

## ASSESSING THE DIGITAL REPOSITORY: HOLISTIC EVALUATION OF A LANGUAGE DOCUMENTATION TECHNOLOGY

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### Abstract

The digital repository is a component of language documentation which is of increasing importance. At the same time, it is a relatively new technology. Digital repositories serve to protect the linguistic (and, at the same time, cultural) resources of a community, often for both scientific inquiry and local use, and usually long into the future. This work is a broad, critical assessment of the digital repository as a technology. This is carried out by proceeding through a set of questions which are designed to be applicable to any technology. Through this question-asking exercise, the digital repository is examined from social, moral, ethical, practical, vocational, metaphysical, political, aesthetic, and ecological angles. What emerges are major themes including the incommensurability of archived materials with the language itself, the critical role accessibility of the archived materials plays in making digital repositories better technology overall, and the fact that the effects of the digital repositories are largely unknown and, to some extent, unknowable. Finally, actions which the linguist may take in response to what has been learned are listed.

**Keywords:** Digital repository, Holistic, Documentation, Technology



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## INTRODUCTION

This paper has three main sections. Section 1 establishes some of the basic concepts for the rest of the work. Section 2 responds to the 76 questions. Section 3 provides summary thoughts and conclusions.

This section, section 1, introduces some of the concepts which will be used heavily throughout this work. Section 1.1 conceptualises the archive, the digital repositories, and the archived materials, as well as provides examples of each. Section 1.2 contextualises the author and provides some information on relevant positionality. Section 1.3 give some basic information of the speech communities which will feature in the work.

## METHODOLOGY

This work is carried out by proceeding through a set of questions which are designed to be applicable to any technology.

## RESULT AND DISCUSSION

### 1.1 Archives, Digital Repositories, and Archived Materials: Establishing Terms

An increasingly important feature of documentary approaches to linguistics is the digital repository. As part of the language documentation process, the materials generated are archived and made available in a digital format. These digital materials are ideally substantial, created with as wide a range of uses as possible in mind, and entrusted to a recognised archive which will ensure their continued availability across a long period of time (Himmelmann 2006).

In this discussion, three entities can already be distinguished: the archive, the digital repository, and the archived materials. This work will focus specifically on the digital repository, but because the archive and the archived materials will feature frequently in the discussion, it is worth now providing a word on all three.

The archive is an intentionally designed receptacle, supported by a trusted institution, whose job it is to preserve the resources entrusted to them. Archives are typically professional organisations recognised within their respective fields (all the archives mentioned here are members of the Digital Endangered Languages and Musics Archives Network (DELAMAN)<sup>1</sup>), and employ specially trained experts. They are, emphatically, not shoeboxes in one's attic, labelled hard drives stored in drawers, or Facebook pages and YouTube channels. Examples of digital archives for language and cultural materials include The Language Archive<sup>2</sup>, the Pacific and Regional Archive for Digital Sources in Endangered Cultures (PARADISEC)<sup>3</sup>, and the archive which will be spoken about most here, the Endangered Languages Archive (ELAR)<sup>4</sup>.

The digital repository refers to groups of resources which are considered the same in some way, and functions as a more-or-less coherent whole. The Language Archive, PARADISEC, and ELAR all refer to these digital repositories as "collections", but other archives refer to them by different names. The Pangloss archive<sup>5</sup> calls them "corpora", for example. A digital repository may cohere around a geographical location, such as van Schie's (2018) recordings from the Bird's Head Peninsula of New Guinea. A digital repository may cohere around the collector of the materials, such as the legacy documentation of Soo and Nyangi from John M. Weatherby's field notes and audio recordings (Beer (forthcoming), see also Beer (2021)). Perhaps most commonly, a digital repository may cohere around the speech community whose voices and images it contains, such as Choguita Rarámuri description and documentation (Caballero, 2015 and 2017).

Digital repositories are composed of the materials archived within them. These are limited only by what can be stored in a digital format, and audiovisual materials feature prominently. This can include photos, such as the .jpg file of the sunrise looking east in Phedi form Datshering's house in Gawne (2016 and 2018) videos, such as the .mp4 file that forms part of Saksak Batokon telling the history of the slit-drums of Ambrym and how they became to be carved with faces on them in Franjieh (2018, see also (2019)); as well as audio recordings, such as the .wav file that forms part of Raphael Olope talking about games children play in Salffner (2014 and 2015)). Written resources are also present in most digital repositories, such as the .pdf file

<sup>1</sup> <<https://www.delaman.org/>>

<sup>2</sup> <<https://archive.mpi.nl/tla/>>

<sup>3</sup> <<https://www.paradisec.org.au/>>

<sup>4</sup> <<https://www.elararchive.org/>>

<sup>5</sup> <<https://pangloss.cnrs.fr/?lang=en>>

of the Asimjeeg Datooga - English - Swahili dictionary in Griscom (2018), or the .xml ELAN file of a customary court deliberation in Dissake (2021).

Schematically, the archive, the digital repositories, and the archived materials can be represented as in Figure 1 below, with the examples used being the digital repositories that will form the cases from which this work will proceed.

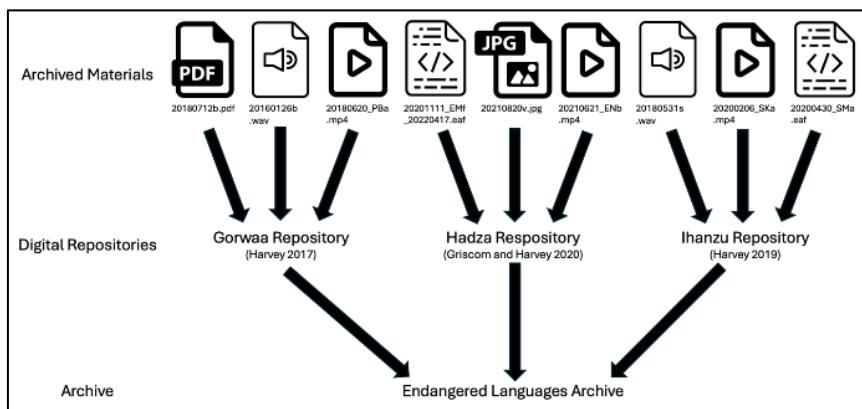


Figure 1: The archive, the digital repositories, and the archived materials

## 1.2 The Author: Positional Contexts

My specific experience with digital repositories is related to the collection, creation, and ongoing maintenance and use of three digital repositories with ELAR. Each of the three digital repositories correspond to a language community, or linguaculture (Cameka & Amha, 2022) of north-central Tanzania: Gorwaa (Harvey 2017), Hadza (Griscom & Harvey 2020), and Ihanzu (Harvey 2019a). It will be largely from this experience that I will draw in this work.

In terms of a timeline, I began working with the Gorwaa speaker community during MA studies at the University of Dar es Salaam, during which I began making recordings of the language as part of my dissertation. The documentary paradigm in which I worked was largely traditional, influenced by the discourse popular at the time (Crystal 2000, Bowern 2008, Mosel 2006). PhD studies at SOAS, University of London, also focused on Gorwaa, and in 2015 I received a grant from ELAR sister programme ELDP (Endangered Languages Documentation Project) to conduct more concerted language documentation with the Gorwaa community [IGS0285 July 2015-September 2018]. It was at this point that I began archiving Gorwaa language materials with ELAR. In 2018, I received a Firebird Fellowship from the Firebird Foundation for Anthropological Research which provided funding to train Gorwaa-speakers to conduct language documentation themselves, an approach influenced by the The Fogo Process (Lunch & Lunch 2006), as well as works including Grinevald (2003). Throughout this work, these members of the speech community trained in documentary methods are called local researchers. Outputs from this community-led work were also archived with ELAR. In 2019, I received a further grant from ELDP to conduct language documentation with the Hadza and Ihanzu speaker communities [IPF0285], adopting the same community-led, local researcher paradigm as the one that had been operating for Gorwaa. Interventions old (Freire, 1970) and new (Leonard, 2018) provided new models, but also inspired new long-term goals for the uses to which the digital repositories could be put. At this point I began archiving Hadza and Ihanzu material with ELAR, all the while continuing to archive new materials developing as part of the Gorwaa project. In 2023, I received a Laura W.R. and George N. Appell Research grant

from the Firebird Foundation for Anthropological Research to continue work with the Hadza community – this time to focus particularly on Hadza-speaking people who live to the north of the area, who had unfortunately not figured as prominently in the earlier documentation project.

From a procedural perspective, during language documentation, data of the kinds described above is being produced daily. At the same time, data about this data (metadata) is also being produced: notes on where a recording was made, what topic was discussed, who was involved in the recording, etc. Both this data and its metadata form the basis for what goes in the archive. Audio and video data from the same recording session are organised together, along with information about that recording session. This information is then transmitted to ELAR, who store it as part of the larger deposits (Gorwaa sessions in the Gorwaa deposit, Hadza sessions in the Hadza deposit, etc.), and make it accessible according to the directives of the depositor (in this case, the author). In these cases, the majority of the materials were archived open-access. A researcher looking for a recording about a particular topic can then access it within the archive. As the projects continued, further information associated with individual sessions was developed: sessions may be transcribed in a practical orthography, and may be translated into the lingua franca Swahili, or English – this can be done in many ways, but in the projects I am associated with, it is done using software called ELAN, and produces xml transcript files in a format called .eaf. These .eaf files are also then added to their existing sessions within the archive. The archive collections feature many speakers, many different types of recordings from many different locations within each respective language community, and are large in terms of volume (Gorwaa 553h, Hadza 226h, & Ihanzu 282h).

All of this is to say that, today, any user of the Internet can, free of charge and with a good Internet connection, visit the ELAR archive, which exists as a webpage, and search for recordings in Gorwaa, Hadza, or Ihanzu, and watch, listen, or read transcripts of them. Users can download the materials for use offline.

Much has already been said about the value that the digital repository has for academic linguistics (Himmelmann 1998, Berez-Kroeker et al. 2018). And indeed discussion of its value for the speaker communities themselves is not new (Austin 2006). In this work, I wish to focus particularly on the effects of the digital repositories as they relate to the speaker communities.

Finally, a distinction that I commonly draw on throughout this work is that of "insider" and "outsider". A definition adopted from Meakins, Green, and Turpin (2018) is useful here: "'Insider[s]' belong to the speech community where the fieldwork is based and they study their own language, [while] '[o]utsider[s]' are external to the speech community and are often members of [a] dominant group [...] that may be responsible for the marginalisation of the speech community." Outsiders must be mindful of their impact on and their responsibilities to the community. Outsiders must commit to dialogue with community members regarding their projects. And outsiders must understand that ideological commitments they may have to "saving" languages may simply result in colonial dynamics repackaged as narratives of empowerment (Kusters, 2012). As a white Canadian, I fall firmly into the outsider profile, and all of the caveats about my understandings apply. As much time and as much work as I have carried out with the Gorwaa, Hadza, and Ihanzu people, the motivations and ideologies I have are often different from the ones they have

### 1.3 Gorwaa, Hadza, and Ihanzu: Community Contexts

All three of the language communities can be found in an area of north-central Tanzania, sometimes referred to as the Tanzanian Rift (Kießling, Mous, & Nurse 2008), a region defined by its high linguistic diversity and history of language contact.

Gorwaa is a Southern Cushitic language (of the larger Cushitic family and Afroasiatic phylum), and is spoken by approximately 133,000 people in and around the Babati district. Many Gorwaa people today farm maize, beans, and sorghum, as well as tend cattle, sheep, and goats. They possess a rich tradition of sung poetry in several styles (Saqwaré et al. 2019). Harvey (2019) provides a linguistically-focused introduction to the Gorwaa people.

Hadza is a language isolate, spoken by approximately 1000 people (Blurton Jones 2016) in the Lake Eyasi Basin. Hadza people are thought to have obtained food mainly through hunting and gathering in the past, and today subsist through a combination of hunting-gathering and community aid. Many Hadza people are consummate storytellers, many of which are accessible in the digital repository at ELAR (Griscom & Harvey 2020).

Ihanzu is a Bantu language (of the larger East Bantu family and Atlantic-Congo phylum), and is spoken by approximately 26,000 people in the Mkalama district of northern Singida region. Many Ihanzu people today grow a variety of crops, including sorghum, maize, groundnuts, and cash crops including cotton. Ihanzu people are renowned for their rainmaking practices, a topic treated extensively in Sanders (2008).

A common dynamic shared by these three speaker communities is that their languages are today being spoken by fewer people, and are being passed on to fewer children. The reasons for this are many: Gorwaa parents have to work longer each day to provide for their families and are too exhausted in the evenings to engage in pedagogical teaching genres; Hadza people are being dispossessed from their traditional lands; Ihanzu people are prohibited from speaking their language at school. In wider disciplinary discourse, these languages are endangered. This is one of the reasons their documentation is seen as a priority, and perhaps the biggest reason that these documentation projects received funding. At the same time, the communities themselves continue to draw on their histories, languages, and cultures in a host of ways, responding to contemporary change with dynamism, creativity, and agency. Language documentation and language repositories are not designed to save these communities, but to provide them with resources on which they can draw upon as they see fit.

### Summary

In this section, I began by providing some definitions and important contexts which will form the basis of the coming work. In 1.1, I established the archive, the digital repositories, and the archived materials as distinct and interrelated elements that arise from documentary linguistic practice. In 1.2, I laid out what my involvement has been in conducting documentary linguistics and archiving materials to create digital repositories. I also mentioned some particular aspects of my identity and how I expect they will affect my response to the questions in the next section. In 1.3, I briefly mentioned the language communities whose voices make up the digital repositories, as well as the continued marginalisation and vulnerabilities that they face.

In some ways, I have presented a situation which is highly specific. I explicitly claim no wider knowledge of a representative sample of digital repositories, but I expect my experience and the versions of the technology with which I work will be broadly applicable to that of other digital repositories.

## 2.0 RESPONDING TO THE 76 QUESTIONS

In this section, I will respond to the 76 questions attributed to Jacques Ellul (Geez 2020). The questions present themselves as a list, and therefore the numbering within this section will adopt a different pattern to that of the wider text. The list itself is subdivided into thematic sections: social, moral, ethical, practical, vocational, metaphysical, political, aesthetic, and ecological. Virtually all of these push me to the limit of my expertise, and I will leave it to the reader to judge whether I have strayed past it at times.

### 2.1 SOCIAL

#### 2.1.1 Does it serve community?

I am convinced that the digital repositories have great potential to serve the Gorwaa, Hadza, and Ihanzu communities whose voices they preserve. Otherwise, I would not be working in cooperation with ELAR, nor within a documentary linguistics paradigm in general. With that said, and insofar as the Gorwaa, Hadza, and Ihanzu communities can be seen as corporate entities, the digital repositories have served these communities very little. That is to say, when these communities come together (community-wide rituals, state interventions that occur over areas in which the speakers are in majority, major and active sub-groupings of the communities including dance groups, churches, and processes of traditional justice), people do not engage with the digital language archive. However, there seems to be an appreciation for the digital language archives and their role in making the communities visible. Indeed, during many processes of obtaining consent from speakers to have their voices recorded and included within the archive deposit (Harvey, 2018), they have spontaneously expressed their approval for their language and culture to be made visible and accessible to the wider world. Pride is a topic present in the archived materials as well – in [20210505\_ENc]<sup>6</sup>, Stephano Langa talks about how when he was young, his parents told him to be proud to be a Hadza person.

#### 2.1.2 Does it empower community members?

In contrast to the language communities as corporate entities, benefits of the archive to individual members of the language communities are more easily identifiable. The hundreds of individual speakers who consented to be recorded were paid an hourly wage, as well as were (if they so chose) recognised by name as contributors to the digital repository. Local researchers, who conducted much of the work of identifying and preparing people to record, investigating topics of interest, processing data and metadata, as well as transcribing and translating recordings, have also benefitted from fairly-compensated part-time work over a period of many years. Local researchers also received in-depth training in use of computers and associated hardware, as well as software such as ELAN (Harvey & Griscom 2020). In these communities, these skills are not common and often desirable. This has, in some cases led to further employment. With that said, whether fair compensation or stable employment are appropriate measures of empowerment is another question.

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<sup>6</sup> From this point on, on a given recording's first mention in this sketch, its handle will be given as a footnote. This recording can be retrieved at <<http://hdl.handle.net/2196/5aead12e-6a8c-417f-bbbf-fd86d7716abb>>

### 2.1.3 How does it affect our perception of our needs?

One of the immediate changes the digital repository has on the local communities is the perception (for those who know about the digital repository, at least) that certain things need to be preserved there. This represents a strikingly new concept: where once it was sufficient for history, artistic genres such as riddles and riddling, and life stories to be transmitted orally (or simply allowed to change or be forgotten with time), there is now an imperative that they be archived with the digital repository. In one sense, this represents a valorising dynamic (i.e. that lived and highly-contextualised knowledge is worthy of preservation), which may serve as a positive counterweight to the hegemonic power of globalisation. On the other hand, it may encourage the establishment of unnecessary standards (now that these materials can be recorded and preserved, failing to do so represents a failure of the community), which could easily result in feelings of shame (Leonard, 2021).

### 2.1.4 Is it consistent with the creation of a communal, human economy?

In terms of their creation, though the digital repositories themselves are electronic (pages on a website and digital sound and video files), they represent interaction between two or more community members. In a sense, then, the individual items of which the digital repository is composed are artisanal. The greatest resources used to produce these recordings are also people. The revaluing of human interaction and the human task of interpreting language, and their framing as valid objects of interest (as cultural objects, as texts which can be analysed and reanalysed) could contribute to developing a human-scaled and human-centred economy. Examples which stand out to me in this regard include the series of recordings Christina Gwa'i produced by visiting women in their kitchens, including [20181104\_CHg]<sup>7</sup>, [20190407\_CHb]<sup>8</sup>, and [20181217\_CHf]<sup>9</sup>.

### 2.1.5 What are its effects on relationships?

The creation of the digital repositories – especially the process of the local researchers visiting speakers from across the community – has put people in touch with each other in new ways and for new reasons. Local researchers visit speakers, sometimes whom they have never met before such as local Ihanzu researcher Sara Kalael and consultant Rehema Rajabu (e.g. [20200206\_SKa]<sup>10</sup>). They talk together about their lives, such as when Samwel Isia asks Betha Issiah about a memory in [20210408\_SMb]<sup>11</sup>. Most importantly, they listen to each other, building relationships based on familiarity and trust.

### 2.1.6 Does it undermine conviviality?

In contrast to the creation of the digital repositories (that is, the collection of recordings, described in I.E. above), which is highly convivial, the use of the digital repositories is much less so, and could be seen as detrimental to conviviality. Where once the songs, stories, and other verbal arts had to be heard from someone directly, they are now accessible directly on the Internet. This takes the process of physical and social interaction with the speaker (as well as engagement with the land, the bus conductor, the owner of the roadside restaurant along the way) and causes it to disappear.

<sup>7</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/213f79c6-d0f7-4f43-b425-2c98d1a11ac6>>

<sup>8</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/1796ac85-83ee-4c47-b15b-a940ec4daee0>>

<sup>9</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/c411ee36-408c-45d2-a389-6b4d9eb80491>>

<sup>10</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/dba3511e-ff47-4f79-bcd9-972ec6116989>>

<sup>11</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/e235eb64-0d58-4a79-8b92-3195b5987518>>

### 2.1.7 Does it undermine traditional forms of community?

The existence of the digital repository means that some instances of knowledge held by particular individuals in a given community are now held in an openly-accessible format on the Internet. Secret knowledge aside (which was explicitly not a focus of the Gorwaa, Hadza, and Ihanza documentations), people's role in a community (and therefore the form that that community takes) are shaped by what they know and what they do not know. All consenting participants were informed about how their recordings would be used, and were free to say (and withhold) what they wished. It is therefore uncertain whether the existence of a digital repository of these kinds of recordings undermines the networks of knowledge, and therefore the form of the communities, in this case.

### 2.1.8 How does it affect our way of seeing and experiencing the world?

If the digital repository presents a way in which the Gorwaa, Hadza, and Ihanza worlds are encountered, it is worth comparing them to the Gorwaa, Hadza, and Ihanza worlds that exist otherwise. Two dimensions worth bringing up are space, and time.

In terms of space, where the language communities are laid out over a physical area complete with geography, climate, plants, and animals, the digital repository eliminates this almost entirely: the user of the Hadza digital repository may listen to a traditional song sung in the community of Mang'ola (e.g. [20200918\_MAC]<sup>12</sup>, and a minute later a narrative told in the community of Kipamba (e.g. [20210511\_EMB]<sup>13</sup>). In the physical world, 100 kilometres of road and a full day of travel lies between the two.

In terms of time, the distortions are multiple. A material collected in 2012 (such as the image of Hhape Male made at my first Gorwaa natural speech recording [20150728a]<sup>14</sup>) may exist beside one made 10 years later (such as this version of the Gorwaa lightning story recorded by Stephano Edward in 2022 [20220115\_STa]<sup>15</sup>), with no sense of the changes that occurred in the decade that intervenes. Additionally, what once existed as an ephemeral modality (an instance of speech was only directly accessible in the moment of its production) now exists potentially forever.

Further collapses and distortions are present in the recordings themselves: a video of a story is not the story. It is not the feeling of sitting on the ground, it is not the presence of the neighbours' children, it is not the feeling of satiety that comes after the evening meal: all of which are features of Ihanza stories as typically told, and all of which may be exploited by a good storyteller. What exists in the video is only what the camera sees and hears.

### 2.1.9 Does it foster a diversity of forms of knowledge?

The three digital repositories feature relatively large numbers of speakers (Ihanza approximately 30, Gorwaa and Hadza both well over 100). This was a result of local researchers casting a wide net across the speaker communities and attempting to make a wide variety of recordings on different topics.

With this said, the digital repository is limited in the kinds of knowledge it can preserve: that kind of knowledge which can be told and which can be shown is well-represented. All knowledges expressed otherwise are much harder to include.

<sup>12</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/438f679e-c755-4b1e-8703-610b2c03467e>>

<sup>13</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/a10867e7-90a4-44fa-beeb-944e5e4ee895>>

<sup>14</sup> This image can be retrieved at <<http://hdl.handle.net/2196/00-0000-0000-000F-F71D-9>>

<sup>15</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/6f5628ea-a2d1-40c2-bb75-8c18338643dd>>

### 2.1.10 Does it build on, or contribute to, the renewal of traditional forms of knowledge?

Archival records of various forms have been important tools in reawakening languages on the African continent (Sands, Harvey, Griscom 2023). If these results can be generalised, this means that the digital repositories may have important roles to play as sources for language reawakening in the future.

### 2.1.11 Does it serve to commodify knowledge or relationships?

Within the digital repositories, recordings are presented as lists (see Figure 2 as an example), which can be filtered and sorted based on keywords, speaker, recording type, etc. With this in mind, one can ask: Does this format render the materials like of string of products (rather than instantiations of an integrated system), and is this a first step toward commodification?

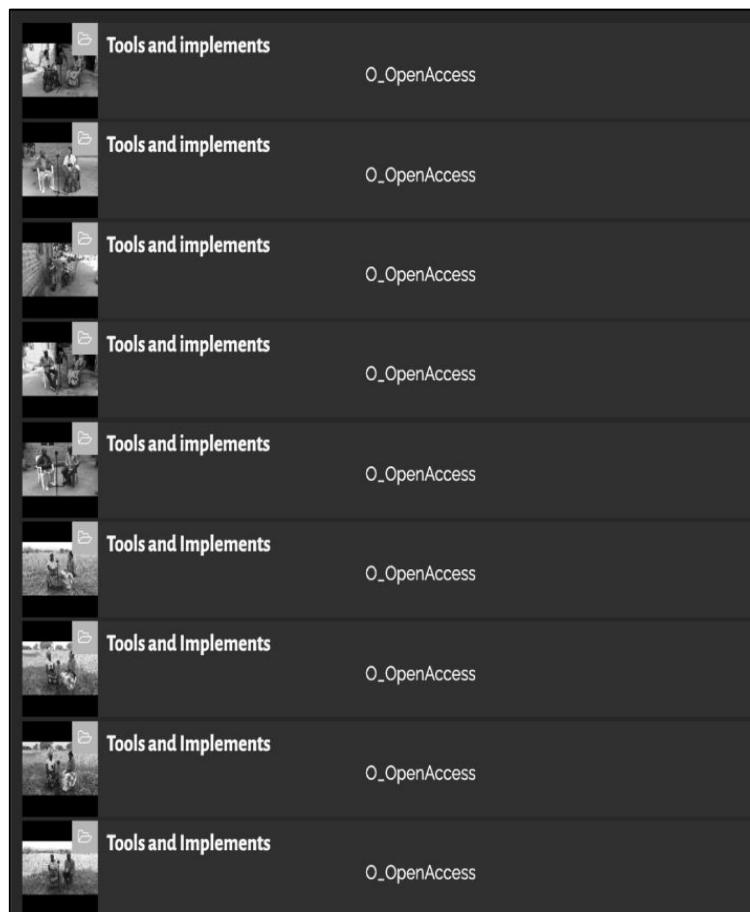


Figure 2: A view of recordings treating "Tools and Implements" in the Ihanzu digital repository

### 2.1.12 To what extent does it redefine reality?

The digital repositories have now made oral accounts more readily available than other forms of information, including colonial records, many scholarly publications, and other largely undigitised material. This redefinition may possibly be beneficial in that most of the recordings are of community members representing themselves, rather than being represented by outsiders.

### 2.1.13 Does it erase a sense of time and history?

With the creation of the digital repositories, the most readily available source material (both of how people are, and how they were) has become the recordings available therein. This risks a bias toward seeing these communities as they were in the early 21st century, simply because this is the time period represented in the digital repositories. Additionally, accounts of history are forever changing and reinterpreted by community members as they are told in the present, whereas materials in the archive are unchanging.

### 2.1.14 What is its potential to become addictive?

Low (though the author is doubtless a bit of a junkie).

## 2.2 MORAL

### 2.2.1 What values does its use foster?

What the creation and use of the digital repositories has required more than anything else is a willingness to practice deep, careful listening. For outsiders, this can encourage the valuing of another culture. For insiders, this can encourage the valuing of serious commitment to traditional knowledge. Indeed, the underlying systems that underpin our fascination with Gorwaa local researcher Paschal Bu'u's interview with a stone diviner [20151211f]<sup>16</sup>, Hadza local researcher Mariamu Anyawire's recording of Njegela Majui's making arrow poison [20201223\_MAA]<sup>17</sup>, and Samweli Isia's discussion with John Kipimo on the Ihanzu genre of riddles [20201020\_SMB]<sup>18</sup> are all only knowable with great attentiveness, both within the recordings themselves, but also to the larger traditions (healing, hunting, verbal art) to which they belong.

### 2.2.2 What is gained by its use?

By creating digital repositories, the most obvious (and perhaps most consequential) result is open access to important sources of language and cultural material far into the future. These are not unqualified benefits, but their potential for good is considerable.

### 2.2.3 What are its effects beyond its utility to the individual?

By being open archives, the digital repository becomes maximally available to others.

### 2.2.4 What is lost in using it?

Perhaps the most consequential loss is that of the absolute need of physically being with community members in order to listen to and learn from them. This represents a loss in that it may make it harder to develop solidarity, as well as a richer contextual knowledge of the community, which would normally be built during dedicated research by spending time with people in the community.

### 2.2.5 What are its effects on the least advantaged in society?

The language communities represented in the digital repositories – the Gorwaa, Hadza, and Ihanzu people – all experience different levels of marginalisation, both by the state, as well as in the larger context of the globalised world. By many measures, they may be considered poor, “underdeveloped”, or subaltern (Spivak 1988). As a technology designed to preserve their voices, one effect might be to raise the visibility of these people and allow them to represent themselves. Another effect may well be their alienation from their own knowledge brought about by its reframing as an object of outsider and academic interest.

<sup>16</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/00-0000-0000-0010-2EAB-A>>

<sup>17</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/24597b30-46f3-4c57-936c-bbf33516d4bc>>

<sup>18</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/46833a09-f22a-43d8-bf87-ffc75359e11f>>

## 2.3 ETHICAL

### 2.3.1 How complicated is it?

Use of the digital repositories is relatively easy as long as one is familiar with the basic use of a computer. This, however, should not be a given, especially for the Gorwaa, Hadza, and Ihanza speech communities (c.f. van Dijk 2006).

Upkeep and more advanced manipulation (addition or removal of recordings, editing of information) requires trained staff.

### 2.3.2 What does it allow us to ignore?

In using audiovisual material from the digital repositories, it becomes much easier to ignore the larger context which occurs beyond what is recorded by video or audio recorder. For example, the Gorwaa hoop and spear game *gange'i* only happens when the ground is wet (for more examples on lost context, see I.H.).

### 2.3.3 To what extent does it distance agent from effect?

Research on the languages can now occur without being near the communities. To an extent, however, the agents (those producing knowledge about these communities) have always been distant from effect (i.e. the real-world perception of local peoples which is informed by this new knowledge).

### 2.3.4 Can we assume personal, or communal responsibility for its effects?

Within the digital repositories, authorship is still clear. From the depositor, to the individuals speaking, to the individuals involved in translating and transcribing the recorded materials, information on who has contributed and in which way they have contributed is available.

### 2.3.5 Can its effects be directly apprehended?

Some effects of the digital repositories, such as facilitating academic production (see I.A.), and developing community member pride (see I.C.), can be easily observed (through things like citation counts and personal testimonials). Other effects, such as reshaping perceptions of time and space (see I.H.), and improving self-representation (see I.L.) are less easy to observe.

### 2.3.6 What ancillary technologies does it require?

The most obvious ancillary technologies required to use the digital repositories is the Internet, as well as a device through which to use the Internet such as a computer or a smartphone.

Less visible are the technologies of literacy, especially in the language of the website interface (currently English, see Figure 3), but also, for those wishing to access the written materials present in the digital repositories, in the working orthographies of Gorwaa, Hadza, and Ihanza – none of which have orthographies which are formally taught or in widespread use.

20180531_FMe	2) Terms: Users must: a) give appropriate credit providing, at least, the credit lines above; b) indicate if changes were made, and c) not knowingly use materials for any purpose which causes disparagement, disrespect, damage to reputation, or harm to any individual or group. None of the data in this collection may be used as evidence in court.    Data collection funded by the Firebird Foundation for Anthropological Research - 'The Gorwaa Indigenous-Led Language Documentation Project: Research, Documentation, and Analysis by Local Gorwaa People'	Topic: Gorwes Keywords: Keyword: Ayá Sanda Keyword: Gange'i Keyword: Natural Speech Keyword: Deposit04 workflow status rough Gorwaa transcription; Swahili translation Content: Genre: Conversational Text Language: Name: Gorwaa Description: content language Actor: Name: Festo Massani (Bu'u Massani) Role: Collector Actor: Name: Tiophili Bura (Taghasi Bura) Role: Consultant Actor: Full Name: Paschal Bu'u Role: Transcriber Topics:	Actor: Full name: Paschal Bu'u Role: Translator Media Files: Filename: 20180531_FMe.wav File handle: <a href="http://hdl.handle.net/2196/71eef7bc-8371-4049-a7b1-89233e55fb11">http://hdl.handle.net/2196/71eef7bc-8371-4049-a7b1-89233e55fb11</a> File type: Audio Access: O Filename: 20180531_FMe.MP4 File handle: <a href="http://hdl.handle.net/2196/dab66432-e935-4dbb-bc36-0a85dc258a3">http://hdl.handle.net/2196/dab66432-e935-4dbb-bc36-0a85dc258a3</a> File type: Video Access: O Written Resources: Filename: 20180531_FMe_20240510.eaf File handle: <a href="http://hdl.handle.net/2196/28598327-c3d0-e4e8-8960-g2a99574tabc">http://hdl.handle.net/2196/28598327-c3d0-e4e8-8960-g2a99574tabc</a> File type: ELAN Access: O
Session Information	Session Handle: <a href="http://hdl.handle.net/2196/cb392e85-dc9b-494e-b743-4ff87b3ff2a0">http://hdl.handle.net/2196/cb392e85-dc9b-494e-b743-4ff87b3ff2a0</a> Title: Hoop-and-spear game    Gange'i		

Figure 3: A view of the metadata for Gorwaa recording [20180531\_FMe]<sup>19</sup>

### 2.3.7 What behaviour might it make possible in the future?

The practice which seems most immediately concerning is data mining: the reduction of the digital repositories to mere databases and their broad (perhaps entirely automated) analysis. This, if accompanied by a failure to properly contextualise the materials analysed, as well as honour the communities from which they came, could result in kinds of work to which most documentary approaches would be opposed.

### 2.3.8 What other technologies might it make possible?

In the worst case scenario, the digital repositories could be plundered to produce deepfake videos or other such technologies which present the illusion of humanness and fluency without any of the underlying understanding to actually possess them (Bender, Gebru, McMillan-Major & Schmitchell 2021).

More optimistically, technologies which are used to serve the communities could draw from the archived materials. Pedagogical aids such as children's videos, cultural wikis drawing from archived interviews and procedural explanations, guides on how to construct traditional musical instruments (based on recordings such as [20181130\_PBe]<sup>20</sup> and [20181130\_PBf]<sup>21</sup> where Muna Ng'ayda makes a *gidondoori* musical bow and its accoutrements, for example) – all of these technologies are possible outputs.

### 2.3.9 Does it alter our sense of time and relationships in ways conducive to nihilism?

In my assessment, the answer is emphatically no. The digital repositories are built solely on the contributions of individual people – both community outsiders such as myself and the experts which develop and maintain them and, and, most importantly, the community insiders who filled the digital repositories with materials that are products of their daily work and contributions. Moreover, recordings are always intentional, and often spiritual, philosophical, and poignant. Stephano Edward's talk with Edward Gwa'i about Gorwaa indigenous beliefs [20180604\_STC]<sup>22</sup>; Samwel Isia's interview with John Kipimo about Ihanzu conceptions of respect [20201106\_SMC]<sup>23</sup>; Nange Chaka's discussion with Joyce Zengu about memories of how her mother would make her look pretty when she was a little girl [20210211\_NCD]<sup>24</sup> –

<sup>19</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/cb392e85-dc9b-494e-b743-4ff87b3ff2a0>>

<sup>20</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/4a0def46-cb56-49a1-b86c-c083f8d29e8e>>

<sup>21</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/9103da4b-efcc-4499-89b2-8a243faa0e21>>

<sup>22</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/0bca2335-4d72-411f-a967-2bc62601bf05>>

<sup>23</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/ddfa3d5f-b00a-495e-be6b-3cd4b2eb2fff>>

<sup>24</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/e5634267-b2f1-4b7c-8a01-ff2a96ebb246>>

these are all testimonials of the kinds of meaning-making which affirm the value of life and the centrality of the individual in it.

## 2.4 PRACTICAL

### 2.4.1 What does it make?

Thus far, the materials in the digital repositories have been used to create primary data for linguistic analysis – principally for use by academics (papers, talks, etc.). Other outputs have been more community-oriented, including short edited videos for community viewing, as well as a Gorwaa alphabet chart for pedagogical use. With that said, there are virtually no limitations to what could be created. This is obviously a reason for caution as well as optimism (see III.H.).

### 2.4.2 Who does it benefit?

The construction of the digital repositories, as well as the continued analysis of the materials archived there, have provided skilled training as well as employment of different kinds to local community members (as described in I.B. above). It has also had a valorising effect on perceptions of language and associated verbal arts for the speaker communities (see I.C. above).

The materials archived in the digital repositories have been used by linguists to conduct their work, as well as to progress in their careers. The author is certainly the most direct beneficiary in this respect (see, for example, the author's doctoral dissertation (Harvey 2018), and other outputs cited throughout this text).

Staff of the Endangered Languages Archive derive employment from the ongoing work involved with maintaining and expanding the digital repositories.

Funders of the Endangered Languages Archive, and of the documentary linguistic work of the author and the local communities, benefit from having what is seen as a legitimate cause to direct charitable (and tax-deductible) donations toward.

### 2.4.3 What is its purpose?

One of the explicitly stated purposes of ELAR is “preserving endangered languages”. While the digital repositories certainly preserve recordings of endangered languages, whether they will preserve the languages themselves is yet to be seen (Perley 2012).

### 2.4.4 Where was it produced?

The conceptualisation, back-end infrastructure, and user interface of the digital repositories were developed in the global north. The materials which populate the digital repositories were all collected in north-central Tanzania in Gorwaa-, Hadza-, and Ihanzu-speaking communities. In a sense, then, the model is a modification of the ubiquitous Apple refrain: *Designed in the imperial core, assembled in Tanzania*.

### 2.4.5 Where is it used?

So far, the vast majority of use of the digital repositories is located in the global north (most likely wherever the author was located). The specific contexts will be almost exclusively academic in nature.

#### 2.4.6 Where must it go when it's broken or obsolete?

As the digital repositories are part of a large, centralised infrastructure, they can only be fixed by the experts at ELAR. As components of an archive, the digital repositories are not supposed to obsolesce, but are designed to be maximally stable over a long period of time.

#### 2.4.7 How expensive is it?

The digital repositories can be accessed, browsed, and most of the materials they contain can be viewed and downloaded at no cost to the user (outside of the costs associated with Internet access and access to a device to use the Internet with).

Creating a digital repository is not, however, free of cost. Aside from the costs associated with collecting the materials to be archived, the cost involved in preserving the materials long-term is significant. As mentioned above, the Gorwaa, Hadza, and Ihanzu digital repositories were all made possible by significant funding from ELDP, and could not have been created otherwise.

No doubt the continued functioning of ELAR is also significantly expensive.

#### 2.4.8 Can it be repaired?

Issues of functionality with the Gorwaa, Hadza, or Ihanzu digital repositories are repaired by the ELAR staff.

#### 2.4.9 By an ordinary person?

As described in IV.H. repair is possible, but only by a trained individual.

### 2.5 VOCATIONAL

#### 2.5.1 What is its impact on craft?

Insofar as verbal art can be considered craft, the collection of the materials archived with the digital repositories has, if nothing else, resulted in interesting reflections in the Gorwaa, Hadza, and Ihanzu communities about verbal art. Speakers who contributed (and especially those who were recorded for more formalised genres such as songs, stories, or prayers) were consistently concerned with how they were portrayed, and generally took pride in how they spoke or performed. Isaya Sapo took care to wear intricate beadwork when he was recorded in [20200217\_MAC]<sup>25</sup>, a fine woven mat is laid out for Hassan Abdala's telling of the story of Hare and Hyaena in [20201217\_SKb]<sup>26</sup>, and, though clearly arranged for the purpose of recording, the participants in the traditional Gorwaa prayer in [20181008\_STe]<sup>27</sup> located it within a grove of sacred ficus trees.

Regarding translation as craft – the processing of recorded materials for the digital repositories has, for Gorwaa, Hadza, and Ihanzu, been the most extensive project of translation (from the target languages into Swahili) yet to take place. The development of working orthographies; the discussion of how to work with gesture, silences, and ideophones; and myriad other decisions associated with reducing spoken language to written form and then transforming written Gorwaa, Hadza, and Ihanzu into written Swahili are all contributing to the development of this set of skills and techniques.

<sup>25</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/c80f518b-076c-4cc3-8d63-1956230f582b>>

<sup>26</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/5d8b464a-fdc1-4e88-9170-e49bdb735e91>>

<sup>27</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/c945efdd-0fe2-4492-b603-d882cebd777c>>

Craft in its most concrete sense – skilled handiwork – is also impacted, with many procedural explanations and demonstrations from potters (e.g. [20160919g]<sup>28</sup>), carvers (e.g. [20210203\_BPa]<sup>29</sup>), and cooks (e.g. [20201222\_SMd]<sup>30</sup>) existing as part of the digital repository. These recorded materials can serve to enrich and preserve these traditional crafts.

### **2.5.2 Does it reduce, deaden, or enhance human creativity?**

In preserving recordings of language, verbal arts, and other traditional knowledge, the digital repositories can at the very least be seen as maintaining records of human creativity. A view that sees open access and long-term preservation of these materials as ways of increasing the number of people (both insiders and outsiders) able to learn from them, the digital repositories could be seen as enhancing human creativity.

### **2.5.3 Is it the least imposing technology available for the task?**

The digital repositories, in existing on the Internet, are invisible in terms of the space they take up in most users' physical worlds. Simultaneously, the user interface of the digital repositories is text-heavy and intricate, which can make its use daunting (for an example, see Figure 3).

### **2.5.4 Does it replace, or does it aid human hands and human beings?**

In one sense, the digital repositories could replace human beings, in that now people wishing to access certain verbal art or knowledge can do so without the necessity of physically visiting a person (c.f. I.F.). However, this replacement can only be seen as an incomplete approximation (see I.H.).

At the same time the digital repositories serve as a key piece of infrastructure for conducting both language documentation and description, and also promise to be instrumental in the work of strengthening and reclaiming languages and culture in the face of homogenising forces (c.f. the instrumentality of archival materials in the Breath of Life workshops and institutes (Baldwin, Hinton, & Pérez-Báez 2018)).

### **2.5.5 Can it be responsive to organic circumstance?**

As subsections of a larger website, the adaptability of the digital repositories is low.

### **2.5.6 Does it depress or enhance the quality of goods?**

When taking academically-oriented outputs into account, if the digital repositories are seen as a total and equal replacement for engagement with the language and culture in its wider context, then the quality of the work and insight produced from them will be poor. If the digital repositories are seen as rich sources upon which to build hypotheses or questions, which may then be further explored through physical, authentic engagement with the language communities, then the quality of the work and insight produced from them will be good.

When examining community-oriented goods, see the comments on skilled handiwork in V.A. above.

### **2.5.7 Does it depress or enhance the meaning of work?**

Cultural work is often invisible work (Daniels 1987). The remembering of the lyrics of songs, the reinterpretation of existing stories in new contexts, the making of products for which low-quality alternatives are available for purchase – all of these acts may be viewed as idle or otherwise unproductive. The simple act of these types of labour being seen as interesting and

<sup>28</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/00-0000-0000-0010-56A2-8>>

<sup>29</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/6ac5c2f9-b75f-4854-87d4-3f1caef4e579>>

<sup>30</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/631972c9-7ae5-4c34-a448-7f462b823fa7>>

worthy of preservation goes a long way in expanding what individuals see as legitimate work, and indeed legitimate art.

## 2.6 METAPHYSICAL

### 2.6.1 What aspect of the inner self does it reflect?

Through what has been archived within them, the digital repositories are affirmations of lived and contextualised knowledge.

Through their mere existence, the digital repositories reflect aspirational visions of the future which, it must be said, is no small feat in a world preoccupied with apocalypse (Fisher 2010).

### 2.6.2 Does it express love?

The digital repositories become richer the more they are listened to and analysed and translated. Like a garden or orchard, they must be tended. This approximates a kind of vegetable love.

### 2.6.3. Does it express rage?

No.

### 2.6.4 What aspect of our past does it reflect?

It is impossible not to see parallels between the digital repositories and the colonial museum. Both stand to benefit deeply from contemporary discussions of repatriation and community ownership (e.g. Riding In 1996; Schmidt and Pikirayi 2016; Bolin & Nkusi 2022).

### 2.6.5 Does it reflect cyclical or linear thinking?

The digital repositories encourage a highly cyclical approach in their use: a recording may be identified and listened to, listened to again and again and analysed, new questions are formed in the listening, and new recordings are identified and the listening begins afresh.

## 2.7 POLITICAL

### 2.7.1 Does it concentrate or equalize power?

Most of the materials in the Gorwaa, Hadza, and Ihanza digital repositories are openly accessible. This means that the ability to access, view, and more generally use the archived materials is free for anyone. With that said, the disparities which exist surrounding who can and cannot easily access the Internet means that open access remains an ideal, rather than a reality. As such, though the digital repositories could well serve to put knowledge (and therefore power) in the hands of a large number of people, the current reality means that that knowledge remains accessible only to those who have affordable and reliable access to the Internet (van Dijk, 2006).

### 2.7.2 Does it require, or institute a knowledge elite?

The user interface and most of the metadata of the digital repositories is in English. In a place where knowledge of English is a skill most associated with those having received schooling, this means that only those who have an advanced level of education are able to use the digital repositories in their current form.

### 2.7.2 Is it totalitarian?

The digital repositories are plurivocal – that is, they very often represent a topic or an idea from many different perspectives. Ihanza local researchers conducted more than ten interviews across three different villages about people's thoughts on conflict resolution (e.g.

[20200318\_SKb]<sup>31</sup>, [20200331\_SMb]<sup>32</sup>, and [20201007\_SKc]<sup>33</sup>). A Hadza song about a baobab which produces no fruit is represented by no fewer than four different versions (e.g. [20201030\_ASe]<sup>34</sup>, [20210316\_ASa]<sup>35</sup>, [20210617\_ASe]<sup>36</sup>).

With this said, control of the digital repositories (including what is included, what is accessible, and what kinds of analyses and metadata accompany the archived materials) rests with the original depositor (in the cases of the Gorwaa, Hadza, and Ihanzu digital repositories, this is the author).

### **2.7.3 Does it require a bureaucracy for its perpetuation?**

The digital repositories' perpetuation is entirely dependent on the staff of the larger archive, who are trained specialists that operate according to their own rules and procedures.

### **2.7.4 What legal empowerments does it require?**

Legally, the legitimacy of the digital repositories rests on the consent of the people whose voices are preserved there. One of the basic aspects of this consent is that it must be informed, meaning that participants must be reasonably aware of how the materials associated with their contributions (their photos or videos, data about their ages, etc.) will be used. Given that the lifespan of the archive is designed to span generations, and therefore will exist much longer than anyone alive today, and given the rapidly-changing nature of how such materials can and may be used, it is extremely difficult to fully inform contributors about their ultimate uses.

### **2.7.5 Does it undermine traditional moral authority?**

In and of themselves, the digital repositories do not impose any new sensitivities, judgments, values, and motivations. As such, they cannot be seen to undermine moral authority (or authorities) that currently exist within the Gorwaa, Hadza, and Ihanzu communities.

However, if it becomes the case that the materials within the digital repositories come to be seen as authoritative (for example, somehow "better", "more pure", or "more effective" than the types of authorities that currently exist within the communities, then the potential for this kind of subversion is there.

### **2.7.6 Does it require military defense?**

Physically, the digital repositories exist as space occupied somewhere. This could include things like hard drives, but more likely includes some kind of server, most likely multiple such servers spread out in various locations in order to provide the level of protection needed for an archive and its archival materials.

In a direct sense, the archive is not defended by any sort of military, national or otherwise. At the same time, the archive which houses the digital repositories (ELAR) is located in Germany, a country within the imperial core, whose "stability" and "security" do certainly contribute to the perceived legitimacy of the archive as a whole.

### **2.7.7 Does it enhance, or serve military purposes?**

No. Though I do wonder how this may change as technology changes in the future (c.f. VII.E.).

### **2.7.8 How does it affect warfare?**

<sup>31</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/b3c64023-da9e-4061-b8bf-78e59f2255bc>>

<sup>32</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/113c092d-0601-4d83-a110-10e8158405ed>>

<sup>33</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/662f698f-2472-4e33-80ca-9c7ccc78dfd5>>

<sup>34</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/a19064c2-688d-4495-a3ef-4b11b425c5cc>>

<sup>35</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/4fa6f462-909d-4b9e-b148-b43bb9a476cd>>

<sup>36</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/2851fa96-6c38-4b24-bb5d-878120221322>>

The digital repositories do not, at present, affect how war is being waged. As mentioned in VII.H above, it is also unclear if or how the digital repositories may affect warfare in the future. For example, one may imagine the traditional knowledge contained in the digital repositories (of the local geography, of the cultures, and of the languages themselves) as exploitable during local conflict in order to render incursions or guerilla resistance more effective. At the same time, the way in which the digital repositories render the communities visible to the wider world may serve as a deterrent for those who may seek to conduct war locally.

### 2.7.9 Is it massifying?

The voices preserved in the digital language repositories are of individuals, and they are usually associated with both names and faces. The vast majority of materials represent individual people speaking, reflecting, and performing – as such, the digital repositories may be seen as not massifying, but rather individuating.

### 2.7.10 Is it consistent with the creation of a global economy?

The materials in the digital repositories have been gathered together, both across time and across space (c.f. I.H.), and made available in a way which prioritises ease of use (c.f. I.K.). Though not designed in direct service of a global economy, the materials have certainly been rendered easier to consume.

### 2.7.11 Does it empower transnational corporations?

The open-access nature of the digital repositories could allow for commodification by corporations. The author's worst nightmare would be to view an advertisement selling Pepsi that uses materials found in the archived deposits.

### 2.7.12 What kind of capital does it require?

Most directly, the digital repositories require several types of capital. The first is knowledge, crystallised in the form of individuals with various specialist training (documentary linguists, local researchers, archive staff). The second is electricity (for the running of the machines used to access the digital repositories, as well as the machines within which the materials reside). The third is the Internet.

Indirectly, the digital repositories represent a tremendous amount of cultural and social labour, especially in how they were produced (c.f. V.G. above).

## 2.8 AESTHETIC

### 2.8.1 Is it ugly?

The materials preserved with the digital language repositories are, unquestionably, beautiful. The virtuosic singing in the version of *Koonkír Hhando* recorded at a raucous beer party in Hoshan [20150903f]<sup>37</sup> (c.f. Saqwaré et al. 2019); the vivid descriptions of care and healing depicted by Israel Ibrahim [20200519\_SKd]<sup>38</sup>, the quiet adeptness of processing baobab [20210608\_JLb]<sup>39</sup>.

Their audiovisual content aside, the interfaces within which they exist are not visually interesting or elegant. On the contrary, the digital repositories themselves are typically dull or packed densely with text (see Figure 3 above).

<sup>37</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/00-0000-0000-0010-0338-6>>

<sup>38</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/50c1cb6e-489f-4689-bfcc-32ec7584f705>>

<sup>39</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/2024224f-6e0e-4b69-b614-1ef9dc86ced>>

### 2.8.2 Does it cause ugliness?

As mentioned in IV.A. above, the primary uses to which the digital repositories have been put is as the bases of linguistic analysis. Insofar as linguistic analysis can be seen as beautiful (a view to which the author generally ascribes), then the digital repositories do not cause ugliness, but cause beauty. In their construction, they have also resulted in the empowerment of community members (c.f. I.B.) and the development of new relationships (c.f. I.E.) – both of which are considerably beautiful.

### 2.8.3 What noise does it make?

The digital repositories, aside from the whirr of a computer fan, are silent. The noises of their materials are complex and beautiful (c.f. VIII.A.).

### 2.8.4 What pace does it set?

The degree to which users can move from “place to place” within a given community is greatly increased (see I.H.). With that said, the use of the materials is still a slow process (see VI.E.). For example, local researchers may spend weeks working on a 15-minute recording, which, once completed, the author may spend months to analyse.

### 2.8.5 How does it affect the quality of life (as distinct from the standard of living)?

The ability of people (both insiders and outsiders) to access traditional knowledge adds a richness to life. This is at once difficult to quantify, and potentially transformative.

## 2.9 ECOLOGICAL

### 2.9.1 What are its effects on the health of the planet and of the person?

The use of a website (which is the form taken by the digital repositories) is a sedentary activity – one that has the potential to contribute to sedentary lifestyles and the problems that arise from them. With that said, the alternative of physically travelling to speakers is itself a dangerous activity, given the condition of the roads in most of the Gorwaa, Hadza, and Ihanzu-speaking areas.

The dimension of digital access versus physical access is also one of carbon expenditure. If outsiders (most users live far away from the speech communities, see IV.E. above) can now access the archived materials without having to rely on carbon-heavy travel, this is better for the planet. At the same time, the digital repositories are already carbon-heavy technologies, in that their very creation has required large amounts of travel between where the speaker communities are located (central Tanzania) and the institutes at which the author has been employed, in the global north.

In addition to all of this, servers (where the website is ultimately located) also run on electricity – and video-heavy websites unavoidably use large amounts of it.

### 2.9.2 Does it preserve or destroy biodiversity?

Of the topics frequently addressed in the digital repositories, traditional ecological knowledge is one of the most robustly represented. For example, farming methods and traditional sorghum species [20180609\_FMc]<sup>40</sup>; trees with which to measure the changing of the seasons [20210716\_SMc]<sup>41</sup>, and plants which can be made into arrow poison [20201223\_MAA]<sup>42</sup> are all demonstrations of how the Gorwaa, Hadza, and Ihanzu peoples know and use the diverse flora, fauna, and natural forces around them. While this does not represent the direct

<sup>40</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/d88db722-5303-40ec-96ce-b34649f9a7a9>>

<sup>41</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/2cc97c9a-2c36-4379-a6c9-3b920c4dfcef>>

<sup>42</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/24597b30-46f3-4c57-936c-bbf33516d4bc>>

preservation of local biodiversity, the preservation of local biological knowledge and its valorisation may serve to help their protection (c.f. VII.I above).

### 2.9.3 Does it preserve or reduce ecosystem integrity?

The natural environment and the communities which inhabit it are inseparable, and as such, so too are ecological, linguistic, and cultural integrity inseparable from each other. This is, in fact, directly expressed in an early unpublished report on language vitality produced with the Gorwaa people (Harvey et al. 2016). Further explicit comments about the ecosystem are made in Hadza songs (e.g. [20210430\_ASd]<sup>43</sup>), as well as Ihanzu discussions on forests (e.g. [20201109\_SMe]<sup>44</sup>). By preserving materials associated with how people live in the environment – how they affect it and how it in turn affects them – visions of the ecosystems they are part of are also preserved.

### 2.9.4 What are its effects on the land?

Discussions of carbon emissions associated with its creation and everyday function aside (see IX.A.), the physical effects of the digital repositories on the land is minimal.

In the local context, having materials that represent knowledge of the land preserved in the digital repositories represents a rich source of lived experience and cosmological wisdom about how to use, preserve, and interact with the land.

### 2.9.5 What are its effects on wildlife?

As with IX.D. above, the caveats and basic principles are the same: the digital repositories feature materials rich in descriptions of wild plants and animals, and as such represent a rich source of information on how to live with, their uses, and their preservation. Across the three digital repositories, recordings associated with birds alone (e.g. [20161005a]<sup>45</sup>, [20200213\_MAf]<sup>46</sup>, [20180707b]<sup>47</sup>) number more than eighty.

### 2.9.6 How much, and what kind of waste does it generate?

The creation of the digital repositories has employed an array of electronic devices, including video cameras, audio recorders, as well as laptop computers. When this equipment ceases to function, it becomes inorganic waste which requires special care to dispose of safely.

As mentioned in IX.A. above, the major waste product that arises from using the digital repositories is the carbon associated with the running of the servers on which the archive exists. I do not know how much this is, but given that the websites feature large amounts of audiovisual material, one would expect that they are rather more carbon-intensive than average websites. It is not, of course, inevitable that the running of the website be powered by carbon-intensive energy, and a move away from these energy sources (either passively by the archive as wider society switches to low-carbon energy sources, or actively by the archive as a conscious decision to decarbonise) would result in the digital repositories being usable at minimal harm to the climate.

### 2.9.7 Does it incorporate the principles of ecological design?

In the case of the digital repositories, ecological design would most be most directly instantiated in web design. Drawing concrete examples of applicable principles from the *Web Sustainability Guidelines*, I get the sense that, where principles of ecological design were

<sup>43</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/594f44ab-84d7-4382-ab7e-0c9a8113f311>>

<sup>44</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/d47c82c6-db07-4045-9986-7d6c36d7f57a>>

<sup>45</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/00-0000-0000-0010-5976-9>>

<sup>46</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/da9009d7-147f-417e-b4d5-40405acc6ba2>>

<sup>47</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/8333da1e-f5cf-4627-9fce-b0b7ec04a996>>

adopted, this was not done consciously. Some principles, such as avoiding overtly distracting elements (Sustainable Web Design: 2.9) are present, and some, such as ELAR defining and making available a list of sustainability goals (Sustainable Web Design: 5.6) are not.

### 2.9.8 Does it break the bond of renewal between humans and nature?

Many materials in the digital repositories are directly related to this very topic. Gorwaa yearly agricultural rites [20180727\_FMe]<sup>48</sup>; the movement of Hadza people across the land [20201211\_MAA]<sup>49</sup>; and Ihanzu animal stories [20201020\_SMC]<sup>50</sup> are all examples of ways in which the Gorwaa, Hadza, and Ihanzu people look to nature for fertility, sustenance, and meaning, and how nature itself is rendered richer in the process. Preserving this knowledge is an initial step in safeguarding it from rupture, and ensuring that it is not forgotten.

### 2.9.9 Does it preserve or reduce cultural diversity?

In explicitly focusing on communities which speak endangered languages, ELAR certainly aims to preserve cultural diversity. Whether the digital repositories will serve to actually preserve diversity within these communities is associated with who they benefit (see IV.B.), and where they are used (IV.E.).

Further, if during the creation of the digital repositories, those collecting the materials were guided by essentialist and exclusionary ideas of what their speech community is or who should or should not be recorded, the end product would represent a homogenised view, therefore reducing the internal cultural diversity of the speech community. In the case of the Gorwaa, Hadza, and Ihanzu digital repositories, effort was made to include a wide range of contributors (c.f. the plurivocality mentioned in VII.C. above) – this approach avoided many of these essentialist effects.

### 2.9.10 What is the totality of its effects, its “ecology”?

The digital repositories exist as instances of technology that each straddle the interface of two different traditions: the Gorwaa, Hadza, and Ihanzu local traditions on one hand, and the Western, academic tradition on the other. This presents elements that are colonial (processes of extraction, imbalances of power), as well as elements that occasionally surpass the colonial (the interchange of values, the development of new epistemes). Its ecology – or, more appropriately, the ecologies of each of the digital repositories of the respective speech communities – is complex.

Perhaps most importantly however, is that the ecologies of the digital repositories is emergent – that is, all three are newly coming into being, and their eventual forms and meanings will be characterised only within the process of their use. I will comment more on this in the next section.

### Summary

This section, section 2, formed the main body of this work, responding to 76 questions attributed to Jacques Ellul, subdivided into thematic sections: social, moral, ethical, practical, vocational, metaphysical, political, aesthetic, and ecological.

## CONCLUSION

In this section, section 3, I will provide some summary thoughts and conclusions based on what was discussed above. Section 3.1 reviews each of the thematic subsections of the list of

<sup>48</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/25446f2c-a66c-4fa7-b3fa-1b78752f9c4c>>

<sup>49</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/597b2351-370f-47d8-9fe2-5790fea554f3>>

<sup>50</sup> This recording can be retrieved at <<http://hdl.handle.net/2196/c86d87a9-ae95-4ecf-a4dc-714e6daf97d3>>

questions. Section 3.2 provides reflection on threads which ran throughout the questions. Section 3.3 suggests some actions I may take as a result of this exercise.

### 3.1 Summaries

**Social** The creation of the digital repositories was a labour rooted in the speaker communities. Their continued use has, thus far, not been as widely inclusive. Additionally, the digital repositories present distortions (in space, in time, in what information is available and how that information is encountered) that could impact community dynamics in multiple ways.

**Moral** In a time during which the Gorwaa, Hadza, and Ihanzu communities are undergoing rapid change, and with few privileges and protections afforded to their traditions, providing community members the opportunity to preserve aspects of their language and culture can be seen as a moral act.

However, the combination of open access and long-term preservation of materials raise issues surrounding unknown (and unknowable) effects into the future, as well as current issues associated with alienation of speaker communities from their languages and cultures.

**Ethical** Unequal access to the digital repositories associated with the digital divide present significant issues for ensuring that the materials can benefit the speech communities themselves.

At the same time, the materials are life-affirming and place individuals at the centre of meaning-making.

**Practical** The digital repositories themselves are expensive and complex. The expenses of attendant technologies used to access them aside, much of the cost to use them is borne by the archive itself, and therefore their use is free. Users are predominantly outsiders.

**Vocational** The creation and ongoing processing of materials collected in the digital repositories has spurred activities including the display of indigenous crafts, the performance of verbal arts, as well as the practice of Gorwaa, Hadza, and Ihanzu transcription and translation. Discussions of and experiments in valorising cultural work have been started.

The act of recording instances of indigenous crafts and verbal art, and then making them available openly into the future raises complex issues: the contributor gains recognition, but also is no longer in direct control over that material.

**Metaphysical** The equivalence of the digital repositories to the colonial museum is impossible to ignore.

At the same time, the mere existence of the digital repositories is a statement on the nature of the future, that – despite the ruptures that will come – there will be a future, and in that future, the contributions of the Gorwaa, Hadza, and Ihanzu people represented in these digital repositories will have value and meaning.

Further, the digital repositories become more valuable only as they are nurtured. Through the often slow, cyclical process of listening, transcription, translation, and further analysis, what is archived becomes richer.

**Political** The digital repositories have the potential to either encourage the sharing of power, or to encourage the concentration of power. Material is openly accessible, but the digital divide means that access is limited to those who can easily navigate the Internet. The materials themselves are plurivocal, but the control of the digital repositories rests virtually exclusively

with depositor (in the case of the Gorwaa, Hadza, and Ihanzu digital repositories, the depositor is the author). The contributions of the individual are recognised and forefronted, but at the same time all of these contributions risk misuse by bad actors.

**Aesthetic** The digital repositories encourage slow work, and are ugly containers filled with beautiful things.

**Ecological** The digital repositories produce both e-waste and carbon emissions. At the same time, they play a critical role in documenting indigenous knowledge about the land, wildlife, biodiversity, and ecosystem integrity.

Ecologically, their overall effects range between perpetuating colonial dynamics (including extractivism and power imbalances) to surpassing the colonial and allowing glimpses of what lies beyond (e.g. the interchange of values, the development of new epistemes). Ultimately, however, the digital repositories are emergent – their overall effects remain to be fully seen.

### 3.2 Common Threads

Across all of these subsections, several key ideas were repeated again and again. Here, I will mention some which stand out to me.

First, though the digital repositories are able to preserve recordings of language and voices of people, they cannot preserve language, nor can they preserve culture. To hold that digital repositories can do either of these things is to underestimate the inherent role of rich context in any system of meaning or communication. To hold that the digital repositories can serve as an equivalent to working with members of the speech community, or as an equivalent to physically being in the community will only serve to impoverish the result<sup>51</sup>. To hold that creating digital repositories of speech communities is an equivalent to working toward the long-term viability of these languages and cultures as spoken and lived traditions is to shirk the responsibility we have in the here and now toward real, living people. Digital repositories, however rich, can only be simulacra of the real thing.

Second, accessibility of the archived materials is at the heart of many of the issues associated with the digital repositories. If the archived materials are rendered accessible to the communities (or even the individuals) from which they came in a durable, useable, and appropriate manner, many problems could be addressed. This includes lessening the risk of alienating members of the speech community from both their language and their culture; mitigating power imbalances associated with who can use the digital repositories; as well as ensuring that members of the speech community can enjoy the beauty and richness of the materials they were central in creating.

Third, the digital repositories are new, and as such, their impacts on the speech communities are still largely unknown.

### 3.3 Actions

The technology that this work treats – the digital repository – is an increasingly central feature of documentary and descriptive linguistics, and it is hoped that the reflections herein will be useful to others who create and use digital repositories. However, because this work treats a very specific context – that is, of the digital repositories containing language and cultural material of the Gorwaa, Hadza, and Ihanzu peoples – rather than give general recommendations, I will instead outline several actions which I, as an outsider researcher interested in doing reclamational language work (Leonard 2021) with these communities, can undertake:

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<sup>51</sup> Using the digital repositories should not be seen as an *equivalent* to physical time spent with the communities, but may be used as an *alternative* to it. This could be appropriate, depending on the objectives of use and the cost (environmental, monetary) of face-to-face work.

Making the archived materials freely and easily accessible to the speaker communities. This could take several forms, including both those which focus on the digital repositories (improving metadata in the lingua franca Swahili, developing local Internet access points, etc.), and those which focus on the archived materials (creating locally-based archives (Meakins, Green, & Turpin (2018: 87), and O'Meara and Guadarrama (2016)).

Understanding how the digital repositories, as well as the archived materials they contain, can be used to support Gorwaa, Hadza, and Ihanzu language documentation, description, analysis, learning, teaching, and advocacy (Leonard 2021), as well as understanding why the languages are being used and transmitted less and less.

Committing to the slow (Stengers 2018), long-term, community-based work of processing materials in the digital repositories, learning from them, and in so doing honouring the languages, cultures, and communities from which they came.

## ETHICAL STATEMENTS

This study was conducted in strict compliance with established ethical principles, encompassing informed consent, the protection of participants' confidentiality, and due respect for local cultural values. Special attention was afforded to individuals from vulnerable groups to ensure their safety, comfort, and equitable participation. The research received no external funding, and the authors declare that no conflicts of interest exist. All data and information were collected using rigorous research methods and subsequently verified to ensure their accuracy and reliability. The application of artificial intelligence (AI) was confined solely to technical assistance in writing refinement and language editing, without exerting any influence on the scientific content of the study. The authors wish to acknowledge with gratitude the valuable insights provided by the participants and the constructive feedback offered by anonymous reviewers on an earlier version of this manuscript. The authors accept full responsibility for the content and conclusions presented here.

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