/or how it is used in the language. An example of these lexical gaps is *akara* alternatively known as *agara* (a fried snack made with ground peeled brown or black-eyed beans and spices). Second, the English equivalents of some Ọ̀rọ̀ words are rather inadequate, not totally suitable to capture the nuances of their local meanings. In this case, notes indicating the meaning nuances were provided for such words, e.g. *ekpo* (masquerade).



#### iv. Parts of speech

A number of parts of speech are already installed on the portal as a plugin, an automatic list from which a dictionary maker can select the parts of speech that match a given headword. Appropriate parts of speech were selected for all entries in the dictionary.

## Sample entries with parts of speech

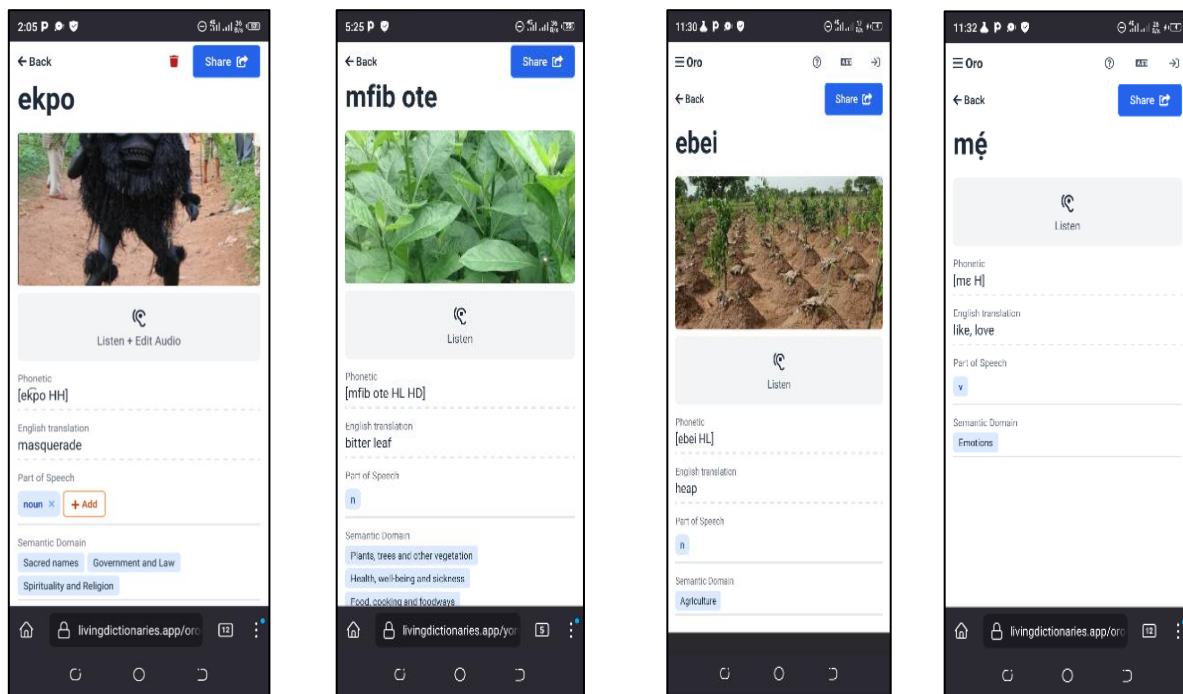


## v. Semantic domain

A semantic domain (also called semantic field) is a set of words that can be grouped together because they share a related meaning. For example, *eye*, *nose*, *ear*, *head*, *leg*, *hand* and *neck* can be grouped together as a semantic domain called **body part**. There is a plugin on the website to select one or more semantic domains for a headword. Almost all the entries in the dictionary were assigned appropriate semantic domains. Semantic domains give further clarifications to word meaning, especially culture-specific words. For example, *Sacred names* and *Government/Law* and *Spirituality/Religion* which were the semantic domains selected for *ekpo* will give a user of the dictionary a better understanding that the Ọrọ masquerade is quite different from the American/European kind of masquerade, whose semantic domain would be *Fashion*. Similarly, categorizing a variety of bitter leaf called *mfib ote* (*Lasianthera africana*) under *Plants/tree/vegetation*, *Food/cooking/foodways*, and *Health/well-being/sickness* gives a hint that the plant serves both as food and medicine to the Ọrọ people who use its leaves to prepare one of their most popular soups and to treat neurological diseases (Nwanna, Oyeleye, and Oboh, 2020). The SIL

International’s resource website for semantic domains (<https://semdom.org>) was consulted in order to check the semantic domains for some words.

### Sample Entries with Semantic Domains

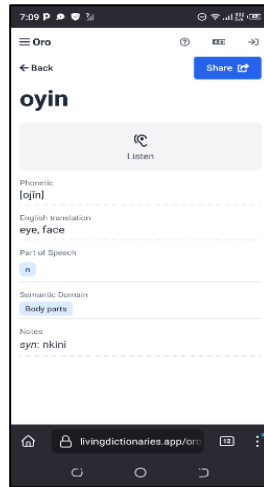
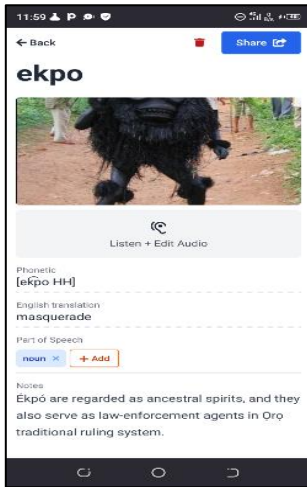


### vi. Notes

Each entry has a **notes** dialogue box or slot where the dictionary author can insert extra comments about the headword, its meaning, its usage, etc. This feature goes in line with Zgusta’s definition of a dictionary as a collection of “linguistic forms compiled from the speech-habits of a given speech community and *commented on by the author in such a way that the qualified reader understands the meaning*” (cited in Tarp, 2018, p.242; emphasis by the present researcher). The researcher made use of this dialogue box to insert culture-specific information like that of Ékpó’s sacredness for the purpose of non-Ọ̀rọ̀ users. Ékpó in this dictionary is loosely translated *masquerade*; whereas Wiki Dictionary defines *masquerade* as “a party of people wearing masks and amusing themselves”, but in the Ọ̀rọ̀ culture, Ékpó are sacred and are not primarily meant for fashion or amusement.



## Sample Entries with Notes

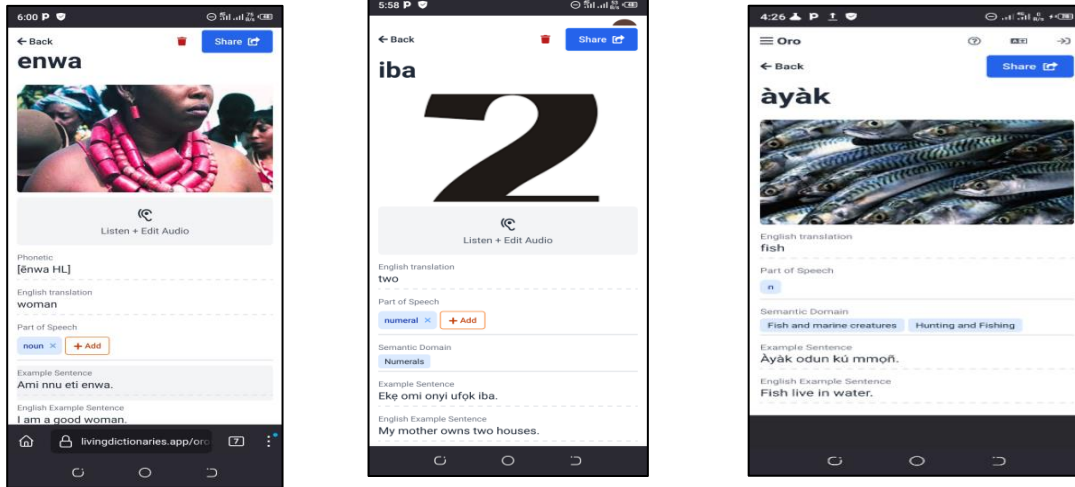


### vii. Example sentence

The **Example Sentence** dialogue box is meant for providing a sentence that shows how a headword is used in the source language. An example sentence was provided for many headwords in the dictionary.

### viii. English example sentence

This is the space for the English translation of the example sentence. All example sentences in the dictionary were rendered into English.

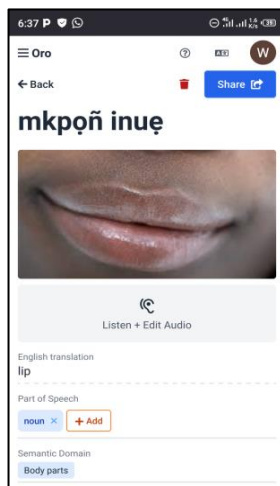
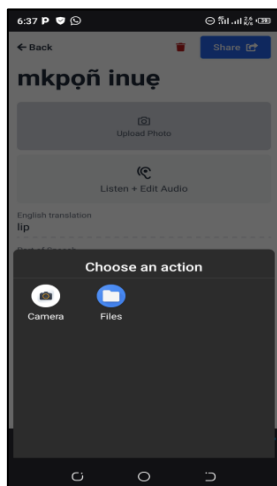


Other dataset information for a headword in a Living Dictionary includes its noun class, morphology, plural form, and interlinear gloss of the example sentence. However, I left out all this information in the Ọrọ dictionary created for this study.

### 4.2.3 Illustrating entries

An image can be added to illustrate a headword on Living Dictionaries. The button to click for this purpose is **Add image**. There are two ways to upload an image: using one's device camera to snap the entity to be uploaded, or selecting an already snapped or downloaded image on one's device. The latter option was employed for this study. All the images used were open-access pictures downloaded online, with preference for those that would be applicable to the speech community. For instance, the varieties of masquerade images on the Internet differ from culture to culture — European masquerades, Yorùbá Egúngún masquerades, Ibìbio/Ọrọ Ékpó masquerades, etc. An Ibìbio/Ọrọ Ékpó

picture, which depicts a typical *Orọ́ Èkpo*, was chosen to illustrate the *ekpo* entry. Also, to illustrate *mkpoñ inue* (lip), I selected a picture of an African's lips rather than that of a non-African.

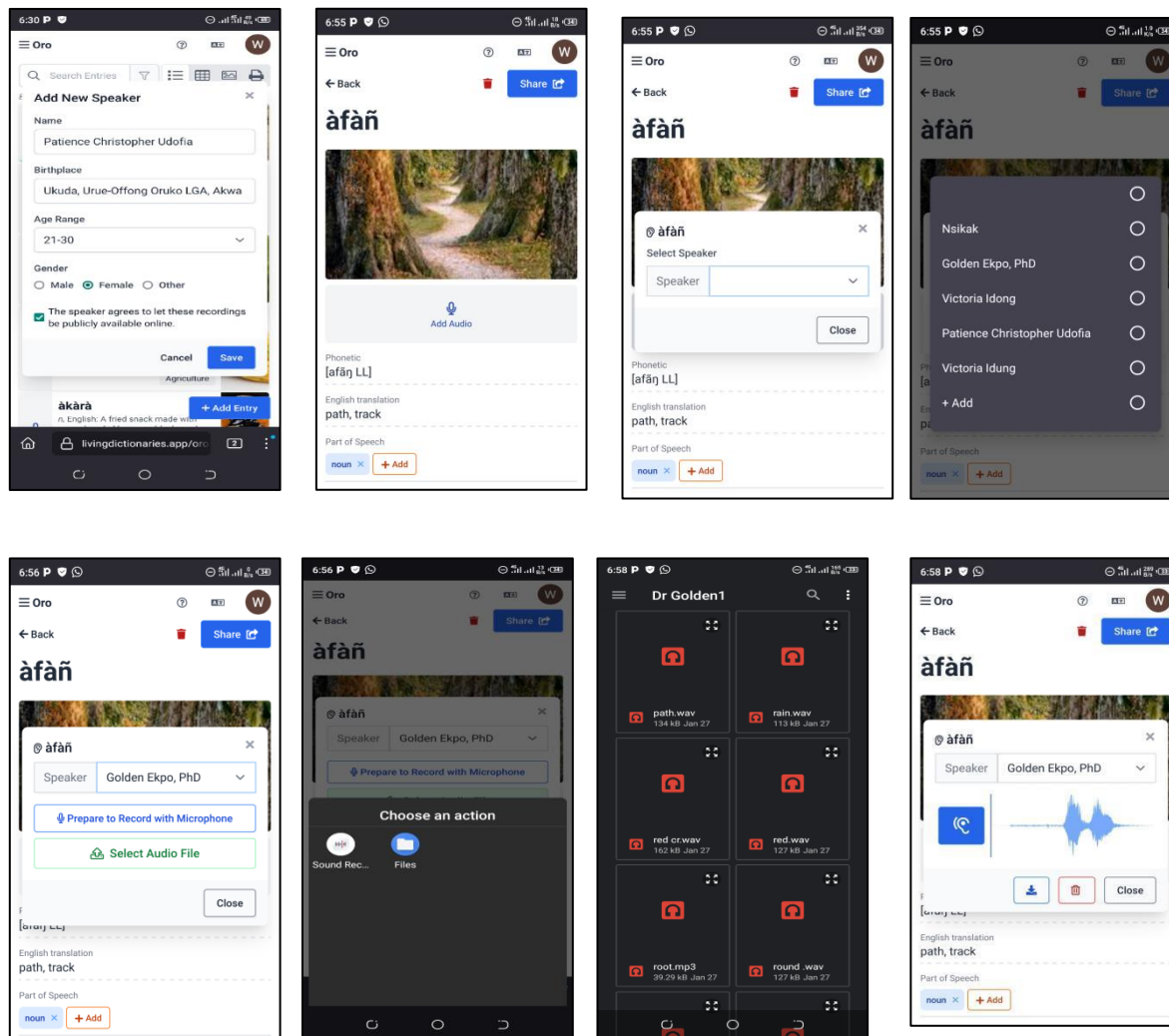


#### 4.2.4 Making the dictionary talk

The **Add Audio** icon below the headword is meant for inputting an audio pronunciation for the headword. It is essential to supply a metadata about the speaker who pronounces the word, such as their name, birthplace, age range, gender, and consent.

There are two ways to upload an audio: recording the speaker directly via the portal by clicking **Prepare to Record with Microphone** button, or uploading an already recorded audio file saved on one's device by clicking **Select Audio File**. The latter option was employed for this study. Wavepad had been used to record each headword from the consultants; this digital recording application was used because its recordings can be saved in .WAV (Waveform Audio File Format), the preferred format for storing uncompressed audio recordings in language studies. Audio pronunciation is one unique feature and advantage that distinguishes an electronic dictionary from its print counterpart. Print dictionaries usually provide pronunciation guide for words through phonemic transcriptions using IPA, which may look esoteric to language learners and general users. In contrast, audio pronunciations by a language's native speakers is natural and more effective for learners of the

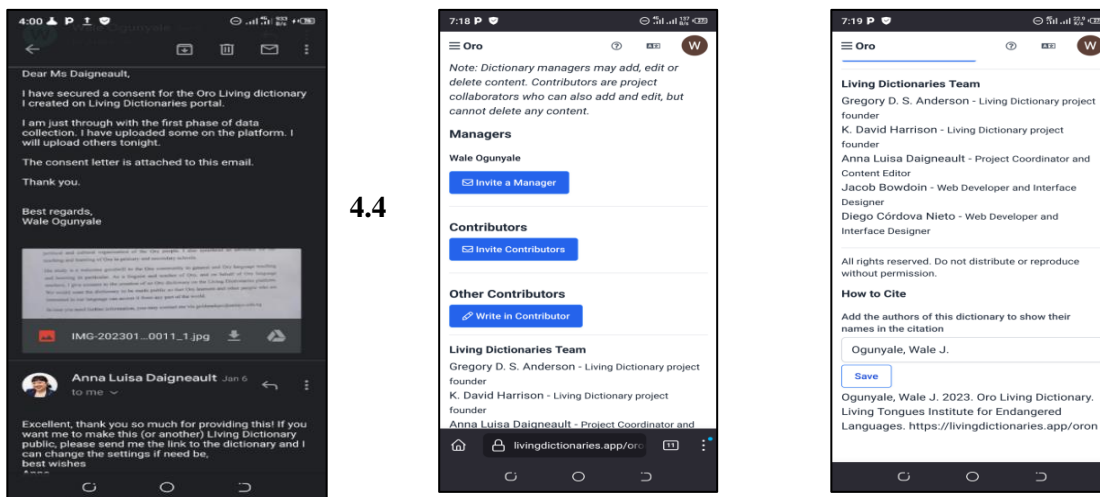
language to grasp the correct pronunciations of words. The consultants who provided the audio pronunciations for this dictionary spoke the Oron variety, which is considered General or Standard Oro.



### 4.3 Ethical and copyright issues

Informed consent was sought from the consultants and it was granted in both oral and written forms. The consultants were informed about the purpose of the dictionary and the fact that their voices and names would be made available to the public on the dictionary's URL page. Through the principal

consultant, Dr Golden Ekpo, an informed consent was secured from the Ọrọ Advancement Society, the body promoting Ọrọ studies and standardization. For authorship, the researcher was recognized as the author of the dictionary. This information can be added by clicking **Contributors** key.

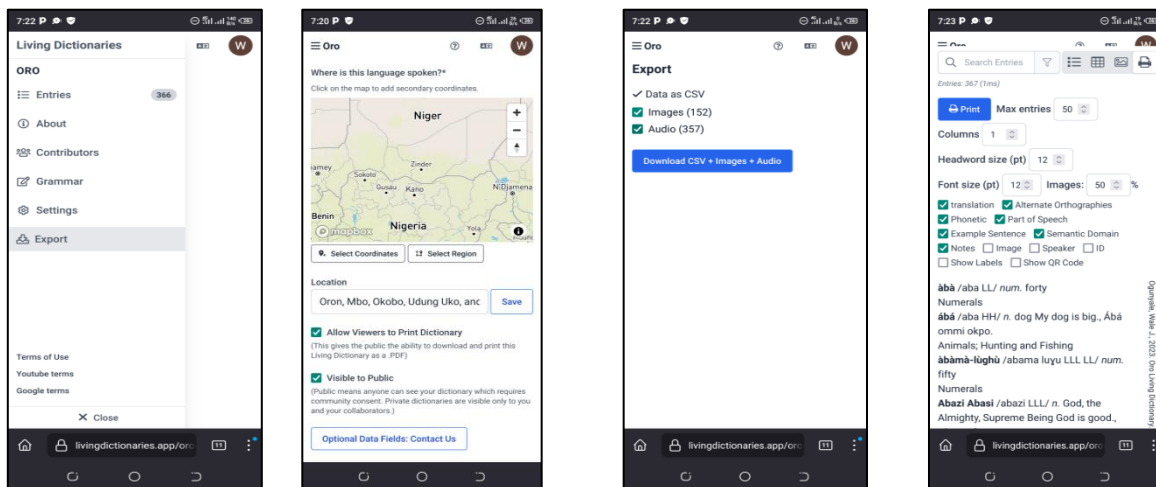


## Distribution and support

A created dictionary remains private and no other person apart from the creator would have the permission to view its content. To make a dictionary visible to public, the dictionary creator needs a proof of approval or consent for creating the dictionary from the language stakeholders, such as community leaders and/or language teachers (Anna Daigneault, personal communication, December 28, 2022). After confirming the consent letter secured for this study, the portal's Program Director made the dictionary available for public access. Therefore, the dictionary is readily available for public view. Besides, the researcher and author gave permission for the dictionary user to download an entry or the whole entries in PDF. This option is available under **Settings**.

Apart from the fact that an entry or the whole entries can be converted to PDF and printed in book form, another distribution feature for Living Dictionaries is that the entries can be exported with both images and audio pronunciation files in .csv format to a Microsoft Access database, although this aspect is not covered in this study. The icon to click for achieving this is **Export**.

## Permission, Distribution and Support



## 4.5 Research Findings

1. The major finding of this study is that in this electronic age, it is easy and relatively free for both linguists and language communities to create online-based dictionaries especially for endangered or low-resource languages on Living Dictionaries platform. In fact, much of this can be carried out on a smartphone.

2. It is also found that entries in a Living Dictionary can be published in book form by using the print function on the portal. Thus, self-publishing is possible in case a researcher or dictionary creator wants to provide a hardcopy of their dictionary to the speech community that lacks Internet connection, or even when they intend to sell their dictionary in print form.

## 5.1 Conclusion and Recommendation

This study was an exercise in an emerging field of lexicography called electronic lexicography. It demonstrates that Living Dictionaries are a set of free tools at the disposal of trained linguists and language communities for documenting the lexical resources of a language, preferably an

understudied one. The online dictionary or its print output can serve as a useful instructional material for the teaching and learning of Ọrọ.

We recommend that linguists and other individuals working on endangered or low-resource languages make use of Living Dictionaries for their dictionary compilations.

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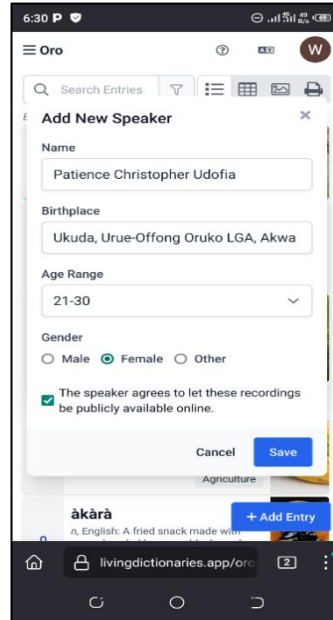
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# Appendix

## Dataset



## Speaker metadata



## Speakers/Consultants

