

Entanglements of digital technologies and Indigenous language work in the Northern Territory

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A thesis submitted for the degree of Doctor of Philosophy of

Charles Darwin University and the Australian National University.

November 2020

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Abstract

This thesis addresses the question of what happens when digital language resources are developed and become entangled with different types of language work in Indigenous languages of Australia's Northern Territory. It explores three specific sociotechnical assemblages, defined as heterogeneous sets of social and technical resources functioning together for various purposes. The types of language work that emerged were the role of language in practices of documentation, pedagogy and identity-making.

The three projects under consideration respond to different motivations: the *Living Archive of Aboriginal Languages* is a digital archive of endangered literature in languages of the Northern Territory, motivated by a concern for the fate of materials produced in bilingual education programs in remote schools. The *Digital Language Shell* is a resource for developing and mobilising curricula in Indigenous languages and cultures, motivated by a need for a low-cost and low-tech template for sharing content under Indigenous authority. The *Bininj Kunwok online course* is a specific implementation of the Digital Language Shell, teaching an Indigenous language of West Arnhem land in a university context. Each project was created by the author working collaboratively with different teams, to support various types of language work.


This PhD by publication offers a set of seven academic papers, each focusing on different aspects of the projects, and written for distinct audiences. The methods entailed iterative inquiry, as I reflected on my work as project manager in developing these digital resources, first addressing the technical and practical considerations, then through the lenses of various academic disciplines, and finally in a meta-analysis of the various heterogeneous elements that make up the research. The thesis emerges as an assemblage of heterogeneities – projects, papers, concepts, academic references, and auto-ethnographic stories – that is in itself a sociotechnical assemblage.

Signed statement

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying online via the University's Open Access repository.

Signed:

A handwritten signature in blue ink, appearing to be 'G. H. R.', written in a cursive style.

Date: 27 April 2020

Acknowledgements

This work was mostly carried out on the traditional lands of the Larrakia people, and I pay my respect to elders both past and present. I extend this respect to all traditional owners of the lands in which I have worked, particularly the Bininj peoples (Mirarr, Kunwinjku and others) of West Arnhem Land, and the Ngunnawal of Canberra.

This section may actually be the most enjoyable part of the whole process, as I take the opportunity to name at least some of the people who made this whole thing possible.

Firstly, thanks to the dream team of supervisors – I could not have wished for a better line-up. Across two universities and three cities, Michael Christie, Jane Simpson, Helen Verran and Susy Macqueen were incredibly supportive, patient and inspiring.

Secondly, all those who were involved in the various projects described here. For the Living Archive, thanks to Brian Devlin, Hina Siddiqui, Haidee McKittrick, Trish Joy, Melanie Wilkinson, Rebecca Green, Ailsa Purdon, Kathy McMahon, Susan Moore, Maree Klesch, Karen Manton, Anja Tait, Kerry Blinco, Anthony Hornby and his team in CDU Library, particularly Jessie Ng, Ujjal Kandel, Jerome Apresto, Glenn Boyling, Neil Godfrey and Jayshree Mamtora. For the Bininj Kunwok course and Digital Shell project, thanks to Murray Garde, Andy Peart, all the members of the Bininj Kunwok Regional Language Centre, Marcella Maloney, and all the learners who took part in the various iterations of the course.

Thirdly, to my colleagues at Charles Darwin University who have inspired and supported me over the years. Thanks to Ruth Wallace and the Northern Institute, particularly the amazing research support team, to Michaela Spencer and the wonderful TopEndSTS crew, Greg Williams and the AILI/TAIL-NT group, Steven Bird, Nori Hayashi, Johanna Funk, Fiona Shalley, Shelley Worthington, Linda Ford, Anthea Nicholls, and so many others who've made this a lovely place to work. And to colleagues at the Australian National University, particularly in CoEDL for inspiring conversations, and in CASS for patience with managing my complicated arrangements. Thanks to the Australian

Government Research Training Program (RTP) Scholarship program for their financial support for this research.

On a personal note, thanks to those friends who tolerated my whinging and self-doubt, and stuck with me throughout these last four years. Particularly Ruth, Emily, Liz, Vicki, Tali, Ro, and the Nightcliff BBQ mob in Darwin, for helping me to 'just keep swimming'. To Gij, Jehan, Clare and Nat – my BFFs in Melbourne who also stood by me from a distance. Thanks to the wonderful CMS/SAH team in Melbourne for their support, with special acknowledgment to the incredible Isabel Dale for her wisdom, insight and encouragement.

Finally, to my two families – my Bininj family, who adopted me and welcomed me into their Bininj world – my *kakkak* Ngalwakadj Jill Nganjmirra and my *yabok* Ngalkangila Seraine Namundja. And the Bows, who never really understood what I was doing, but loved me anyway. My parents Pat & Barry sadly didn't live to see me reach this milestone, but were always proud of anything I did.

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Presentation of thesis

This thesis is presented as a collection of seven academic papers based on three research projects. At the time of submission, four papers were published, two accepted for publication, and one under review Paper 7 has since been published. The candidate is the sole author for five of the papers, the co-authors for the other two have signed permission and indicated the shared contribution (see [Appendix 1](#)). Publisher permissions are in [Appendix 2](#). The publications are presented without numbering (as published) while the discussion chapters (1, 2, 10) are numbered for clarity.

Preface: Bow, C. (2018). The politics of language and technology. *Flycatcher - CDU Student Magazine*, 6(Wet Season), 31. (not peer-reviewed)

Paper 1: Bow, C. (in press). Technology for Australian Languages. In C. Bowern (Ed.), *Oxford Handbook of Australian Languages*. Oxford: Oxford University Press.

Paper 2: Mamtora, J., & Bow, C. (2017). Towards a Unique Archive of Aboriginal Languages: A Collaborative Project. *Journal of the Australian Library and Information Association*, 66(1), 28–41. <https://doi.org/10.1080/00049670.2017.1282845>

Paper 3: Bow, C., & Hepworth, P. (2019). Observing and respecting diverse knowledge traditions in a digital archive of Indigenous language materials. *Journal of Copyright in Education and Librarianship*, 3(1), 1–36. <https://doi.org/10.17161/jcel.v3i1.7485>

Paper 4: Bow, C. (2019). Diverse socio-technical aspects of a digital archive of Aboriginal languages. *Archives and Manuscripts*, 47(1), 94–112. <https://doi.org/10.1080/01576895.2019.1570282>

Paper 5: Bow, C. (2019). Collaboratively designing an online course to teach an Australian Indigenous language at university. *Babel*, 54(1/2), 54–60.

Paper 6: Bow, C. (submitted for review). *Identity work in teaching and learning Indigenous languages online*.

Paper 7: Bow, C. (2020). Sociotechnical assemblages in digital work with Aboriginal languages. *Learning Communities: International Journal of Learning in Social Contexts*, 26, 12–21.

Preface: The politics of language and technology

Bow, C. (2018). The politics of language and technology. *Flycatcher - CDU Student Magazine*, 6 (Wet Season), p.31. <https://flycatchermag.wixsite.com/flycatcher/single-post/2018/05/11/THE-POLITICS-OF-LANGUAGE-AND-TECHNOLOGY>

I have chosen to use this short reflection as a preface to the whole thesis, as it introduces some of the themes addressed in the rest of the research presented here.

The article was written for the Charles Darwin University student magazine as an informal reflection on an experience I had in February 2018 at a government-sponsored event which gathered a range of people working in Indigenous languages across Australia.

The paper is not peer-reviewed, nor written in an academic style, so should not be counted as one of the published papers of this thesis.

THE POLITICS OF LANGUAGE AND TECHNOLOGY

By Cathy Bow

"Digital technologies hold the potential for Australia's Aboriginal and Torres Strait Islander peoples to record, revive, maintain, celebrate and share languages today and with future generations."

*Senator Mitch Fifield, Minister for the Arts.
Foreword to the 2018 National Indigenous Languages Convention,
Gold Coast, 23 February, 2018.*

I recently attended the first National Indigenous Languages Convention on the Gold Coast, a forum for language workers and others to share innovative ideas "to inspire and motivate" and showcase "digital approaches that work." The event was part of the Commonwealth Government's additional \$10 million commitment over four years for protecting, preserving and celebrating Indigenous languages.

The invitation list for the event was a source of much conjecture and discussion. Was it just for Indigenous people and bureaucrats? I'd heard an early request to "keep the academics out" and comments about linguists "stealing our words." I'd had to argue for my invitation, as a non-Indigenous linguist and PhD student researching digital language resources for Aboriginal languages, so tried to keep my head down and observe the dynamics, as bureaucrats, policy officers, language authorities, and Indigenous leaders grappled with the affordances and challenges of technology for Australian languages.

The program itself was also a contested space, with a lack of transparency about which language projects were showcased and why. What I noticed about the presentations by language workers was firstly the range of attitudes to the affordances of digital technologies, from "we need to use mobile technologies because they're the new campfire where kids are sharing stories," to "not every language group wants a website." Secondly, the presenters didn't focus on the technologies themselves, but on what they facilitated for people—attention was always on how people can be equipped and enabled to record, revive, maintain, celebrate, and share languages. This often involves using digital technologies, but the tools are enablers, not agents. As one young participant said from the stage, "You don't revive language with an app, you revive language with people."

Yet the government had already decided to spend this additional funding on technologies. There is something alluring about the narrative of modern technologies 'saving' ancient traditional tongues. It makes for good headlines and photo opportunities, but vastly oversimplifies a complex story. Indigenous Australians have a long history of adapting new technologies to suit their own purposes, from trading implements with Macassans, to using colonial tools such as guns, 4WDs, and mobile phones. Those Indigenous Australian languages which have survived the ravages of colonisation have also adapted to the modern world, incorporating new words, and even new varieties to enable the continuing transmission of knowledge, maintenance of relationships, and caring for country.

But the aspirations of many of those working in the area of Indigenous languages expressed at this event were not to create the new technology that would 'save' their language. Again, the focus was on people, lobbying for more support for training language professionals, more career paths, ongoing support for language centres, and recognition of the less tangible outcomes

of language maintenance and revival—issues of empowerment, identity, and well-being that are harder to match to key deliverables.

One of the Indigenous language workers at this event commented, "We need to frame 'language' differently—the word doesn't express what we mean." For many Australians, especially those who subscribe to the 'monolingual mindset,' language is simply a means of communication, a form of technology in itself that facilitates other things. This implies that languages other than English are either a luxury (akin to doing ballet classes) or a problem (that reduces NAPLAN scores, and requires interpreting and translating services). But when Indigenous people talk about languages, they're actually talking about land, law, health, well-being, relationships, justice, identity, culture, and connection to country. When language is gone, it's like having the land stolen all over again.

The narrative of those who consider language as something to be 'captured' crossed paths at this event with those who consider it something to be 'enlivened.' Like technologies, languages are not the end in themselves, but rather what they enable for people. There was a concern that shifting the agency in language maintenance and revival to digital technologies could bypass people altogether—why invest in teachers or language authorities when an app can preserve language for longer and share it further than any individual?

These tensions over the role and power of technologies and languages created an interesting dynamic, keeping everyone agreeing and disagreeing. While the program was set up to create conversations on particular topics in particular ways, the really interesting and productive work was happening completely in parallel to those structures, including the gossiping and grumbling as much as the networking and schmoozing.

The whole process reminded me of the First Nations National Constitutional Convention held at Uluru in 2017, where the government invited key Indigenous representatives to meet together to discuss and agree on an approach to constitutional reform to recognise Aboriginal and Torres Strait Islander peoples. The clear message that came out of that meeting, known as the Uluru Statement, was then summarily rejected by the government with a very Aussie response of, "Yeah, nah." The message that came out of this language convention was that digital technologies are an important component in the work of language maintenance and revival, but they are not the solution. Was this message heard, or is it another case of consultation being performed without actually changing practice?

Cathy Bow is a PhD student at CDU in the College of Indigenous Futures, Arts, and Society, jointly enrolled at the Australian National University.

Chapter 1: Introduction and outline

SECTION 1 Introduction

1.1 Overview

This thesis seeks to respond to the question of what happens when particular digital technologies become entangled with different types of language work in Indigenous languages of Australia's Northern Territory (NT).

Efforts made to document, archive and preserve Indigenous languages are based on certain assumptions about the nature of language. The use of digital technologies adds new layers of possibility, through aiding production of a range of language resources, such as recordings, texts, dictionaries, videos, etc. These components can then be assembled into larger infrastructures such as databases, archives and pedagogical websites. These infrastructures are forms of sociotechnical assemblage, defined here as heterogeneous sets of social and technical resources which perform and enable various types of language work.

Rather than attempting to explore the large range of digital technologies currently in use in support of Australian Indigenous languages, I focus on three particular digital language infrastructures that I have worked with – the Living Archive of Aboriginal Languages, the Digital Language Shell, and the Bininj Kunwok online course.

My work with these projects raised many questions and revealed many tensions as I grappled with the contingency and situated nature of the digital infrastructures being created. The data presented here involves my lived experience as project manager on these projects, the emergence of particular types of language work and the relationships between

them. The research has been an iterative process, with different levels of inquiry, and is presented here in different ways: sometimes ethnographically, sometimes theoretically, sometimes descriptively.

The thesis comprises seven academic publications produced as I worked on these three digital language infrastructure projects. The published papers are aimed at specific audiences from a range of disciplines – librarians, archivists, language teachers, technologists – each addressing different aspects of the projects. The research is necessarily transdisciplinary, crossing language documentation, digital archiving, information management, online language teaching and learning, Indigenous knowledges and digital humanities, as I consider the between-world processes of many kinds that help to look beyond disciplinary notions that can lead to decontextualising or limiting the research to particular academic domains.

I draw on some analytic concepts from the field of Science and Technology Studies (STS) which I found useful, particularly ‘assemblages’, ‘heterogeneities’ and ‘sociotechnology.’ Simply put, an assemblage is “a mode of ordering heterogeneous entities so that they work together for a certain time” (Müller, 2015, p. 28) . The heterogeneous entities (or heterogeneities) may be anything from books to digital artefacts to people to places to concepts, and a sociotechnical analysis rejects the distinction between the ‘social’ and the ‘technical’, seeing them as completely entangled and mutually constitutive (Law, 1990). These concepts are explored in more detail in the following chapter.

The word ‘entanglement’ is used deliberately here, as a way of introducing a sense of ‘mess’ and lack of structure. Where the idea of assemblages suggests order and purpose

with an intentionality of design, the notion of entanglements highlights the messiness of such collections of heterogeneous elements, but without implying chaos or lack of care in design. When understood as such, entanglements can help to identify some hidden or unexpected outcomes.

In my research working in technology development for archiving and pedagogy, and through the iterative research process of writing academic papers, three types of language work – understood as ‘things that people do with language’ – emerged.

- The type of language work that involves documentation, including developing and managing resources for language analysis and study, work which is most often found in formal education and the academy
- The type of language work that involves community knowledge, governance and culture, which includes various pedagogical practices, and concepts of ownership, both internal to the speech community and also in engagement with outsiders
- The type of language work that involves generating, regenerating, managing and negotiating identity within and among language communities

This typology is not meant to be comprehensive, as clearly there are many other types of language work, nor are these mutually exclusive. These three types of language work are summarised as ‘documentation’, ‘pedagogy’ and ‘identity’.

In the remainder of this opening chapter I will briefly introduce the three projects under consideration (which will be further detailed in the following chapter), and establish my research persona. Then through the use of auto-ethnographic stories (presented here in a different font), I describe some of the disconcertments I felt as I went about my work on

these projects, and use these to explore the different types of language work that emerged. I then describe my methodology of iterative inquiry, and go on to outline the remainder of the thesis, describing how these different types of language work emerge in the papers that follow. Throughout the chapter I pivot between ethnographic storytelling, reflection and academic writing to present different lenses through which to view the research.

1.2 Introducing the three projects

I was employed at Charles Darwin University (CDU) as project manager for three projects to support the ongoing maintenance and transmission of languages through archival and pedagogical practices. They are briefly introduced here to give context to this chapter, before being described in more detail in the next chapter, along with the academic contexts in which they are situated.

1.2.1 *The Living Archive of Aboriginal Languages*

The Living Archive is a digital archive of endangered literature in Indigenous languages of the Northern Territory. The project was developed in response to a concern for the fate of printed materials produced for vernacular literacy in bilingual programs at remote NT schools since the mid-1970s. Thousands of booklets were collected, digitised, and made available on an open access website, with the consent of the copyright and moral rights holders. There are now approximately 5000 items in 50 languages, around two-thirds of which are publicly available through the open access website at

<http://laal.cdu.edu.au/>.

Living Archive of Aboriginal Languages

A digital archive of endangered literature in Indigenous languages of the Northern Territory

Home Map Place Language People Books

Home > Books

137 books



MAKÉDDJA KAKKÓYA RÁNBA
Djibáma
Makédjja Kakkóya Ránba
Djibáma, Kim
Ndjébbana: English
Maningrida



Kirijini Jarrakalani
Kirijini Jarrakalani
Kerinaia, Marguerita
Tiwi: English
Ngulu (Wurrumiyanga)



Nyiring Leyhmay Wurruyung?
Nyiring leyhmay wurruyung?
Galmur, Judy; Katherine, Margaret
Jawoyn: Kriol; English
Barunga



Makédjja barrúra barra-ngódjbara-nja
Makédjja barrúra barra-ngódjbara-nja
Ndjébbana: English
Maningrida



Lilboi en tetul
Lilboi en tetul
Kriol; English
Barunga



Garriwa
Garriwa
Burarra: English
Maningrida



Barraróddjiba Njanbiridjórrika Ránba
Barraróddjiba njanbiridjórrika ránba
Wilton, Monica
Ndjébbana: English
Maningrida



Al-mangiyi Garri-meyh
Al-mangiyi garri-meyh
Galmur, Judy
Jawoyn: English
Barunga



Kaddikkadda n-barrábarra karrabba nga-nangáddjeya
Kaddikkadda n-barrábarra karrabba nga-nangáddjeya
Mamanyi, Melanie
Ndjébbana: English
Maningrida



Karri Ngawa Ngintrikrimi Japuja Kukuni
Karri Ngawa Ngintrikrimi Japuja Kukuni
Kerinaia, Marguerita
Tiwi: English
Ngulu (Wurrumiyanga)



Murrinh Ku Menti
Murrinh ku Menti
Bunduck, Kumyep
Murrinh-Patha
Wadeye (Port Keats)



Muka Dhawal Dhukarr Mojuklilyndja Gapuli?
Muka Dhawal Dhukarr Mojuklilyndja Gapuli?
[Beattie, Pat]
Djambarrpuygu: Yolgu Matha [multiple languages]



Bidjja Djúrra 2
Bidjja Djúrra 2
Ndjébbana: English
Maningrida



Ja iŋŋap Manpiri
Ja iŋŋap Manpiri
Text by
MAGUIF: MARJAL CLAI &

Filter

Author (72)

- 7 Kelantumama, Magdalen
- 7 Kerinaia, Marguerita
- 5 Brennan, Queenie
- 5 Lalara, Gula

Place (18)

- 36 Maningrida
- 24 Ngulu (Wurrumiyanga)
- 12 Barunga
- 12 Milingimbi

Category (6)

- 67 Narrative
- 22 Language instruction
- 19 Instruction
- 14 Traditional

Illustrator (55)

- 8 Puruntatameri, Ancilla
- 7 Westblade, Brett
- 6 Kerinaia, Fiona
- 4 Kerinaia, Marguerita

Language (32)

- 101 English
- 25 Ndjébbana
- 24 Tiwi
- 17 Yolgu Matha [multiple languages]

Figure 1 (Ch1.1): Screenshot of browse results from Living Archive of Aboriginal Languages

1.2.2 The Digital Language Shell

The Digital Language Shell is an online template developed to support Indigenous groups to share their language and cultural materials under Indigenous authority. Using freely available tools, the Shell was developed as a low-cost and low-tech means of curating and sharing materials for various pedagogical purposes. It is available at <https://language-shell.cdu.edu.au/>.



Figure 2 (Ch1.2): Screenshot from Digital Language Shell home page

1.2.3 Bininj Kunwok online course

The Bininj Kunwok online course was the first instantiation of the Digital Language Shell, allowing Australian tertiary students to study an Indigenous language online. Developed in collaboration with members of the Bininj Kunwok Regional Language Centre, the course focused on the Kunwinjku language of West Arnhem Land in the Northern Territory. An initial pilot program of four units involved over 100 volunteer learners in 2016, and this course was later extended into a full semester course delivered across two universities for the first time in 2019.


Bininj Kunwok

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Bininj Kunwok Online

Charles Darwin University and the Australian National University, in conjunction with the Bininj Kunwok Regional Language Centre, are pleased to offer this online course.



Kunwinjku is an Australian Indigenous language spoken by around 2000 people in West Arnhem Land, Northern Territory. It is part of the family of languages known as 'Bininj Kunwok' – 'bininj' meaning 'people' and 'kunwok' meaning 'language'.

Students are welcome to enrol in this unit for credit through the Australian National University or Charles Darwin University in Semester 1, 2019

The course descriptions are generic for learning an Indigenous language, but in Semester 1, 2019 the language being studied is Bininj Kunwok (Kunwinjku)

Figure 3 (Ch1.3): Screenshot from home page of Bininj Kunwok online course

All three projects are collections of heterogeneities, brought together for various purposes. Different types of language work are evident in the projects. The Living Archive re-presents materials produced in particular contexts for pedagogical and identity-making

purposes which also serve as forms of documentation. The Digital Language Shell creates space for Indigenous people to present their own accounts of how identity and pedagogy are pursued through language with the presentation of various kinds of linguistic and cultural elements (curricula, grammatical explanations, multimedia objects, songs, kinship charts, etc). The Bininj Kunwok online course presents as a pedagogical tool, displaying a range of objects presenting linguistic data to be mastered, which also performs significant identity work for both the designers and the learners.

1.3 Understanding 'language'

Yolngu have often said: The land is made out of language, language comes out of the ground, and history stays in the place where it is made. Everything we can recognise is made out of language. Everything we say contributes to the ongoing creation of a knowable world, a world we can share together. (Christie, 2001, p. 34)

For Indigenous Australians, language is inseparable from the land from which it emerges (Christie, 1993, 1994; Christie & Perrett, 1996; Evans, 2001, 2011; Merlan, 1981). According to Christie, for Yolngu “neither the shapes of the world nor the shapes of its languages are ontologically prior. They are co-extensive and co-constitutive. This is a striking metaphysics when we compare it to a view of language as representing an objective pre-existing reality, which generally underpins our European philosophy of language” (2007, pp. 57–58). As such, language is not simply a communicative system but a key component of being a person in place.

Rather than considering language as an *a priori* category, representing an objective reality that can be captured and analysed, it is helpful to view it as emergent and

constituted in the everyday here-and-now life, and as such is constantly in flux. This approach modifies and moderates the common practice of treating language as a found object which is somehow separable from other aspects of life, and enables work with the entanglements of language and technology that emerged within my own research.

Much of the academic writing on Indigenous languages comes from non-Indigenous researchers, however there are some attempts by Indigenous authorities to express these alternative conceptions of language in English for academic audiences (Bell, 2007, 2013; Boyukarrpi, Gayura, Madawirr, Nunggalurr, & Waykingin, 1994; Marika-Mununggiritj & Christie, 1995; Williams, 2011; Yunkaporta, 2010; Yunupingu, 1996). Indigenous voices were incorporated in submissions to the 2012 parliamentary hearing on Language Learning in Indigenous Communities (House of Representatives Standing Committee on Aboriginal and Torres Strait Islander Affairs, 2012). An example comes from an Arrernte elder:

Words are given to us by the land and those words are sacred. What does it mean to an Aboriginal culture? The land needs words, the land speaks for us and we use the language for this. Words make things happen—make us alive. (Amelia Turner, cited in House of Representatives Standing Committee on Aboriginal and Torres Strait Islander Affairs, 2012, p. 10).

Use of the term 'language' throughout this research should be seen as a kind of shorthand for an intricate entanglement of competence, performance, ownership, social meaning and value, which is produced and reproduced in complex linguistic ecologies of bi- and multilingualism, incorporating code-switching and translanguaging, in home situations and educational contexts. The term 'language owners' is used here, sometimes interchangeably with 'language authorities,' though they are distinct ideas – for example a child could be a language owner but not a language authority. Most often I use the term

'Indigenous languages' to refer to Aboriginal and Torres Strait Islander languages, though in some cases the term 'Aboriginal languages' is used when referring to language groups of the Northern Territory where use of Torres Strait Islander languages is very limited.

In using the term 'Indigenous', I am cognisant of the risk of generalising or totalising my understandings of the myriad perspectives of Indigenous Australians. As a non-Indigenous researcher, I do not claim to speak for Indigenous Australians – my research is based on working with colleagues mostly from the Top End whose traditional languages are still in use, and much of my reading relates to similar contexts. My main interactions have been with Bininj of West Arnhem Land, and Yolŋu of North-east Arnhem Land, who have managed to maintain many aspects of their traditional language and culture, and therefore whose perspectives may differ significantly from those of other groups who have suffered greater destruction of their language and culture due largely to colonisation.

SECTION 2 Auto-ethnographic stories of language work

Auto-ethnographic story-telling is an approach I mobilise as an initial technique for opening up possibilities for interrogating my own assumptions and how they have been challenged through my engagement with Indigenous knowledge practices.

This initial story sets up my identity as a researcher, and the ideas I brought with me to the role which led to this PhD. Later, a set of three stories show some of the ways in which these ideas were challenged throughout my research, so identifying my 'starting point' opens up space to explore the shifts in my understanding.

2.1 An autoethnographic research origin story

Alice Springs, February 2012. *I'm on my way to Darwin to start a one-year contract as a project manager for the Living Archive of Aboriginal Languages at Charles Darwin University. Though I've visited Central Australia a few times previously, this will be my first experience of the Top End.*

My flight from Melbourne to Darwin includes a stop-over in Alice Springs. As often happens after a flight, there's a queue in the ladies' toilets. As I wait my turn, my heart swells as I hear the sound of Indigenous languages being spoken around me. As a linguist with a strong interest in Indigenous and endangered languages, it feels like a special privilege to hear such language use 'in the wild'. I've heard Indigenous languages before of course, but this may be the first time I've heard them spoken in such a mundane context – it's not a formal Welcome to Country, or a recitation of a traditional story, or an example of a particular grammatical structure – for all I know the ladies may be discussing how much toilet paper is in the stalls, or who's picking them up from the airport. It doesn't even matter, the fact that they are using their languages gives me an unexpected thrill.

So much of my experience of Indigenous languages has been based on language documentation – a brief stint in outback NSW working with local Wangkumara people wanting to bring to life their heritage language which now only 'existed' in the form of a published grammar and dictionary from the 1980s. I also did some home-based contract work for a language centre in WA, where I was sent

files of language data that I would structure into a database format. But linguistic data is very different from language in use, a lesson I would come to appreciate more in my new position.

I'd already experienced some of this tension, when all my academic training in linguistics only partially prepared me for two years of fieldwork experience in central Africa as a graduate intern with SIL. In the hot, dry Sahel area of northern Cameroon, I was constantly challenged by the 'rawness' of the data I elicited which would form the basis of my phonological description and analysis of the previously unwritten Chadic language of Moloko (Bow, 1997a, 1997c, 1997b), which later became the focus of my Masters thesis at the University of Melbourne (Bow, 1999). Collecting linguistic data for analysis from native speakers was very unlike my experience solving linguistic problems with neatly curated data at university. The results of my analysis seemed so dissociated from the active collective and embodied language work of the Moloko people with whom I'd been working.

The new job in Darwin looked like it would combine my interest in Indigenous and endangered languages with my emerging interest in technology. Following my time in Africa, I'd worked in a computer science department exploring linguistic tools for documentation of endangered languages (Bow, Hughes, & Bird, 2003; Gibbon, Bow, Bird, & Hughes, 2004; Hughes, Bird, & Bow, 2003; Penton, Bow, Bird, & Hughes, 2004). This work did not turn me into a computer scientist, but it did produce a number of papers co-authored with computational linguists and exposed me to a range of technologies used to support language

work in this space. My later work as a research assistant-cum-project manager to create an online resource to help international medical graduates with communication skills in English (Bow, Woodward-Kron, Flynn, & Stevens, 2013; Woodward-Kron, Fraser, Pill, & Flynn, 2015) further fuelled my interest in the affordances of technology for various kinds of language work.

The other interest I bring to my new role is in language learning and teaching. As well as a few years teaching English language intensive courses to international students, I've been helping Christian missionaries learn new languages to work in cross-cultural contexts since returning from Africa. These days I'm involved in an intensive course called Missions Interlink Language Learning (MILL), which presents a methodology focusing largely on building relationships through language learning, involving strategies and activities working with a 'language helper' (Bow, 2012). This approach sees language learning as a social activity rather than an academic one, using oral rather than literate methods, which can be confronting to many who studied a 'foreign language' at school in Australia but rarely learnt to use the language for actual communication. Previously I'd facilitated two MILL courses in Alice Springs supporting people learning Indigenous Australian languages and noted significant differences – not just linguistically but in the way the Indigenous language helpers we worked with engaged in the process of sharing their language. Language seemed to be more than the words that came out of their mouths, but more closely linked to their identity than I'd experienced previously,

and their pedagogical approach didn't seem to recognise 'language' as a separate object that could be 'learned.'

This project in Darwin looks like a good way to combine my interests in both language and technology, with a focus on Indigenous Australian languages. I haven't done the hard yards of living and working in a remote Aboriginal community to get a better understanding of life in that context. I'm acutely aware of my privilege, as a non-Indigenous, settler-colonial, middle-class, well-educated woman, though not fully aware of how these characteristics will inform and impact my work. Standing in the queue for the ladies' toilet at Alice Springs airport on my way to Darwin, though delighted by the sound of Indigenous languages being spoken, I have no idea what to expect in my new role. And anyway, it's only a 12-month contract, how bad could it be?

2.2 Using auto-ethnographic stories

When beginning to think about language work and digital technologies, I found that I needed to unsettle some of the assumptions I brought with me around technology being a panacea for language endangerment, or being the 'solution' for language owners to share their language and knowledge practices with younger generations and with interested outsiders, and that preservation, reconfiguration and sharing language would be an undisputed good. Using auto-ethnographic stories as an analytic method allows me to open up a range of issues and possibilities which confronted me in my everyday work. Situating such knowledge work in everyday activities, interactions and reflections brings a particular

perspective from which to explore implications and shifts and the impacts on my own thinking and research.

According to Winthereik and Verran, “ethnographic stories have in them a capacity to re-present the world in ways that are generative for the people and practices that the stories are about, as well as for the authors and their academic collectives” (2012, p. 37). Some of the stories involve ‘disconcertment’ which “is experienced as a moment of existential panic—being suddenly caused to doubt what you know” (Verran & Christie, 2013, p. 53). In their analysis of a collection of ethnographic stories of disconcertment around working with different knowledge systems in the NT, Verran and state:

We see our stories revealing new ideas and ways to do difference collectively as they emerge from collective action. We see how new ways of going forward together depend upon the coming together of diverse and unusual subjects, objects, and settings. We focus upon how these new energetics disconcert, contradict and transform our thoughtless assumptions. Stories have a special ability to clarify the character of their participants (ourselves, we hope, especially), their histories, desires, imaginations, their psychological and emotional states, their aesthetics and their entrenchedness, as well as their searches for the new and the different. Through narratives, the ethnographer introduces and engages unusual and nonhuman participants. (Verran & Christie, 2013, p. 55)

In this section I narrate three auto-ethnographic stories taken from my experience working with Indigenous people in the development and delivery of the three digital language projects. Through these stories I draw out three different types of language work that emerged in my practice. In recounting how my assumptions about language were challenged in specific instances, I expose these assumptions, and open up a means of analysing them. The types of language work described in these stories did not come from

theory, but from my first level of my inquiry, as I went about my work developing digital resources for Indigenous language work.

2.2.1 Man bites dog

Darwin, January 2018. *I'm trying to write a clear explanation of some aspects of Kunwinjku grammar for the Bininj Kunwok online course. So thankful that I have access to the learning guide "Kunwinjku Kunwok: A Short Introduction to Kunwinjku Language and Society" (Etherington & Etherington, 1998). It's a wonderful resource, written by the local missionary who developed fluency in the language, and it's written for non-Indigenous learners, so it often gives careful explanations of some of the grammatical differences that can trip up English speakers. I'm very conscious of my deficiencies as a learner of Kunwinjku language, relying heavily on this book for explanations, sometimes even just copying and pasting huge chunks into the online lessons (with attribution of course).*

I come across an example that I think would be useful to include. On p139, in a section at the end of the book describing "Differences between English and Kunwinjku" Etherington explains word order in Kunwinjku:

Word order

In English word order tells who did what to whom: *the dog bit the man*, *the man bit the dog* only differ in the order of words. In Kunwinjku a prefix on the verb specifies who did it to whom. So regardless of word order, we know who did the biting. Both these sentences mean “the dog bit the man” despite word order. (There are complex rules that govern the way word order can change in Kunwinjku, so the following examples do not mean that Kunwinjku has “free word order”. No language does. They just show that word order doesn't dictate the way participants are involved in the action of a verb.)

Duruk bibayeng bininj.
Bininj bibayeng duruk.

Figure 4 (Ch1.4): Screenshot from 'Kunwinjku Kunwok', p.139

This makes perfect sense to me linguistically, I know duruk is 'dog' and bininj means 'person' or 'man', so obviously there's something in the verbal word bibayeng that indicates who does what to whom. But I'm not too strong on verbs yet in Kunwinjku, I know it's possible to pack a lot of information in each one, with various prefixes and suffixes containing all sorts of grammatical and contextual information. My question is, how do you swap the subject and the object? If these two sentences both mean 'the dog bit the man', then how would you say 'the man bit the dog'?

I regularly work with a Bininj colleague, an experienced translator and language worker, who is very insightful about language. During one of my regular sessions with Jill, as we record words and discuss resources for the course, I raise the question.

“Duruk bibayeng bininj - that means 'the dog bit the man,' doesn't it?”

“Yo.” [yes]

“So how would you say ‘the man bit the dog’?”

She looks confused. I try again.

“What does Bininj bibayeng duruk mean?”

She hesitates to answer - is it because she knows it means the same as the previous sentence, and she’s questioning how to explain how that could be the case?

I write the two sentences out, making it easier for me to point to the words and clarify the meaning, rather than talking abstractly.

“Do these two sentences mean the same thing?”

I recall the linguist Murray Garde beginning to explain to me the complexity of the verbal word in Kunwinjku. Not only are there different prefixes for who’s doing the action, but an additional set of prefixes to show one actor doing an action to someone else, with a whole hierarchy of animacy that determines which pronoun form goes on the verb. The two volume grammar (Evans, 2003) includes several pages on this hierarchy, where a human is ‘higher’ than an animal, but ‘lower’ than a spirit being, which determines the form of the pronoun prefix used. I’m not expecting Jill to explain all this to me, I just want to know how to swap a subject and object form in a simple sentence.

She tries to help, by telling me a story.

“So maybe there’s a house, and there’s a cheeky dog there. So you need to be careful when you walk past in case that dog comes to bite you.”

I should have learnt this technique by now, that Bininj prefer to consider a concrete example, a situation in the world where the something is true. I appreciate her story, but it’s not what I need. I try to ask again.

“What if it’s the other way around, what if the man was biting the dog?”

I don’t think she can come up with any kind of story to illustrate that sentence.

We both end up frustrated, and I move away from grammar to a new topic.

2.2.2 Language in documentation practices

This story evidences two different attitudes to language – my own, as a Balanda (non-Indigenous) linguist trying to analyse and understand a particular grammatical structure, and that of a language authority struggling to separate the grammatical structure from an actual situation in the world. Such dialogues are common for linguists in elicitation practices, with a similar story reported in Bower (2008, p.85). The story reveals the type of language work involved in documentation, seeing language as an object of study, which does not resonate with the Indigenous perspective where there is no distinction between talk and action, "things in the world" and ways of talking about them (Christie, 1994). This distinction is less evident for English speakers for example, where a monolingual English speaker may struggle with the concept of a man biting a dog, but is unlikely to struggle to produce the phrase. This experience also highlights the importance of story when negotiating knowledge, as this was the way my colleague tried to explain something to me,

and situates the kind of respectful collaborative work we were negotiating in establishing the language course.

In my focus on eliciting and elaborating grammatical insights in my discussion with Jill, I was engaging with language in documentation – viewing it as a series of rules and structures which could be broken down and reconstructed, and consequently taught to learners. The fact that I could find a phrase like ‘the dog bit the man’ translated into Kunwinjku in a learners’ guide indicates that someone had already done that analysis of language as an object and presented it in a form that I could consume. This made little sense to Jill, whose philosophy and experience of language was that it builds a knowledge community in the social world. She struggled to envision a situation in the world in which a man bit a dog, so she wasn’t thinking about language as an abstracted form, she was trying to find a world in which that situation was true so that she could express it in Kunwinjku.

In my work in each of the language projects, I was able to identify the knowledge practices which support the work of language in documentation. In the Living Archive project, I was taking paper artefacts and turning them into digital items for different forms of delivery. In the Digital Language Shell, I was creating a platform for sharing various resources, where language practices had already been documented and packaged as data in various forms. In the Bininj Kunwok project, I was identifying those resources for a particular language that could be used for pedagogical purposes, selecting the products of language documentation that should populate the course.

This experience opened up to me the need to take seriously the language-in-the-world aspect of Bininj understandings of language as a way of relativising my own concerns for

structures and rules which are internal to the language structure. The disconcertment involved in this realisation shifted my perspective on language, and in the papers in this thesis, I can see a shift in my own thinking from focusing on the work of language in documentation to incorporating other types of language work.

The next story extends this tension further, from dealing with one language authority about 'grammar' to dealing with a group of language authorities about 'curriculum.'

2.2.3 Runs in the family

Gunbalanya, March 2018. *The shire council meeting room is a cool haven from the oppressive humidity outside, though somewhat noisy with all the fans and air conditioning units running. It's the biennial meeting of the Bininj Kunwok Language Project Reference Group, which is about to become the Bininj Kunwok Regional Language Centre. Much of the meeting was taken up with discussion about the structure of the new language centre, about membership, directors, names, objectives – lots of whitefella requirements for this new legal entity.*

Then it was my turn to speak. In previous meetings I'd shared about the Bininj Kunwok online course we'd piloted in 2016 with very positive feedback from the learners, and I reminded the committee by showing some of the lessons and resources on the big screen. Some in attendance were aware of the project, as they'd all had input in previous meetings, but I knew it wasn't particularly salient to the group. The idea of Balanda (non-Indigenous people) who live thousands of kilometres away from West Arnhem Land sitting at their computers learning about Bininj Kunwok even strikes me as odd in this context.

We've been invited to expand the 4-unit pilot course to a full course for a 12-week university semester. Is the committee happy to do that? Murmurs of 'kamak, yo' indicated approval. As we did when we created the first set of lessons, I wanted to know the committee's ideas for what other topics should be covered. We already had lessons on introducing yourself, talking about family, coming and going, and how to stay safe and show respect. What do they think Balanda should know about when they come to Gunbalanya or any other Bininj community?

I got no response. It had been a long meeting and we were all getting tired. I was careful to speak slowly and clearly, not using difficult language or idioms. Murray Garde, the non-Indigenous linguist and instigator of the language centre was able to help out and translate into Kunwinjku when needed. I started offering suggestions, like maybe we could talk about 'country', about 'land', about manme (food) ... Murray said manme would be a good one, then Jill said 'yo, manme dja mayh' (plant food and animals), so I wrote that down.

More silence as I waited for further response. I proposed some more ideas: would they like to teach people about the land, the country, 'stone country' – Murray suggested kunbolok (trees) and gave some other words which I duly wrote down. More silence. I suggested 'seasons', Murray translated and gave examples for the committee. I mentioned 'body parts' and 'health', which Murray already has some resources we can use. Still waiting in vain for suggestions from the committee, I suggested 'art' – we could go to Injalak Art Centre and make some videos of Bininj artists talking about their work there.

It was clear to me that Murray and I were doing all the heavy lifting in this interaction, the committee either didn't understand what I was asking for, or had no interest in providing answers. Surely it must be time for lunch?

I tried asking the question a different way. What other things do you think Balanda should know about when they come to Gunbalanya, what do you need to teach them so they behave the right way? Ngabangardi started telling a story in Kunwinjku, but I could only pick up some English words:

“at the clinic ... locking up the doors ... one toilet ... diarrhoea ... what if poison cousin or brother is there? ...”

The other Bininj nodded in agreement, apparently also aware of the issue. The woman continued,

“They don't want to listen to us, ‘excuse me, I got diarrhoea, can I use the toilet?’ while that person is there, because sometimes they think, the receptionist thinks they know everything about the situation. Inside only, outside locked, if they don't want people using the inside one, why don't they fix up the toilet outside?”

I realised that the story was answering my question, but not in the form I expected. I duly noted ‘avoidance relationships’ as a topic that needed to be included in the course.

2.2.4 Language in pedagogical practices

This story describes a similar disconcertment where I as a linguist attempt to carve up language content in a way that is unnatural to the language owners, and how their story of

an actual situation in the world generated an answer to my question. This relates to the role of language in community knowledge, culture, and knowledge transmission – summarised here as ‘pedagogy’.

In my misguided attempt to elicit abstract concepts as possible frames for teaching language, I realised (again) that my Bininj colleagues do not separate language from everyday life, but that it is an inherent part of teaching appropriate behaviour, and this was the pedagogical imperative. Rather than trying to find an objective ‘topic’ of study for the language course, the Bininj authorities considered specific situations in the world in which people needed to learn how to behave properly and respectfully.

Learners of Kunwinjku would need to understand the complexity of the kinship system in order to avoid shameful experiences such as that witnessed at the clinic. In Bininj society, identity is established through a number of processes including the skin system and kinship relations (explained briefly in Papers 5 and 6) which imposes rules about specific kin relations who must be avoided. This is not an abstract concept, but plays out in specific situations such as the one described by Ngalbangardi, where a lack of understanding of such rules on the part of the non-Indigenous staff at the clinic caused a situation which created shame and potentially damaged relationships. If a patient in the clinic needed the toilet, they would feel shame if they had to speak about such personal matters in the presence of certain kin. The implication of the story was that if the receptionist had understood the importance of avoidance relationships, she would have recognised the necessity of making the outside toilet available to circumvent such a situation.

The role of language in pedagogical practices incorporates various kinds of community knowledge and governance and how these are produced and reproduced. Language (when transformed into data as a form of documentation) can be repurposed for pedagogical purposes. For example, books created for particular contexts (e.g. bilingual education programs) can be repurposed for new pedagogical contexts when accessible online, including for teaching language to non-Indigenous learners. With regard to the creation of the Digital Language Shell, the online template needed to be sufficiently 'innocent' and flexible to enable different types of pedagogical work – through stories and texts and images and audio and grammatical explanations, and the Bininj Kunwok course mobilised this by incorporating Bininj pedagogies (see Paper 7 for further discussion).

The next story shifts the focus to identity, where engaging with language authorities always begins with a relationship, and how these play out on the ground.

2.2.5 Family matters

Darwin, March 2012. *I'm in a classroom at Charles Darwin University, as a student in the 'Introduction to Yolŋu Languages and Culture' course. I'm very new to Darwin, and excited to have this opportunity to learn about one of the languages of the Top End. We're talking about skin names, and how everyone in a Yolŋu community fits into the complex kinship structure and is identified by one of eight names – four from each moiety, with variations for male and female. Like in many Australian Aboriginal communities, the kinship system is both classificatory and actual, for example a person may have several 'mothers' beyond just their biological mother, and person may be incorporated into the*

system without any genealogical affiliation. It is important to know who someone 'is' in order to speak to and relate to them appropriately. Some students in the group already have skin names from their work in Yolŋu communities, the rest of us need to be given them so we can do the task of introducing ourselves in Gupapuyŋu for the first assignment.

Galiwin'ku, June 2012. *I'm sitting on a mat outside someone's house with a few older Yolŋu ladies, talking about the Living Archive project. I'm explaining how we'd like to put those old books from the Literature Production Centre on computer, and asking who could give permission for particular books. As we chat, one of the ladies asks me "You got a skin name?" I proudly respond, "Yes, I'm Wämuttjan." She asks "Who gave you that name?" I'm a bit stuck for an answer – how can I say it was randomly allocated to me in a classroom so I could do an assignment? Hesitantly I give the name of the Yolŋu teacher who presented some of the course content. The ladies on the mat confer – "well if she gave you that name, then you must be my waku, and this lady is your märi." I dutifully learned who each one was, and tried to remember what to call them, but felt deeply uncomfortable that my skin name wasn't given appropriately, so the connections these ladies were identifying didn't really belong to me.*

Darwin, September 2016. *I'm in the Indigenous Researchers' Room at CDU, working on the Kunwinjku language course with my two Bininj colleagues. We've been working together on and off for a few months on resources and curriculum for the pilot Kunwinjku course, recording vocabulary, reading stories from the Living Archive, making videos, etc. We're talking about skin names and how they*

should be introduced in the course materials. I comment that it's a bit strange that I've been working with these two ladies for some time but I don't have a Bininj skin name. Immediately, the younger one says "You're my sister, Ngalkangila, you call me yabok." She points to the older lady alongside her and says to me "She's our grandmother, you call each other kakkak." From that moment, the dynamic between us changed. We weren't just professional colleagues, now we were family. This is the kind of adoption I'd missed with the Yolŋu connection, I knew it would be easy enough to 'translate' my Yolŋu skin name into its Bininj equivalent, but I still felt uncomfortable with claiming that name. This felt much more authentic. Now that I had a Bininj identity, I was entangled in the social and cultural life of all Bininj.

2.2.6 Language in identity-making practices

This third ethnographic story records two ways in which I as a researcher became enmeshed in the type of language work that involves identity-making practices through my relationship with my Indigenous colleagues, and how this opened up new possibilities for respectful collaboration.

For the Yolŋu ladies in Galiwin'ku, my skin name was a way of validating my presence, allowing them to transcend the abstract matrix of skin names and fit me into the wider and more significant networks of existing flesh and blood kinship. Once this was established, they could determine how to answer my questions about books in the Living Archive.

Before I was given an identity in the Bininj system, though I enjoyed a fruitful working relationship with my Bininj colleagues, I was not situated as a learner in the appropriate

way. The identity of a 'granddaughter' (*kakkak* specifically refers to daughter's daughter, a term used reciprocally with one's mother's mother) comes with a range of responsibilities, particularly where grandmothers take charge of teaching their granddaughters how to behave appropriately. Following my 'adoption', I noticed Jill taking more care to teach me about Bininj culture and behaviour.

In all three language infrastructure projects, I found myself working with language in the construction and maintenance of identity. Schools with bilingual programs expressed aspects of the identity of their communities through the books they produced, the kinds of information they taught their students. The Bininj Kunwok course forced learners to engage with new forms of identity as they took on skin names and became embedded in strong kinship ties with the Bininj teachers. Developing the Digital Language Shell was a means of creating opportunities for Indigenous language authorities to share something about their identity online, through language and culture.

Where the previous story related to language in lived experience and appropriate behaviour, this story relates to kinship in lived experience and appropriate connectedness. This concept strongly influenced the design of the Bininj Kunwok online course. The focus on skin and kin terms was not simply as explanations for understanding how Bininj interact, but would situate the learners immediately in relation to all Bininj, and to each other – as outlined in Papers 5 and 6 here. The Bininj course co-designers were adept at steering me away from a purely instrumental communicative understanding of language, which strongly influenced the development of the online course.

2.2 Three types of language work

These three specific types of language work, in practices of language documentation, of pedagogy, and of identity politics, emerged in my experience developing digital tools for language work. All are partial, making no claims to completeness, and clearly neglect many other types of language work, but they are sufficient to address the issues that concern me in this thesis. Rather than being identified through careful research on the topic or theoretical imperatives, they have emerged from my work on the ground, arising through developing technologies to support Indigenous language work.

These stories, and my recognition of the different types of language work led me to consider a number of related issues, such as how digital technologies contribute to activating, supporting or enabling these types of language work, the role of technology in intervening in these types of language work, and how these types of language work support or undermine each other when entangled with digital technologies. The next section explores how consideration of such issues directed my research.

SECTION 3 Methodology

Working with the claim that all knowledge is situated (Haraway, 1988), I recognise my research as configured by and situated in a specific context of working in a university doing language work in the Northern Territory in the second decade of the 21st century. In this section, I describe the ways in which the research came together – the projects, the papers, the readings, the theoretical material – to create an assemblage of sociotechnical analysis which is presented here as my thesis.

3.1 Iterative inquiry

My work as project manager for the language projects described in these papers consistently involved various kinds of inquiry. The activities were not initially established as research projects but rather as infrastructure projects, working to create products to support language work in particular ways. The focus on the ‘particular’ is important here, and a point worth noting in relation to the analysis emerging out of these projects: the projects support *particular* language practices and *particular* technologies in *particular* social-political contexts in ways that express *particular* values. As such, they cannot be directly applied to other projects in other circumstances.

As I went about my work, I became interested not only in the various technical, political, social, legal and ethical aspects of the projects but also in different theoretical understandings of the work. The compilation of this thesis is the result of an iterative process of inquiry, exploring various facets of the projects, how they emerged from and responded to particular contexts and imperatives, how they work or don’t work, exploring the entanglements of language and technology in these particular contexts.

3.1.1 First level of inquiry

The kinds of inquiry I was making as I went about doing my job included the ‘big’ questions like how to maintain a digital archive of Indigenous language materials? Whose voices need to be included in the discussion? How do we incorporate Indigenous pedagogies into the course curriculum? How can we connect learners around the country with Bininj on country? And also, many ‘small’ questions addressing the day-to-day issues that emerged in developing these projects, like what is the best way to manage the

technology, the processes, the permissions, the distribution, the promotion, the reporting, the finances, etc? What tools should we use to build a platform for sharing Indigenous languages online? Which plugins should we choose? How do we recruit learners? How do we extend from the four pilot units to a full semester course?

Pursuing these questions led me to certain places and people, and asking additional questions. I found myself considering many disconcertments and tensions about my role and the construction of these digital language infrastructures, as I met with various stakeholders in the projects, including an advisory group for the Living Archive project, the language committee from the Bininj Kunwok Regional Language Centre, and the technical support team from CDU Library, each with their different perspectives on the task. Every decision was carefully considered as we focused on the tasks of building and assembling resources to support Indigenous language activities. This kind of articulation work (Star & Strauss, 1999) involves “tuning, adjusting, monitoring, and managing the consequences of the distributed nature of work. This is the interplay between formal and informal. Articulation work is almost always invisible (especially when it is done well), and because of this it is often overlooked in technological innovation" (Van House, 2003, p. 281).

3.1.2 Second level of inquiry

The second level of inquiry in turn investigates the questions and processes arising from my work. While I didn't begin with a specific research question that could be answered by empirical research, my initial aim was to investigate the role of digital language resources in the ecology of Australian Indigenous languages. This morphed in various ways across the four years of my enrolment, as I read, reflected and wrote about

some of the questions raised by my first level of inquiry. An ethics application gave me permission to seek input from Indigenous language authorities and other users of the various digital resources (see [Appendix 4](#) for HREC approval document). Some of this feedback and evaluation has been included in this research in various ways.

As I engaged the theoretical and technical aspects of my work throughout the process, I participated in many of the everyday activities of academic life – reading relevant literature, attending conference, giving presentations, etc. Engaging in these activities allowed iterative reflections on the projects and their various components and interactions.

The results of this second level of inquiry are the academic publications that make up the bulk of this thesis, written and rewritten with feedback from supervisors and reviewers. These products of academic research emerged as one outcome of the ongoing work for which I was employed. Each of the publications embody original research, presenting my own findings based on the development and analysis of the digital language resources under consideration, and written to address audiences from different disciplines.

3.1.3 Third level of inquiry

The third level of inquiry is a meta-analysis of the projects and papers, collated here as a single body of work to submit as a PhD by publication. This level of inquiry involved more reading, discussions with supervisors (each of whom came from a different background – Indigenous education, linguistics, philosophy and applied linguistics), then later rereading the papers and reconsidering the projects to look for overall themes and connections to develop a thesis. As the various components came together, a research question emerged to account for my various levels of work and inquiry: what happens

when digital technologies become entangled with various types of language work in Indigenous languages of the Northern Territory?

3.2 An inquiry into inquiry

This kind of methodology may seem unusual, but also reflects a practical approach to research, where everyday work becomes data for academic inquiry. It is a kind of practice-led inquiry, which has a history in the creative arts (Candlin, 2000; Hawkins & Wilson, 2017), but is now growing in the social sciences also, including innovative work in documentary linguistics. A recent example comes from Carew (2016), whose thesis used the collaborative processes of a language documentation and repatriation project to explore intercultural alliances. She observes that “in the context of rapidly shifting language ecologies in remote Indigenous communities, practice-led research provides one way that university-based scholars can form alliances with language practitioners at the local level” (Carew, 2016, pp. iii–iv).

The advantage of this type of approach is that the focus is on products that can engage in the work of language description, pedagogy, documentation, maintenance and revitalisation, rather than simply to produce publications to maintain academic credibility. The input of Indigenous colleagues in the projects can produce a rich exchange of ideas that benefit both the practical and theoretical work. The academic writing is not simply a by-product but an important and useful accompaniment to the work of the practitioner.

My task of analysing empirical instances and arrangements as demonstrated in these assemblages highlights the entanglements of practice that constitute the projects. Doing this enables more generous and generative analyses of language work across Indigenous

and non-Indigenous understandings and practices. This thesis itself is an example of a sociotechnical assemblage of heterogeneous entities including academic publications, reference lists, projects, theories, stories, reflections, themes and tensions.

SECTION 4 Outline of thesis

In this section, I explain my reasoning for collating this thesis as a collection of publications rather than as a single narrative. I then outline each of the papers in this collection, and how the various types of language work emerge. I identify each paper by number, separate from the introductory chapters and conclusion, as outlined in the 'Presentation of thesis.'

4.1 PhD by publication

The method of inquiry undertaken here – at the primary level developing the projects, at the secondary level addressing questions through writing academic papers – made it a logical step to approach the PhD as a collection of publications. This third level of inquiry involves not just collating the papers but the meta-analytic work of the introductory and conclusion chapters in extrapolating the practice-based projects to generate broader insights about the interactions between language and technology in the context of Indigenous language work in the Northern Territory.

Having published academic papers prior to enrolment in the PhD, both from the Living Archive project and previous research assistant roles as noted earlier, I was already familiar with the process, and keen to continue to build my publication resumé. Being accepted for publication also suggests that the research is of sufficient quality and interest

for an academic audience, and feedback from journal editors and reviewers improves the quality of the writing beyond that provided by thesis supervisors.

This form of delivery also enables my research to reach a variety of audiences of quite different interests, from librarians to archivists to those with an interest in copyright and intellectual property, to language teachers and those interested in computer-assisted language learning, plus something for my emerging interest in science and technology studies. The intentional targeting of journals of different disciplines has allowed me to maximise the reach and impact of my inquiry, and forced me to read widely across many disciplines.

This transdisciplinary approach suited my research interests since, as noted earlier, my work goes across a range of areas, including linguistics, digital archiving, language teaching, cultural heritage management, education and digital humanities. Christie argues that “transdisciplinary research is different from interdisciplinary research because it moves beyond the disciplinarity of the university and takes into account knowledge practices which the university will never fully understand” (Christie, 2006, p. 78). This approach is appropriate for my inclusion of Indigenous perspectives on language and technology which recur throughout this research.

The papers are not presented here in the order they were written, but in an order that flows for my overall argument.

4.2 The papers of this collection

In the preface to this thesis ([‘The politics of language and technology’](#) – a non-peer reviewed contribution to the CDU student magazine), I briefly reflect upon the politics of

language at work at a gathering of language workers, bureaucrats, policy officers and Indigenous leaders. Technology was recognised as an important component in work of language maintenance and revival, but there was disagreement as to whether it was ‘the solution’. Resistance to the focus on technology rather than people saw tension between what was understood by ‘language’ by the different participants.

Paper 1 ([‘Technology for Australian Languages’](#)) addresses the question of how digital technologies are being used for transmission, maintenance, revival, promotion and analysis of Indigenous languages in Australia. In this paper, the three types of language work – documentation, pedagogy and identity – are first identified. There is some clashing and competing reflected in the rhetoric of ‘saving’ endangered languages, and evident dislocations between those who work on digital solutions, those who fund language projects, and those who own languages. The paper describes some of the tools, resources and projects created to support Indigenous language work, and addresses some of the challenges and opportunities inherent in the use of technology for this work.

Paper 2 ([‘Towards a Unique Archive of Aboriginal Languages: A Collaborative Project’](#)), written for a library journal, addresses the question of how the knowledge practices of language researchers and library staff can work together to produce a digital infrastructure of Indigenous language materials for preservation and sharing. The paper describes the collaboration between the CDU Library and the Living Archive project team to provide a sustainable repository of Indigenous language materials. It outlines a number of challenges addressed in relation to balancing the requirements of best practice for information management with the desire to incorporate some of the Indigenous components that don’t neatly fit those structures. The types of language work that are most

evident in this paper are language in documentation and pedagogical practices, where the products of bilingual education programs are transformed into digital artefacts. The paper also highlights some of the implications for librarians who may be involved in working with Indigenous language materials.

Paper 3 ([‘Observing and respecting diverse knowledge traditions in a digital archive of Indigenous language materials’](#)) addresses the question of how a digital language archive can navigate the often incommensurable understandings of ownership and intellectual property according to Indigenous and non-Indigenous knowledge practices. Written for an audience of educators and librarians with an interest in copyright issues, and co-authored with a lawyer, the paper outlines the negotiations and compromises inherent in addressing the issues of intellectual property for the Living Archive project. In seeking a way to move forward while respecting two incongruent knowledge traditions, the paper describes working between the worlds of Australian Indigenous knowledge practices and the worlds of copyright and intellectual property. The books in the collection were originally designed to support pedagogical (literacy) and identity work (ancestral histories, local practices, etc) under specific protocols in the context of bilingual education. As the items were digitised, they entered into a new range of protocols and legal regimes, and the project team wanted to avoid the easy obscuring of important traditional Indigenous functions of language which occur in the development of technical infrastructures.

Paper 4 ([‘Diverse socio-technical aspects of a digital archive of Aboriginal languages’](#)), written for an archiving journal, addresses the question of how the mobilisation of a digital language archive is received by different kinds of users in different contexts. Some ethnographic stories show how the materials in the Archive take on a new life when they

enter into the worlds of different users. An Indigenous elder sees the pedagogical resources she developed as a teacher in a bilingual program, but in a new sociotechnical context far removed from their origins. She is disconcerted by the gatekeeping role of the map interface which visually represents connections between language and place. A non-Indigenous schoolteacher recognises the pedagogical value of the Archive, connecting with certain materials from her previous role and imagining uses in her urban school context. She is careful to respect the usage rules of the collection, and also identifies some missing features which would be useful. A review of the original application for funding of the Living Archive project places it in a certain political and historical context, with a reflection on how what was imagined in the application has developed into a product which is now in use in various contexts.

From here the focus shifts from the Living Archive to the two related projects which sought to mobilise some of the materials from that collection for new purposes. Paper 5 ([‘Collaboratively designing an online course to teach an Australian Indigenous language at university’](#)), written for an audience of language teachers, addresses the question of how academics and Indigenous language owners can collaborate effectively to produce online language courses. Here the focus shifts from the collection and sharing of previous products of knowledge practices in the Living Archive to the mobilisation of these and other similar products for new pedagogical purposes, which also serve some purposes of documentation and identity-making. The paper describes the collaborative engagement with members of the Bininj Kunwok Regional Language Centre to address some of the known challenges of teaching Indigenous languages at university and online. It highlights the affordances of this

context for developing new resources, strengthening teachers, creating student demand and building connections between learners and speakers.

Paper 6 ([‘Identity work in teaching and learning Indigenous languages online’](#)) addresses the question of how engaging with language in an online context can mobilise identity work for language owners and learners. In particular, the paper focuses on the ways in which identity became the focal point of the Kunwinjku online university course. Bininj presentation of their own identities, through skin charts, videos, explanations, were shared with learners not simply as information but as tools for them to develop their own imagined identities as potential members of a Bininj community.

Paper 7 ([‘Sociotechnical assemblages in digital work with Aboriginal languages’](#)) addresses the question of how these digital language infrastructures function as sociotechnical assemblages. Drawing on a statement by Watson-Verran and Turnbull (1995), the paper explores how each of the three digital language infrastructures “constitute connections and contrive equivalences” between the heterogeneous elements of which they are composed. This paper looks at the three projects through the lens of Science and Technology Studies, drawing on some of the analytic concepts used in that field.

SECTION 5 Summary

This research develops its analysis by bringing together three digital language infrastructures, all created to support the work of Indigenous language maintenance and transmission. The work of heterogeneously engineering three distinct sociotechnical assemblages form the data of this thesis. A methodology of iterative inquiry involved a first level addressing practical, technical, ethical and legal questions in the creation of the three

assemblages, a second level addressing academic questions of how these relate to language and technology, and a third level of analysis involving the meta-analysis of these sociotechnical assemblages. The types of language work for documentation, pedagogy and identity-making purposes emerge in the projects themselves, and are explored in the writing of papers about the projects.

A sociotechnical analysis of these particular assemblages (alongside others outlined in Paper 1 in the broader Australian context) allows me to uncover some of the simultaneously social and technical relations within them. Focusing on their construction (the Living Archive in Paper 2 and the Digital Language Shell in Paper 6), specific aspects of the contexts in which they exist (intellectual property in Paper 3 and university language teaching in Paper 5), and the users who engage with them and use them to produce new knowledge and identity work (for the Living Archive in Paper 4 and the Bininj Kunwok course in Papers 5 and 6), highlights the crucial interaction of the social and the technical. This thesis emerges as an assemblage of heterogeneities – projects, papers, concepts, academic references, and auto-ethnographic stories – that is in itself a sociotechnical assemblage.

Each of the publications in this thesis is introduced by a short text describing how each paper connects to the previous and following papers, outlining the contribution of the paper, and a brief history of the paper, including the reason the particular publication outlet was chosen. Each paper has its own reference list, as do each of the surrounding chapters.

Before reaching the academic papers, the following chapter outlines some of the analytic concepts used in this research, and gives more comprehensive descriptions of the

three projects, situating them partially in some of their academic contexts. Following the seven academic publications, the final chapter in this thesis brings together the third level of inquiry as a conclusion and summary. I draw together the various components of the projects and the published papers, and the themes which emerged in each of them, highlighting the significance of the research and its methodological and conceptual contributions. I consider the limitations of the study, and some future directions for research, including some more ethnographic stories.

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Chapter 2: Projects and Analysis

Introduction

This chapter introduces the particular analytic concepts used in this research, which will then explore the three digital language infrastructure projects that form the basis of this thesis – the Living Archive of Aboriginal Languages, the Digital Language Shell and the Bininj Kunwok online course. In describing and analysing these projects, this chapter also places them in their academic context, positioning them in light of some of the relevant academic literature. The final section brings together the analytic concepts and the projects, and sets up the reading of the following seven published papers.

SECTION 1 Analytic concepts

A number of concepts from within the field of Science and Technology Studies (STS) have been helpful as I've sought ways to articulate and analyse the empirical instances and arrangements of language work emerging in my projects. While deliberately resisting strict definition, STS has been called “an interdisciplinary field that investigates the institutions, practices, meanings, and outcomes of science and technology and their multiple entanglements with the worlds people inhabit, their lives, and their values” (Felt, Fouché, Miller, & Smith-Doerr, 2016, p. 1). STS is interested in the politics inherent in the design and practice of technologies (Winner, 1980) and a focus on entanglements of different knowledge traditions and ways of going on together (Verran, 2001, 2002).

My engagement with STS grew out of my connection to the nascent TopEndSTS group at CDU who engage “particular Indigenous approaches to knowledge production, in the doing of a contemporary northern Australian STS” (TopEndSTS, 2019). A reading group with other students and researchers led me to new ways of thinking about my work, using some of these particular analytic concepts.

Considering STS as an analytic ‘method’, Law suggests that “the STS focus on practice means that theory, method and the empirical get rolled together with social institutions (and sometimes objects). They are all part of the same weave and cannot be teased apart” (Law, 2017, p. 32). Working largely through case studies, STS methods “are shaped *by* the social; that they *also* shape, stage and structure the social; that they are performative and heterogeneously enact objects, worlds and realities; that they are situated, productive, essentially political and normative, and that they might be otherwise” (Law, 2017, p. 48).

In my own work, theory, method and the empirical are all entangled in the analysis of the motivation, development, and mobilisation of the sociotechnical assemblages. The iterative methodology I use in this thesis focuses closely on the empirical in the first level (developing the projects), on method in the second (writing academic papers), and theory in the third (meta-analysis of projects and papers), however cannot be as cleanly individuated as this suggests.

The terms ‘assemblage,’ ‘heterogeneities’ and ‘sociotechnical’ drawn from the discipline of STS are useful when seeking to talk about particular instances of the coming together of language work and technical work without necessarily assuming language and technology as separate at the outset. From STS comes “the assumption that reality is always

in the making through the dynamic relations of heterogeneous assemblages involving more-than-humans” (Blaser, 2014, p. 54). As my research progressed, this approach allowed me to think through some of the complex interactions among the heterogeneities of political, technical, legal and epistemic constituents of the digital language resources being developed.

1.1 Assemblage

The concept of assemblage relates to “a mode of ordering heterogeneous entities so that they work together for a certain time” (Müller, 2015, p. 28). The word itself has a complex history, originally a translation of the French term *agencement* from (Deleuze & Guattari, 1988), though the English word has more focus on the connections between the various components than simply their arrangement (Nail, 2017; Phillips, 2006).

Rather than just seeing the word as a convenient shorthand for a gathering of disparate items, the term ‘assemblage’ can do useful work in exploring the complexities of particular arrangements and connections between various components. I draw on the description provided by Watson-Verran and Turnbull:

Assemblages constitute equivalences and contrive connections between locales in knowledge systems. In research fields and bodies of technoscientific knowledge/practice, otherwise disparate elements are rendered equivalent, general and cohesive through processes that have been called ‘heterogeneous engineering.’ (Watson-Verran & Turnbull, 1995, p. 117)

This description is used in Paper 7 to explore the three projects described here.

The term has also appeared in applied linguistics in the work of (Pennycook, 2017, 2018; Pennycook & Otsuji, 2017), relating to the specific coming-together of various

components in a particular interaction. In one scenario, the authors identify a conversation in a Bangladeshi shop in suburban Sydney as involving the assemblage of a range of products in the shop, the language choices of the customers and shopkeepers, the demography of the suburb, the history of migrant market gardening in Sydney, the ingredients of international cuisines represented in the suburb, and even the layout of the shop.

All these things and the meanings attached to them come together in the relations between artefacts (bitter melons, fish), places (market gardens, fruit and vegetable shops, freezers, the Ganga and Brahmaputra deltas) and people (buyers, sellers, cooks or producers). It is through the locatedness of these intersections that we can understand the shifting moments and assemblages of the city. (Pennycook, 2017, p. 275)

In a different sociolinguistic context, this time a multilingual classroom situation, an assemblage includes “pens, paper, people, the physical setup of classrooms, discourses about teaching and learning, school district policies, the curriculum and so on” (Toohey & Dagenais, 2015, p. 305). The researchers recognise the complexity of these assemblages as they work together in producing ‘reality’ (p305).

These notions of assemblages incorporate an STS perspective, in refusing to separate ‘language’ as an ontological entity – “as if languages preexist their instantiation in particular places, having been carried around by people as mobile language containers” (Pennycook, 2018, p. 129). This explicit assumption about what language is (and is not) enables an approach to language work that corresponds to some extent to the understandings of the Indigenous people with whom I worked.

Pennycook challenges the hegemonic knowledge structures of the Western academy, which “opens up applied linguistics to an ethical engagement with alternative ways of thinking about language and context from the Global South, so that renewal of applied linguistics comes not via other disciplines but rather through alternative forms of knowledge” (Pennycook, 2018, p. 130). In my own research, I attempt to draw on my own understanding of Indigenous perspectives of language and its entanglement with technology, allowing a multiplicity of viewpoints in the discussion.

The digital language infrastructure projects described in this thesis, as well as those described in Paper 1 for work in other Indigenous Australian contexts, can be considered assemblages, as they bring together various components (books, texts, recordings, videos, images, webpages, etc) into an identifiable object that exists for a certain time. While not as momentary as Pennycook’s understanding of semiotic assemblages coming together in terms of a shop interaction (Pennycook & Otsuji, 2017), the assemblages explored here are themselves temporary, though solidified through various practices for various purposes, and contingent on various external factors (funding, technologies, human capacities and skills, etc).

1.2 Heterogeneities

The notion of ‘heterogeneous engineering’ comes from Law (1987), who asks how objects, artefacts, and technical practices become stabilised and take the shape or form that they do (p.105). He focuses on “the heterogeneity of the elements involved in technological problem solving, the complexity and contingency of the ways in which these elements interrelate, and the way in which solutions are forged in situations of conflict” (p.105). The

activity of arranging “a range of disparate elements of varying degrees of malleability” is labelled heterogeneous engineering, producing a network of juxtaposed components (p.107).

My own work involves engagement with a range of physical objects (books, computers, permission forms), digital objects (PDFs, text files, metadata, videos, email messages), digital tools (software for image processing and optical character recognition, online templates, learning management systems), conceptual objects (curricula, copyright rules, assessment tasks, ‘best practice’), institutions (universities, funding bodies, language centres, schools), places (remote communities, university offices, sites of historical significance), and of course people (authors, illustrators, rights holders, librarians, technical support teams, web developers, language authorities, research support staff, project leaders, linguists, teachers, language learners). The gathering of these various items is outlined in Paper 2 for the Living Archive project and in Paper 5 for the Bininj Kunwok online course. Positioning all of these under the umbrella term ‘heterogeneities’ allows for a degree of equivalence, where none are considered more important than any other, and all are changed in the process of being entangled together. As an example, the books produced in bilingual programs are all presented as artefacts in the Living Archive as if they were equal in their historical context, when in fact some may have been educationally more useful than others, some may have been hardly used, some used a lot, some may be ‘incorrect’ in some way, some may have caused controversy, etc. In the archive, these histories are neutralised.

As a project manager, I become a heterogeneous engineer, bringing together these heterogeneities and transforming them into new entities, now known as the ‘Living Archive

of Aboriginal Languages,' the 'Digital Language Shell' and 'Bininj Kunwok online course.'

These assemblages require considerable maintenance to keep the heterogeneous elements working together. In this type of work "participants are engaged, aligned and assembled, and project goals are achieved when the assemblage of heterogeneous elements has been enrolled and mobilised" (Hannon, 2009, p. 17). This process provokes a careful analysis of how assemblages come together and cohere (or not) and the work they support or hinder.

Framing my research as working with heterogeneities to produce assemblages allows me to see how the technical arrangements of disparate elements were impermanent, unstable and contingent. It also reveals some of the invisible work (Star & Strauss, 1999) involved in assembling and maintaining these heterogeneous entities into an identifiable and somewhat stable unit.

1.3 Sociotechnology

It also became useful for me to think of these assemblages as being sociotechnical. This concept refers to the inseparability of the social and the technical – these assemblages are always social and always technical (Bijker, 1997; Bijker & Law, 1992; Jasanoff & Kim, 2015; Law & Callon, 1989). "It is mistaken to think of technology and society as separate spheres influencing each other: technology and society are mutually constitutive" (MacKenzie & Wajcman, 1999, p. 41). The assemblages described here are responses to particular sociotechnical scenarios, defined as "a solution to an interconnected set of political, bureaucratic, and strategic problems" (Law & Callon 1988, p. 287). According to Law, "thinking sociotechnically involves a concern with heterogeneity, a concern for overlaps, with how it is that different elements are brought together, and with how

differences and similarities are constructed and sustained” (Law, 1990, p. 18). These differences and similarities connect to equivalences, where all need to be analysed in the same way (Callon, 1984).

A sociotechnical assemblage is exemplified in the work of a Yolŋu elder, Mäŋay Guyula, performing ‘place’, as described by Verran and Christie (2007). In travelling through his ancestral lands around the Arafura Swamp in East Arnhem Land, “Mäŋay spoke of its history, the ancestral journeys it features in, its location in the complex patterns of Yolŋu land ownership, and the varied responsibilities for and interests in that place invested in different groups of Yolŋu people. Mäŋay exhorted and instructed, demonstrated and explained” (p216) in his *Liya-Dhälinymirr* language. This process was captured on digital video by a non-Indigenous applied linguist colleague and edited into sequences. Later an interpretation spoken in English was recorded by Mäŋay’s brother Yiŋiya. Together the two files of video footage were edited into a DVD, which could be played in either language. The purpose of the recording was two-fold: “to induct [Mäŋay’s] young Yolŋu kin into knowing and loving these places as Yolŋu places; he exhorts them to contribute to the ongoing collective life of these places” (p221); and secondly to ensure that non-Aboriginal people who were planning the installation of a pipeline in the area “knew that the land has a story, and that the places have people keeping the story alive. It is the Aboriginal people who need to tell that story and have an active, authoritative role in negotiations over access to those lands and to resources” (p217).

The product of this complex work by Mäŋay and his brother and others, along with the paper of Verran and Christie analysing this work, can be seen as comprising an assemblage of sociotechnical analysis. In that DVD, the social (the various arrangements of

people and clans and places and histories) cannot be separated from the technical (the video recording and English interpretation and the authoring software used to produce the result). The analysis (in the paper by Verran and Christie) forms part of the sociotechnical assemblage also. In a similar way, this thesis enacts a sociotechnical assemblage involving the creation and analysis of particular resources.

The risk of ‘engineering’ Indigenous knowledge practices into artefacts and assemblages is that the process can uncritically take an academic or technical approach, which ignores or marginalises the commitments of Indigenous language owners. It is through the embodied participation of active ‘engineers’ that risks and dangers for Indigenous people and country and knowledge practices are reduced. In my role as a heterogeneous engineer for these language infrastructure projects, I have a responsibility to support and enable both sets of practices, to carefully and responsibly re-present the heterogeneities in these emergent assemblages. As a result, my role brings a human element – an extra link in the chain – that distinguishes it from the processes of an assembly line or an algorithm.

1.4 Entanglement

The concept of entanglements comes from quantum physics, and has been drawn into use within STS largely through the work of Karen Barad, who states that “to be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack an independent, self-contained existence” (Barad, 2007, p. ix). The term is also used in anthropology, and allows investigation of how different entities may or may not be separate or separable from each other.

What holds together much of the research employing ‘entanglement’ is an intuition that some set of things, commonly held to be separate from one another (indeed, that define themselves precisely with reference to their separability) – science and justice, humans and non-humans, settlers and natives – not only might have something in common, but also, in fact, may be quite inseparable from one another. (Fitzgerald & Callard, 2016, p. 39)

Thus in my work it was never straightforward to separate the practices or the objects of ‘language’ and ‘technology’. As the term ‘sociotechnology’ highlights the inseparability of the social and the technical, the notion of ‘entanglement’ shows how language practices and digital technologies come together and are each reshaped by the entanglement. The idea of ‘assemblages’ suggests some kind of order and purpose, where ‘entanglements’ highlights the messiness of such collections of heterogeneous elements. It is important to point out that entanglement does not mean that things are illogical, or thrown together, or to imply a sense of chaos. Attending to their contingent, impermanent, partial and flexible nature can potentially generate new concepts and activities.

1.5 Working with sociotechnical assemblages

There is need for assemblages that mediate and produce entities that cannot be refracted into words. There is need for procedures which re-entangle the social and the technical. (Law, 2004, p. 121)

This research describes the careful work of gathering a variety of heterogeneities into sociotechnical assemblages – taking various components and combining them in new forms for new purposes, to create “new meanings and new entities, to make new worlds” (MacKenzie & Wajcman, 1999, p. 7). My role as heterogeneous engineer is to bring them together in such a way that honours both the Indigenous and non-Indigenous knowledge

practices they are designed to serve. The creation of these assemblages is itself a sociotechnical process involving various players and components, and the products are designed to serve both social and technical functions.

These assemblages come together as a result of particular sociotechnical imperatives – to preserve a vulnerable collection of Indigenous language materials, to support Indigenous authorities to share their knowledge and materials online, and to allow university students to learn an Indigenous language online under Indigenous authority. But they are not permanent – to fix them too carefully, or ‘futureproof’ them would both limit their capacity to support new knowledge production activities and subvert Indigenous perspectives of knowledge being performative and linked to particular people and places. Since knowledge is never fixed but always produced and reproduced, it is important to build such tools well to support these knowledge practices. It is also important to remember that assemblages, entanglements, heterogeneities and language resources are all practices, activities that gather things in certain ways, and so should not be seen as fixed.

In the next section I draw on these concepts in my description of the three projects in focus in my research, as I position them (partially) in the various academic contexts in which they function, leading to the following published papers in which the projects are explored in different ways.

SECTION 2 Project descriptions

2.1 Living Archive of Aboriginal Languages

The Living Archive of Aboriginal Languages is a digital archive of endangered literature in Indigenous languages of the Northern Territory. The project was developed in response to a concern for the fate of thousands of printed resources produced for vernacular literacy in bilingual programs at more than 20 remote NT schools since the mid-1970s.

As the project manager of the Living Archive since its inception in 2012, I have had first-hand experience of the development and delivery of this collection. Specific elements of the project are explored in greater detail in Papers 2 (on development of the Archive), 3 (on the legal issues involved), and 4 (on responses of users). Previous publications relating to the project (relevant to but pre-dating this thesis), are outlined here as appropriate.

2.1.1 Background

The project was funded through a federal government Australian Research Council (ARC) Linkage Infrastructure, Equipment and Facilities grant in 2012. Initially funded as a partnership between Charles Darwin University, the Australian National University and the Northern Territory Department of Education (LEI120100016), a second successful funding application in 2014 extended the partnership to include Batchelor Institute of Indigenous Tertiary Education, Northern Territory Library and the Catholic Education Office of the NT (LEI140100063).

Since 2012, the Living Archive project has collected and digitised around 5000 items in Indigenous languages of the NT. It has established an infrastructure which houses the

digital objects in PDF format for presentation, and TIFF format for preservation, plus plain text files and cover images, all linked to the available metadata. These items are all hosted in the institutional repository at Charles Darwin University Library, and over 3500 of these are publicly available under a Creative Commons license through a web interface at <http://laal.cdu.edu.au/>. There is also an app for offline access to the materials on mobile devices, an accompanying website with other features of the project (such as news, research publications, suggestions for use), a ‘bot’ which posts one item per day to a Twitter feed, plus social media platforms and a blog site to report updates and stories about how the Archive and its contents are being used.

Serving as both a research infrastructure and a publicly accessible repository, the Living Archive project reveals a number of tensions. Principally funded to serve academic interests (rather than a preservation archive, or even a community resource), there were from the beginning constraints upon how the resources could be configured for both academic research, and educational and cultural purposes (further discussed in Paper 4). The sociotechnical assemblage now available as the Living Archive drew on the affordances of digital technologies to capture and present these otherwise inaccessible materials, while respecting the original work of literature production in the communities of origin in the days of bilingual education.

The name ‘Living Archive’ predated my involvement in the project, and is not unique, including (unrelated) projects in Indigenous Australian contexts (the Living Archive of Aboriginal Art and the Living Archive of Aboriginal Collections – both based at the University of Melbourne). There are also various uses of the term in the literature on archiving (Ketelaar, 2009; Linn, 2014; McKemmish, Chandler, & Faulkhead, 2019), and it is

used as the tagline for the Australian National Film and Sound Archive. In the context of this project, the name was given to communicate that the materials in the collection were not simply rendered as museum artefacts, but retained connection to the people and places from which they came, and could continue to generate new knowledge practices within those communities as well as in wider academic and educational spheres.

2.1.2 Contents

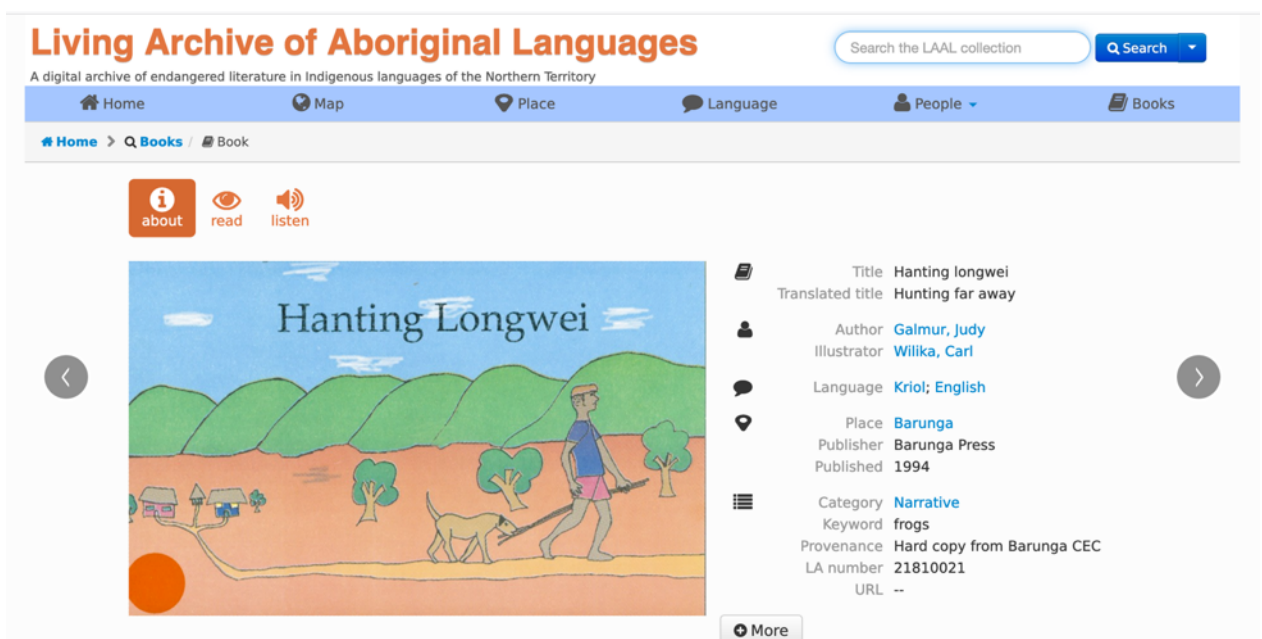


Figure 5 (Ch2.1): Screenshot of a single record with cover and metadata

The components of the Living Archive are entangled in various ways, as heterogeneities of technologies, institutions, artefacts, people and their practices. The physical books are transformed into digital artefacts through processes of scanning (using photographic equipment to create images of each page), editing (adjusting colours, trimming page edges, tidying up unwanted marks on pages), and optical character

recognition (to produce plain text files). The creation of the Archive involved careful massaging of available information about the materials – selecting and populating metadata fields to provide cataloguing information such as names of authors, illustrators, translators, editors, as well as titles, dates and places of publication (where available), and identifying keywords to assist with discoverability (Bow, Christie, & Devlin, 2015).

The materials in the Living Archive mostly consist of small booklets of 10-25 pages, ranging from a single word with a line drawing per page to long narratives with detailed artwork. Most of these were produced in Literature Production Centres in schools with bilingual programs, in response to the call to “flood the place with literature” (O’Grady & Hale, 1974, p. 3), to provide reading materials for vernacular literacy. This call led to production of many different kinds of materials, “all aimed at getting the children, and hopefully the adults, hooked on reading in order that they would ultimately succeed academically in the classroom” (Gale, 1994, p. 35).

The history of bilingual education in the NT is significant for the current research because it underpins much of the recent history of non-Indigenous/Indigenous interactions around language and education, and is the source of most of the materials in the Living Archive collection. The fraught history of these programs has been carefully outlined in a book describing the policy context, pedagogical environment and personal stories [Devlin, Disbray and Devlin, 2017]. The demise of these bilingual education programs has been carefully documented and discussed, particularly the lack of evidence leading to policy decisions (Devlin, 2011, 2017; Simpson et al., 2009; Wigglesworth & Lasagabaster, 2011), and the impact of its demise in terms of educational outcome for Indigenous students

(Oldfield & Lo Bianco, 2019) and human rights for Indigenous people (Nicholls, 2005; Simpson et al., 2009).

The body of texts that now make up the Living Archive is part of the material legacy of the era of bilingual education. These resources can be seen as products of collaborative knowledge work that enabled Indigenous and non-Indigenous pedagogies to come together, resulting in the publication of pedagogical materials (Bow, Christie, & Devlin, 2017; Christie, 1996) as part of curricula for bilingual education programs (Bunduck & Ward, 2017; Christie, 2017; Disbray & Martin, 2018; Murray, 2017; Purdon & Palmer, 2017; Tamisari & Milmilany, 2003; Yunupingu, 1989). Not only does the Living Archive serve as a repository of materials, but also as a reminder of this important educational movement in Australia. As bilingual education fades further from the energy and momentum it had at the time, the Archive provides evidence of what was happening in remote communities over that period, and the types of texts and images produced in this significant moment in Australian Indigenous education.

Well before the conception of the Living Archive project, Christie identified the potential value of the collection of materials, saying “in my work observing the rehabilitation of Aboriginal knowledges in a post colonial era, I find increasingly that apparently marginal, apparently poorly produced, apparently irrelevant little documents will in time become crucial landmarks in the retelling of Aboriginal history” (Christie, 1996, p. 169). The Living Archive is a significant step in making these materials available to enable them to do this kind of work.

It is useful to recognise that the Living Archive is not ‘complete’ in any sense. Besides new materials being added to the collection, there is room for tweaks and changes in the functionality and presentation of the Archive. Some updates are routine, but others are complicated by previous decisions. For example, when we explored adding an application programming interface (API) to enable users to interact more directly with the contents, such as through updating metadata or uploading permission for items, we found that since such an option was not identified in the initial design, it was highly problematic to add later. Similarly the addition of a content management system to enable the team to provide dynamic updates for promotional and documentary purposes, could not be incorporated within the original web interface. The workaround was to create a separate site using WordPress which was linked to the web interface (available at <https://livingarchive.cdu.edu.au/>), though this was hardly a seamless connection. When the Firefox browser changed its settings regarding opening PDF files inline, that feature no longer worked when viewing Living Archive books on Firefox, but forced the user to download the item. The possibilities for making such changes in the Living Archive reflects “a recognition that an archive is not a finished, static repository for data—instead, it is an ever-unfinished research product that involves taking in new information, digitizing old materials, and navigating developments in digital infrastructures, formats, and standards” (Henke & Berez-Kroeker, 2016, p. 426).



Figure 6 (Ch2.2): Homepage of the project page for the Living Archive

2.1.3 Previous projects

The Living Archive was largely developed at Charles Darwin University which has a strong history of collaborative knowledge work with Indigenous Australians, including innovative projects exploring how new technologies can be put in service of Indigenous knowledge practices (summarised in Christie & Verran, 2013). Such work has involved both collaborative resource development for teaching languages and culture (Christie, 1997, 2008b), and research into Aboriginal knowledge practices and their relation to academic knowledge work, and in particular to the emerging forms of digitisation which made them available to various audiences (Christie, 2001, 2003, 2004, 2005a, 2005b, 2008a; Christie & Verran, 2006, 2013; Verran & Christie, 2007, 2014).

The Indigenous Knowledge and Resource Management in Northern Australia project (IKRMNA) (Christie, Verran, & Gaykamangu, 2003) highlighted the Western bias in databases, where pre-determining the use of metadata categories “enforces a particular a priori ontology inhibiting and in fact precluding the creative work of making new worlds, new possibilities, through the creative, connective work of language” (Christie, 2005a, p. 65). The project aimed to give “a dominant voice to Indigenous researchers and consultants in the development of protocols for database structures, protection of intellectual property rights, intergenerational transmission and negotiation of dissemination of information to resource management agencies and academic researchers” (Verran, 2007, p. 102). It also called for a new type of database, which reflects Indigenous priorities and enables new connections and opportunities for knowledge-making.

A project more closely related to the Living Archive was the Yolŋu Literature CD project (Christie, 1997), which focused on texts from the bilingual programs in Yolŋu communities of Northeast Arnhem Land. With a goal of ensuring Yolŋu control of their own stories, the project addressed the affordances of technology and its potential for various kinds of use in the community, as well as issues of ownership and intellectual property. This project was later adapted into an online database of Yolŋu stories to support the Yolŋu Studies curriculum (Christie, 2005b, 2008b).

Assembling useful materials for teaching and learning Yolŋu languages either on CD or online enabled further investigation into “how information architecture both reflects and enacts a politics of knowledge” (Christie, 2005b, p. 55). This project and the IKRMNA work led to a rethinking of ontologies, making them more ‘fluid’ (Duarte & Belarde-Lewis, 2015; Srinivasan & Huang, 2005). The rethinking involved “collapsing the structures of metadata

and flattening out their content [to] enable the creative connecting processes upon which Aboriginal knowledge-making depends” (Christie, 2005b, p. 56). To make resources more engaging and interactive for users, both Yolŋu and non-Indigenous, the process involved careful consideration of issues such as naming practices, where individuals may use different personal names, changing in various contexts (Christie, 1993, 1994b). Challenges with orthographic standards affect both Yolŋu in terms of literacy and non-Indigenous users in terms of pronunciation, and the sociotechnical solution involved enabling fuzzy search options and lemma search capabilities (Christie, 2005b).

2.1.4 Creating the Living Archive

Many of the considerations and negotiations involved in the development of these resources influenced the development of the Living Archive project, which from the outset was designed to enhance rather than inhibit Indigenous knowledge traditions. For example, use of a highly visual interface with a map and thumbnail images of book covers does not require text literacy to navigate. For literate users, the search function translates between special characters and their plain text equivalents, search strings call on both text data and metadata, breaking down the separation between these two.

The Living Archive project was more ambitious than the Yolŋu Literature CD project, which focused on one particular region of the NT where there is a complex network of closely related languages (Christie, 1993). The creation of a collection of materials from the whole NT in a central repository, while done with the support of copyright holders and community members, is somewhat at odds with Indigenous practices, where knowledge is locally owned and situated (Christie & Asmar, 2012). A preferable solution would involve

local community archives under local authority, though these come with their own challenges and threats (Ormond-Parker & Sloggett, 2012). The vulnerability of the materials and the lack of a simple solution and funding source for local archives gave the Living Archive project an opportunity for a coordinated means of rescuing these extant materials.

Funded specifically as a research infrastructure project, the Living Archive was designed with a focus on creating a strong technological tool, though with awareness of how Indigenous users might interact with the interface, and their perspectives on the materials and their intellectual property. A quote from one of the first papers written by the project team about the Archive notes the striving for a balance between different imperatives:

We visualise our archive as emerging in an uncertain space in the middle of a range of polarities. We are balancing, for example, perspectives such as the imagined insider (language community member) and outsider (interested researcher external to the community), the responsibility to create a public archive and the need to maintain traditional authority, the pressure for interoperability and the need for local usefulness, the technical exigencies and our vision of the potential users, while attempting to 'future-proof' and take account of the creative uses of highly provisional and contingent resources typical of Aboriginal knowledge work in situ. (Christie, Devlin, & Bow, 2014, p. 57)

In the design of the Archive the Indigenous 'voice' was present in the imagined audience who were uppermost in our minds as we aimed to develop the assemblage to meet the needs of the Indigenous language owners we hoped the project would serve, as well as the academic audiences we were funded to serve. Aware of the dangers of technologies in disrupting Indigenous knowledge practices (Christie, 2001, 2005b), we

aimed to foreground the anticipated needs and uses of Indigenous users, without simply allowing the affordances of technology to take over and create something technically elegant and innovative but which did not appropriately serve its audience. These imperatives needed to be balanced with the understanding that the resulting assemblage would not store 'knowledge' but should enable Indigenous knowledge practitioners to engage in their own language work using the materials stored in the Living Archive.

As a repository of artefacts of previous knowledge work, all attached to particular moments, people, and places, the Archive was designed to enable both Indigenous and non-Indigenous engagement and knowledge work. Indigenous language owners accessing the archive are likely to be seeking resources to support a new knowledge production or agreement making activity, or connections of stories with places and people. Such practices involve a different perspective on books and other products of knowledge practices (Christie 1994a; 1995; 2001).

It seems from the way Aboriginal students and teachers both treat the printed text, it is not read as a container of hidden meanings to be decoded, but more as a material record of an episode of collective meaning making in which we all shared. The knowledge produced in that setting was in a sense only true in the context of its production. The record of that activity is not a record of objective knowledge, but it is a resource for the ever ongoing business of making knowledge in context. (Christie, 1996, p. 168)

The role of such materials for Indigenous people is significant in a number of ways:

Indigenous interest in the digitisation of Indigenous materials is not just based on a nostalgic yearning for the past, nor is it based on arguments about national significance. Digitisation is a practical means for reconnection with knowledge and

information produced about Indigenous groups, collected from them and now dispersed through cultural collections across the country. This is knowledge and information Indigenous people want to access for future utility, for creative endeavours and, importantly, for emotional and spiritual restoration of a people. (Nakata et al., 2008, pp. 233–234)

The existence of collections such as the Living Archive make such materials available to do the kind of work that both Christie and Nakata describe here, however such collection must be done carefully, avoiding the “widespread suspicion that digital technologies can only work by treating Indigenous knowledge as a commodity” (Verran, Christie, Anbins-King, van Weeren, & Yunupingu, 2007, p. 130). The Living Archive aimed to create ‘common ground’ between Indigenous and non-Indigenous perspectives (Christie, Devlin, & Bow, 2015; Devlin, Bow, Purdon, & Klesch, 2015) to produce educational and linguistic resources to support language work across different knowledge traditions.

The Living Archive places materials created for specific pedagogical and identity purposes into a new digital context for a diverse range of users from academics to remote community members to the general public (Bow et al., 2017), and was carefully designed to support new knowledge practices for community and academic purposes. The interface is designed to meet the needs of these different users by not requiring high text or technical literacy, but still providing full search and browse functionality for those familiar with catalogue searching.

One of the affordances of the digitised resources is the possibility of repurposing materials created for specific pedagogical contexts for new pedagogical situations, for example in the Australian Curriculum. An early paper by the project team explored this potential for use in the curriculum (Devlin, Christie, Bow, Joy, & Green, 2014),

demonstrating examples of usage in the classroom and in the wider community, and proposing ways in which active engagement with materials in the archive could mutually enhance the classroom experience and the archival materials themselves. This theme was extended later (Bow, 2016), where I explored each of the learning areas in the Australian Curriculum and identified materials in the Living Archive which could be used in various ways in classroom situations to meet the requirement to incorporate Aboriginal and Torres Strait Islander histories and cultures as a priority across the entire curriculum.

The Living Archive project enabled a range of different types of language work – in providing access to thousands of texts in Indigenous languages of the NT it contributes to the work of language documentation. The Living Archive collection of vernacular literacy work in Australian Indigenous languages provides evidence to dispel the myth that these languages are “not written”, even if the uses of vernacular literacy has not had the expected impact outside the educational context. There are some interesting examples of literacy use outside the school context (Christie, 1994a; Gale, 1992, 1994, 1995; Goddard, 1990, 1994; Kral & Ellis, 2008; Kral & Falk, 2004).

The different uses of the Archive can extend beyond what the designers envisaged. Where archives are created for specific purposes, it is impossible to foresee the possible uses to which the contents may be put, which may have implications for permissions and consent at the point of collection (Thieberger & Musgrave, 2007). There are examples in the literature of unexpected uses of language archives for ethnobotany or astronomical information (Holton, 2012), and others describe reviving traditional cultural practices (Holton, 2017). Thieberger (2012) proposes that archives should be built to enable such discoveries. A case of an unexpected use of the Living Archive came from a teacher

recounting how Indigenous students from remote NT communities living in a boarding school outside Melbourne would often look at the materials in the Archive not for pedagogical purposes but to see familiar people and places. A remedy for homesickness was not one of the expected outcomes of the project, but also points to the work of digitised language materials for the work of identity practices.¹

The Living Archive can be seen from a number of different perspectives (as explored in Christie et al., 2014). The archivist view focuses on the process of collecting, digitising and preserving materials and the decisions involved in creating the infrastructure. The Science & Technology Studies perspective focuses on “its contingency, its uncertain emergence from an ongoing, often fraught flux of ideas, technical possibilities and constraints, interests and agendas” (p.52). The view “from Country” focuses on how Indigenous users might view the re-presentation of their materials in this new context, asking how to avoid the Archive “becoming a mausoleum, of interest only to anthropologists and linguists and others of a Western knowledge tradition? How do we achieve the goal of developing an archive which is alive in ways that others may not be?” (Christie et al., 2014, p. 56).

The digitisation and online presentation of texts is more than a mere replication of physical objects in a digital environment. It is part of a larger process involving transforming oral stories into written texts and later digital artefacts, a product of complex negotiation between Indigenous authorities and non-Indigenous pedagogies, combining traditional knowledge and modern technologies (Bow, Christie, and Devlin 2017). The shift

¹ This story was reported in a blogpost on the Living Archive project site <https://livingarchive.cdu.edu.au/worawa/>

from paper publications for a small local audience to a global audience in the online environment represents far more than a simple change of delivery mode. Digital archives are not simply an extension of existing ways data can be collected and stored, but they qualitatively change the ways in which knowledge is generated and shared (Widlok, 2013).

One concern about digital archiving of language or cultural materials is that it can be based on a completely western view of reality, which is then coded into the software (Christie, 2005b). Resisting this push requires an understanding of Indigenous epistemologies and finding ways to encode them, for example by mobilising the connection between people and place in the coding of the Archive. Much of the work of this thesis involves awareness that the technological ‘solutions’ may not allow for alternative perspectives, and finding ways to observe and respect both knowledge systems.

2.1.5 Access

Questions of access are relevant to archives of all types, and digital technologies enable access options unavailable for physical archives. As Holton points out, “access is not just about accessibility; access is about control” (Holton, 2017 no p.n.). From a wide range of different examples, Berez-Kroeker & Henke (2018) make the point that there is no single uniform approach to language archiving particularly in terms of access. They use the Living Archive project as a specific example of how “linguists will also keep working on situation-specific solutions to problems in the field that present challenges for a one-size-fits-all approach to archiving (e.g., Bow et al. 2015)” (Berez-Kroeker & Henke, 2018, p. 350). This danger of thinking there is a single solution that will fit all projects is referenced in this

thesis in Paper 1 which outlines different digital solutions, and in Paper 3 specifically about the intellectual property issues in the Living Archive.

Careful efforts have been made to manage the dual responsibilities of providing access and protecting the rights of individuals and communities documented in collections (Thorpe & Joseph, 2015), including negotiations of the tensions between Australian copyright and intellectual property laws and Indigenous practices of knowledge ownership (Devlin, Bow, Purdon, & Klesch, 2015) (further explored in Paper 3). A project in Cape York grappled with this tension, maintaining local control over the material with careful selection of what could be made accessible to outsiders (Godbold, 2009).

From its origins, the Living Archive collection was intended to be publicly accessible. Since the materials were made in school contexts and contained no secret or sacred content, the Archive was designed to be 'open', not requiring any login or password that would restrict access. Here is one instance where the sociotechnical nature of the Archive is evident, in building in restrictions to access in the underlying code which are responsive to the requirements and preferences of the Indigenous owners of the materials. However there are challenges in dealing with a large collection from diverse communities, which locally run community archives would be in a better position to manage (Ormond-Parker & Sloggett, 2012).

2.1.6 Interoperability, discoverability and sustainability

Best practice in digital archiving incorporates the pursuits of interoperability, discoverability and sustainability. From a technical standpoint, discoverability and interoperability is made possible through following guidelines outlined by groups such as

the Open Language Archives Community (OLAC) (Bird & Simons, 2003; Simons & Bird, 2003) for language archives, alongside other standards for archiving (Van de Sompel & Lagoze, 2002) and digital libraries (Shen, Gonçalves, & Fox, 2013). However interoperability can be difficult to achieve in projects with limited technical, financial and human resources (Sloggett & Ormond-Parker, 2013, p. 234), and may also conflict with Indigenous ideologies where sharing of data needs to be carefully negotiated rather than taken for granted.

While the NT was the only jurisdiction in Australia with an official policy of bilingual education, some communities in other states ran similar programs on a smaller-scale, or produced other language materials that could be stored in a similar form. Making the Living Archive's code base available to other users means the platform could potentially be replicated or expanded to incorporate other collections.

Archival practices are not always conducive to Indigenous ways of classifying and representing the world. For example, naming conventions of languages, people, and places tend to be fixed in information management systems, where Indigenous practices may resist these, with a flexibility in personal naming, requiring means of linking different names through unique identifiers. The variable quality and quantity of the metadata included in the material (title, authors, date, etc) created a tension between how the materials were originally described in the Literature Production Centres and how they needed to 'fit' with standard practices. Different understandings of 'language' as noted earlier may be reflected in the different ways of identifying and naming languages which do not always conform to the classification system outlined in the ISO 639-3 coding of language names (Constable & Simons, 2000; SIL International, 2015). Workarounds were

found to attend to both sets of practices in many of these situations (Bow et al., 2015), each of which are contingent and subject to challenge. Harvesting of metadata by OLAC and the National Library of Australia's Trove supports discoverability of the materials in the Archive through Google and other search engines.

It is widely accepted in the literature that sustainability is an important goal in the archiving and preservation of Indigenous language and cultural material, with the understanding that collecting the material is only part of the job. Sustainability has been defined as the sum of three factors: "good data collection and management, robust preservation properties, and the relevance of materials" (Nathan, 2006, p. 57). Sustainability has been the topic of recent conferences (Soria, Besacier, & Pretorius, 2018), reviews of older projects (Strathman, 2019), solutions proposed in specific projects (Drude, Broeder, & Trilsbeek, 2014), and recommendations for best practice (Bird & Simons, 2003; Johnson, 2004).

However, these approaches do not always recognise divergent perspectives of Indigenous people. Fixing an object in time and space can actually disrupt knowledge practices, where knowledge is always negotiated and productive. Issues of 'storage' and 'sustainability' are invested in people and the land rather than products such as books and digital storage devices. The claim of Yolngu elder Yingiya Guyula that the land is his database (as cited in Christie, 2005a, p. 64) was not a rejection of the affordances of digital technology. A key question to ask is "How can we keep the relational, performative, and dynamic character of indigenous knowledges 'alive' in the design of knowledge management software?" (van Der Velden, 2010, pp. 8–9).

One of the challenges in the Living Archive project has been to balance the ‘fixed’ nature of technology that holds things in place with the need for ‘flexibility’ in allowing new knowledge practices. The performative nature of Indigenous knowledge resists the design imperative of technology to ‘fix’ things in certain configurations. “This stability and reproducibility, so valued by most users of the technology, is both dangerous and invalid in the context of Yolŋu knowledge practices, where each instance of witness is by definition a novel performance” (Verran & Christie, 2007). Attending to such concerns has led to several decisions in the development of the Living Archive to avoid hindering Indigenous language practices.

This section has outlined the history of the Living Archive of Aboriginal Languages and its connection to parts of the academic literature, in terms of its role as a digital archive of artefacts of Indigenous knowledge-making practices and the challenges of observing and respecting those knowledge practices while creating a robust and useful digital archive according to recommendations for access, interoperability, discoverability and sustainability.

2.2 Digital Language Shell

A different sociotechnical scenario – the interconnected set of political, bureaucratic, and strategic problems – prompted the development of the second project. The lack of a low-tech, low-cost, off-the shelf platform motivated the production of an online template for sharing Indigenous language and cultural knowledge to interested learners under Indigenous authority. The development of the Digital Language Shell, available at <https://language-shell.cdu.edu.au/>, and its entanglement with the Bininj Kunwok online

course is described in more detail in Papers 5 and 6, each with its own literature review. A separate report (Bow, 2017) details the development of the Shell, including delivery of the pilot program in 2016. This report was submitted to the funding body and is available online (see link in [Appendix 3](#)), however it was not peer-reviewed.

The Digital Language Shell was developed to enable Australian tertiary students to access Indigenous language and culture resources online under Indigenous authority. The project aimed to address the dearth of Indigenous language courses available through Australian universities (Simpson, 2014)(and discussed further below) by providing a sociotechnical solution. It was also prompted by a desire to activate some of the resources in the Living Archive which could be repurposed for language teaching and learning contexts outside the communities of origin. The project was funded by the federal Office of Learning and Teaching (SD15-5124) as a pilot program, with the possibility of further funding should the pilot be successful, however the funding body was later dissolved, so additional development required alternate sources of funding.

The sociotechnical assemblage of the Digital Language Shell involved a variety of heterogeneous components, to incorporate the envisaged needs of language owners, learners, teachers and university administrators. It included finding ways to incorporate display and delivery of various multimedia components (video, audio, images, text), arrangement of content into units and lessons, management of users through logins and user profiles. The selection of a platform (in this case WordPress) then required identifying appropriate themes and plug-ins to enable these kinds of sociotechnical work within the Shell.

Many of the decisions involved in creating the Shell required balancing competing imperatives, such as the desire for flexibility of access to materials and respecting the intellectual property of the materials and concern about misuse (similar to the Living Archive project). There was also a need to give users the flexibility to either allow free and open access to all materials or to charge for the privilege and make money out of it (see Christie, 2010a for discussion of appropriate payment for Indigenous knowledge work). WordPress offered the kind of flexibility we sought, as its range of options allowed customisation for various purposes. The design was intended to be adaptable to support a range of user groups with different requirements, neutral with regard to the historical condition of the language, so that it could be used for languages in various stages of revitalisation or those still used in everyday community life. Since its implementation, other groups have expressed interest in using the Shell for their own purposes, including over 100 participants in demonstration workshops at the 2019 Puliima conference. A language centre in northern NSW is already using the Shell to teach Gumbaynggirr language online to heritage learners (Muurrbay Aboriginal Language and Culture Co-operative, 2019)

2.2.1 CALL

The Digital Language Shell sits in the highly multi-disciplinary field of Computer Assisted Language Learning (CALL) (Levy, 1997; Stockwell, 2012; Thomas, Reinders, & Warschauer, 2013; Warschauer & Healey, 1998), which involves language teachers, learners, linguists, technologists, interface designers and pedagogical specialists. This field has expanded enormously in recent decades, with dedicated journals and conferences, and handbooks summarising key concepts and directions (Chapelle & Sauro, 2017; Farr & Murray, 2016).

There are a number of benefits to CALL programs, such as improving student multimedia learning experience, enhancing learner autonomy and widening participation (Yang & Rau, 2005). The flexibility available to both teachers and learners is largely valued, and it is seen as both a pedagogical innovation and potentially a way of reducing overheads for content delivery. CALL can provide means for learners to engage with language materials that would be otherwise inaccessible, which transcend geographic distance, support learner autonomy and enable alternative pedagogical approaches.

Much of the research in this field focuses on English and other majority world languages, though there is a growing body of work attending to 'less-commonly taught languages', a label developed in the US to include anything except English, French, German and Spanish. These other languages (such as Arabic, Japanese, Hindi, Russian, etc.) have rich bodies of literature and strong internet footprints, and possibilities for engagement with natural language processing (McShane, 2003; Robin, 2013).

There is much less published research focused on CALL solutions to teaching and learning Indigenous languages, for which there are smaller user groups and less linguistic data and resources available. Much of this literature tends to entangle the two issues of Indigenous and endangered languages, since the majority of Indigenous languages globally are also endangered. There are many opportunities in this space for CALL approaches, including increased possibilities for language documentation, as a forum for cultural expression, as a catalyst for literacy training, and to arouse interest in the language (Ward, 2004).

A number of concerns documented in the literature on CALL are particularly relevant to endangered or Indigenous languages. These include resource issues, small enrolments, teacher training, (Godwin-Jones, 2013), teaching issues (Wang, 2009), learner profiles (A. V. Brown, 2009; Lee, 2005), language ideologies (King, 2000), learner autonomy (Kostina, 2012; Reinders & White, 2011, 2016), language issues (Gor & Vatz, 2009), technical capacity and attitudes to online learning (Winke, Goertler, & Amuzie, 2010), dialectal issues, lack of societal support, lack of language documentation, and lack of native speakers or active speaker community, competent linguists and teachers (Ward, 2015). In the development of the Digital Language Shell, the issues that were most in focus were lack of trained teachers, lack of resources and low enrolments – these are explored in Paper 5. The design of the Shell was less concerned with the other issues, though in the design of the curriculum the focus was on incorporating Indigenous pedagogies and creating connections with learners.

The Digital Language Shell project was specifically designed for Indigenous language work, in relating to the careful ways in which content and pedagogy must be negotiated. Clearly this can also support the work of language documentation or revitalisation, which are welcome outcomes of the potential work of the Shell. The focus of the Digital Language Shell project was to provide a low-cost and low-tech means of enabling Indigenous authorities to share their own content under their own authority, with the technology being ‘innocent’ (Christie, 2005b) with regard to language status.

2.2.2 Creating the Digital Language Shell

The negotiations around the development of the Digital Language Shell entailed engagement with what Ward refers to as

a much bigger tapestry that includes technological, sociological, anthropological, political, ethnographical, and other perspectives. Environmental and historical contexts are key components of learner, teacher, and CALL environments. It is important to consider the complex ecological, sociocultural, and institutional relationships between these environments (Ward, 2018, p. 125).

In the case of the Digital Language Shell, the environmental and historical contexts relate to the status of Indigenous languages in Australia, particularly on their lack of visibility in academic contexts, where they are often treated as objects of study rather than opportunities for language learning.

While CALL offers many affordances for endangered and Indigenous languages, they are not a solution for every challenge. Holton points out that “while CALL can be an effective tool, language-maintenance projects should be cautioned to carefully evaluate their goals before pursuing a CALL project” (Holton, 2011, p.383). Similarly, Hugo (2014) suggests asking important questions about language technology projects for endangered languages, recognising that the goals, content, pedagogical approach and expectations may be different than for other languages. Ward even suggests that the social impact of CALL in the context of endangered languages may be considered more important than the actual language learning gains (Ward, 2004). This demands careful consideration in the design of CALL tools for these contexts. Paper 1 identifies a range of technological tools and projects which

perform different types of language work in the Australian context, where the work of language goes far beyond communication.

Another challenge is that ongoing maintenance and development of CALL products tends to require additional funding, and a range of skill sets, which may be beyond small-scale funded projects. Since CALL is such a multidisciplinary field, it can be difficult to keep abreast of changes across the domains of pedagogy and technology (Ward, 2002, p. 293). CALL for minority language contexts can draw on lessons and tools established in larger language projects, to avoid duplication and repeating errors, and with the possibility of sharing knowledge and reusing resources (Soria, Mariani, & Zoli, 2013; Ward, 2015, 2016). However tools and resources for CALL on majority languages “are not always easily transferable to endangered, Indigenous, and smaller (in terms of speaking population) language communities, contexts, and spaces” (Galla, 2018, p. 392).

Given the number of limitations involved, a pragmatic approach is required. Rather than simply using existing CALL platforms based on proprietary and commercial software, which may be costly and inappropriate (Galla, 2009; Holton, 2011), a move towards bespoke solutions created in collaboration with Indigenous communities is becoming apparent (Alexander, 2018; Cassels & Farr, 2019; Westwood, 2017). Ward (2004) argues that limited resources would be better spent on community activities and language revitalisation than on state-of-the-art technologies. In a similar vein, Hugo states:

Rather than seeking to ‘reinvent the wheel’ for each endangered language, it may be worth looking around to see whether applications that have already been created can also aid the documentation, development and distribution of learning materials for endangered language efforts. Given that most endangered languages are at risk of

disappearing in the not too distant future, revitalizers should never lose sight of the fact that these tasks may often be more vital, and urgent, than developing a(nother) tailor-made and high-spec computer programme. (Hugo, 2014, p. 110)

In the case of the Digital Language Shell, with the limited amount of funding and technical expertise available, it was not possible to create a bespoke platform from scratch. The challenge became to create a low-cost and low-tech product that could be used by other groups working in contexts constrained by budget and technical expertise. Our requirements resembled those described as “lean, low-cost and reusable solutions that do not involve reinventing the CALL wheel, the production of CALL courseware in multiple modalities from a single source and compatibility with language documentation efforts” (Ward & van Genabith, 2003, p. 234). Furthermore, those authors describe an ‘ideal’ CALL solution for endangered languages:

Ideally, an EL [endangered language] CALL solution provides both a software template and a curriculum template (in addition to the actual courseware) that can be maintained, reused, populated and extended by different EL CALL courseware developer groups. These groups can include members of the local EL community as well as local and external academics, educationalists and linguists. To minimise development cost, such a template should be designed to be portable to other ELs. At the same time it should be free of charge and lean as regards software and hardware requirements – this can rule out “bleeding edge” technology and some existing, commercially available authoring systems. (Ward & van Genabith, 2003, p. 234)

A solution proposed by Hugo (2014) uses an existing learning management system (Moodle) for creating courses in Indigenous language, drawing on existing technologies “that can make it possible to have a single, centralized system for endangered languages that can handle content archiving, material development, collaboration, distribution and

even some basic documentation” (p. 106). This solution is closest to the development of the Digital Language Shell, for which WordPress provided the most flexibility. Choices about the range of plug-ins selected to furnish the template were intended as a guide only, with many other possible solutions available.

In the case of the Digital Language Shell, the software template was the focus, with the understanding that the curriculum template must be co-designed with Indigenous language owners. The online template needed to be flexible enough to enable Indigenous pedagogies to be incorporated, rather than being shoehorned into a western paradigm for language teaching, and to manage a range of different options, to allow users to customise their courseware and curriculum to align with their own needs and pedagogies.

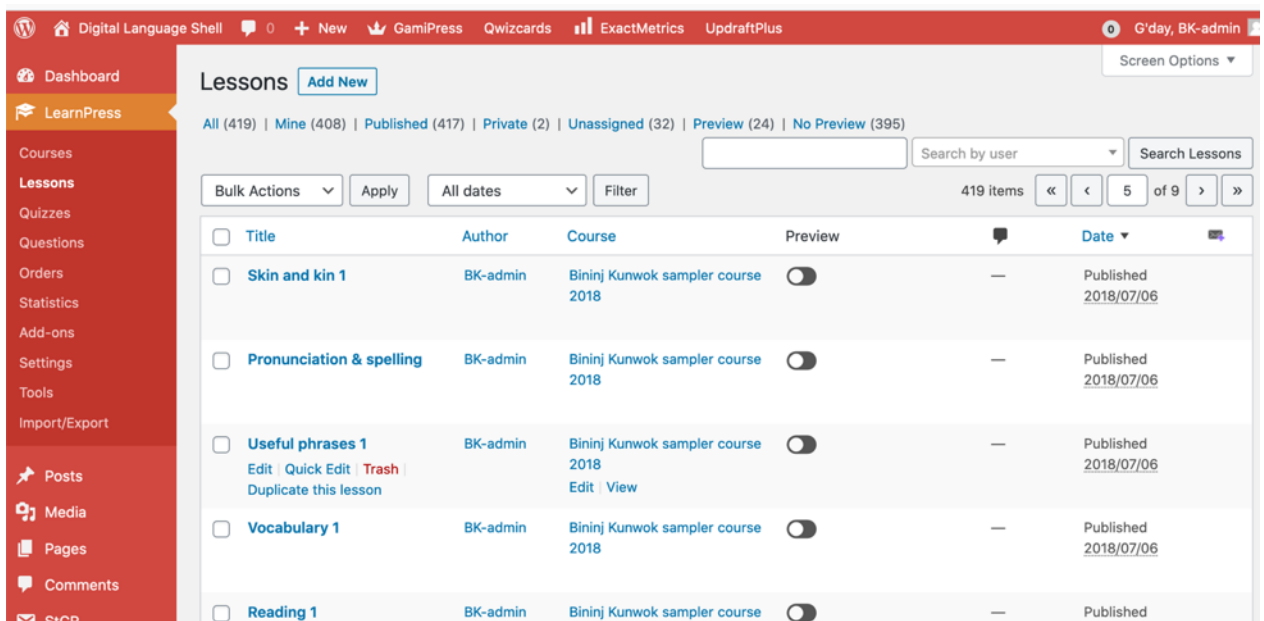


Figure 7 (Ch2.3): Screenshot of back end of Digital Language Shell (on WordPress)

Other examples in the literature show innovative uses of technology for learning minority languages, for example using virtual communities for community-based language documentation (van't Hooft & González, 2019), and 'social learning' using social media to

connect learners with fluent or native speakers on specific tasks (Henry, Carroll, Cunliffe, & Kop, 2018). Such activities can draw on the input of Indigenous language authorities, which may involve further training which could be mutually beneficial (Bird, 2018; Carew, Green, Kral, Nordlinger, & Singer, 2015; Galla, 2018).

Without additional funding to develop the Digital Language Shell itself, it remains experimental and contingent, limited in many ways when compared to more highly developed learning management systems, yet retaining a simplicity that makes it attractive to community groups who lack the budget and technical expertise to develop their own or invest in existing commercial options.

The following section describes the first instantiation of the Digital Language Shell as it became engaged with a specific language group. The entanglement of these two assemblages is the subject of Papers 5 and 6.

2.3 Bininj Kunwok online course

But most importantly, Aboriginal and Torres Strait Islander languages are Australia's priceless, irreplaceable national heritage. Teaching these languages at universities does help to afford status and value upon these languages. Students enrol in the knowledge that they are an important part of efforts to maintain, revive and revitalise Australia's national linguistic treasures. (Amery, 2020, p. 407)

The Digital Language Shell project was first instantiated in collaboration with members of the Bininj Kunwok Regional Language Centre. The Bininj Kunwok online course began as a four-unit 'pilot' for a self-selecting group of keen learners. Feedback from these learners was incorporated into the later expansion of the course to a full semester unit, at the invitation of the Australian National University (ANU). With the further collaboration of

language authorities, additional units and assessment tasks were added to the four units of the pilot program. In 2019 it was delivered to students at the ANU, CDU and a small group of non-university learners working on country or with Bininj people. The course is discussed further in Papers 5 and 6, each of which has its own literature review. Sections of the course are available from the website at <https://language-shell.cdu.edu.au/>.

This section describes the language group, and places the course in the context of university language teaching in Australia, then discusses some approaches to teaching Indigenous languages, and the audience of non-Indigenous learners.

2.3.1 Kunwinjku/Bininj Kunwok

Charles Darwin University's development of the successful Yolŋu Studies program had led to opportunities to extend the range of languages offered for study. An Arrernte course had been established in Alice Springs, and the Digital Language Shell project offered a new possibility to engage with people from another Indigenous language group. Previous connections to people who later formed the Bininj Kunwok Regional Language Centre (outlined in Paper 6) created an opportunity to negotiate a new language and culture course using the Shell.

Bininj Kunwok is a name used for a chain of six mutually intelligible dialects which stretch from Kakadu National Park in the Top End of the Northern Territory south to Pine Creek and Manyallaluk, across the Arnhem Land plateau and east to the Mann, Liverpool and Cadell Rivers districts and as far east as some outstations south of Ramingining in central Arnhem Land. Bininj Kunwok is perhaps best known in the anthropological literature by the name of one of its dialects, namely Kunwinjku (spelt 'Gunwinggu' before the development of a standard practical orthography). The terms used by the speakers of each of the six dialects for the name of their particular

dialectal varieties are - Kunwinjku, Kuninjku, Kundjeyhmi, Kundedjnenghmi, Kune and Mayali. (Bininj Kunwok Project, 2017)

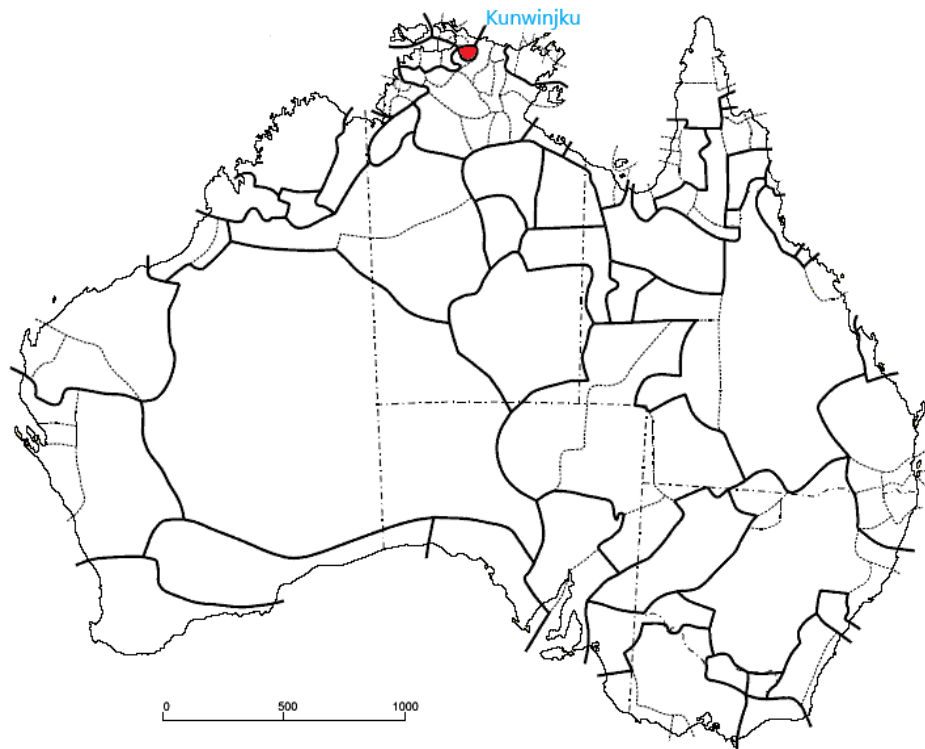


Figure 8 (Ch2.4): Map showing location of Kunwinjku language

(taken from https://commons.wikimedia.org/wiki/File:Kunwinjku_map.png)

The name 'Bininj Kunwok' is similar to the term 'Yolŋu Matha' used as a collective name for a group of closely related language varieties that share many features. *Bininj* means 'people' and *Kunwok* means 'language,' thus the term means 'people's language.' This label is mostly used by non-Bininj people, as Bininj identify as belonging to one of the dialectal varieties.

There are around 2000 speakers of Bininj Kunwok in the West Arnhem Land region, including the remote communities of Gunbalanya and Maningrida and their outstations, as well as in nearby towns such as Katherine and Darwin. The language is used across all

generations, and is the primary language used among Bininj families. This makes it one of the few Australian languages that is still considered 'strong' according to the second National Indigenous Languages Survey (NILS2) (Marmion, Obata, & Troy, 2014). Yet there are still concerns for its long-term viability, and on the Expanded Graded Intergenerational Disruption Scale (EGIDS) it is ranked as 6b 'threatened' (Eberhard, Simons, & Fennig, 2019). There are concerns that children are not using the language or losing some of the 'old' language. Language shift in the region tends towards Aboriginal English, though many Bininj can also communicate in the contact language of Kriol, spoken widely in the NT.

A key component of this project was the involvement of a group of Bininj elders who constitute a language reference group with experience mediating between their own everyday language work and language in institutions (the Ranger mine, schools, art centres, etc.). This group of people has now formed the nascent Bininj Kunwok Regional Language Centre, which is becoming a locus of community language work, overseeing the development of resources, providing translations, producing apps and books, etc.

Bininj Kunwok has long been a topic of interest for linguist researchers, and is among the most well-documented Australian languages. There is a two-volume grammar (Evans, 2003), a number of smaller grammatical descriptions (Carroll, 1976; Harris, 1969; Oates, 1964), and a learners guide (Etherington & Etherington, 1998), as well as academic descriptions of other aspects of the language and culture.

One of the implications of this work of language documentation is the availability of materials about Kunwinjku language and culture. These materials still need to be selectively arranged into a curriculum, to address the needs of an *ab initio* learner. One of the ideas

behind the Digital Language Shell project was as a means of activating some of the resources in the Living Archive which could be repurposed for new language teaching and learning contexts. As described in Paper 6, a series of Kunwinjku primers were mobilised in the Digital Language Shell in various ways, for reading practice, to exemplify points of grammar, and to create assessment tasks. This aligns with recommendations to adapt existing materials for CALL programs, such as creating talking books (Holton, 2011, p. 383), an approach which has also been used in Maningrida for home-based vernacular literacy work (Auld, 2007).

2.3.2 Teaching Bininj Kunwok

Identifying resources specific to Bininj Kunwok was less difficult than it would be for many other Indigenous Australian languages, and some of the materials could potentially be adapted or used as models for resource development in other languages. It is important to ensure that materials are culturally appropriate, which means that it may be necessary to create new materials rather than adapt resources from other languages or contexts, as content and images may be too generic or inappropriate and not suit the language of focus (Buszard-Welcher, 2001; Galla, 2009; Holton, 2011). Referring to endangered language contexts where ability to access speakers may be constrained, Ward recommends a pragmatic approach, saying that “Perhaps the CALL resources are not the best or most beautiful and may not adhere to the latest ‘correct’ way to teach a language, but it is better that they exist than to wait until the ‘perfect’ CALL resource for the language can be developed” (Ward, 2016, p. 552).

While most researchers in this space acknowledge the importance of involving members of the language community in the development of course materials, there is a lack of attention to the participation of language authorities in course design. More than having culturally appropriate materials, the co-design of courses incorporating Indigenous pedagogies is crucial to avoid further colonising practices of sharing Indigenous languages. As noted above, the Digital Language Shell was designed to be neutral with regard to language status, and Papers 5 and 6 describe how the Shell was mobilised with specific pedagogies once it was used to serve a particular language group.

The status of Kunwinjku sits in an unusual space. Much of the literature that focuses on teaching and learning Indigenous languages relates to revitalisation for languages with few remaining speakers, which often rely on legacy materials of varying qualities (Henderson, 2008; Thieberger, 2011). Also, the presumed audience for such work is those who have cultural or familial connection to these languages, such as heritage learners. There is little published research on outsiders learning Indigenous languages which are still spoken. Hinton's paper on language revitalisation and pedagogies distinguishes between teaching foreign, majority, heritage and endangered languages, yet treats endangered languages as a sub-category of heritage languages, stating that "in most cases, the endangered language is the ancestral language of the learners" (Hinton, 2011, p. 310). Although Bininj Kunwok can be seen as endangered, it does have a community of speakers who use it as their everyday language in a large range of domains. In the case described in my own research, and with other courses in 'strong' Australian languages, the learners are 'newcomers' or outsiders to the community, seeking to learn for other purposes.

The Kunwinjku language itself makes for an interesting object of learning and teaching. As a polysynthetic language, it differs greatly from English and many languages commonly taught in Australian schools. There are a number of difficulties inherent in learning languages very different from the learner's own, including "depletion of attentional resources and overload on working memory, which ultimately delays automatization of L2 processing" (Gor & Vatz, 2009, p. 239).

Literature on teaching polysynthetic languages is now drawing on the affordances of language technology tools to facilitate this work, which fall under the category of ICALL (Intelligent CALL) (Bontogon, Arppe, Antonsen, Thunder, & Lachler, 2018; Ward, 2017). For example, computational morphology can be used to automate the analysis of complex wordforms, which then generates examples for students to practice, as "it's one thing to illustrate structure and processes; it's another to find ways for students to practice them" (Gasser, 2011, p. 56).

Another challenge for polysynthetic languages is looking up words in a dictionary, as Kunwinjku uses a number of prefixes, making word roots difficult to identify. A Bininj Kunwok dictionary incorporating vocabulary from all varieties has been in development for some time, but not ready for publication. A reduced form of this dictionary was released as an online tool to support the Bininj Kunwok course. The online format is preferable for searching polysynthetic words, where a paper dictionary requires significant language knowledge to identify word roots. Colleagues at CDU are currently working on natural language processing tools to assist in this area using Kunwinjku (Lane & Bird, 2019).

The Kunwinjku course resembles the situation described in (Miyashita & Chatsis, 2013) when developing a university course in Blackfoot, a polysynthetic language in which an inflected verb may contain a great deal of information. Teaching grammar involved careful selection of appropriate limited number of forms. Similarly in the Bininj Kunwok course, only a small selection of verbal morphology was introduced to avoid overwhelming the learner. Another parallel with the Blackfoot project is the complexity of language variation and the challenge of how this can be managed in a language learning context (Chatsis, Miyashita, & Cole, 2013). This is one area that has yet to be explored in the Bininj Kunwok course, though there is scope to incorporate other varieties of the language. The Language Centre have recommended this addition, and the functionality of the Digital Language Shell should be able to facilitate this.

2.3.3 University language learning

Language teaching in Australian universities has sometimes been considered in ‘crisis’ (Group of Eight, 2007; Martín, 2005), however research indicates increased enrolments in recent years (J. Brown, Caruso, Arvidsson, & Forsberg-Lundell, 2019). Still, it is generally acknowledged that “institutions of higher education teach fewer languages, in less secure ways, for less time per week, for shorter periods, by an increasingly casually employed staff, in often underfunded, underappreciated and under stress modes” (Lo Bianco, 2009, p. 29).

The pressures on all language courses are heightened for less commonly taught languages, which in the Australian tertiary context “embraces languages such as Ukrainian that are taught at a small number of universities as well as languages like Indonesian which, though taught in a larger number of universities, have small enrolments” (Dunne &

Pavlyshyn, 2013a, p. 6). Research shows an increase in the number of these languages offered between 2005-2011 (Dunne & Pavlyshyn, 2012), with shifts towards Asian languages like Hindi, and moves to online courses (Dunne & Pavlyshyn, 2013a). Later shifts between 2011-2013 were influenced by collaborative arrangements between universities (Kinoshita, 2018; Pauwels, 2007) and reliance on some private benefactors (Dunne & Pavlyshyn, 2013b).

When it comes to the teaching of Indigenous languages in university, statistics can be hard to find. In their audit of less commonly taught languages in Australia, Dunne & Pavlyshyn (2012) had difficulty identifying Indigenous languages, as these are often housed in Indigenous studies rather than language departments. This is the situation at CDU, where the Yolŋu Studies program started in the Faculty of Aboriginal and Torres Strait Islander Studies, just as the linguistics department was being closed down. The Yolŋu advisers who co-designed the Yolŋu Studies courses insisted that language and culture are inseparable and must be taught together.

The visibility of available language programs has been enhanced with the establishment of the ULPA website (Simpson, 2014; University Languages Portal Australia, 2018) supported by the Languages and Cultures Network for Australian Universities (LCNAU) (Hajek et al., 2013). One of LCNAU's first advocacy activities was to call on all universities to teach Indigenous languages "for the benefit of the nation and all students" (Hajek & Lloyd-Smith, 2011). The ULPA online portal highlights opportunities for potential students to study Indigenous languages at Australian universities (University Languages Portal Australia, 2018). At the time of writing (2020), there are seven Indigenous languages

available across Australia's 44 universities, though there are no official statistics available regarding enrolment numbers.²

Simpson (2014) points out differences between teaching Indigenous languages in revival (which she calls "emblem languages") and those that are means of everyday communication. Each may have different audiences and materials available, and including them in a university context "can act as a sign that these languages are as rich and effective means of communication as any other language taught at university" (Simpson, 2014, p. 56).

The role of the university is significant not just as a site for teaching and learning languages (Kinoshita & Zhang, 2012), but for the research required for ongoing language maintenance particularly for language revitalisation (Giacon & Simpson, 2012; Simpson, 2014). Solid research is required to engage in the necessary analysis of available linguistic data, to understand the processes involved and to provide training for those working in language revitalisation (Desmoulins, Oskineegish, & Jaggard, 2019; Giacom, forthcoming).

Concerns about the viability of Indigenous languages in Australian universities are highlighted by Amery:

The lack of funding directed to the tertiary sector has stifled the study of Indigenous languages, and especially the teaching of Indigenous languages. Indigenous languages are struggling for a niche within the tertiary sector. Their place is highly dependent on individuals, internal politics and the demand, or lack thereof, for knowledge of and skills in Indigenous languages outside the tertiary sector. (Amery, 2007, p. 345)

² Unofficial statistics collected by the nascent Australian Indigenous Languages Institute suggest that approximately 342 people studied an Indigenous language through a university-affiliated course in 2019, with at least 150 of these enrolled in accredited programs.

Furthermore, Amery (2020) argues that majority or world languages are taught in universities for their instrumental value, such as business, trade, diplomacy, national security, access to academic literature, or international travel. These reasons do not apply to Indigenous languages in Australia. He gives a range of reasons for studying an Indigenous Australian language:

By studying an Indigenous language at university, students can know that they are part of a movement that values Indigenous languages and is working for their continued survival, in the case of 'strong' languages, or their re-introduction, in the case of revival languages. What better way to bring about reconciliation than to allow students to experience firsthand the genius of Aboriginal languages with their intricate and complex grammars, complex pronoun systems, complex kinship systems, radically different semantic organization and their ability to adapt and change? (Amery, 2020, p. 479.)

There is little academic literature addressing reasons Aboriginal language owners themselves may have for agreeing to their languages being taught through formal institutions. Paper 6 addresses some of the reasons Bininj authorities gave for sharing their language in this context. On the other hand, some Indigenous individuals and groups may prefer to avoid the appropriation or institutionalisation of their language teaching by formal institutions. For example, the Larrakia people of Darwin were consulted about language revitalisation during the establishment of the Yolŋu Studies program at CDU (Christie, 2009, p. 25), but rejected offers of support for this work from the university for various reasons. Increasing awareness of Indigenous languages in the academy, and creating opportunities to learn them can contribute towards better understanding and increased valuing of Indigenous knowledge practices.

Some universities have developed strong relationships with Indigenous communities through language and other research programs. The relationship between the Kurna community and University of Adelaide has been described as being “driven by a long-standing, but poorly defined partnership embodied in Kurna Warra Pintyanthi (KWP), a committee with no legal standing, which operates between the Kurna community and the tertiary sector” (Amery & Buckskin, 2013, p. 65). Charles Sturt University in NSW has developed a “nation building initiative” in its Wiradjuri program which is “owned and developed by Wiradjuri people guided through university process by the body of co-curating advocates” (Currie, Wheat, & Wess, 2018, p. 8). The Yolŋu Studies program at CDU has been a key part of the university’s commitment to Indigenous community engagement (Campbell & Christie, 2009), not only for the teaching and learning language component but as a locus for Indigenous research projects with Yolŋu researchers (Christie, 2008b). The Bininj Kunwok course further diversifies CDU’s engagement with the communities it serves, and other universities could benefit from similar connections with Indigenous language groups.

2.3.4 Teaching and learning Indigenous languages

Outside the university context, there is a small but growing range of programs for teaching and learning Indigenous language in Australia in school or community programs, however there is little documentation in the academic literature on the methods used. There are reports of the Master Apprentice model (Hinton, 2002) for Miriwoong language in WA (Olawsky, 2013), and language nests used for Gumbaynggirr in NSW (Poetsch, Jarrett, & Angelo, 2019; Poetsch, Jarrett, & Williams, 2018). These methods are face-to-face

and require speakers and teachers with a certain level of training, which can make them highly resource-intensive and therefore expensive to run.

Community involvement is a key to the success of these programs, where Indigenous authority, perspectives and pedagogies can be incorporated into programs. In the university context, this is exemplified in the Yolŋu Studies program at Charles Darwin University, where Yolŋu had already conceptualised both-ways education “without compromise to either of the contributing traditions” (Christie, 2008b, p. 32). The current teaching model is based on the way Yolŋu children learn, focusing first on kinship relations. “Our approach thus contrasts with other approaches informed more by anthropological and ethnographic literatures concerning Yolŋu worldview” (Hayashi, forthcoming). In such literature the concept of moiety is often prioritised, however Yolŋu parents focus on kinship terms ahead of moiety in raising their children.

Renowned Yolŋu educator Dr Marika offered a first-hand perspective of teaching non-Indigenous students of linguistics at the University of Melbourne, identifying some of the challenges and opportunities. She noted a need to oppose the way Yolŋu have been portrayed in anthropological literature “as if it were from a fairytale, as if it were dead” (Marika-Mununggiritj, 1991, p. 24). She also states: “I need to teach in such a way that the students can see that learning involves co-operation. That our knowledge needs to be a living thing which we all build together” (Marika-Mununggiritj, 1991, p. 24). This approach reflects that of the Bininj authorities in developing curriculum for the Bininj Kunwok online course.

Community members are best placed to engage in language pedagogy, but it cannot be assumed that they are willing or equipped to teach outsiders (Miyashita & Chatsis, 2013; Penfield & Tucker, 2011). If formal training is not available or appropriate, there is a need for mentoring and partnership (Hobson, 2007, 2013; Johns & Mazurkewich, 2001). There is an important role for applied linguists here, particularly those willing to think ‘out of the box’ where methods and resources for large languages may not be available or appropriate in endangered or Indigenous language contexts (Penfield & Tucker, 2011).

Papers 5 and 6 outline some of the co-design activities involved in developing the Bininj Kunwok course in collaboration with the language authorities of the Bininj Kunwok Regional Language Centre, and how Indigenous perspectives and pedagogies were incorporated into the course.

2.3.5 Non-Indigenous learners

The literature on teaching and learning endangered and Indigenous languages focuses mostly on an audience of people with connections to the language, particularly heritage learners (Davis, 2020; Hornberger, 2005; King, 2000; Lee, 2005; Rivera & Teske, 2018; Te Huia, 2017). There is very little in the literature about non-Indigenous people learning Indigenous language and culture (see Weinberg, 2015 for one exception). NILS2 reported that the majority (76%) of Australian Indigenous first language speakers would support non-Indigenous people learning Indigenous languages, although some stipulated that this be on the proviso that Indigenous people also had access to learning their language, and that teachers should be Indigenous (Marmion et al., 2014, pp. 34–35). This small sample

cannot reflect all attitudes, and there are some groups who restrict language teaching to those with a direct connection (see example of the Tasmanian language in Paper 1).

For those groups that are willing to teach their language to non-Indigenous learners, there may be differences in the way Indigenous pedagogies frame this process. For Yolŋu, “communication is a matter of building shared understandings and working to bring narratives together towards agreement rather than transmitting truths from one mind to another; that is, collaboration rather than transmission” (Christie, 2008b, p. 41). Hayashi states that in the CDU Yolŋu Studies program “the course is an intellectual shift from rendering Yolŋu people and their knowledges and practice as study or research objects, to partnering with them as knowledge experts and collaborators” (Hayashi, 2020, p. 519). These courses were co-designed with Indigenous and non-Indigenous collaborators, and the process involved learning (and unlearning) some received assumptions regarding language and its practices. A similar process was followed in co-designing the Bininj Kunwok course with Bininj authorities.

One of the ways learners are engaged in Yolŋu Studies was through the tradition of skin names: “If newcomers are adopted into the system, the practice offers an opportunity for Yolŋu to welcome and care for them properly, as well as a chance for the adoptee to learn how to treat others with care and respect. Consistent with this practice, students are added to a class kinship network ... which allows them to relate in particular ways to the lecturers, but also to each other.” (Christie, 2008b, p. 39). This practice was also significant in the Bininj Kunwok course (see Paper 6), where skin names were not just taught as content, but as a way of connecting learners to the Bininj teachers and the Bininj community. This practice is more complex than a classroom role-play activity where a

learner ‘pretends’ to engage with a language group, but is in fact fundamental to Indigenous engagement with outsiders (Swain, 1993).

Since language is so closely connected to place, it can be challenging to teach the language if it is removed from its origin. CALL and digital tools can enable innovative solutions, such as the ‘Teaching from Country’ program developed at CDU as part of the Yolŋu Studies program (Christie, 2010b; Christie, Guyula, Gurruwiwi, & Greatorex, 2013). This project supported Indigenous teachers to teach from their homelands rather than on the ‘foreign’ territory of an urban classroom. The teachers were configured as “demonstrators of knowledge, not so much as lecturers” (Clark, 2005, p. 80).

One of the teachers in that course commented that part of the experience of learning for non-Indigenous learners was that “first of all they have to find out for themselves who they really are.” (Gurruwiwi, 2010, p. 24). According to Verran, the learners become part of remaking places and themselves through stories told from country about the Ancestors making place (Verran, 2010). This focus on identity is explored further in Paper 6

A collation of feedback from non-Indigenous learners who participated in the experimental Teaching from Country program includes this comment:

The Yolŋu Studies course was not simply ‘another subject’, a ‘box to tick’ or a knowledge for you to deposit in your ‘bank’ of knowledge and qualifications (though much work was done to ensure it did meet the university’s requirements for assessment, course review, and study streams.) Students felt they were being given a great privilege in being participants in the class. They did not feel they were given a broad or general survey of ‘knowledge’, nor simply a course in an Australian Indigenous language. The course offered an insight into Yolŋu life and culture and the learning was understood within this context. (Clark, 2010, p. 78)

While Kriol is a very different case in the ecology of Australian languages, a learner of Kriol in the 1990s stated that “Kriol is not a language that one may speak, just because one can speak it, to other people who are known to speak it. One has to wait for permission to speak it” (Rhydwen, 1995, p. 117). She also suggests that the contexts in which it is acceptable for non-Indigenous people to use Kriol may be lessening, however other research in Ngukurr suggests otherwise, with strong support for non-Indigenous people to learn Kriol to function in community (Hendy & Bow, in preparation). There is still an important sense in which a learner should seek permission to learn an Indigenous language, to respect the traditions of knowledge ownership within a community.

Outside the university context, this example from the Pilbara region of WA shows the benefit of non-Indigenous people living and working in Indigenous communities learning the local language:

The desire of non-Indigenous people (such as teachers, nurses and other community workers) to learn a Pilbara language was recognised as having the potential for positive flow-on effects throughout the community, in terms of improved provision of key services (especially in the health and education spheres), as well as increased awareness of Indigenous people’s language rights. Both outcomes increase the prestige of Pilbara Aboriginal languages and create space within the broader community for language revitalisation to occur. (Dixon & Deak, 2010, p. 126)

In the Bininj Kunwok context, the language committee was keen for non-Indigenous people living and working in Bininj communities to have access to the language learning materials. However, these potential students were not necessarily keen or in a position to enrol in a university course. The Digital Language Shell provided a solution as it functioned independently of and in concert with university learning management systems. In the first

university course delivery in 2019, a small cohort of learners participated in the course in ‘workshop mode’ at a reduced rate without enrolling in university, while some in similar situations chose to enrol just to participate in this course. This point links to Simpson’s comment that

Training in Indigenous languages, let alone tertiary-level training, is rarely available to professionals. As a result, they struggle with communicating vital information such as management of renal disease or bail conditions. It also means that they may often have limited understanding of the people with whom they interact. (Simpson, 2014, p. 55)

This section has outlined a number of issues around the development of an online course in Kunwinjku to teach in a university context using the Digital Language Shell. In relating these issues to the available literature, it highlights some gaps, particularly where Indigenous voices are not heard with regard to sharing their language in these different contexts and with different audiences, the lack of research on non-Indigenous audiences, and the unusual status of an endangered language which has a reasonably strong speech community. The importance of co-designing such courses with Indigenous authorities and incorporating alternate pedagogies is explored further in Papers 5 and 6.

SECTION 3 Linking projects to types of language work

The analytic concepts of sociotechnical assemblages and heterogeneities assist in considering what happens when particular digital technologies become entangled with different types of language work in Indigenous languages of the Northern Territory. The three sociotechnical assemblages described in this chapter can be seen as the result of such

entanglements, using digital technologies to support language work for Indigenous people and others. In this section, all three projects are described in terms of these three types of language work and how they are facilitated.

3.1 The Living Archive project

The Living Archive project assembles a range of heterogeneous elements, including books, digital artefacts, metadata, servers, code, people, places, spreadsheets, webpages, social media platforms, scanners, OCR software, search functions, teachers, linguists, language authorities, pedagogies, knowledge practices, intellectual property, universities, libraries, cost-codes, PDFs, text files, translations, thumbnail images, special characters, language codes, OLAC standards, metadata harvesting protocols, bilingual education programs, government funding, chief investigators, project managers, casual staff, research support. This range of people, technologies, artefacts, institutions, etc, are assembled to enable language work to happen through the resulting sociotechnical assemblages.

The type of language work that involves documentation practices emerges in the thousands of texts in dozens of Indigenous languages that are now available through the Archive, for linguistic analysis, new pedagogical purposes, or general interest.

The type of language work that involves pedagogical practices emerges both in the content of the Archive, those thousands of items produced in particular pedagogical contexts of bilingual education or other Indigenous language and culture programs from around the NT over a forty year period, and in the affordances of those materials now available for further pedagogical purposes. Educators can draw on them in new contexts, such as through the current Indigenous Language and Culture programs in schools under

the new NT guidelines (Northern Territory Government, 2016) or the cross-curricular priority of the Australian Curriculum (Bow, 2016), the types of work described in the Living Archive blog, and many other as-yet-unknown contexts.

The type of language work that involves identity-making also emerges in the Archive project through the contents of the books themselves, in which Indigenous people negotiate and manage their identity and connection to place and language through their stories and pedagogical materials, and the structure of the Archive allows users to connect with those identity practices and negotiate their own identities through engagement with the materials and making their own connections with and through them. The Archive was carefully designed to enable all these types of language work, though not explicitly stated at the outset.

3.2 The Digital Language Shell project

The Digital Language Shell project uses digital technologies to entangle the heterogeneities of open-source platforms, content management systems, themes, plugins, web-design, learning management systems, units, lessons, templates, videos, audio files, photos, language authorities, linguists, project managers, payment options, user profiles, logins, glossaries, dictionaries, task managers, educators, servers, spreadsheets, forums, codecs, etc.

The type of language work that involves documentation practices is supported here through the establishment of a 'keeping place' for Indigenous authorities to both store and display their materials for various purposes. While not sufficient to serve as an archive for these materials (Thieberger, 2017), it offers a way of collecting and curating them,

arranging them in various ways (as lessons or pages focused on particular categories for example). Depending on how the access conditions are established (and WordPress offers many options for this), it is possible to upload items and choose to display or hide them from various users.

The type of language work that involves pedagogical practices is supported through the Digital Language Shell in the ways noted above and in Papers 5 and 6, in allowing Indigenous authorities to share their knowledge practices under their own authority, using a platform that is 'neutral' with regard to language status, and flexible enough to allow different pedagogical practices.

The type of language work that involves identity-making practices is supported through enabling Indigenous language authorities to determine how they want their materials to be viewed and shared, retaining appropriate links to people and places, with capacity to apply appropriate restrictions.

While the Digital Language Shell is not as sophisticated or complex as purpose-built systems such as Mukurtu (Christen, 2012; Christen, Merrill, & Wynne, 2017) and or Ara Irititja (Hughes & Dallwitz, 2007; Scales, Burke, Dallwitz, Lowish, & Mann, 2013), it has a low barrier to entry both financially and technically, and may be sufficient for some community needs, or useful as a stepping stone towards using more complex tools.

3.3 The Bininj Kunwok online course project

The Bininj Kunwok online course project uses digital technologies to entangle many of the same heterogeneities used in the Digital Language Shell, plus language committees, field officers, assessment tasks, grammatical descriptions, example sentences, primers, stories,

cartoons, learner profiles, grades, university structures, cross-institutional enrolments, extension requests, pairwork activities, meetings, forum posts, feedback, funding support, office hours, so many emails, class lists, due dates, uploading media, web searches, weblinks, promotional activities, unit codes, learning outcomes, etc.

The type of language work that involves documentation practices is supported through the collection and curation of resources from various sources – in this case including videos created by other organisations that can be linked from YouTube, or academic articles linked as appropriate from websites or library catalogues (respecting publisher access conditions). In addition, a course for learning a language supports the work of linguists and other researchers working on Kunwinjku to build better relations with their Bininj colleagues to support better research outcomes.

The type of language work that involves pedagogical practices is supported through the delivery of explicit teaching of the language using Bininj linguistic and pedagogical approaches (e.g. storytelling, use of skin names and kinship connections), as well as non-Indigenous forms of language teaching (e.g. explicit grammatical explanations, assessment tasks). The project configures the Bininj language owners as university lecturers, and supports their own pedagogical practices to inform curriculum to teach their language to outsiders.

The type of language work that involves identity-making practices is supported through the Bininj authorities expressing their pedagogical practices through identity – insisting that the first thing learners should understand is about identity through kinship and skin systems. This identity work is then mobilised by the learners who select a skin

name which entangles them in the network of Bininj relationships. Their identity as a learner is configured as a partial insider, a legitimate peripheral participant (Lave & Wenger, 1991), from which to make their own connections to people, place and language.

3.4 Iterative reconfiguring

Each of these products – these sociotechnical assemblages – are not ‘new’ but reconfigurations of existing practices and technologies. The Living Archive takes previously published books and uses existing technologies – PHP, Twitter bootstrap, SOLR, other web technologies – to present particular material in a particular way. The Digital Language Shell uses existing WordPress themes and adds plugins to configure the shell for particular uses. The Bininj Kunwok course uses this Shell and assembles available multimedia files and grammatical descriptions in certain ways to facilitate teaching and learning.

This form of heterogeneous engineering creates assemblages which are fixed enough to function but flexible enough to enable new forms of knowledge production. Each was deliberately designed to not limit possibilities, to not force users into certain ways of interacting. The projects were created not to ‘store knowledge’, but to enable Indigenous knowledge practitioners to engage in their own language work, and be open for non-Indigenous people to do the same. They need to comply with technical, legal and administrative requirements, but these should be managed carefully, so as to not overwrite or limit Indigenous knowledge practices.

This approach resists the view of technology as a panacea, that the appropriate assemblage of digital tools will provide the ‘solution’ to various issues. Focusing on the sociotechnical nature of the undertaking highlights the inclusion of the ‘social’ to counter

the potential overreach of the 'technical'. There is a danger in entangling Indigenous knowledge practices into digital forms, as Christie states: "When Aboriginal knowledge is uncritically absorbed into the machine of Western science and humanities, a violence is done to it, it is misrepresented, and its owners are marginalised from the process" (Christie, 2006, p. 79).

The sociotechnical analysis of the assemblages and their heterogeneous elements described here is not intended as a general prescription for how to create digital tools to support Indigenous language work. Each project is highly situated and localised, responding to a particular sociotechnical scenario, so the analysis is not aimed at drawing generalisations.

SECTION 4 Summary

In this chapter, I have introduced the key analytic concepts used in this analysis. Drawn from STS, the concepts of assemblage, heterogeneities and sociotechnology have helped me to analyse the three digital language projects developed to support different types of Indigenous language work. I then described each of the projects in detail, describing their motivation, development, some of the issues faced, and the academic context in which they sit. Finally I showed how the projects function as sociotechnical assemblages, identifying the heterogeneities of which they are produced, and how they support three specific types of language work that involve practices of documentation, pedagogy and identity-making.

As highlighted in the Preface to this thesis, the technology affords so much, but people are the key feature – as developers, teachers, linguists, language owners, users, and audiences of various types. It is important not be too distracted by the affordances of the technology and overlook the importance of people, particularly the Indigenous people for whom these tools are purportedly designed to serve. There is a need to avoid the “widespread suspicion that digital technologies can only work by treating Indigenous knowledge as a commodity” (Verran et al., 2007, p. 130), which can be done by intentionally including Indigenous voices in the design and delivery of the tools.

These initial chapters lay out the groundwork for the publications which follow. Having outlined the projects, their motivation, development and position within the academic literature, as well as defined the analytic concepts used throughout this thesis, the following papers present an empirical account of the development of each of these assemblages, and the emergence of different types of language work in each of the projects.

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Chapter 3 (PAPER 1): Technology for Australian languages

Bow, C. (accepted for publication). *Technology for Australian Languages*. In C. Bowern (Ed.), *Oxford Handbook of Australian Languages*. Oxford: Oxford University Press.

This first published paper sets the context of my research. It gives an overview of the current state of technology in Australian languages, describing a number of tools and resources currently in use, as well as highlighting some of the challenges and opportunities in this field.

The contribution to the thesis is in the identification of the role of technology in different types of language practices, language documentation practices (where language is presented as data which can be captured, analysed, preserved and re-presented in various ways), language in pedagogical practices (incorporating processes of formal and informal teaching, sharing information within groups and across groups), and language in practices of identity politics (involving claims to land, law, culture, ceremony, etc). As a chapter for a Handbook, it did not demand a highly theoretical or academic approach, but aims to provide a useful background for someone possibly new to the area to develop an understanding of the types of tools currently in use, as well as the issues surrounding this field.

The paper was written in response to an invitation from the editor of the 'Oxford Handbook of Australian Languages' in August 2017 to contribute the chapter on 'Technology'. Over the two years of writing and rewriting, I was acutely aware of the changes in technology, with new examples of technological tools and resources appearing regularly which could easily fit into this chapter.

The version submitted in the original thesis was accepted for publication in May 2019, and the version included here was revised in November 2020 with feedback from my thesis examiners. It is the pre-publication version (without section numbering), prior to copy editing. The final volume was expected to be published in 2020, but has been delayed due to COVID19 issues.

Abstract

Digital technologies are entangled in Australian Indigenous language work in a variety of ways, and may be differently mobilised according to how they support and enable some of the social functions of language. This chapter focuses on three types of language work: language documentation practices, language in pedagogical practices, and language in practices of identity politics. It presents a snapshot of current tools and resources, with a focus on the contexts and purposes of their development and implementation, and a discussion of some of the challenges and opportunities inherent in the use of technology for this work.

Introduction

Digital technologies have become entangled in Australian Indigenous language work in a complex range of contexts and purposes. These technologies are often mobilised quite differently according to how they support and enable certain types of language practices. Focusing on language documentation practices presents language as data which can be captured, analysed, preserved and re-presented in various ways. Focusing on language in pedagogy incorporates processes of formal and informal teaching practices. Focusing on language in practices of identity politics involves individual and communal claims to country and ceremony. While not an exhaustive list of the ways language can be understood, these types of language practice are not mutually exclusive, and can work together in productive ways, all potentially enabled and supported through digital technologies.

The social ecology of Australian languages is hugely complex, ranging from languages with no speakers and no extant documentation, through to a few remaining communities where languages are still spoken across generations. There is considerable linguistic interest in languages across the full range, and as technologies become less expensive and more accessible, more people are using digital tools and resources in the work of language maintenance and revival. Beyond transcribing texts using generic word processing software, or recording stories and songs on mobile phones, new technologies are being developed specifically to address the needs of language workers, linguists, researchers, speakers and owners. Existing tools are customised for specific purposes, and bespoke resources are being created and shared with other groups. The use of technology creates a generative cycle whereby language practices are transformed into data which can be analysed and archived, and in turn produce new materials and generate new data which can support the work of documentation, pedagogy and identity, producing new analyses and materials for archiving. The cycle can continue to reproduce new affordances for different types of language practices.

All activity of this nature relies on a range of contingent alliances between various groups of people (Indigenous language authorities, speakers, linguists, teachers, learners, archivists, programmers), institutions (funding bodies, language centres, schools, universities), technologies (software, hardware, interfaces, platforms, devices), artefacts (texts, recordings, images), pedagogies and knowledge practices (both of which come in Indigenous and non-Indigenous forms). These alliances are all tentative and vulnerable arrangements, open to threats of many kinds. A person leaves a language project, a software update is not compatible with a particular tool, a format becomes obsolete, a rift emerges

between a language community and a linguist, an institution withdraws financial support – all are everyday examples of the vulnerability of these alliances which threaten the sustainability of digital language resources. When resources are no longer functional, it is vital to consider what happens to the data they contain and how their purposes can be served in other ways. The inevitability of change should inform the development of new digital tools for new contexts and purposes.

This chapter explores some of the ways in which digital technologies are being used for the work of documentation, pedagogy and identity practices for Indigenous languages in Australia. The snapshot of current tools and resources is likely to date quickly, so the focus here is on the contexts and purposes of their development and implementation. The next section addresses the role of technology in language documentation practices, including tools, issues of access, and the re-presentation of data. The third section considers the role of technology in pedagogical practices, with a focus on online language teaching, and tools to support cross-cultural communication. The following section explores the role of technology in identity politics for Indigenous languages, considering issues of authority, recognition and cultural continuity. The final section highlights some of the challenges and opportunities inherent in the use of technology for this space. A deliberate focus on Australian research underlies the chapter, without discounting the important and valuable work done internationally in this space (see for example Carpenter et al., 2016; Littell et al., 2018 for reflections on the situation in Canada).

Language documentation practices

From bark paintings telling stories of different clan groups and their languages, to videorecording songs and ceremonies, Indigenous Australians have a long tradition of using technologies to perform, share and document language practices. Other kinds of language documentation have been undertaken by non-Indigenous people, from early colonists and explorers writing word lists to modern linguists using high-tech equipment to collect and analyse language practices. Contemporary forms of language documentation capture language and turn it into data which can then be enriched, analysed, shared and archived. The resulting data can then generate new language practices and consequently more data.

Tools for language documentation

Beyond the use of video and audio recorders to collect data, linguists commonly use readily available linguistic software produced for example by research institutions (such as *ELAN*, 2020; Wittenburg, Brugman, Russel, Klassmann, & Sloetjes, 2006) or by the Summer Institute of Linguistics (FLEX, Saymore, Toolbox, etc. 'SIL Language Technology', 2019), for documentation and analysis (Rice & Thieberger, 2018). Customised tools have also been developed in Australia to enable Indigenous people to document their own practices. **Miromaa** software was created by Indigenous developers from NSW, and supports audio, video, images and documents in various formats (Miromaa Aboriginal Language & Technology Centre, 2016). The software facilitates analysis and presentation through dictionaries and apps, and is now shared with other language groups nationally and internationally to support reclamation and documentation activities.

Other tools developed in Australia draw on familiar technologies such as mobile phones to enable language communities to document their own languages. The **Aikuma** mobile app uses networked smartphones to collect spoken data (Bird, Hanke, Adams, & Lee, 2014), with capacity for re-speaking and translating texts on the fly, requiring no text literacy and minimal technical proficiency. The **Ma!** project (Birch, 2013) developed a mobile app to enable crowdsourcing of dictionary entries, with a simple interface for language speakers to record words and sync audio, video, text and image data to an online database for building digital dictionaries. Such apps require ongoing maintenance and often redevelopment, and when the alliances that initiated their creation are no longer operational, questions remain over what happens to the data contained in the tools.

Access to language data

Once language practices are documented they can be preserved and made available for access. Digital technologies offer many affordances for preservation of and access to language data, from scanning and archiving wordlists collected in the early days of colonisation to the creation of large corpora of textual and multimedia materials. The value of preservation is highlighted in language revival programs, where only materials that have been preserved can be repurposed, but is also significant where languages are still in everyday use, as certain language practices such as songs and ceremonies are becoming endangered, and older forms of language are being lost. Changes in technology, language vitality, cultural and family considerations should be reflected in constant renegotiations over access conditions (Singer, 2019), though such work is often impractical.

Digital archives of language data raise important questions about access and authority, with concerns about misuse or inappropriate sharing of language content. A tension exists between traditional Indigenous practices of knowledge sharing and the contemporary push for openness of data (Wilkins, 1992; Withey, 2012). Technology can provide means of structuring access to materials, by establishing forms of gatekeeping through passwords and user profiles. Technical solutions need to be informed by consultation with language authorities about who has the right to decide who can access materials (Anderson, 2005). People developing such resources require an understanding of the policies and practices of copyright and intellectual property law in Australia, and how these do and do not protect Indigenous language and knowledge practices (Janke, 1998; Janke & Sentina, 2018). There is a wide range of views about how language data should be shared, with some groups (often those with very few language resources, such as the revived Tasmanian language (Tasmanian Aboriginal Centre, 2005)) mandating that content only be shared with Indigenous people connected to that language. Views also differ within communities, and can change over time, suggesting the need to build flexibility into systems to deal with such changes.

The tensions between providing information to the public and seeking to protect the rights of Indigenous knowledge authorities (Koch, 2010) have been addressed in different ways in digital archives at national, regional and local levels. The **Australian Institute of Aboriginal and Torres Strait Islander Studies** (AIATSIS) is the federal government's official 'keeping place' for information about Australia's Indigenous culture and heritage. Many language materials held there have been digitised for preservation and access (Lewincamp & Faulkner, 2003; Ormond-Parker, 2019), with some materials available

online and others supplied only to Indigenous authorities as appropriate. The **Pacific and Regional Archive for Digital Sources in Endangered Cultures** (PARADISEC) digitises and archives audio, text and visual records of minority languages, balancing the need to conform to international standards for digital archiving with the requirement to provide access to interested communities. This process is managed through assigning licences to each item, and a means for depositors to assign rights to individuals while keeping items closed to general users (Thieberger & Barwick, 2012).

There are alternative ways to handle this sensitive issue for projects with different purposes. The **Living Archive of Aboriginal Languages** (Bow, Christie, & Devlin, 2014) collected and digitised materials produced in remote schools during the era of bilingual education in the Northern Territory. The materials are freely available online with the permission of both the copyright holders and the moral rights holders under a Creative Commons license (Bow & Hepworth, 2019). Similarly, Batchelor Institute's **Centre for Australian Languages and Linguistics** (CALL) has a collection of materials collected from staff, students and communities. They created a custom range of community and creator consent forms, cultural protocols, and three End User Licenses for the general public, education purposes and Indigenous community users (CALL Collection, 2017).

At a local level, digital tools have been developed specifically to address issues of access and incorporation of cultural protocols. The **Ara Irititja** project responded to the request of Indigenous communities of Central Australia to store and make available materials of cultural and historical significance (Dallwitz, Dallwitz, & Lowish, 2019; Scales, Burke, Dallwitz, Lowish, & Mann, 2013). This proprietary software allows language authorities to upload, label, sort and view photos, videos, documents, etc., with appropriate

restrictions as needed. An open source alternative, **Mukurtu** was developed with the Warumungu community of Tennant Creek to house returned digital materials as well as newly produced digital content (Christen, Merrill, & Wynne, 2017; Withey, 2008). Using three status levels, each with different rights, enables some knowledge to be restricted to specific groups (by gender, clan, etc). The concern with all collection tools of this nature is the sustainability of the data over time, particularly if there is no provision for exporting to an appropriate archival location.

Re-presentation of curated data

The products of language documentation activities vary widely, from published grammars and wordlists to collections of annotated stories and subtitled videos. The increasing amount of linguistic data available in digital form has led to new models and tools for displaying, analysing and sharing materials online. This re-presentation (in terms of ‘making present again’) of linguistic data also involves recontextualisation, which in turn creates new affordances for analysis and sharing of language materials.

Collections of extant data from Australian languages can be re-presented for community access and linguistic analysis. The conversion of materials in Nunggubuyu language to a hypertext format (Musgrave & Thieberger, 2012) connects the grammar, dictionary and text collection to enable further analysis and model data structures for electronic grammars. **CHIRILA**, a lexical database collated from a range of sources (Bower, 2016), contains over 780,000 words from all over Australia. The **Daisy Bates project** (Thieberger, 2016a) contains 23,000 pages of vocabulary manuscripts collected via a questionnaire sent around Western Australia in 1904. The materials have been digitised,

transcribed, and encoded using the Text Encoding Initiative (TEI) guidelines (Renear, 2004), and presented on an interactive website. Such projects facilitate Indigenous people's access to vocabularies of their traditional languages, as well as providing a rich dataset for linguistic analysis and research.

The re-presentation of curated materials can also reveal gaps in the functionality of existing tools, leading some to engineer their own solutions. **Audiamus** was developed to link text to media examples for verification (Thieberger, 2004), and the **Ethnographic E-Research Online Presentation and Annotation System** (EOPAS) to link interlinear texts with time-aligned transcripts of recorded language (Schroeter & Thieberger, 2006). The **Online Language Community Access Pilot** (OLCAP) was developed to enable community members to access language documentation online (Lee & McConvell, 2008). These tools are among many created to address specific situations, yet they no longer function, again raising concerns about the data contained within them.

Dictionaries

Dictionaries are a common product of language documentation efforts, and serve multiple purposes, including translation, language learning, language revitalisation, and vernacular literacy programs. The interface of structure and content is crucial – even basic word processing software can produce a publishable output, however the underlying content will not be structured appropriately for reusing the data in other formats (Thieberger, 2011, 2016b). Though not without their challenges, digital dictionaries can support a variety of features, such as linking to sound files, images and contextual information (Simpson, 2003). The use of lexicographic software such as Toolbox, Flex and

AppBuilder ('SIL Language Technology', 2019) also facilitate dynamic updating and various distribution formats.

Digital tools for language dictionaries also enable the reimagination of lexicographic records. A prototype to create visualisations of dictionary data, **Kirrkirr** was developed for Warlpiri language, with the aim of providing useful tools for end users (Manning, 2014), including native speakers who may not naturally reach for a hard copy dictionary (Manning & Parton, 2001). While no longer maintained, Kirrkirr is still used in some communities, and its incorporation of features such as fuzzy search and semantic networks have been taken up in other Australian dictionary projects. An example of fuzzy search is incorporated in the **Yolngu Matha Dictionary** (Greatorex, 2014), where users select from a range of letters at different points in the word, returning results from the lexicon for all possible matches. This feature is especially useful for languages with special characters and a number of options for place of articulation for certain sounds, which can make spelling very challenging (Christie, 2005b).

Technical and cultural considerations can improve an online dictionary's functionality as a community resource. An online dictionary of Australian sign languages, **Iltyem Iltyem** uses video to document and share sign language practices from different Indigenous communities (Carew & Green, 2015). This project focused not only on the products of documentation but also on increasing capacity for language authorities to develop digital literacy. Control of language documentation can be given back to the language communities through activities such as participatory design workshops and digital literacy training (Carew, Green, Kral, Nordlinger, & Singer, 2015; Gawne, 2015; Bird, 2018).

This section has outlined some of the digital tools and resources used to support practices of language documentation, creating data which can be analysed, preserved and re-presented. For Indigenous people, language is not an end in itself, but a means of connecting and caring for land and people, and so does not need to be captured, configured and commodified to do its generative work. Documentation is necessarily reductionist as it cannot replace oral transmission between generations and personal interactions in real life contexts, yet it also serves a valuable role in maintaining and preserving language practices as they become endangered.

Language in pedagogical practices

Digital technologies can support and enhance the role of language in pedagogical practices in various ways, through keeping languages strong in community, teaching languages to interested outsiders, and reviving sleeping languages. Such activities often involve alliances between Indigenous language owners, educators, and technicians. As digital technologies make the production and distribution of pedagogical content more accessible and less expensive, they can facilitate language and knowledge sharing within a language group or across groups, including to non-Indigenous audiences. This section will consider a few areas in which digital technologies support the sharing of Indigenous languages in pedagogical practices.

Online language teaching

The affordances of the internet support language teaching on various scales. **Massive Open Online Courses** (MOOCs) are being used to educate learners around the world about the linguistic situation in Australia. In 2015 a MOOC on “Language Revival: Securing the

Future of Endangered Languages” (Zuckermann & Amery, 2015) presented by the University of Adelaide attracted over 10,000 participants globally. In 2018 Curtin University in collaboration with the Noongar community of Western Australia produced the first MOOC teaching an Australian language (Kickett & Forrest, 2018). Such platforms have enormous reach, allowing a global audience access to Indigenous language content.

Beyond the range of commercial tools available for online teaching, there are examples of customisation of existing software to enable sharing with other groups. A **Digital Language Shell** was developed as an online template using low-cost and low-tech tools to enable language authorities to share their language and culture online (Bow, 2017). The shell was used to run a course in Kunwinjku language, developed in collaboration with Bininj Kunwok language authorities, for a target audience of non-Indigenous learners at universities (Bow, 2019), but can easily be adapted for other purposes and audiences. This project was influenced by the longstanding Yolŋu Studies program at Charles Darwin University, which incorporated an innovative model of **Teaching from Country** (Christie, 2010; Christie, Guyula, Gurruwiwi, & Greatorex, 2013) in response to Yolŋu concerns that online teaching alienates languages from their places. Bespoke websites which incorporate analysis of community knowledge sharing processes have also been developed for languages of NSW (Kutay, 2016).

Visual and performing arts can combine with technology to promote and teach language. The **Ngapartji Ngapartji** project involved members of Pitjantjatjara speaking communities creating content for both an online language course and a touring theatre show (Sometimes & Kelly, 2010). The project arose from concern for language maintenance in the Pitjantjatjara community, and was also shared online for other interested people to

learn the language. The active engagement of both local people and the general public in language maintenance and revitalisation supported community building and social cohesion (Palmer, 2010).

Cross-cultural communication

Besides language learning programs, there are other means of supporting communication between Indigenous and non-Indigenous people across language barriers. The **Uti Kulintjaku** initiative in the APY lands of Central Australia developed an app to support communication for mental health and wellbeing in remote communities (NPY Women's Council, 2014; Togni, 2017), and is now exploring virtual reality options (Fryer, 2019). Similarly, the **Commdoc** app (Northern Territory General Practice Education, 2015) aims to facilitate communication between health professionals and patients by providing basic vocabulary in 16 Indigenous languages. The **Rumbalpuɣ Dhāwu** app (ARDS Aboriginal Corporation, 2019) explains anatomy, pathologies and procedures in plain English and several Yolŋu languages. The **iTalk library** has developed resources and educational tools using pictures and speech in Indigenous languages and simple English, producing over 100 videos on topics such as domestic violence, gambling, food handling, disability, crocodile safety, and mental health (iTalk Studios, 2016).

This section has outlined some of the ways in which technologies can enable new forms of sharing language in pedagogical practices, focusing on those which enable non-Indigenous people to engage with Indigenous languages and their speakers, which can increase awareness, recognition and understanding of Indigenous ways of knowing and being.

Language in identity practices

For many Indigenous Australians, language is inherently connected to identity, belonging to particular people or groups with enduring links to land. Beyond simply a means of communication, language gives shape to the land, its species and its human identities and politics (Christie, 2007; Evans, 2011; Merlan, 1981). This connection is still maintained even if the language is no longer spoken. Indigenous language owners increasingly use digital technologies for their own cultural and political purposes, for regenerating collective life, reconnecting places and families, and claiming authority or rights to particular resources (Verran & Christie, 2007). Much of this work is small-scale, local and unfunded, often undertaken without the involvement of linguists, and may not be visible to the wider public. This section describes some digital tools developed to support the work of Indigenous languages in identity practices.

Authority

Technologies can be used to represent some aspects of traditional language practices. The **Welcome to Country** app (Weerianna Street Media, 2015) draws on Aboriginal traditions of welcoming visitors to certain territories. Using GPS technology and video tools, the app presents an introduction to the local country and culture, including basic cultural protocols appropriate for that land. The app home page warns against using the videos as a substitute for an official in-person Welcome to Country, to prevent the technology being used as a substitute for human engagement.

Visual representations of country and local Indigenous authority also draw on mapping technologies. The **Gambay** map (First Languages Australia, 2014b) was developed

in collaboration with regional language centres to ‘crowdsource’ a dynamic map of Australian languages that reflects the names and groupings favoured by the community, which includes videos of local authorities speaking in and about their language. The underlying dataset can also be shared for other purposes, such as a project aiming to collect **50 words** in all Australian languages as an educational resource and display of linguistic diversity (Research Unit for Indigenous Language, 2019).

Recognition

Digital resources can serve to claim a space in the online environment to present a language group as a legitimate entity, even when that language is no longer spoken. Such representation makes the internet a space where Indigenous languages can sit alongside English and majority world languages. As Indigenous academic Marcia Langton stated, the internet “allows Indigenous peoples to position themselves outside colonial nation-states, in the new cyberspace” (Langton, 2013, p. vi).

An entry-level means of creating a space in the digital realm for Indigenous languages is through a web presence. A simple website can be created at minimal cost and without requiring great technical skill. It may include some language components, from a word of greeting or some common vocabulary, through to extensive linguistic material such as dictionaries, texts, recordings and learning materials. A site which contains information about the Gamilaraay and Yuwaalaraay languages of NSW (Catholic Schools Office, 2008) includes online lessons, a dictionary app, recorded stories, and links to other resources. Gamilaraay was one of the first Indigenous languages in the world to appear online (Austin, 2008), and the web dictionary (Austin & Nathan, 1996) is still available and functioning

after over two decades. Such resources allow different audiences to access materials – the Gamilaraay diaspora wanting to reconnect with their heritage language, teachers in NSW schools wanting to include local Indigenous language content in line with new legislation (Aboriginal Affairs NSW, 2017), researchers in language revitalisation, students at university where Gamilaraay is one of only a handful of Indigenous languages taught at tertiary level (Simpson, 2014), and interested members of the public.

Websites can serve other purposes, such as sharing information about language endangerment and revitalisation. **My Grandmother's Lingo** focuses on the Marra language of south-east Arnhem Land (SBS, 2016). This interactive site introduces visitors to the issue of language endangerment in Australia through one young woman's struggle to preserve and revive her heritage language. It includes educational resources to raise awareness about the cultural and linguistic importance of endangered languages (Munro, 2017). While visually engaging, the linguistic content of the site is minimal – its role in language revitalisation being more in representation than in content.

Digital resources that provide simple templates can be populated with content from different language groups without incurring significant expense. The **Jila** framework (ThoughtWorks, 2015) was developed with the Yawuru community of Broome as a customisable template. Apps built on this framework in Yawuru and Miriwoong language include dictionaries with audio recordings, and a learning area with games. The framework has also been used to create bird apps in a number of languages, presenting the names of birds accompanied by pictures and recording of the sound of their calls, plus some short stories in various languages (Carew et al., 2015). Such resources provide opportunities for

language groups to be represented in the app space, enabling recognition on a broader scale.

Indigenous groups can also draw on the affordances of well-known online platforms to stake their claim for recognition. The **Noongarpedia** project ('Noongarpedia', 2017) claims space in one of the most popular sites on the internet, using Wikipedia to present local knowledge and language. This project – the first of its kind in Australia – explores the open nature of a platform which highlights and foregrounds the openness of all knowledge while respecting the appropriate authority structures of the Noongar community, working with elders to develop procedures to prevent access to certain information by the general public (Buchanan et al., 2016).

Beyond simply consuming content, access to digital technology and tools enables Indigenous people to become active cultural producers, using video production tools and local broadcasting to support their own aspirations (Michaels, 1986; Kral, 2013). The popularity of YouTube in Indigenous communities has led to the development of **IndigiTUBE** (First Nations Media, 2018) which streams Indigenous-produced videos online. **ICTV** (Indigenous Community Television Limited, 2019) broadcasts contributions from local Indigenous media to much of regional and remote Australia and is now available online, with around half their content presented in Indigenous languages.

Cultural continuity

The means by which Indigenous authorities use technologies for cultural continuity naturally differ from the work of linguists in language documentation and analysis. There are many examples of speakers and elders exercising authority over their language records,

contrasting with the outdated model of linguists withholding records and maintaining control of the technology.

Cultural and environmental knowledge can be shared in digital formats specifically for use by local language communities. The **Walyaku** project (Southern Tanami IPA, 2016) transforms an environmental management plan into a digital storybook with videos, animations, a seasonal calendar and interactive maps. The site is all in Warlpiri language, with some English synopses available. Other apps developed for rangers working on natural resources management can include features supporting data collection in local languages (Atlas of Living Australia, 2018).

Video games are increasingly used for sharing Indigenous culture and language, as content can be embedded within the narrative and structure of the game. **Tjinari** is an online video game developed at ANU in collaboration with the Ngaanyatjarra community of the Western Desert. School children from that community were incorporated in its development as both creators and target audience (Morelli, 2016). Growth in use of video games in Indigenous languages of the Americas (Ząbecki, 2020) is likely to influence the Australian context in the future.

The work of Indigenous languages in identity practices can generate different tools and resources for Indigenous people, which may be harder to promote to linguistic funding bodies, but may attract cultural or philanthropic funding or other forms of financial support. Local examples include stories of elders accessing traditional songs that are then shared as ringtones among young community members, or videorecording ceremonial dances for verification of correct practice. Such activities may be less visible, shared locally

rather than publicly available online, and generally undocumented in academic literature. The resources identified in this section represent outputs of funded projects, as products which can be promoted and showcased, whereas many intangible benefits of language work for communities receive less attention outside the community (Bedford & Casson, 2010).

Challenges and opportunities

The many challenges in the domain of language technologies are not unique to the Australian Indigenous language context, and addressing these can lead to innovative solutions and new opportunities. The exponential rate of change in the technology sector makes it almost impossible to maintain currency in an ever-changing environment. Warnings from early this century about “technological quicksand” (Bird & Simons, 2003, p. 557) remain salient today, considering the limited lifespan of many systems, versions and formats. Language centres and research projects with short-term funding have limited capacity to continually update tools and resources, leaving a graveyard of apps and web links that are unused, unsupported or obsolete.

While digital technologies hold the promise of longevity for language documentation and recording, this risk of obsolescence remains an ongoing and critical issue. Digital data can be lost or created in formats that become quickly inaccessible even to the creator (Thieberger, 2014). Simply collecting something in a digital form – whether born digital or transformed from analogue – is not sufficient to preserve it. Publishing online is sometimes considered a reliable means of storing data, yet URLs are notorious for their lack of persistence (Bird & Simons, 2003). More bluntly, “a website is not an archive” (Thieberger,

2017), since an archive provides backups, determines access conditions, maintains formats, optimises discoverability, etc. There are cautionary tales of data becoming inaccessible through lack of backups, forgotten passwords, outdated hardware, system updates, and poor metadata recording, damaged hardware and human error. Consideration of sustainability and access to resources should be key components of decision-making processes in designing or customising digital language resources and tools (Sloggett & Ormond-Parker, 2013). However, Christie (2005b) warns of the ways in which linguists' and technologists' insistence upon 'future-proofing' and 'interoperability' can compromise the here-and-now of language authorities mobilising digitising technologies for their own purposes. The tension between immediate results and ongoing sustainability should be considered a productive space for negotiations and innovative solutions.

The 'digital divide' is a challenge in Australia, disadvantaging regional and remote communities where traditional languages may still be strong. There is great variation in network access, costs and consistency of service (Leung, 2014; Rennie et al., 2016). Beyond the provision of infrastructure, better access to facilities, training, and development of relevant content are also required (Featherstone, 2013). Moreover, because digital records are easier to access remotely, increased coverage and delivery of digital records is required to ensure that appropriate language and cultural authorities are not excluded from access due to location. Innovative tools and resources are useless if the intended audience lacks the internet access, hardware, software or skills required to benefit from them.

Fortunately, there are also many positive stories of creative uses of digital technologies in remote locations to document and share local knowledge, as well as problem solving, collaborative and cross-generational learning, literacy development and

innovative uses of multimedia (Kral, 2013, 2014). In youth centres in the Western Desert for example, young people are exploring digital tools to create music and film projects, which can then be shared globally through social and broadcast media (Kral, 2010; Kral & Schwab, 2012). Projects such as **Indigimob** (First Nations Media, 2019) are incorporating language content into their resources for improving digital inclusion.

The field of community-based Indigenous language work in Australia is relatively small and scattered, so opportunities to share knowledge are crucial. The key forum for such exchange is **Puliima**, the biennial national Indigenous language and technology forum, which brings together language workers, researchers and technologists to explore projects, products and equipment for Indigenous languages projects (Miromaa Aboriginal Language & Technology Centre, n.d.). The work of **First Languages Australia**, the peak body representing language centres and language projects around the country, also plays an important role in sharing ideas and communicating among the scattered centres. Their **Angkety Map: Digital Resource Report** (First Languages Australia, 2014a) provides valuable information for community groups or those starting out in this field, exploring issues of access, commercialisation, customisation, and sustainability, with a range of examples from around the country. Both these enterprises are funded through the federal government's Indigenous Languages and Arts program, which is currently the main source of funding for language work in Australia. Both projects also prioritise people over technologies, providing opportunities to network and share knowledge and ideas.

A notable shift in the role of technology in Indigenous language practices is exemplified by the take-up of social media platforms among Indigenous people (Carlson & Frazer, 2018; Rice, Haynes, Royce, & Thompson, 2016). While there are concerns that these

modes of communication may exacerbate instances of fighting and bullying (Vaarzon-Morel, 2014), they can also connect the local to the global community (Kral, 2013). Such tools tend to privilege the use of English, and though various user groups engage in language on these platforms, little published information exists on the use of Indigenous language in this space (Auld, Snyder, & Henderson, 2012; Brady, Dyson, & Asela, 2008; Oliver & Nguyen, 2017). There are instructions available for changing the interface of Facebook into Indigenous languages (Scannell, 2012), which has required grappling with the translation of certain concepts, such as how to 'friend' someone in a community where everyone is related (Dickson, 2012; Garde, 2012).

Text and literacy

Much interaction with technology relies on text literacy, particularly in English. However in many communities, particularly in remote areas, people struggle to read and write in English or in their home language, especially where the language of education is not the language of the community (Gawne, Wigglesworth, Morales, Poetsch, & Dixon, 2016; Simpson, 2013). Barriers of literacy for some Indigenous people can prevent their interaction with the tools designed to serve their language needs, and limit their involvement in the development and distribution of such digital resources. However, new digital technologies can either bypass text literacy, with tools that do not privilege text (Kral & Schwab, 2012), or which support local literacy practices (Auld et al., 2012; Kral, 2012). **Sound printing** technology uses an audio player linked to a code embedded in the page, allowing the user to listen to a pre-recorded sound file while reading the text. This technology has been used for example for posters sharing community messages (Lorimer, 2017), and in a publication of stories in the Burarra language of Maningrida (England,

Litchfield, England, & Carew, 2014), making the products of language documentation more accessible to the language community.

Writing systems for all Australian languages are based on a Latin alphabetic script, with some requiring special characters such as underscore and diacritics. Since these are not always readily available on a standard keyboard, digital tools have been created to support typing in Yolŋu and Anangu languages (Australian Society for Indigenous Languages, n.d.). Text interaction could be enhanced through tools such as spell-checking, predictive text, and autocorrect options, which are not currently available for any Australian language.

Transcription is one of the most time-consuming aspects of language documentation, relying on human effort by those who know the language. The **Transcription Acceleration Project** is using data from a number of Indigenous languages to train machines to recognise and transcribe linguistic materials (Centre of Excellence for the Dynamics of Language, 2017b). Such research is making machine learning speech technologies available to people working with languages with minimal data, with a focus on Indigenous languages (Foley et al., 2018). Other tools such as **Persephone** (Adams, 2017) for the automatic understanding of unwritten languages are beginning to be developed and applied to Australian languages.

Looking ahead

Despite the many projects and initiatives already discussed, advances in language technology and the digital humanities have yet to make a significant impact on Australian languages, either due to small populations making such efforts commercially unviable, or the lack of sufficient corpora on which such tools rely. There are currently efforts to

develop large datasets of Australian languages with sufficient analytical detail to facilitate language processing of this nature (Centre of Excellence for the Dynamics of Language, 2019). A few examples of these technologies being used for Australian languages are available, such as natural language generation for producing commentary-style textual descriptions of Australian Football League games in English and Arrernte (Lareau, Dras, & Dale, 2011), statistical machine translation for Warlpiri and Wik Mungkan (Zwarts & Dras, 2007), deep language processing for Murrinh-Patha (Seiss & Nordlinger, 2012), semantic web ontologies for investigating Australian Indigenous knowledge systems (Corn & Patrick, 2019), and morphological analysis of the polysynthetic language Kunwinjku (Lane & Bird, 2019). Further research in these areas will not only support the work of language maintenance and revival in Australia, but could benefit Indigenous people wanting to interact with technology in their own language or without using written text.

Looking ahead, it is expected that new trends in computer science will be felt in the domain of Australian language work. Linguists and language authorities are looking to new technologies such as virtual and augmented reality to support language preservation, presentation or promotion. Projects involving cultural artefacts (such as 'Indigital', 2017), oral history (Wallworth, 2016), and ceremonial activities (Gong Wanhurr, 2017) are likely to spread to the language domain. A move towards data visualisation is enabling new forms of analysis of language materials using technologies developed in other areas. Archives and other collections can be interrogated and discovery aided through innovative visualisation tools (Thieberger, 2018). Experimental work with social and humanoid robots (Centre of Excellence for the Dynamics of Language, 2017a; Keane, Chalmers, Boden, & Williams, 2019), and emerging work on 'tangibles' (such as a talking toy crocodile in Taylor et al.,

2020) can encourage language use in individual and social activities, and may lead to new insights into engagement with technology for language work.

Conclusion

Stories about endangered languages occasionally emerge in the popular press with a narrative of technologies as the ‘saviour.’ Headlines promote “How Australia’s newest technology can be used to save its oldest languages” (Carmody, 2014) and “Smartphone apps used to save endangered Indigenous languages” (James, 2014). There is something alluring about the narrative of modern technologies ‘saving’ ancient traditional tongues. It makes for good headlines and photo opportunities, but vastly oversimplifies an intriguingly complex story. Indigenous Australians have a long history of adapting new technologies to suit their own purposes, from trading implements with Macassans to using colonial tools such as guns, 4WDs and mobile phones. The use of digital technologies to support the continuing transmission of knowledge, the maintenance of relationships, and caring for country, is a natural progression.

Unfounded claims about the saving powers of technology are potentially hazardous, implying that the technologies themselves can rescue or resuscitate language practices. While the technologies have some agency, it is the custodians of those language practices who will determine their continuation, with or without the use of technology. Beyond the click-bait headlines, there is often an acknowledgement that the technologies themselves will not save the language, but rather the agency is with people, who may or may not choose

to use digital resources to support their language activities. A new narrative is emerging that says 'technology won't save languages, people will'.

Technology has impacted language documentation, description, analysis, and preservation enabling rich linguistic analysis. Nonetheless, transforming language into data fundamentally changes the nature of the object. Digital objects do not in themselves contain knowledge, but are simply series of ones and zeros, artefacts of earlier acts of knowledge performance or production (Christie, 2004, 2005a). Digital technologies can facilitate the preservation and sharing of these artefacts, but in themselves are unlikely to change practices without the agency of the language speakers and authorities.

The affordances of digital technologies explored throughout this chapter are not always realised. The complex range of contexts and purposes in which languages exist require different forms of access – whether practical (internet, hardware, software, funding), skills-based (text and digital literacy), or knowledge-based (language knowledge, authority), and the multi-faceted interaction of all these elements. Those with the practical resources may lack language knowledge, and vice versa, so the affordances may be theoretical rather than actual. Attending to the dynamics of these interactions can reveal some of the inequities and assumptions which underpin this space.

Indigenous language owners are growing increasingly concerned that government funding is often diverted towards technological solutions for endangered languages, rather than supporting people to do language work on the ground (Bedford & Casson, 2010; Gale, 2016). Outcomes that are difficult to measure, such as community well-being or increased use of language, tend to be rated less highly in funding decisions. Tangible products are

often favoured over capacity building in community, and the requirements for receiving grants can exclude certain groups (Gale, 2016). Alternate sources of funding are required to evade the vagaries of government policy regarding the value and cost of maintaining Indigenous languages. There is also an alarming lack of evidence for the careful and thorough evaluation of most of the technological solutions, and little support for such activities, which risks endangering much linguistic data.

In recent years the use of digital technologies has supported and enabled various language practices, including language documentation, pedagogical and identity practices, among many others. The contexts and purposes of the tools described in this chapter will change, as will the technologies, the vitality of languages, and the cultural considerations involved. Design of new technologies is being informed by the inclusion of more Indigenous people in language work and the engagement of linguists with the social and political life of languages. The future is likely to hold interesting innovations, collaborations and theoretical insights as digital technologies continue to inhabit the world of Australian languages and those who use them.

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Chapter 4 (PAPER 2): Towards a unique archive of Aboriginal languages: a collaborative project

Mamtora, J., & Bow, C. (2017). Towards a Unique Archive of Aboriginal Languages: A Collaborative Project. *Journal of the Australian Library and Information Association*, 66(1), 28–41. <https://doi.org/10.1080/00049670.2017.1282845>

Where the first paper presented an overview of the state of the art in technology for Australian languages, the next paper moves to a specific digital language infrastructure. The contribution of this paper is to identify some implications for practice regarding the benefit of collaboration between researchers and library staff for a unique project involving Indigenous language materials.

This paper began as a conference presentation for the VALA 2016 conference: *Libraries, Technology and the Future*, prompted by an invitation from Jayshree Mamtora, the research librarian from CDU Library. It was co-authored with Neil Godfrey, the CDU Library metadata librarian (who regrettably declined to participate in the adaptation of the conference paper to a journal article).

Godfrey, N., Mamtora, J., & Bow, C. (2016). Preserving a living archive of Indigenous language material. *VALA 2016: Libraries, Technology and the Future. Presented at the VALA 2016: Libraries, Technology and the Future*, Melbourne, VIC. Retrieved from <http://www.vala.org.au/vala2016-proceedings/vala2016-session-5-mamtora>

The expanded paper was published in an Australian library journal, appearing in the first issue of a 'new' journal resulting from a merger of two longstanding journals in the field, the *Australian Library Journal* (1951 – 2016) and *Australian Academic and Research Libraries* (1970 – 2016). As such, the paper reaches an audience of library researchers and practitioners from across the academic, government, technical and community library space.

The version presented here is the accepted manuscript version. See [Appendix 1.1](#) for signed statement of contribution from the first author.

This is an Accepted Manuscript of an article published by Taylor & Francis in Journal of the Australian Library and Information Association, 66:1, 28-41, available online at <http://www.tandfonline.com/https://doi.org/10.1080/00049670.2017.1282845>

Abstract

Charles Darwin University Library is directly helping to sustain and preserve Aboriginal language and cultural materials that encounter many hurdles for their long-term survival. The Library is supporting an ARC-funded project known as the Living Archive of Aboriginal Languages, by providing a repository, web application, digitisation program and professional advice. The collaboration between the Library and research team addressed a number of challenges in relation to appropriate ways to represent complex and variable metadata, widely varying content from diverse sources and in various conditions, and in making these fragile and endangered materials accessible to a global audience. The open access Archive now includes thousands of items in dozens of Northern Territory Indigenous languages, providing a sustainable repository for researchers and allowing Indigenous communities to share their languages, histories, knowledges and practices around the world. The project serves as a rich case study demonstrating how academic libraries can work with researchers to support the archiving of cultural heritage.

Implications for Practice

- Collaboration between researchers and library staff benefits both sides. In this case library staff learnt a great deal about Indigenous knowledges while the research team learnt a great deal about information management
- Negotiation with Indigenous authorities is crucial to the sensitive and careful management of Indigenous language materials
- Reference to the wealth of established guidelines, protocols and best practice recommendations to provide direction for the development of Indigenous collections is an important component of such a project
- Such collaboration can draw on the wide range of skills within the team and outsource skills where they are lacking

Introduction

This article presents a case study of a collaborative project between the Charles Darwin University Library and a research team from the Northern Institute of the University. The research team, comprising educational and linguistic experts, was successful in securing an Australian Research Council grant to preserve and make widely available a rich collection of Indigenous language materials from the Northern Territory. At the time, many of the materials were being lost and some of the languages were on the verge of extinction making it imperative that they be gathered and digitised for long-term preservation. The Library, with its special skills and expertise, was invited to assist with the

digitisation and presentation of these valuable materials. In 2012, the collection was developed as an open access, online repository known as the *Living Archive of Aboriginal Languages*.

Background

In the last 20 years or so, there has been a concerted worldwide effort for libraries to digitise resources of cultural, historical or linguistic importance for their long-term preservation. At the World Summit on the Information Society, held in Tunis in 2005, the signatories committed themselves to “... local content development, translation and adaptation, digital archives, and diverse forms of digital and traditional media” in recognition that “these activities can also strengthen local and Indigenous communities” (World Summit on the Information Society, 2005). Furthermore, according to the UN Declaration on the Rights of Indigenous Peoples (2007) under Article 13, Indigenous people have the right “to revitalise, use, develop and transmit to future generations their histories, languages, oral traditions, philosophies, writing systems and literatures”.

In Australia, Martin Nakata, an Indigenous academic, has written about the increasing role libraries can play in the provision of services to their Indigenous communities, improving digital access to Indigenous knowledge, and the “need to bring information closer to the community through new technologies and multipurpose venues” (Nakata, 2007, p. 99). Librarians and archivists play a significant role in managing such knowledge, as “mediators, in the sense that they occupy an intermediate space between those who produce and are the legal owners of knowledge and those who require access to knowledge” (Nakata & Langton, 2005, p. 5). Nationally, the Australian Institute of

Aboriginal and Torres Strait Islander Studies (AIATSIS) in Canberra has been the keeping place for materials, however with collections becoming more dispersed, access requirements changing, and the affordances of the digital era, new standards are being established to meet fresh challenges. In this context, both preservation *and* access are equally important areas that need to be addressed.

In recent years in Australia there have been important initiatives on the part of national and state libraries and other collecting institutions to develop appropriate guidelines and protocols for the management of Indigenous knowledge and cultural materials. The Aboriginal and Torres Strait Islander Library, Information and Resource Network developed a series of protocols for the respectful handling of Indigenous knowledge and materials in libraries (ATSILIRN, 2012). The NSLA (National and State Libraries Australasia, 2016) has set up an Indigenous Working Group solely to promote “best practice for the collection and preservation of materials relating to Aboriginal and Torres Strait Islander (ATSI) peoples.” As part of this strategy, it has developed: guidelines for libraries and Indigenous communities to successfully collaborate with each other; a National Position Statement for ATSI services and collections; and a Digital Infrastructure for Indigenous Collections. The Working Group has also collaborated with First Languages Australia to make Indigenous language material more accessible to their communities. The report on the National Indigenous Languages Collections Strategy notes that “little contemporary material representing the lives, knowledge and cultures of Aboriginal and Torres Strait Islander people is being collected within many of the key collection agencies” (First Languages Australia, 2015, p. 3). It also emphasises the imperative for agencies and institutions to reconceptualise these collections and the needs of Indigenous peoples in

respect to access to their own materials. Several state libraries have developed specific projects relating to the management of such collections, such as the State Library of New South Wales's efforts to support access to language materials (Thorpe & Galassi, 2014), repatriation (Nicholls et al., 2016), service improvement (Thorpe & Galassi, 2015), and the use of social media (Thorpe & Joseph, 2015). The State Library of Queensland has developed a portal to Indigenous language materials and knowledge (State Library of Queensland, 2016) and maintains an informative blog (Crump, 2016).

In the Northern Territory, Knowledge Centres were established in remote communities by the Northern Territory Library as repositories of materials of local significance (Gibson, 2007; Nakata, 2007). However, a vast body of literature in local vernacular languages not collected in institutional repositories remained scattered and vulnerable, and required significant efforts in preservation and careful negotiations regarding access.

Development of the Living Archive

Around 30% of the population of Australia's Northern Territory (NT) is Indigenous, a large proportion of whom live in remote communities and speak an Indigenous language at home. There are up to 100 different languages around the NT, of which all are endangered and many have no remaining fluent speakers. An estimated 40 languages are still in everyday use in the Territory (Northern Territory Government, 2016), each with its own set of cultural traditions and practices. In general, literacy rates are low in English, which is often a second, third or fourth language.

In the 1970s, the Australian Federal Government established a program of bilingual education in selected remote Northern Territory schools to enable children to be educated first in their mother tongue, before transitioning to English (Devlin, Disbray, & Devlin, 2017). Bilingual education was introduced in around 20 schools, many of which established Literature Production Centres (LPCs) to produce books and teaching materials in the Indigenous languages of those communities (Bow, Christie, & Devlin, 2014). An estimated 4000 small books were produced in dozens of languages. The books were often only a few pages, printed locally in small production runs of 50–200 copies, and usually richly illustrated by local artists or with photographs or simple line drawings. Topics include “old time children’s stories, pre- and post-contact histories, books about the environment, hunting, bush medicines, ghost stories, creation stories, stories of memorable events ... life stories, conception stories, and cautionary tales” (Christie, Devlin, & Bow, 2014, p. 49). These stories were produced for school programs and did not include any secret or sacred knowledge that should not be shared publicly.

Since the 1990s, government support for bilingual programs in the Northern Territory has been progressively reduced (Devlin, 2009), and many programs and LPCs have closed (though some schools still maintain programs). This has resulted in the serious endangerment of this rich collection of literature in Aboriginal languages, as the books were put into storage or sometimes lost or destroyed. While some LPCs deposited items at the National Library of Australia or AIATSIS, there was no systematic collection of these resources and hard copies were scattered around private collections and libraries, or left vulnerable in harsh environments in storage in remote communities. Some digitisation

efforts were conducted in recent years, but a large proportion of the items was at risk of being lost forever.

In 2011, the Australian Research Council funded a research team from Charles Darwin University (CDU), jointly with the Australian National University (ANU) and the NT Department of Education, to develop a digital archive of these materials. The Living Archive of Aboriginal Languages began in 2012 as a research infrastructure project that would enable academics to access these materials. In addition, a major goal of the project was to make the language materials accessible to the Indigenous communities that originally produced them, thus incorporating the 'repatriation' called for by Nakata (2007, p. 100). Digital archiving provides a means to preserve these materials of enormous cultural value, as well as opportunities to allow access for a wide audience. Additional funding was awarded in 2014, which saw new partners join the research team. They were the Northern Territory Library, Batchelor Institute of Indigenous Tertiary Education, and the NT Catholic Education Office, and their involvement expanded the project to include materials from other communities that didn't have bilingual education programs but had produced language materials.

As noted by Nakata and Langton (2005) among others, the importance of negotiation with the appropriate Indigenous authorities is a crucial component in any project of this nature. While the research team has no Indigenous representation, the team regularly drew on its connections with Indigenous communities and individuals developed over many years, inviting discussion and negotiation, sharing ideas and implementing suggestions. In calling the project a 'Living' Archive, the aim was to go beyond the simple preservation of historical documents by creating a space for the celebration and revitalisation of these rich

resources, in collaboration with the original creators of the materials. The challenge of negotiating the various technical, performative and pedagogical aspects of the project proved “a difficult and unpredictable balancing act, mediating between different knowledge practices so that the archive itself is developing in multiple ways” (Christie, Devlin, & Bow, 2014, p. 49).

Collaboration

The Living Archive project research team required assistance with the appropriate means of digitising, storing and making accessible these thousands of small books. The Library at CDU offered support, which turned into a strong collaboration of mutual benefit to the research team and the Library. Given the increasing role of librarians in research data management (ANDS, 2016), the Library brought its specialised skills and knowledge and combined them with the skills and knowledge of the linguists, educators and others involved in the project. Prior to this project, CDU Library had been carefully maintaining a special collection of NT Indigenous language materials in hard copy, but with limits on access to these vulnerable materials. Around the same time as the development of the Living Archive, the Library was also engaging in research with the University’s School of Education to embed Australian Aboriginal and Torres Strait Islander Knowledge, Culture and Language in the Bachelor of Teaching and Learning program. This led to the development of a LibGuide allowing a single point of access to a wide range of materials focused on Indigenous knowledges (Ford, Prior, Coat, & Warton, 2014). The Living Archive project gave the Library an opportunity to extend its capacity to manage Indigenous

knowledge materials, not just for use within the University, but to a potentially global population online.

The research team brought to the project the thousands of hard copies of language materials sourced from around the NT, through its network of connections with schools, community leaders, individuals and organisations, which also enabled fruitful conversations about the process of preservation and guidelines for access requirements. The team also had the linguistic knowledge and expertise to make decisions about the materials and established the project methodology, but had minimal experience in archiving or metadata. This project was unique in that it focused only on textual materials in languages of the Northern Territory, deliberately excluding linguistic notes and other types of research or publications in English about these languages, cultures or people. It was also important to make the collection open access with permission from the appropriate authorities: it was to be a tool not only for linguists and other researchers but also for the members of the Aboriginal communities that produced the literature in the first place. Other cultural archives, such as those of AIATSIS, have wider collection policies, but more restricted access protocols, which is appropriate for their statutory requirements, but means that certain materials are not readily available to the public.

The CDU Library was able to draw on its experience in handling research data to provide the research team with support, training and advice, as well as online storage and sustainability for the materials. The Library was responsible for the repository, web application and digitisation program to preserve the endangered Indigenous resources and to facilitate both Indigenous community engagement and international linguistic research. A key contribution to the project was the Library's expertise in knowledge and resource

organisation and management, which informed the creation, storage, preservation and sharing of the materials included in the Living Archive. Furthermore, the Library played a crucial role in the establishment of the Archive by providing ongoing technical information management support needed to ensure its success and sustainability. The Library hosted the Archive in its institutional repository, known as CDU eSpace, which allowed the project team to upload metadata and digital artefacts, which could be accessed through a custom-made website, as well as be harvested by OAI-PMH and other relevant harvesters, such as OLAC (the Open Language Archives Community).

Digitisation and storage

The Library team developed a workflow for digitising the materials on its in-house scanning equipment. To ensure quality and enable the technical aspects of the digitisation process, the Library began the process of digitisation with its existing equipment, software and expertise, learning the settings required for the equipment and image editing software, developing appropriate workflows, following best practice, and from there training others from the research project team to take over the responsibility. The Library collaborated with ANU where other materials were being scanned, to ensure consistency of quality, size, etc., and also sought advice from other experts in the field. This had the dual outcome of providing a high standard of digital material from the hard copy sources, but also extending the skills and knowledge of the Library staff in handling, scanning and storing valuable cultural materials, including digital image processing and Optical Character Recognition (OCR). A workflow was designed to maintain a record of 'actions', to enable tracking each

item through the various stages of processing (as the item is digitised, OCRed, uploaded, etc.).

The collection requires approximately 2Tb of storage, including metadata and the digital artefacts (both presentation versions in PDF format and preservation versions as TIFF files). Storing these in the institutional repository with its systems for maintenance and backup allowed for greater sustainability over the long-term than if a standalone web archive was created. This also ensures an ongoing commitment to the collection at an institutional level beyond the project funding cycle. Further assurance of sustainability was initiated by arranging a backup copy of the entire collection to be stored offsite at AIATSIS.

Metadata

The Living Archive collection of materials included basic readers, learning primers, stories of historical reminiscences, creation stories, stories of daily life, translations from English, in multiple languages and multiple genres. While in some cases it was a straightforward task to identify appropriate categories, the research team wanted to maintain a flat structure, as “collapsing the structures of metadata and flattening out their content may enable the creative connecting processes upon which Aboriginal knowledge-making depends” (Christie, 2005b, p. 56). With the focus on building the Archive to serve the needs of an audience ranging from academic researchers to language speakers in remote communities, it was important not to constrain these categories too much, or to impose a Western typology on Indigenous categories.

The combination of expertise from the research team (in Indigenous knowledges and linguistics) and the Library team (in cataloguing and classification) led to valuable

discussion as common ground was found. As a language archive, the research team chose to use the guidelines provided by OLAC (Simons & Bird, 2003), an extension of Dublin Core, so a crosswalk was created to map between terms used in OLAC, MARC and MODS.

Customisation of the eSpace environment for these specific records was facilitated by the technical team, who were also required to maintain a stable library system for its institutional obligations.

Negotiation about how the resources were to be described, browsed and searched led to a satisfying outcome designed to meet the needs of the diverse audiences, as well as conforming to best practice in both library and linguistic standards. Much of this was built on chief investigator Christie's previous work on Indigenous knowledges in digital contexts (Christie, 2001, 2004, 2005b, 2005a; Christie & Verran, 2013; Verran & Christie, 2007, 2014). Where there existed no standard controlled vocabularies specifically catering for the language materials, the librarians' skills in cataloguing and metadata made significant contributions to the way the materials were organised, structured and described. 'Place' and 'Language' were chosen as the primary classifications of the materials, even though there was rarely a one-to-one correlation between the two fields, as in most cases each community included several languages, or in some cases one language was spoken across several communities.

The negotiation of additional fields to be included in the catalogue was an ongoing process, with new materials creating new questions about classification (Bow, Christie, & Devlin, 2015). The Library team was also able to advise on the best way to classify particular items, as it was not always a straightforward task to distinguish 'form' from 'genre' from 'subject' for example, especially in a language unknown to either the research

team or the Library team. Data entry forms were developed to assist the research team with the cataloguing of materials, using controlled vocabulary lists where possible to ensure consistency. A long list of 'author types' was added, including illustrators, photographers, translators and editors. However, in some cases books listed a whole classroom of children as the authors (all by first names only). Aboriginal naming practices sometimes confounded the issue, with a single contributor being known by a number of different names, or with different spellings. Questions about fine distinctions between categories (such as the difference between a 'Series number' and a 'Part number', or between 'Geographical origin' and 'Origin of story'), or the inclusion of keywords (in English and/or the language of the publication), or the correct way to handle missing metadata, were the types of discussion that the Library team was able to resolve for the research team.

Access

Ensuring the open access status of the Living Archive collection was not a routine outcome of simply adding the records and attachments to the repository. Issues of ownership and copyright were carefully negotiated by the research team, involving licensing from institutional copyright holders and permission forms from individuals named as contributors (Devlin, Bow, Purdon, & Klesch, 2015). As noted earlier, the resources collected have no access restrictions, with no secret or sacred knowledge in the books produced for the bilingual programs. However, it was important to the research team to ensure that the Indigenous creators of the materials were included in the negotiations, so visits to communities involved discussion with knowledge authorities about the project, and showing people involved in the creation of the materials how these were being safely

stored and made available through the Archive website (Bow et al., 2014). Feedback from the community members was consistently positive, and many suggestions and requests were implemented in the Archive. The Library assisted with the technical aspects of access management in the collection by enabling access rights to items as they were released to public view, and restriction of access to others for which permission had not yet been secured. The process involved facilitating the project team to manage the movement of records across these different domains in a simple and transparent manner. A 'take-down' policy was also publicised and implemented, with any concerns about access to material in the collection being addressed immediately. These negotiations complied with the ATSIILIRN Protocols, specifically 12.6 which recommends "Work(ing) cooperatively with Aboriginal and Torres Strait Islander peoples to promote the creation, collection and management of digital materials" and 12.7 "Educate users of their collections about the potential benefits and risks of sharing digital content in an online environment" (ATSIILIRN, 2012).

The aim of the project to make the materials accessible to a wide range of audiences required careful consideration of how to present the Archive online. The language materials have a different significance to speakers of those languages than they do to academic researchers, or to the general public, and so the Archive would need to support the different ways users might interact. The standard interface to the Library's repository was considered too complex for users who are not familiar with library online databases. What was needed was primarily a graphical public webpage where potential users with relatively little experience in navigating library pages could access and use the materials in the Archive. It was essential that the graphic interface work seamlessly with the repository

collection. The research team and Library team worked together with a talented programmer to design and implement a website that would accommodate the requirements of low-tech users and highly literate users, while respecting the integrity of the collection as both culturally valuable and appropriately searchable. The result is a visual webpage incorporating an interactive map of the Northern Territory and clearly marked access points via language areas (represented by coloured shapes), and communities (represented by geo-location points) (Figure 9). The inclusion of thumbnail images of the book covers (Figure 10) was not simply an aesthetic decision, but provided a crucial service for users in remote communities with limited literacy skills. Using the map and thumbnails allows users to navigate the site without needing to type or read much text. This design makes this Archive quite different from those designed specifically as research infrastructure, yet maintains its integrity in that role, while appealing to a broader demographic than just researchers. A video screencast demonstrates the use of the Archive site (http://laal.cdu.edu.au/app/public/images/videos/LAAL_demo_complete.mp4), and an accompanying project site gives background and topical information about the project and related activities. The project team also maintains a social media presence for promotion and engagement.

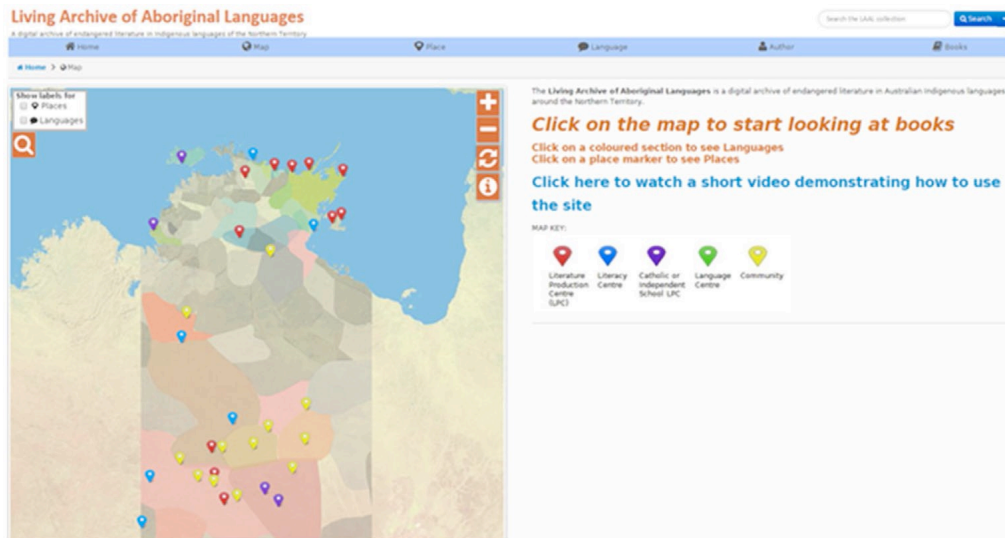


Figure 9 (Ch4.1): Home page showing map access by place or language

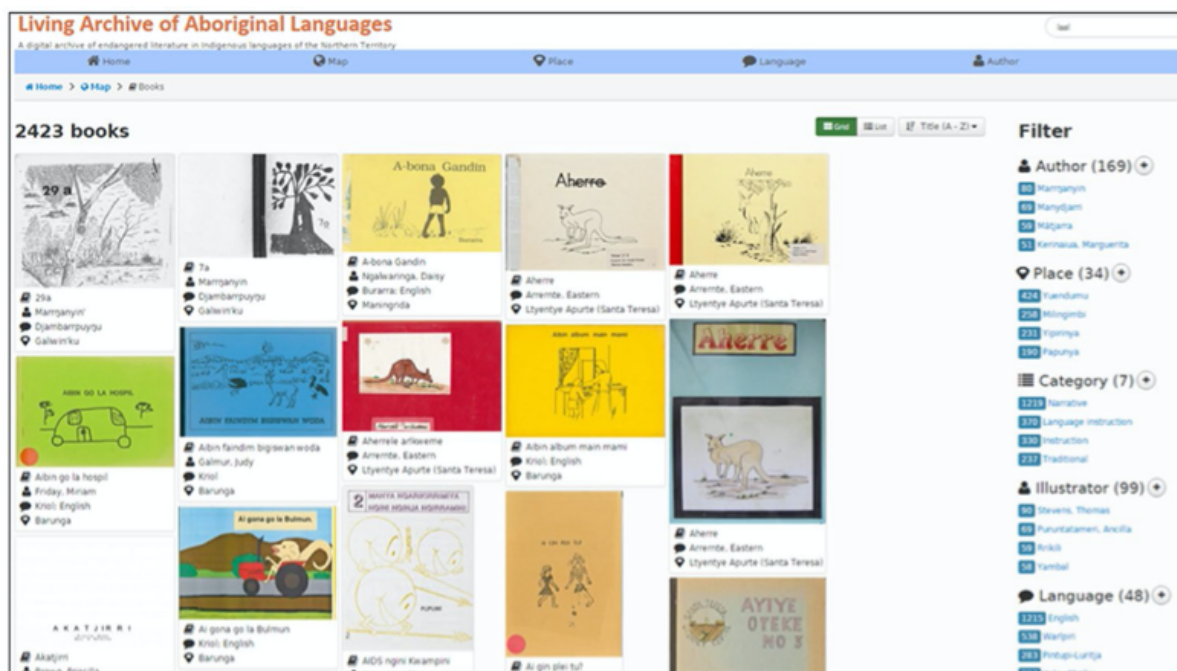


Figure 10 (Ch4.2): Screenshot of Browse view of collection showing thumbnails with basic metadata plus display and filter options

Another important aspect of making the Archive easily accessible was the capacity to make the data harvestable by other systems. The careful selection of metadata categories noted above makes the material interoperable with both the OLAC system and the National Library's Trove database. In collaboration with Trove staff, the CDU Library team arranged for the metadata from the Living Archive to be harvested and presented as a discrete collection, that is, not mixed up with other collections that had been harvested (for example, research papers, historical photographs). Such negotiation improved the quality and accessibility of the Archive itself, as well as strengthening the capacity of the Library team to manage such projects. While it was not considered necessary to consult with Indigenous knowledge authorities on all technical aspects of the project, the team was careful to explain how the materials would be made available online, and the openness of the Archive was widely supported. Access was also enhanced in response to a request from a remote Indigenous community for offline access to the materials. The Library worked with a developer to create a mobile app to enable downloading of materials from the collection to a mobile device for offline usage (CorrelLink, 2015).

Challenges

Some of the challenges faced in the project were resolved through collaborative discussion between the teams, with input from Indigenous authorities as appropriate. Two specific challenges are outlined here, with others recorded elsewhere (Bow et al., 2014, 2015). For the materials to be maximally useful to both researchers and the local community, it was decided that text versions should be available for each item. The nature of the materials and the variety of languages presented a challenge for Optical Character

Recognition (OCR). Some of the materials were old or faded, used a variety of fonts, some handwritten or with words cut off the edge of pages. While the OCR software gave a reasonable first draft of the text, each page needed to be carefully edited to match the source image. This was time-consuming and challenging for those doing data entry, none of whom were speakers of any of the languages. Some of the languages use special characters, however the multilingual support available within the OCR software does not extend to Australian Indigenous languages. The Library team experimented with adding custom dictionaries to assist the OCR process by aiding word recognition, but with so many languages to work with this, and lacking dictionaries in many of these languages, the task became untenable. It was possible to add Unicode versions of the special characters used in several of these languages to the search database of the OCR software, but these characters (such as ä, ð, ñ, etc.) were still regularly overlooked or misrecognised and had to be entered manually. In addition, some adjustments were required to SOLR querying within the CDU eSpace repository and the website, to correctly search and display these characters.

A further challenge was the use of codes to identify languages. Following best practice recommendations in language documentation (Bird & Simons, 2003), the international standard ISO 639-3 was used. However, in some cases these did not meet the requirements of Aboriginal languages with their own unique structures and relationships and naming conventions. Discussion among the Library and project team, with advice from experts in Indigenous languages and computing, resulted in a solution that involved retaining the ISO 639-3 codes and supplementing these with internal-use language codes (Bow et al., 2014). This ensured conformity with best practice and international standards while allowing some flexibility in reflecting Indigenous means of classifying and categorising languages.

Engagement

The establishment of the Living Archive has created many opportunities for communities to re-engage with the materials in digital formats. This engagement has taken a number of forms, with anecdotal evidence for positive responses to the availability of the materials in digital form (many of these stories are shared on the project's blog at <http://www.cdu.edu.au/laal/blog/>). For example, in an English-only school in southern Arnhem Land with no history of bilingual education, a non-Indigenous teacher shared a Kriol story from the Living Archive with her class. Hearing their language used in the classroom, the teacher said the students were "at such ease ... I was asking them to recount and they were recounting with 100% accuracy ... I had kids who rarely speak answering questions". A linguist identified a particular expression that was shared across a number of different languages, yet did not appear in many dictionaries, and was presented in context with illustrations to convey additional meanings. A digital story competition invited users to select a story from the Archive and, with the permission of the story owner, bring it to life, e.g. by animation, adding audio, acting it out, creating a dance, etc. This created opportunities for engagement with the stories, as well as intergenerational language work, and produced a range of multimedia materials in various formats which have been added to the Archive, and additional materials continue to be uploaded. The requirement for all learning areas in the new Australian Curriculum to include Aboriginal and Torres Strait Islander histories and cultures as a cross-curriculum priority (Australian Curriculum Assessment and Reporting Authority, n.d.) allows further engagement with the authentic resources in the Archive from schools around the country (Bow, 2016). The Library's engagement with the research project has led to identification of further possible

contributions it can make to Indigenous knowledge management, such as a nascent project creating a database for Indigenous researcher profiles and representations of knowledge.

Lessons learnt

This collaborative project expanded the capacity of the University Library staff in several ways. The technical director reflected that the staff learnt “a lot more about local Indigenous cultures and their very different world view, how language is an inseparable part of culture and how some concepts are just not able to be represented in the same way outside their native languages.” (Anthony Hornby, personal communication). Staff deepened their understanding of how to manage Indigenous languages online, from font selection and modification, to OLAC metadata skills, to modifying the SOLR search and indexing engine, which forced the team to upskill in a number of areas that are valuable for other Library projects. The improved skills and workflows around digitisation of print materials including development of workflows also enabled training of people outside the Library how to use the digitisation equipment. Involvement in discussion about online rights management, particularly Creative Commons, and the specific issues relating to Indigenous knowledge management, has built capacity and understanding which will serve the University and the wider community better in this area. The project has also raised interest outside the Northern Territory, and has been picked up by media and shared online, which has been useful in understanding how the profile of the Library and its other activities can be raised.

Conclusion

The Living Archive of Aboriginal Languages project demonstrates how academic libraries can work with researchers to support the archiving of cultural heritage and valuable research data. In this instance, the cultural heritage brought with it unique challenges that were resolved by negotiation and collaboration between the research team and Library team. This has resulted in the development of an innovative online resource containing valuable materials from endangered languages in the Northern Territory. Some of the lessons learned from this collaboration in preserving and providing access to materials of cultural heritage may be useful to other libraries seeking to address similar issues.

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Chapter 5 (PAPER 3): Observing and respecting diverse knowledge traditions in a digital archive of Indigenous language materials

Bow, C., & Hepworth, P. (2019). Observing and respecting diverse knowledge traditions in a digital archive of Indigenous language materials. *Journal of Copyright in Education and Librarianship*, 3(1), 1–36. <https://doi.org/10.17161/jcel.v3i1.7485>

Having described the creation of the Living Archive project in collaboration with the CDU Library team, the next paper addresses one of the most challenging issues which emerged in the creation of this project.

The contribution of this paper to the overall thesis comes through a careful analysis of the intellectual property issues inherent in the Living Archive project, and the means we found to address these issues. The search for a technical solution that would conform to both Commonwealth and Aboriginal law involved entanglements of ownership, authorship, permission, laws, protocols and licenses, as well as people, artefacts and technologies.

The paper was co-authored with lawyer Trish Hepworth who at the time was the Executive Officer for the Australian Digital Alliance and also the Copyright Adviser for the Australian Libraries Copyright Committee (ALCC). We met at a copyright training workshop she presented for ALCC in Darwin in July 2015. Following the workshop we had a productive discussion about the Living Archive as an interesting case study, and later I proposed collaboration on a paper to enable us to explore the issues in depth. (See [Appendix 1.2](#) for signed statement of contribution).

The paper was published in a new international open access journal, with the goal of reaching an audience of both educators and librarians, who may be users of the Living Archive project as well as practitioners facing similar challenges with their own collections of materials. The final version of the paper is presented here as available from the open access journal website.

Originally published in the Journal of Copyright in Education and Librarianship, Vol. 3,

Issue 1: <https://doi.org/10.17161/jcel.v3i1.7485>

Abstract

Australian copyright law and Indigenous Cultural and Intellectual Property (ICIP) have always sat uncomfortably together, each with their own internal logic and legitimacy, but forcing certain arrangements and compromises when applied to specific contexts. The collection of Indigenous language materials into a digital archive has required finding means to observe and respect these two incongruent knowledge traditions. The Living Archive of Aboriginal Languages, an open online repository containing thousands of books in dozens of languages from Indigenous communities of Australia's Northern Territory, offers opportunity to explore how the need to attend to both knowledge traditions led to specific decisions and practices. In particular, where the Australian copyright law was satisfied, additional steps were needed to respectfully incorporate Indigenous perspectives. This paper outlines the negotiations and compromises inherent in seeking a solution which observes and respects both Indigenous and western knowledge practices in a unique collection of cultural heritage materials.

Keywords

Indigenous languages, Northern Territory, digital archive, ICIP, intellectual property, copyright

I'm sitting on a mat in the dust outside a house in a remote community, explaining to a small group of senior Indigenous women that we want to take those old books from the school's bilingual program and put them on computer for anyone in the world to see. If they think it's okay for us to do that, can they please sign this permission form. While they are highly competent in English, it may be their fourth or fifth language. I'm explaining in English, the form is written in English, I don't have any books to show them, or a demonstration of how the books will look on a computer. They talk among themselves in their language, ask about some of the people involved, ask me if I've been given a skin name and by whom. They then sign the forms. I'm uncertain how much they've understood about what they're actually agreeing to. Am I just another well-intentioned white person with a clipboard asking them to sign a piece of paper?

The experience of the Living Archive of Aboriginal Languages project,³ in creating an open online repository of thousands of books in dozens of languages from Indigenous communities in Australia's Northern Territory, has involved exploring the processes and resolution of issues of ownership, permission, and access under two largely incongruous knowledge traditions: Indigenous Cultural and Intellectual Property (ICIP)⁴ and Australian copyright law. The project demonstrates some of the challenges inherent in digitizing and making accessible a cultural heritage collection produced in a largely pre-digital era under a dual set of "laws" (Indigenous and western), each with their own internal logic and legitimacy, and attempts to observe and respect both sets of traditions and practices in the

³ The project website and archive collection are available at www.livingarchive.cdu.edu.au

⁴ Regarding terminology, the term ICIP is commonly used in Australia, while internationally the term Traditional Cultural Expression (TCE) is also widely used (World Intellectual Property Organization, 2016).

digital era. Policies and practices regarding digitization and dissemination have emerged as an effect of the everyday work of building the archive, as the project team seeks to balance respect for the Indigenous knowledge traditions from which the materials originally emerged, alongside increased understanding of the requirements of Australian copyright law. The longevity and sustainability of the archive depends on openness to further negotiation and informed responses to community concerns and changes in legislation, as well as technological and cultural developments.

The purpose of this paper is to offer a worked example of a specific situation in which means were found to observe and respect both ICIP and Australian copyright systems. The solutions offered here are not intended to be normative, as every project is unique and sits within a very specific context and purpose. However, the processes described in this paper may inform and assist others facing similar challenges. The paper outlines the origins of the Living Archive of Aboriginal Languages project (hereafter referred to as the Living Archive, or the Archive) and its uniqueness in comparison with other similar projects. The two legal systems are briefly introduced, with a focus on the key features of ICIP which concern this project. The ways in which the project addressed the copyright and ICIP issues are then described in turn, from the straightforward cases to the problem works and the solutions identified, following the outline presented in Table 1 (Figure 11).

Finally, issues relating to access and usage are addressed. These sections are interspersed with reflections from the project manager and first author, presented in italics, which ground some of these issues in specific contexts.

| | | |
|------------|-----------------------------|--------------------------------|
| | Western | ICIP |
| Who | Copyright holders | Named creators |
| How | Licenses/agreements | Signed permission |
| Challenges | 3 rd party works | Authorship, orphan works |
| Solutions | s200AB, take down policy | Take-down policy, hidden items |

Figure 11 (Ch5.1): Outline of paper

Background to the Living Archive Project

From 1973 to the early 2000s, a large range of books and other materials in local Aboriginal languages were produced in Literature Production Centres (LPCs) in remote schools with bilingual education programs in Australia’s Northern Territory (NT). This corpus includes thousands of books in dozens of languages, most of which were created to enable children who spoke Indigenous languages at home to learn to read and write in their own language before transferring to English literacy (Harris, 1995; Devlin, Disbray, & Devlin, 2017). This produced a rich body of literature created for specific local contexts but with potentially wider significance and utility. The materials were mostly small books of around 10–20 pages, locally printed in runs of 50–100 copies, with illustrations by local artists, and some including English translations. There are stories of traditional and contemporary Aboriginal life, including creation stories, instructional texts, cautionary tales, local knowledge, historical reminiscences, ethno-scientific works, translations, and adaptations from other languages.

With the shift away from bilingual education in the NT since the mid-2000s (Nicholls, 2005; Simpson, Caffery, & McConvell, 2009; Devlin et al., 2017), most LPCs ceased production. Hard copies of existing materials were left in harsh environments in remote communities, vulnerable to rapid deterioration, or scattered around libraries and private collections. There was no systematic cataloguing or collection of these resources, which became largely inaccessible not just to interested researchers but in some cases even to the communities in which and for whom they were produced.

Concern for the future of these materials led to the establishment of the Living Archive in 2012.⁵ This federally-funded collaboration between universities and key stakeholders was created to collect, digitize, preserve, and allow access to this endangered corpus of Indigenous literature from around the NT (Bow, Christie, & Devlin, 2014). It is hosted at Charles Darwin University on the library's digital repository.

The project had several key aims: re-engagement with owners, storytellers, and descendants, including new possibilities for engagement and collaboration; recontextualization and enhancement of materials (for example by linking audio files to works); digital preservation of endangered physical items; and dissemination to a new and wider audience (Christie, Devlin, & Bow, 2014). This reconnection of the materials with their communities, and their subsequent use and reuse, was intended to create a "Living

⁵ The Living Archive of Aboriginal Languages is supported under the Australian Research Council's Linkage, Infrastructure, Equipment and Facilities funding scheme (LE120100016 and LE140100063) as a collaboration between Charles Darwin University, Northern Territory Department of Education, Australian National University, Batchelor Institute of Indigenous Tertiary Education, Northern Territory Library, and Northern Territory Catholic Education Office. The chief investigators are Professor Michael Christie (CDU), Dr Brian Devlin (CDU), Professor Jane Simpson (ANU), and Maree Klesch (Batchelor Institute).

Archive.” By the end of 2018, the project had digitized over 5,000 works representing 50 Indigenous languages from 40 communities around the NT.

Drawing on the chief investigators’ long history of working with remote Indigenous communities in the NT, and previous experience with similar projects (Christie, 1997, 2005b; Christie & Verran, 2006; Christie, Guyula, Gurruwiwi, & Greatorex, 2013), the project proposed to collect and digitize all books produced in schools with bilingual programs and publish them online, with no restrictions on access. This would make them available to diverse groups, including other Indigenous community members, academics, researchers, educators, and the general public. This initial plan was based on the fact that, in discussions with key stakeholders including the NT Department of Education (a project partner and the copyright holder of most of the materials in the collection) and many Indigenous authorities, there was a willingness to make these materials openly available online, without requiring any kind of login or password. This is consistent with fundamental archival principles, whereby “archives are made accessible to everyone, while respecting the pertinent laws and the rights of individuals, creators, owners and users” (International Council on Archives, 2011). Open access would also increase recognition of Indigenous languages and allow access to a rich body of previously unknown literature, challenging the notion that these mostly oral cultures have few written documents in their languages. As the materials were produced for school contexts, they did not contain secret or sacred knowledge that should not be made public.

As the project unfolded and technical requirements were established, it became clear that a more nuanced approach to digitization and access would be required, to respect

Aboriginal claims of ownership and locatedness (Christie, Devlin, & Bow, 2015) while satisfying the legal requirements of Australian law.

Key Distinctives

The development of the Living Archive places these previously hidden materials into an existing archival ecosystem of Indigenous language materials, amenable to sharing and reuse. Significant digital archiving of Australian Indigenous materials has been successfully realized in other contexts, though none are directly comparable to the Living Archive. Unlike the collections of the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS), this project was not managing the digitization of an existing physical collection (Lewincamp & Faulkner, 2003), subject to access requirements imposed by depositors (Koch, 2010). In contrast to the Pacific And Regional Archive for Digital Sources in Endangered Cultures (PARADISEC), which archives audio and video materials and linguistic field notes or descriptions (Thieberger, 2010; Thieberger & Barwick, 2012), the Living Archive deals with text-based primary materials, stories written by and for Aboriginal people. Unlike state library collections (Thorpe & Galassi, 2014; Nicholls et al., 2016), the Living Archive is not subject to requirements such as legal deposit, nor does it contain materials which require special conditions of access (Byrne & Moorcroft, 1994). It does not focus on a particular language or people group, unlike many other collections (Barwick, Marett, Walsh, Reid, & Ford, 2005; Christen, 2005; Hughes & Dallwitz, 2007; Cawthorn & Cohen, 2013; Gumbula, Corn, & Mant, 2013; Scales, Burke, Dallwitz, Lowish, & Mann, 2013); however it is restricted geographically to the NT. The materials in this collection differ from those often discussed in the literature about Indigenous knowledge in archival collections (Anderson, 2005; Janke & Iacovino, 2012), where Indigenous people

were the subjects of the record and not the owners (Iacovino, 2010; McKemmish, Faulkhead, Iacovino, & Thorpe, 2010), becoming “captives of the archive” (Fourmile, 1989). Instead, this collection represents materials created largely by and for Indigenous users, albeit created as part of a western education system and legally owned by western authorities. The transfer of knowledge from oral to written to digital forms in these books (Bow, Christie, & Devlin, 2017) creates new affordances for sharing and transmission, while also creating new contexts under both legal traditions.

Overall the Living Archive is an unusual beast. It is based on a corpus of physical works but is entirely digital, with no hard copy access to manage . It is situated in a university context but is not directly connected to any specific teaching program. It is partnered with a library for technical support but is not directly involved in local dissemination of the materials (which are available through any library or any internet connection). It is associated with the school system but has no direct impact on education. It is an archive of cultural materials but not a key cultural institution. The project aims to make the digital resources entirely open to the public, yet nearly one-third of the items are not yet publicly available (pending approval from copyright holders). It represents a wide range of language and cultural groups, contained within the borders of the NT. Like many archives, the project team had no responsibility over how the materials or metadata (title, author, etc.) were originally created, but only how they should be managed now. In common with many archives of cultural heritage, the project team recognizes the challenges inherent in taking custody of material without taking ownership (Janke & Iacovino, 2012). Acknowledging the existing ecosystem, and the similarities and points of difference between this and other projects, the team has worked to ensure that while the

Living Archive primarily focuses on its corpus, the steps taken in regard to ICIP and copyright will allow the materials to participate in this wider archival environment of Indigenous language collections.

The Framework: Copyright and ICIP

With no directly comparable projects to draw on, and in the absence of clear frameworks, the Living Archive project team had to return to first principles to navigate the different manifestations of law according to the Indigenous (ICIP) and non-Indigenous intellectual property (IP) practices, within the aims of the project. Both legal contexts needed to be addressed and respected, yet it was also necessary to find ways to move the project forward in the context of two largely incommensurable systems. Focusing on following the requirements of just one of these systems would not achieve the aims of the project, and would limit both the content and the audience of the Archive. While it has been argued that the legal issues of such a project may be more straightforward than the ethical issues from a linguist's perspective (O'Meara & Good, 2010), this paper explores the ways in which ethical issues are resolved when the legal framework is problematic.

ICIP rights refer to Indigenous Australian's rights to their heritage. As Janke notes, "heritage consists of the intangible and tangible aspects of the whole body of cultural practices, resources and knowledge systems developed, nurtured and refined by Indigenous people and passed on by them as part of expressing their cultural identity" " (Janke, 1998, pp. XVII).

In contrast to the relatively recent arrival of copyright law to Australian shores, Indigenous groups recognize a continuous 60,000-year history of living culture, spanning several hundred language groups. Forms of cultural expression have always been subject to local understandings of intellectual property, with IP rules and procedures imposing certain obligations and responsibilities over Indigenous knowledges and practices (Janke & Quiggin, 2005). Many aspects of culture are linked to certain traditional understandings, which do not always sit well with western understandings.

Stories and images are protected within the Indigenous context in which they are produced, and are subject to Indigenous law before they become implicated in Australian law (Christie, 2005a). Certain negotiations enable them to be published in material form for a specific context, such as curating an art exhibition or producing books for bilingual education programs. The transfer of materials to a digital realm for preservation and access requires new negotiations, which need to take seriously both knowledge traditions and their practices (Christen, 2005). Books published in Indigenous languages are not traditional artefacts of Indigenous knowledge (such as dance, song, visual art), however they perform some of the same work in maintaining and building community relationships and sharing knowledge. As soon as the books that make up the bulk of the archival collection were created, they were implicated in the western IP system as copyright protected works.

Like many former British colonies, Australia has a common law system of copyright, currently codified in the *Copyright Act 1968* (Cth), the *Copyright Regulations 1969* (Cth) as amended from time to time, and enforceable through the courts. Distinctively, copyright law is based on a concept of property, protecting original expression only when it is

reduced to “material form” (such as being written down or recorded), and vesting rights over that property in the owner (or “rights holder”) such as the rights of sale and use. This notion is an uncomfortable fit with Indigenous knowledge production and transmission, which is often communal and not in a material form. It is only when ICIP is assimilated into western knowledge traditions that it is protected through Australian law and assigned an “owner.” By default, the owner is the “author” of the work, considered to be the employer if the works are created in the course of employment.

In 2000, Australia introduced legally enforceable rights that pertain solely to the author, known as moral rights. These are “(a) a right of attribution of authorship; or (b) a right not to have authorship falsely attributed; or (c) a right of integrity of authorship” (*Copyright Act 1968*, s. 189). Moral rights only apply to works in which copyright subsists, and require the creators or artists to establish authorship in terms of copyright law, which may be problematic for Indigenous knowledge authorities (Janke & Iacovino, 2012). Australia’s copyright law only recognizes a particular view of authorship, usually connected to an individual, which differs from Indigenous practices of attributing ownership (the “author” as “authority”) to a clan or other group (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2015). For the materials comprising the Living Archive collection, the “author” for moral rights is the person who wrote down the story or drew the illustrations, rather than the wider Indigenous heritage on which they draw.

Both knowledge systems are equally concerned about protection of knowledge and of the creators or custodians of that knowledge. However the processes and practices in which they manifest are vastly different: in the understanding of how that knowledge is constituted (in material form or not); its ownership status (individual or communal); its

value (commercial or cultural); and its time frame (life of author plus 70 years or in perpetuity) (Janke, 1998).

Attempts to shoehorn Indigenous knowledge practices into western structures are inherently unsatisfactory (Anderson, 2005, 2010; Janke, 1998; Janke & Iacovino, 2012), particularly if Indigenous knowledge practices are simply seen as an alternative but commensurate system, such as comparing Australian law to US or UK law. The distinctions are much more of an ontological nature. In addition, Indigenous knowledge practices are not uniform across the hundreds of people groups across Australia, so a single “law” will not satisfy this diversity. Yolŋu elders from Arnhem Land state:

Whatever there is in our law that the ancestral creators have given us in east Arnhem Land, they are inseparable. It’s the land, the places, the kinship networks connect them together. It makes up our version of an Intellectual Property tree, that makes up our foundation. (Guyula & Gurruwiwi, 2010, p. 53)

Yolŋu copyright law is in place, not to protect the artist, but to protect the image. Aboriginal traditional images, like Aboriginal land, do not belong to any one individual person. They belong to a group of people who relate to the image in a particular way. (Marika, 1993, p. 14)

Despite more than a dozen domestic reviews and studies that have touched upon these issues (Productivity Commission, 2016), including recommendations for a national framework linking government, community, and industry (Ormond-Parker & Sloggett, 2012), there is no short-term prospect of legislative reform to resolve the inherent tension between these two systems. Internationally, there are efforts to develop legal instruments to protect traditional knowledge and traditional cultural expressions (World Intellectual Property Organization, 2016). However, ICIP lacks consistent definition across different

jurisdictional boundaries, and is subject to power positions and interests, including colonialism, that disenfranchise and dispossess many Indigenous groups (Anderson, 2012).

In the absence of regulation, best practice has been codified in protocols (Nakata, Byrne, Nakata, & Gardiner, 2005), which have the benefit of being a more flexible means of establishing protection, and can be adapted to particular subject matter (Janke, 2016). Protocols may be recognized by a community of practice as defining standards or official procedures and rules, however they do not provide legal protection for institutions or for Indigenous authorities (Nakata et al., 2008). There are a number of different sets of guidelines and protocols available to guide respectful and appropriate handling of Indigenous cultural heritage material, such as those created for libraries (Aboriginal and Torres Strait Islander Library, Information and Resource Network Inc, 2012; Garwood-Houng & Blackburn, 2014), museums (Museums Australia, 2005), archives (McKemmish et al., 2010), linguists (Zuckermann, 2015), those working with Aboriginal authors (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2015) and artists (Australia Council for the Arts, 2007), and collecting institutions working with born digital materials (de Souza, Edmonds, McQuire, Evans, & Chenhall, 2016), as well as international guidelines for museums, libraries, and archives (Torsen & Anderson, 2010). These have informed the Living Archive project team's activities; however no existing protocols are directly applicable to this unique project.

While infringement of copyright, including moral rights, poses legal risk to the project, failure to respect ICIP, although not legally enforceable, is potentially more serious, indicating a lack of trust and a breakdown in working relationships with Indigenous communities. Such an outcome could threaten the character of the project as creating a

“living archive,” break good faith connections with the represented communities and other stakeholders, and/or risk damaging future attempts at collaboration with these communities for other projects and other researchers. Nakata et al. (2008) describe professionals negotiating Indigenous interest with copyright interests as “moving between a rock and a hard place” (p. 227), with risks of infringement of copyright or providing inappropriate access to materials being potentially ruinous to a project or collection.

If Australian laws and protocols are not adequate to protect intellectual property around Aboriginal material culture, it is even more problematic once material culture emerges in digital form. The use of digital technology, with its substantive capacity to expand the creation, collection, and distribution of Indigenous knowledge well beyond the intended purpose of the created materials, raises additional complex questions (Hudson & Kenyon, 2007; de Souza et al., 2016). The transformation of these resources to electronic formats changes their nature, which raises concerns about who can interact with the materials and how. As Christie (2005a, p. 46) points out, “the work of Aboriginal cultural production does not lie inside digital objects, but it lies in the performances and negotiations over those objects. The cultural, political and religious work lies in their assessment and exchange.”

Emergent understandings of how to observe and respect both the western copyright and ICIP contexts informed the process of creating the Living Archive as a digital repository of cultural heritage. In collecting, digitizing, and making available this corpus of endangered language materials, the project team had a desire to ensure an equitable “two-way” exchange between Indigenous people and academic researchers (McConvell, 2000), and to find common ground (Christie et al., 2015; Devlin, Bow, Purdon, & Klesch, 2015) that

satisfied the requirements of both knowledge traditions in terms of their legal systems and practices. Working through issues of copyright ownership and use and meaningful engagement with communities through an ICIP framework takes time, resources, and careful consideration of practice. The solutions which have emerged in the context of the Living Archive project are sufficient for the ongoing life of this project, but are provisional and situational, responding to the specifics of this project and its aims in particular social, legal, and technical contexts.

Addressing Copyright Issues

I'm in a former Literature Production Centre, working through piles of books in the local language produced over decades and stored in moldy cupboards, dusty bookshelves, and rusty filing cabinets. There are some materials published in the school's short-lived bilingual education program, others attributed to the community library or language centre, several one-off items with no indication of authorship, and commercially published books in English with vernacular translations physically pasted over the English text. The local Aboriginal authorities I've spoken to want them all preserved, so we add them all to the pile of materials to take back to Darwin for scanning. We'll work out the IP details later.

The Living Archive project was developed in partnership with the NT Department of Education (hereafter, the Department), under whose auspices most of the books in the collection were created through the bilingual programs in selected government schools. As

most of the creators of the materials were working in the schools, the works are crown copyright according to sections 176 and 177 of the Copyright Act, as unless otherwise agreed, governments own copyright in material created by their employees and those working under their supervision (*Copyright Act 1968*). It is unclear whether those employees were aware of this fact at the time they created the materials, particularly since it would have been a remarkable contrast with Indigenous understandings of ownership of knowledge practices. Nonetheless, the Department has the right to assert its position as copyright holder, the “legal owner” for the majority of the works in the collection.

The Department agreed that the works could be converted to digital formats and put online on the Archive’s open access website. The executive director of the Department sent a letter of support to those schools where materials had been produced, inviting them to share those resources with the Living Archive. Members of the project team visited these sites and collected hard copies of the books for scanning. The initial verbal agreement with the Department was eventually negotiated as a non-exclusive license, granting Charles Darwin University the right to digitize and publish these materials online under an open license, while retaining copyright for the Crown. There was a substantial gap in time between the verbal and formal written agreements, which involved significant negotiations as to the exact wording.

A smaller but sizeable subset of materials was created in non-government schools (Catholic and independent) with bilingual programs. These works were also made by language and literacy workers and other staff, both Indigenous and non-Indigenous, during the course of their employment, and to that extent copyright in the books belongs to the employer (under section 35(6) of the Copyright Act). These other organizations endorsed

the work of the Living Archive, and the team were able to make agreements with these copyright holders under equivalent terms as the license with the Department, including one independent school whose board gave approval.

A second stage of project funding in 2014 extended the Archive to include materials from communities which did not have bilingual education programs, which also expanded the number of copyright holders. Similar arrangements have been negotiated with other organizations which hold copyright of material digitized in the Archive.

Making Digital Copies and Preservation

Under the Copyright Act, the project team can legally create digital copies of all these materials, thanks to certain exceptions in the Act. Despite having no physical home, the Living Archive is considered an Archive under section 10(4).⁶ The archival “preservation and other purposes” exception (s. 51A) at the time allowed an archive to make a copy of a published work that forms or formed part of its collection if it has “been damaged or has deteriorated for the purpose of replacing the work” as long as “a copy (not being a second-hand copy) of the work, or of the edition in which the work is held in the collection, cannot be obtained within a reasonable time at an ordinary commercial price” (*Copyright Act 1968*). As the majority of these books were never available for sale, the commercial availability test is no barrier to making a copy, and there is no limitation as to the format that copy may take. Additionally, the Archive may also make copies for “administrative purposes” which allows the project team to deal with the digital items in an efficient

⁶ Section 10(4) defines an archive as (a) a collection of documents or other material of historical significance or public interest that is in the custody of a body, whether incorporated or unincorporated, is being maintained by the body for the purpose of conserving and preserving those documents or other material; (b) the body does not maintain and operate the collection for the purpose of deriving a profit (*Copyright Act 1968*).

manner and create copies for internal use. Both the administrative and preservation copying provisions have recently been updated with amendments to the *Copyright Act 1968* (Cth) commencing in December 2017. The amendments remove the one copy restriction on preservation copies and instead allow the Archive to use the works in whatever way is necessary for preservation purposes, which may be useful if any further materials are received, or better-quality preservation copies need to be made.

With permission from the legal rights holders to create digital copies of the materials, the works were transferred to digital form. Each page of every book was scanned or photographed, and the outputs saved as PDF for presentation and TIFF for preservation, plus cover images in JPG format and plain text versions of the texts extracted through Optical Character Recognition (Mamtora & Bow, 2017). In some cases, materials previously transferred to digital formats through local initiatives were provided to the project team in already-digital form. The digital artefacts were stored on Charles Darwin University Library's institutional repository, with a web interface for easy access.⁷

Problem Works

As the project continued and more works were collected, different issues emerged. More complex and nuanced responses were required to handle materials with less straightforward or transparent issues of authorship and ownership, particularly those for which the NT Government, Catholic or independent schools did not hold all the copyright in the work. Several different forms of these "third-party works" were identified, including commercially-produced works which were adapted for use in the school, for example by

⁷ This is available at <http://laal.cdu.edu.au/>

translating the text into the local vernacular and either reprinting in the local language or simply pasting the words on top of the English text. Some materials incorporated photos from other copyrighted materials, or otherwise produced new materials based on existing works. These works potentially have additional copyright owners or persons with an ICIP interest who are not covered by the agreements with the government and schools.

Due to the incomplete nature of much of the metadata in the materials (Bow et al., 2015), third-party works were not always clearly identifiable. For example, books may have been adapted into a local language with no reference to the original work, or images used from another source with no attribution to the original creator. Some books included images from other sources (sometimes referred to in the metadata, sometimes indicating associated rights), which makes the copyright status of the entire book more problematic.

Even when third-party works were identifiable, there were no records available of any copyright arrangements made at the time of production. In the 1970s and 80s when the majority of the books were produced, the audience was restricted to the local school and community. While some items were sent to AIATSIS or the National Library for legal deposit, their reach was never expected to go far beyond the local community. In these non-commercial circumstances, it is likely copyright issues were not a high priority, and possibly were never even considered. The net result is that the Living Archive team cannot with certainty identify third-party works and the conditions under which they were created and distributed.

The collection of these various materials from different sources resulted in four different categories of works from a legal perspective: (1) those owned by the Department

or other bodies which can be used under agreement, (2) known works with third-party copyright, (3) an unknown number of works which may have third-party copyright, and (4) a number of “orphans” with no attribution of authorship. Each one technically requires different means of management; however as the collection grew and the project team’s resources dwindled, it became more difficult to address these categories separately. Various solutions were implemented with the goal of making all materials publicly available. Where the third-party copyright holders can be identified, the works can be dealt with on a case-by-case basis. Approaches to commercial publishers and other copyright holders have been met with goodwill in most cases. For example, an Australian cartoonist approved inclusion of a series of books created in collaboration with a local community. The licensees of the “Phantom” comics approved inclusion of translations of these works into the Maung language, on condition that a copyright statement and trademark logo be attached to the item. Approaching other organizations and publishers has been an ongoing task, but it is likely that many items will never be available through the Living Archive website. The alternative would be to adopt a “high-risk” strategy of putting them up in good faith, and relying on the “take-down” policy to alert the team to any concerns.

For those works whose copyright owner cannot be identified or located (known as “orphan” works) the Archive may be able to work under an exception to copyright. In 2006 the Copyright Act introduced a new section, the “flexible dealing” exception (s. 200AB), to cover certain uses of works by libraries and archives. This exception allows organizations such as archives to use copyrighted material for socially beneficial purposes, without permission and without payment, provided certain criteria are met (Copyright Amendment Bill 2006 [Cth]). This section of the Copyright Act appears to be a useful reference point for

many of the problematic works in the Living Archive, in principle allowing many of them to go online. To take orphan works as an example, there is no other exception that would allow these works to be published online, the use is non-commercial and for a socially beneficially purpose, the use would not conflict with the normal exploitation of the work (as the works are not being used), the use would not prejudice the copyright holder and the use is a special case.

There is some debate about the limits of the exception. The Australian Copyright Council takes quite a conservative view, noting that section 200AB is more likely to apply if “the number of people the use is for is small; the time-frame of the use is short; the proportion of the work you are using is small” (Australian Copyright Council, 2014, p. 2). This allows libraries and educational institutions to make a copy available to a user for a specific purpose. However, the Living Archive is intended for a broad public, and will be online for an extended period, and contains complete works rather than small proportions.

It seems that the Australian Government expected that the section would be used in some cases of orphan works, as the Explanatory Memorandum states that s. 200AB “might be determined by a court, for example, to allow a library or archive to make a use of a work where a copyright owner’s permission cannot be obtained because he or she cannot be identified or contacted” (Copyright Amendment Bill 2006, s52). Memory institutions have used s. 200AB for a growing number of digitization projects since the section was introduced (Coates, Robertson, & van de Velde, 2016), including cases where it was impossible to identify copyright third-party works (van Dyk, 2010). As the exception was designed to be flexible in order to “enable copyright material to be used for certain socially beneficial purposes” (Commonwealth of Australia, 2006), it is arguable that the wishes of

and benefits to the Indigenous communities who have expressed their desires for the materials to be placed online could also be taken into account, to bolster the argument for placing the materials online. While it appears that this exception would cover a number of the problem works within the Living Archive, as yet no cases have reached the court, so there is no case law to guide legislative interpretation. As such the project team still has some hesitations about relying on the exception.

Addressing ICIP Issues

Yolŋu elder and current member of the NT Legislative Assembly Yinjiya Guyula, in discussing the use of his teaching materials in a Charles Darwin University course, stated:

Before things go up on a website, the university should have some practices in place to look after and better protect my work. They can hold it and protect it. They have knowledge through the white man's system of protecting work that I don't understand. But I have knowledge of how the Yolŋu copyright system works. One day we'll come to understand each other's systems of intellectual properties and copyright protection and both systems may work together. (Guyula & Gurruwiwi, 2010, p. 56)

Alongside the collection, digitization and preservation processes, the project team also addressed issues relating to the publishing of the materials online. Licenses from the copyright owner were understood to give the project the right to make all works openly available through the public website. However, although there was no legal requirement for any community consultation, from an ICIP perspective such consultation was essential, to include the voices of the Indigenous owners of the materials in the process of making their materials available online. This process required more care to ensure that ICIP was

properly respected, and entailed significant additional work to seek individual permissions rather than relying on the general goodwill of the communities.

With a collection spanning dozens of communities and language groups across the NT, it is important to acknowledge the various forms of customary law in different communities, which are practised at different levels of operation, often dependent on the impact of western influence on Indigenous cultures, traditions, and lifestyles (Janke & Quiggin, 2005). Unlike western IP law, there is no single one-size-fits-all system across different people groups. Logistically however, it was not possible for the project team to have an in-depth knowledge of all the rules relating to cultural and intellectual property for each group.

Therefore, in order to avoid becoming another example of well-meaning but inappropriate decision-making which assumes that public access to Indigenous language materials would be seen as beneficial and welcomed by community members, it was essential that the communities and the original creators of the materials should be consulted about their works becoming publicly available online. This approach is derived from first principles such as respect, consultation, and consent (Australia Council for the Arts, 2007), and builds upon the relationships and consultations with individuals and communities which had informed and motivated the project from the outset.

The project team elected to seek permission from all the named contributors to the original materials, or from their descendants if they were no longer living. A simple permission form was designed (see Appendix A.1), explaining the project and how materials would be openly available via the internet. Working with a lawyer provided by

the Department of Education in 2014, the permission form was later updated to include more robust legal language, with a parallel “plain English” version (Appendix A.2). The project manager visited communities and spoke to many of the people involved in the production of these materials, who readily agreed to sign the permission form. To date only two people have chosen not to sign, but gave no reason for their decision.

Locating individuals in remote communities to sign permission forms was onerous, yet also productive for promoting awareness of and engagement with the project. Trips to communities with long lists of names of people to find took significant time and resources. These lists of names were circulated among partner agencies and others working in Indigenous communities, and any time someone visited a community they were asked to locate individuals and invite them to sign a permission form. Some of the challenges of this process relate to everyday community life over any period, where people move away, pass on or sometimes change names. The names of non-Indigenous contributors in the lists were also problematic; they may have been a teacher in the school who contributed to a book or a creator of third-party materials noted above, who may have had no connection to the community.

Challenges and Solutions

While it seems simple to state that permission should be sought from the relevant people, discerning who the relevant people are was also challenging. Moral rights include the right of attribution, which requires an available and meaningful identification of the names of contributors. In many materials in the Archive, metadata is incomplete, inconsistent, or sometimes incorrect, so the creators cannot always be unambiguously

identified (see examples in Bow, Christie, & Devlin, 2015). In one case, a prolific author and translator from one community was asked about a series of books from the 1980s for which she was listed as a translator, but she had no recollection of the stories. Such situations offer opportunities to explore some of the different understandings of authorship within the two different knowledge systems, and also require a negotiation of which system is prioritized in the solution. In this case, the translators' name remained attached to the books, as a decision was made to respect the original metadata.

The project team had little choice but to take the metadata at face value, as it was impossible to trace the origin of each individual book. In some cases local knowledge filled in some missing attributions, with additional information added from some communities and individuals who were able to identify authors or illustrators of specific items. Calls have been made through the project's mailing list and social media pages for additional information to be provided, and further crowdsourcing options have been explored.

A colleague took a set of books out to a community with a short history of bilingual education. A series of readers were produced, some of which listed the creators; others did not. He sat with the ladies who used to work in the Literature Production Centre and made notes as they recalled who wrote which books, and who drew which pictures. Collective memory can be a rich source of information, but how can the resources be shared online to find the creators, without first finding the creators to allow them to be shared online?

As previously noted, attribution of authorship can also be quite different under traditional Indigenous law, where ownership of story as a collective in Indigenous contexts

competes with western requirements for attributing authorship to individuals. Where local knowledge practices would invest authority over a particular story in a clan or group, the metadata in these items may only record an individual as the “author.” In some cases, this term may have been used as a convenience, where terms such as “translator,” “transcriber,” or “storyteller” may have been more accurate. For example, the story of “The Little Frog” has several different translations in the Archive, with some versions attributed to different authors. This ambiguity makes it difficult to know whose moral rights are at stake. Seeking the permission of the named contributors to the works has the undesired outcome of perpetuating the assumption of individual authority over their works, despite acknowledging the communal nature of knowledge and story.

A number of works in the Archive have no indication of authorship. Initially the project team assumed that these could be freely included in the open access collection, however legal advice indicated that the holder of the copyright or moral rights may be identified later and disapprove of what has been done with their works. Lack of attribution is not a defense, which makes managing cases of this nature particularly problematic. The value in making them available online may well outweigh the risk of litigation, particularly as there is little or no commercial interest. A take-down message was included with every record in the Archive, stating:

Efforts have been made to identify and contact the person or people responsible for creating these materials to request permission to include them in this archive. If you have any concerns about materials being made public on this site, please contact us and we will remove the item from display until any concerns have been addressed.

To date there have been no requests to take down any materials, though this should not be taken as evidence for the efficacy of the measures put in place.

The permission form provided a focus for discussion about the project and the uses and prospects of those sometimes long-forgotten materials. Where possible, local contacts were invited to explain the project and the permission form in the local language, and in some cases verbal approvals were documented on the same forms. Once the public website was up and running, demonstrations of the site and verbal explanations of what people are allowed to do with the materials were given alongside the permission form.

The decision to collect signed permission forms was an attempt to appease the demands of the western tradition while incorporating consideration of Indigenous practices and protocols. It cannot be assumed that all those involved in discussions over permission forms were fully aware of the implications of their signature, especially with those for whom English is not their strongest language. The requirement to use appropriately complex legal language on the permission form made it much less comprehensible to those to whom it was addressed, making it more necessary to rely on a simple explanation, presented in plain English to a multilingual audience, or using a community interpreter. In the end, the verbal explanations of the written text are unlikely to satisfy either the legal requirements of the document or the cultural understandings of the signatories. However, the process functioned sufficiently to allow the work of the project to continue.

The disconcertment of using a western tool (seeking signed written permission) in an Indigenous context is not unique to this project. Seadle (2002) points out that permission

“includes both the explicit permission of the informants and any unspoken rules that might limit how the information is used. Of course, a researcher may not really understand all the implied limits on an informant’s permission immediately, if ever.” Nakata et al. (2008) note that “the thorn in the side of established practice is not just the onerous burden of gaining permissions and clearances to satisfy legal compliance and Indigenous interests. Attending to the legal and cultural sensitivities issues has an impact on all aspects of the decision-making process” (p. 230). This has certainly been the case for the Living Archive project.

I had a message from a colleague in a desert community who had been out with a list of people to find to ask them to sign permission forms. She was not the first to go out with such a list, and locals were asking why they couldn't just give community approval. I explained the (western) legal system's reliance on individual named authorship, but the community members didn't feel that the individuals should be the ones giving permission. The books were produced BY and FOR the entire community so the community should give approval. The elders wrote a letter stating their request to have all the language material produced in the school's LPC available via the Living Archive website without all individuals signing permission forms. I'm sure the lawyers won't like it, but which law should be prioritized when the practices are so different?

Like many projects of this nature, the Living Archive project had limitations of both time and resources, making it difficult to address each individual item in the collection with the appropriate authorities. The result is that the straightforward cases make their way to the front of the line, while more complex cases remain hidden. The public website includes only records and documents with appropriate permissions, whereas the metadata of

records which have been scanned but are not publicly available is hidden within the system, only visible to members of the project team and technical support staff. This makes it impossible for users to know which items have been scanned but are hidden because permission has not yet been given. This results in the paradox that the more unidentified materials are made available online, the easier it is to identify them and get permission; but the materials cannot be put online without appropriate permission. Returning to first principles of communication, consultation, and consent, it is difficult to share information about works that can't yet be made public without making them public. The team has been working towards a technical solution which would allow access to the "hidden" items via a login to enable "crowdsourcing" of additional information, a process which would likely be impossible if the materials were not in digital form.

The team are aware they are also battling against time. The longer the period between creation and distribution, the less chance there is that someone in the community recognizes the works from the time they were made. If the time period is too long there may be nobody left with the first-hand memory of the works' creation.

The fact that the Archive has received strong support from the Indigenous authorities in communities represented in its collection may be taken into account as strengthening the project's purpose (to protect and make significant material available) and the special case analysis that deals with materials of special importance to a specific community. Collecting institutions vary in their practices (Nakata et al., 2008), but some see risk management as preferable to strict compliance. The risk of infringing copyright must be weighed against the benefit of access to the community which has some moral, if not legal claim, to the material (Coates et al., 2016). While such an approach may be "legally precarious" (Corbett

& Boddington, 2011, p. 13), the alternative severely constrains which items can be viewed online, defeating the initial purpose of the Archive. In managing each of these issues, solutions were found which allowed the project to move forward. Problem works in the Archive indefinitely remain in digital form but are not publicly available; however they can be supplied to communities or researchers under other sections of the Copyright Act.

Access and Usage

The digitization and dissemination of cultural heritage materials is valuable for preservation and promotional purposes, but also make them vulnerable to misappropriation and misuse (Anderson, 2005; Dyson & Underwood, 2006; Talakai, 2007). Once the materials were converted to digital formats and made public through the Archive, consideration was needed regarding how the works could be used by those accessing them through the website.

The project team was keen to enable users to access and enjoy the materials available, but also to protect their integrity and respect the authority of the creators. Current web technologies allow and even encourage mash-ups of work, taking sections of different items and combining them to create new forms for entertainment or educational purposes. There is a culturally constructed tension between creativity and misappropriation, and the project team sought appropriate ways to manage this tension, to prevent inappropriate use of the materials without restricting opportunities for Indigenous communities in which they may be used.

Visitors to the Living Archive website are required to view a “warning” notice that states: “Stories and pictures in this archive belong to the Aboriginal language owners, creators of the materials and their descendants.” Entrance to the Archive requires agreeing to the terms and conditions described in the User License Agreement⁸, which was developed in consultation with a legal team provided by the Department of Education. In addition, every record in the Archive includes a “good faith” notice which includes a clear statement of the take-down policy, as noted above. Each PDF in the collection also has a copyright statement appended to the final page (see Appendix B).

Even with these strategies in place, there is an awareness that once something is digitized and made available online it is impossible to guarantee that the work will not be misused. Rights are particularly difficult to enforce overseas, where the cost of bringing proceedings is prohibitive, even if there is clear infringement (Productivity Commission, 2016). Making the materials available in this way implies that the benefits of online access should outweigh the risks. Such judgments are made in light of current understandings, which cannot accurately predict future contexts which may render such judgments inappropriate.

Since the works remain under copyright, consideration of what terms and conditions would be attached to the works was important, as these control who could make use of them and in what ways. The various legal options available included reserving all rights, assigning rights to the individual creators (requiring users to seek permission to use any materials), putting all works in the public domain, or using a Creative Commons license.

⁸ This is available at <http://www.cdu.edu.au/laal/user-license-agreement/>.

The project team selected a Creative Commons Attribution-NonCommercial-NoDerivatives 3.0 Australia (CC BY-NC-ND 3.0 AU) license (Creative Commons, n.d.), which allows users to copy and redistribute the material as long as appropriate attribution is given, no derivatives are made, and the material is not used for commercial purposes. This was seen as the most appropriate license to enable use of the collection while still retaining the integrity of the materials.

The decision to license them under Creative Commons deliberately uses a “some rights reserved” path to navigate the issues in copyright law, while allowing the works to be used in ways that respect Indigenous authority. This license is problematic for third-party works, as only the rights holder can give permission for their works to be openly licensed, meaning that there are a number of works that may be able to be scanned and put online under copyright exceptions, but not licensed for reuse. The license also theoretically restricts what community members can do with their own materials, restricting their ability to reuse the works legally, though neither the copyright holders nor the project team would take action against them. The solution is not ideal, but it is a functional compromise in an imperfect system.

In an effort to encourage engagement with the materials in the Living Archive, we ran a competition in 2015, inviting people to select an item from the collection and create a new digital resource, with the permission of people who “own” the story. Entries included animations, songs, websites, and videos, mostly from the communities of origin of those stories. Were others deterred by the prospect of seeking permission, even with suggestions of how to go about this included with the competition details? The prize was finally shared by two separate groups in

the same community who presented quite different versions of the same book
(Bow, 2015).

Conclusion

The Living Archive of Aboriginal Languages project demonstrates how a specific project worked through some of the challenges inherent in digitizing a cultural heritage collection, and attempting to observe and respect a dual set of knowledge traditions which emerge as western and Indigenous “laws.” Every archive and cultural heritage project is unique and faces its own challenges, and there will be no single solution that will meet the individual needs of such diverse projects. This paper is a worked example of a specific situation and the means that were found to allow the project to continue in a fine balance between two largely incommensurable legal systems. Some decisions privileged one system over the other, as the team managed incomplete understandings of both systems and found workable solutions that are unlikely to fully satisfy either tradition. The project recognizes the multiplicity of knowledge systems as not simply variations of the same system, nor as uniform across all Indigenous groups, and connections between these knowledge traditions acknowledge this overarching dissonance and disparity.

The solutions chosen for this project have not yet been tested by any legal challenges or reports of dissatisfaction, and have generally been supported by the communities represented in the Archive. All proposed solutions are necessarily tentative and subject to change with regard to community requests and in alignment with any changes in the law,

which is yet to produce a satisfactory solution to the problems inherent in the spaces between traditional and contemporary law.

Whichever way it turns out, people working within Australian law to protect Aboriginal knowledge need to look carefully at how traditional law is already starting to govern ways in which digital environments are configured and managed. A careful analysis might help with the development of a law reform agenda and a legal practice which is equally committed to protect from fracture the skeleton of principle of Aboriginal law. (Christie, 2005a, p. 49)

In calling the project the *Living Archive*, the project team was keen to include the voices of the Indigenous creators of the materials. Licenses from the copyright holders to scan and publish materials online, coupled with exceptions from the Copyright Act, were legally sound and sufficient to enable the team to create and populate the archive. However, it was felt that this neglected the voice of the original creators of the materials and would not respect ICIP. Covering the breadth of content across numerous communities meant that individual negotiations with specific groups was not logistically possible. Without wanting to be yet another band of well-intentioned non-Indigenous researchers, taking Indigenous materials and appropriating them for a non-Indigenous audience, it was important for the team to invite the Indigenous owners and creators of the materials to have a say in what happened to their materials. The longevity and sustainability of the Archive depends on openness to further negotiation and informed responses to changes in legislature and community concerns that will outlast any research funding cycle.

Appendix A

1. Original consent form



I (name) _____ have been told about the *Living Archive of Aboriginal Languages* Project. I understand that the Living Archive will make books in Aboriginal languages available on the internet for people everywhere to study and enjoy. No one is allowed to sell or buy the stories or the pictures.

I give permission for these materials to be put in the Living Archive:

- all books I was involved in creating
- all books created by my relative named: _____

I/my relative may also be known by these names:

(Please note below any books that should NOT be included in the archive)

Signed: _____ Date ____ / ____ / 2012

If people are interested to find out more about the story behind these books they can contact

- me directly on _____ (phone or email)
- the LPC or school at _____
- the **Living Archive** at CDU
- or Please don't contact me

For more information call (08) 8946 6876 or email livingarchive@cdu.edu.au

or visit our website <http://www.cdu.edu.au/laal>



2. Revised form following legal advice

| | By reading and signing this document, you agree: |
|--|--|
| CDU can use your work and put it on the internet | 1. You grant a licence to Us to reproduce, use, and communicate the Work or any part of the Work to the public, take copies of the Work, convert the Work to another format and to otherwise modify or adapt the Work. |
| People who find your work there have to name you as the creator; they can't make money from it, and if they change anything they can't share it | 2. This licence also includes the right to digitise the Work and publish the Work on the internet as part of the Living Archive of Aboriginal Languages Project, for any user from the public to view and to use under a licence such as the Creative Commons Attribution-Noncommercial-No Derivs 3.0 Australia licence (Public Licence) . This licence allows users to share, copy and re-distribute the Work, but they are not allowed to sell the Work. You understand and agree that this licence will not be revoked if the users follow the terms of the Public Licence. <i>See the Note below for further information.</i> |
| This says that you're definitely the right person to sign this | 3. You warrant that the Work is the original work of the person named on this document, and that our inclusion of the Work in the Living Archive of Aboriginal Languages (and the rights provided to the public under the Public Licence) will not infringe the copyright or other intellectual property rights of any third party. |
| This says you won't get paid for putting this work on the internet | 4. You do not require any payment or compensation under this licence or for the grant of rights under this licence, and you waive any rights and claims and release Us from any liability associated with Us doing anything anticipated by this document. |
| Your name will be seen | 5. We may use your or your relative's name in connection with the Work. |
| This is a legal document | 6. This document is signed as a Deed Poll and is governed by the laws of the Northern Territory. |
| We will keep this document private | 7. The information on this form will be stored and used at Charles Darwin University in accordance with Northern Territory Information Act 2002. If you have any queries, please contact livingarchive@cdu.edu.au or phone (08) 8946 6876. |

Name : _____

Signature : _____ Location: _____

Witness Name : _____

Witness Signature : _____ Date : _____

[If you are under 18 years of age, please have your guardian sign below, accepting these terms on your behalf]

Guardian Name : _____

Guardian Signature : _____

| | IMPORTANT NOTE: |
|---|--|
| If you change your mind, we can remove your books from the internet, but we can't stop people who already found your book from using it. | If you would like to find out more about the Public Licence, you can find a summary at this website: https://creativecommons.org/licenses/by-nc-nd/3.0/au/ and you can find the full terms of the licence at this website: https://creativecommons.org/licenses/by-nc-nd/3.0/au/legalcode . Creative Commons licenses are not revocable, but this doesn't mean creators can't cease offering a work under the license, it simply means that whoever used the work in the past under a particular licence will continue to have the right to use the work given by that licence, even if you change the licence permissions or revoke the licence for any new users. If you would like more information, see this website: http://wiki.creativecommons.org/FAQ#What_if_I_change_my_mind.3F . |



Appendix B

Copyright statement attached to all PDFs downloaded from the Living Archive website

Living Archive of Aboriginal Languages



This work is from the **Living Archive of Aboriginal Languages** www.cdu.edu.au/laal.
If you have any questions or wish to access information concerning this work, please contact us at livingarchive@cdu.edu.au.

Use of this work is subject to the User License Agreement available at <http://www.cdu.edu.au/laal/permissions/>

This work is licensed under a **Creative Commons Attribution Non-commercial No Derivs 3.0 Licence Australia** which appears as follows:



This licence allows users to share, copy and redistribute the work in any medium or format provided they:

- (i) give appropriate credit, provide a link to the licence, and indicate if any changes were made to the work. Users may do so in any reasonable manner, but not in any way that suggests that we endorse the user or their use;
- (ii) do not use the work for commercial purposes;
- (iii) do not distribute the modified work if they remix, transform or build upon the work, and
- (iv) do not apply legal terms or technological measures that legally restrict others from doing anything that the licence permits.

The full terms of the licence can be found at <http://creativecommons.org/licenses/by-nc-nd/3.0/au/legalcode>.

The creators of this work assert their **moral rights** to:

- be identified and named as the creators of this work. This means that if you reproduce the work, you must identify these creators;
- take action if this work is falsely attributed as being someone else's work; and
- take action if this work is distorted or treated in a way that is harmful to their honour or reputation. This means that the creators of this work have the right to object to distortion, mutilation or other modification of, or derogatory action in relation to the work.

If you share this work, you must identify the creators named in this work and on the Living Archive of Aboriginal Languages website and abide with all other attribution requirements under the Creative Commons licence.

Note that any action that is in breach of the moral rights of the author will give rise to a right of the creators to take legal action under the Copyright Act 1968 (Cth).

Do not remove this notice



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Chapter 6 (PAPER 4): Diverse socio-technical aspects of a digital archive of Aboriginal languages

Bow, C. (2019). Diverse socio-technical aspects of a digital archive of Aboriginal languages. *Archives and Manuscripts*, 47(1), 94–112.
<https://doi.org/10.1080/01576895.2019.1570282>

Having outlined the creation of the Living Archive project (Paper 2) and explored the legal issues it entailed (Paper 3), the next paper explores a different aspect of the Living Archive project, seeing its use in the hands of different kinds of users.

The contribution of this paper is in its consideration of some of the different ways in which the online archive is used and perceived. The creation of the Archive was not simply for preservation of the materials, but involved careful consideration about access, imagining a range of different users and their purposes for using the Archive and the materials contained in it.

This publication came out of a session I presented as part of the Information Technologies in Indigenous Communities (ITIC) symposium at the Australian Society of Archivists conference in Melbourne in 2017. The paper I presented there addressed the theme of the conference, and was entitled [Diverse worlds, diverse ideologies in a digital archive of Aboriginal languages](#). I was invited to submit a paper to this special issue of the journal *Archives and Manuscripts* which would be published as an outcome of this event. This is the scholarly journal of the Australian Society of Archivists, and while not an open access journal, it is widely read among the archiving community in Australia.

The version included here is the ‘author accepted version’ – see [Appendix 2.2](#) for permission from the publisher to include this version in the thesis. Endnotes in the original have been converted to footnotes for consistency with the thesis, however there is no separate reference list, as required by the journal guidelines.

This is an Accepted Manuscript of an article published by Taylor & Francis in Archives and Manuscripts on 17 February 2019, available online at:

<https://doi.org/10.1080/01576895.2019.1570282>

Abstract

A socio-technical approach is taken to explore a digital archive of Australian Indigenous cultural heritage. The Living Archive of Aboriginal Languages is considered in terms of what it is currently doing and what it was intended to do. Two ethnographic stories focusing on user interactions and the outcomes of an online survey serve to evaluate the effectiveness of the Archive from the perspective of different users. This is then juxtaposed with a consideration of the original grant application, outlining what was envisaged for the project. This analysis serves to highlight some of the contingent relations and diverse socio-technical aspects of a specific knowledge infrastructure, as it allows multiple forms of interaction, new connections and generative activities as people discover, access and interact with the content now and into the future.

Keywords

Indigenous languages; digital archive; language maps; knowledge infrastructure; user interaction

Introduction

Telling a purely historical story ... makes it possible to see the archive's complexity, but maybe difficult to see its contingency, its uncertain emergence from an ongoing, often fraught flux of ideas, technical possibilities and constraints, interests and agendas. ... (An alternative) perspective focusses upon the many different moment-by-moment decisions made by countless people who, little by little make it what it is: the occasional disagreement, the sudden insights of possibility, the technical hiccups, and the lucky breaks, and therefore how it continues to grow uncertainly, and how it may become frustrated in its attempts to fulfil the somewhat ill-defined purposes which, in our original funding application, we claimed it would serve.⁹

This remark comes from a 2014 paper describing the birth of the Living Archive of Aboriginal Languages, a digital archive of Australian Indigenous cultural heritage. The Living Archive of Aboriginal Languages project has collected and digitised thousands of texts in Indigenous languages of the Northern Territory (NT), and made them available online at www.livingarchive.cdu.edu.au.¹⁰ In this paper I foreground some of the diverse socio-technical aspects of the Archive, beginning with two stories of my experience sitting with users as they engage with the archive website, first an Aboriginal elder and language authority, and secondly a non-Indigenous teacher. These stories narrate users' responses

⁹ M Christie, B Devlin and C Bow, 'The Birth of the Living Archive: An emerging archive of Australian Aboriginal languages and literature', *Archifacts*, October, 2014, pp. 48–63, pp. 52–53.

¹⁰ The Living Archive of Aboriginal Languages is supported under the Australian Research Council's Linkage, Infrastructure, Equipment and Facilities funding scheme (LE120100016 and LE140100063). The author's research is supported by an Australian Government Research Training Program Scholarship. The project is also discussed in: C Bow, M Christie and B Devlin, 'Developing a Living Archive of Aboriginal Languages', *Language Documentation and Conservation*, vol. 8, 2014, pp. 345–360; C Bow, M Christie and B Devlin, 'Shoehorning complex metadata in the Living Archive of Aboriginal Languages', in A Harris, N Thieberger and L Barwick (eds), *Research, Records and Responsibility: Ten years of PARADISEC*, Sydney University Press, Sydney, 2015, pp. 115–131; C Bow, M Christie and B Devlin, 'Digital futures for bilingual books', in BC Devlin, S Disbray and NRF Devlin (eds), *History of Bilingual Education in the Northern Territory: People, Programs and Policies*, Springer, Singapore, 2017, pp. 347–353.

which express both positive and negative experiences with the digital archive at that time. My commentary on these stories identifies several socio-technical factors that were influential in shaping the current form of the Living Archive, some of the ‘contingencies’ alluded to in the opening quote. Outcomes of an online survey are then used to highlight some of the socio-technical aspects raised in those stories. Following this, I reflect on the initial grant application document as a way of considering the emergence of the Archive at its beginnings, prior to my involvement as project manager. Juxtaposing what was imagined in initiating the project work that established the Archive with what has since been achieved enables an identification of diverse pushes and pulls that still influence the form the Archive takes today. The quotation above highlights the uncertainty involved in the production of a specific socio-technical knowledge infrastructure, in this case an online archive of Indigenous language teaching and learning materials. What was originally envisaged in the proposal to funders has emerged as something that somehow holds together, as users with radically different interests and purposes engage with it. The use of a sociotechnical approach highlights how the technical and the social are mutually constituted, formulating “a view of human culture that privileges neither the social nor the technological and in which neither is reducible to the other”.¹¹

The Living Archive project sits at the intersection of particular sets of archival practices of language documentation, Indigenous knowledges and the role of libraries and

¹¹ DM. Levy, ‘Documents and Libraries: A Sociotechnical Perspective’, in Ann Peterson Bishop, Nancy A. Van House and Barbara Pfeil Buttenfield (eds), *Digital Library Use: Social Practice in Design and Evaluation*, MIT Press, Cambridge, MA, 2003, p. 33.

digital technologies,¹² each of which bring their own sets of standards and assumptions. The Archive contains digital copies of many rare books in Indigenous languages. Many Indigenous communities in Australia currently engaged in language revival crave any extant records or documentation that may assist in expanding understanding of their language heritage.¹³ Digitising such materials is a practical means for reconnection with ‘knowledge and information Indigenous people want to access for future utility, for creative endeavours and, importantly, for emotional and spiritual restoration of a people.’¹⁴ While the materials in the Archive may hold a different significance for those whose languages are still strong, they are likely to contain multiple affordances for those who rely on older materials to connect with their language, now or in the future. Current uses of the Archive may not anticipate future uses – like the early missionaries or colonists who recorded

¹² For language documentation see for example PK Austin, ‘Language documentation in the 21st century’, *JournalLIPP*, no. 3, 2014, pp. 57–71; R Henke and AL Berez-Kroeker, ‘A Brief History of Archiving in Language Documentation, with an Annotated Bibliography’, *Language Documentation and Conservation*, vol. 10, Emergent Use and Conceptualization of Language Archives, 2016, pp. 411–457; K Rice and N Thieberger, ‘Tools and technology for language documentation and revitalization’, in KL Rehg and L Campbell (eds), *The Oxford Handbook of Endangered Languages*, Oxford University Press, Oxford; New York, 2018. For the role of libraries in Indigenous knowledge spaces see for example M Nakata, A Byrne, V Nakata and G Gardiner, ‘Indigenous Knowledge, the Library and Information Service Sector, and Protocols’, *Australian Academic and Research Libraries*, vol. 36, no. 2, 2005, pp. 7–21; M Nakata and M Langton, *Australian Indigenous Knowledge and Libraries*, Australian Academic and Research Libraries, v. 36, no. 2, 1 June 2005, pp. 1–211; S Nicholls, L Booker, K Thorpe, M Jackson, C Girault, R Briggs and C Jones, ‘From principle to practice: community consultation regarding access to Indigenous language material in archival records at the State Library of New South Wales’, *Archives and Manuscripts*, vol. 44, no. 3, 2016, pp. 1–14; K Thorpe and M Galassi, ‘Rediscovering Indigenous Languages: The Role and Impact of Libraries and Archives in Cultural Revitalisation’, *Australian Academic and Research Libraries*, vol. 45, no. 2, 2014, pp. 81–100. For work on Indigenous knowledge practices in digital contexts see for example M Christie, ‘Computer Databases and Aboriginal Knowledge’, *Learning Communities: International Journal of Learning in Social Contexts*, vol. 1, 2004, pp. 4–12; M Christie, ‘Words, Ontologies and Aboriginal Databases’, *Media International Australia, Incorporating Culture and Policy*, vol. 116, 2005, pp. 52–63; H Verran, M Christie, B. Anbins-King, T Van Weeren, and W. Yunupingu, ‘Designing digital knowledge management tools with Aboriginal Australians’, *Digital Creativity*, v. 18, no.3, 2007, pp. 129–142.

¹³ For example, R Amery, *Warraparna Kurna! Reclaiming an Australian language*, University of Adelaide Press, Adelaide, S.A., 2016; J Giacon, *Yaluu. A recovery grammar of Yuwaalaraay and Gamilaraay: a description of two New South Wales languages based on 160 years of records*, Asia-Pacific Linguistics, College of Asia and the Pacific, The Australian National University, Canberra, ACT, 2017.

¹⁴ M Nakata, V Nakata, G Gardiner, J McKeough, A Byrne and J Gibson, ‘Indigenous Digital Collections: An Early Look at the Organisation and Culture Interface’, *Australian Academic and Research Libraries*, vol. 39, no. 4, 2008, p. 233–4.

wordlists of local Indigenous communities, with no idea of any future purpose they might be put to, archiving these resources allows them to become part of future knowledge-making activities.

Rather than viewing the Living Archive as a digital object which contains language materials, it is presented here as a knowledge infrastructure that enables various kinds of activity through the presentation of digital artefacts of Indigenous language and knowledge work.¹⁵ The infrastructure itself is a network of relations that keep things going, technically, politically, socially and ontologically, and can be analysed through a socio-technical lens which involves a meshing of the social, political and technical aspects of the Archive. Waterton identifies ‘a move toward the exposure of the guts of our archives and databases, toward exposing the contingencies, the framing, the reflexivity, and the politics embedded within them.’¹⁶ Star advocates analysing infrastructures using the tools of ethnographic fieldwork, and the present analysis can be considered a form of archival ethnography,¹⁷ which enables the complicated agency of the Archive to be problematised through tracing user narratives. The two user stories presented here are narrations of my own experiences on the field, the first told as a personal reflection some time after the encounter, and the second with direct quotes based on recording. The use of impersonal pronouns preserves

¹⁵ GC Bowker, K Baker, F Millerand and D Ribes, ‘Toward Information Infrastructure Studies: Ways of Knowing in a Networked Environment’, in J Hunsinger, L Klastrup and M Allen (eds), *International Handbook of Internet Research*, Springer Netherlands, Dordrecht, 2009, pp. 97–117; PN Edwards, SJ Jackson, MK Chalmers, GC Bowker, D Ribes, M Burton and S Calvert, *Knowledge Infrastructures: Intellectual Frameworks and Research Challenges*, Deep Blue, Ann Arbor, MI, 2013, p. 41; H Karasti, F Millerand, CM Hine and GC Bowker, ‘Knowledge infrastructures: Part I’, *Science and Technology Studies*, vol. 29, no. 1, 2016, pp. 2–12.

¹⁶ C Waterton, ‘Experimenting with the Archive: STS-ers As Analysts and Co-constructors of Databases and Other Archival Forms’, *Science, Technology, and Human Values*, vol. 35, no. 5, 2010, pp. 645–676, p. 647.

¹⁷ SL Star, ‘Infrastructure and ethnographic practice: Working on the fringes’, *Scandinavian Journal of Information Systems*, vol. 14, no. 2, 2002, pp. 107–122; KF Gracy, ‘Documenting Communities of Practice: Making the Case for Archival Ethnography’, *Archival Science*, vol. 4, no. 3–4, 2004, pp. 335–365.

anonymity of the participants, and the stories serve to link the technical with the social in discussion of the Living Archive as a knowledge infrastructure.

A user from country

I am sitting with an Indigenous Australian elder in her remote desert community, relieved that it is not the hot season here, but it is still so dry and dusty on her veranda. We can hear the sounds of the local football competition close by. I sense that she would rather be at the football oval, where the rest of the community has gathered, but she has graciously agreed to sit with me for a bit. A few family members linger nearby, occasionally engaging in our discussion. The elder I am working with has been involved with bilingual education programs in the past, teaching in the local government school for years before the program was shut down. We talk for a while about the old days, when language took a leading role in the classroom, and we share our disappointment that only English is tolerated now. We talk about all those wonderful books that were created to teach vernacular literacy, and how they have been locked away now, protected from harm but also from use. I tell her about our project to collect and digitise the books produced in bilingual programs all around the Territory, to keep them safe and make them available online. She's heard about this project before, and has previously signed a permission form to allow materials she created to be included in the collection.

I invite her to look at the website. She is familiar with digital technologies, using the desktop computers in the community centre to access banking and Centrelink

services, with assistance from her grandson or one of the digital mentors employed there. She has used iPads and laptops occasionally with non-Indigenous researchers like me, so she is not daunted by the technology, but neither is she dependent on it, besides relying heavily on her phone to stay connected to family. My screen is hard to see, with glare and dusty fingerprints, but I call up the homepage. I've managed to access the wifi, but it is quite slow, and I am conscious of not wanting to use up the community's small allocation.¹⁸

The home page of the Living Archive site presents a map of the Northern Territory, marked out in a mosaic of colours representing the different language areas. Tropical regions near the coast are coloured various shades of green, while in the desert region more reds and oranges are used. There are areas of grey, mostly across the middle with some pockets elsewhere, showing regions where the collection lacks materials. As we navigate around the map, different labels appear in response to the movement of the cursor, displaying the names of languages or places. I show her how to use the controls to zoom in to a certain area, then back out to the bigger picture, and how to tick a box to display the names of the languages or the places – it gets too crowded when they're all visible, so we switch that feature off. The coloured icons marking locations use different colours to differentiate various producers of literacy materials: red for the Literature Production Centres (LPCs) set up in many of the government schools with bilingual programs, blue for Literacy Centres at some of the smaller

¹⁸ Later a mobile app was developed to enable offline access to materials from the Archive CorrelLink, *LAAL Reader*, Charles Darwin University, Darwin, N.T., 2015.

programs, purple for the Catholic or Independent schools which had bilingual programs, green for community language centres, and yellow for communities that produced language materials without any of these infrastructures. We find the coloured area corresponding to her language, and click on the icon for her community, revealing a handful of book covers to the right of the map. I explain how clicking on one of the books will take us into the archive to see the whole book with pictures, or just in text form.

But she stops and wants to look at the map a bit longer. I zoom in further, embarrassed by the sharp edges of the polygons that become visible if you go in too far. I remember the long discussions between the project team, graphic designer and programmer about how to present the map. How far should users be able to zoom? Should we let them move around the whole world, or zoom in close enough to see buildings in their community? How many latitude and longitude points along the imagined borders of each language region should be marked to define each polygon? More points make the edges smoother, but less definition avoids making claims about boundaries. Should we use standard inverted teardrops to mark locations, or something different? How much detail should there be on the underlying map to help orient the user? We ended up choosing a smooth surface on which to map languages and communities, without further interruption of man-made impositions besides state borders, and only marking communities where materials were produced.

She looks carefully at the map of her language region, and those around its borders. Without the marking of roads, rivers or other features, it is difficult to

determine exactly how the border has been determined, though there's a tiny bit of topographical detail if you zoom in far enough. Her sister comes and looks, and they talk together in their language. The only words I recognise are names of places or languages, but I can't tell if they're expressing concern or admiration for what they see on the website. The sister wanders off, the elder nods and allows me to continue. I click on a book and we go to a page headed 'Respecting ownership' – I explain that this reminds users about Aboriginal authority over the books, and that the books in the collection mustn't be misused or sold. I click the green button marked 'Yes' and we move on to looking at some books in her language. I show her how to search and browse and download.

As we continue, I find myself talking too much, explaining all about the site and what we have tried to do with it, but I sense that she is becoming less engaged. I thank her for her time, and give her a lift in my rented 4WD to join the rest of the community at the football oval. There she will continue to engage with family in contemporary, dynamic language practices, as she's done for years. I'm struck by the disconnect between this real-life use of language and the digital artefacts I have been sharing from my computer.



Figure 12 (Ch6.1): Living Archive of Aboriginal Languages home page

As much as I enjoyed my interaction with this elder as a user of the Living Archive website, I was also disconcerted by her apparent loss of interest in the website after we left the map page. Some months later, I received an email from a colleague in Alice Springs, who has shared the website with various schools and individuals through her work with the Department of Education. She said she had become hesitant to show the site sometimes, because people in some communities were ‘unhappy with the LAAL map. It has so many wrong boundaries and too many communities in the wrong language group’. This feedback

seemed to illuminate the response of the Indigenous elder, alerting me to the agency of the map beyond its affordances as a navigation tool to access the contents of the Archive.

Potential users may be wary of its capacities to stir up trouble between users and owners of languages in use in different places. Perhaps the concern is that gathering all these resources in a central repository is actually at odds with Indigenous practices, where knowledge is locally owned and situated. The very construct of an archive requires ongoing negotiation in each of the places represented on the map.

The use of a map as the entry point for the Living Archive was an early decision for the project team. Motivated to maintain the strong connection between language and place and to connect books to stories that circulate in particular places, the plan was to make the digital artefacts accessible through linking mapped language and place names with books in the Archive. We considered the spatiality of a map interface would suit Indigenous Australian users who may prefer to use spatial and visual literacy than text literacy.¹⁹

A map would also highlight the range of languages across the Northern Territory, situate them, and depict their distribution – many languages cluster closely together on the coast, but spread widely across the sparsely populated desert. It was hoped the use of colour could highlight the absence of collected materials from certain areas, implicitly inviting potential users to offer materials in order to bring colour to those regions. The project team was conscious of the politics of mapping, how different maps ‘show different kinds of arguments and audiences, and different ways of dealing with the problem, or not dealing with it’.²⁰ We were reluctant to assert any authority in mapping language

¹⁹ Christie et al., ‘The Birth of the Living Archive’, p. 58.

²⁰ Star, ‘Infrastructure and ethnographic practice’, p. 114.

boundaries, but rather to use abstract shapes as points of access to the books in the collection associated with that language or region. The map is purposefully designed as an explicit oversimplification, to function largely symbolically.²¹ This approach was chosen as an alternative to attempting accurate representations of the detailed geography of language areas or the complex multilingualism of many communities, to avoid giving the false impression that only one language is spoken in each region. This oversimplification of linguistic and spatial distribution is only one of several embedded in the design of the Archive, offering one way of representing complex information in a usable form. The choice of language names and spelling is also a conscious decision, using the names as presented in the material in the Archive, rather than on 'official' (yet still highly problematic) sources such as ISO 639-3.²²

As a point of entry to the Living Archive, the map interface is a node in the network of relations that keep the archive going; technically, politically, socially and ontologically. The processes behind these relations, the contested boundaries and revisions, the discussions that resulted in specific decisions have become embedded in the working of the map interface itself. There may be some evidence buried in a trail of emails and meeting notes, annotated printouts and screenshots, but these decisions are not visible to the user. Configuring technologies in ways we consider will benefit Indigenous Australian community users of the Archive does not disorient or disadvantage academic users, as it

²¹ For discussion of the use of 'technologies of representation' in the performativity of Indigenous knowledges, see H Verran and M Christie, 'Using/designing digital technologies of representation in Aboriginal Australian knowledge practices', *Human Technology*, vol. 3, no. 2, 2007, pp. 214–227.

²² SIL International, *ISO 639-3*, ISO 3 Registration Authority, 2015, viewed 31 May 2017, <http://www-01.sil.org/iso639-3/default.asp>; JA Bickford, 'The ethics of language identification and ISO 639', *Listening: Journal of Communication Ethics, Religion, and Culture*, vol. 51, no. 1, 2016, pp. 21–34.

maintains the expected functionality such as standard search and browse options. The development process has taken seriously the imperfect, problematic relation between the technical and social challenges of constructing the digital archive, while somehow managing to work.

A user from the classroom

The air conditioning in the computer laboratory at the university is an enormous relief from the oppressive Darwin humidity. My colleague from the Computer Science Department has agreed to assist the project team by facilitating a user evaluation of the Living Archive. We're using a think-aloud protocol to access some of the user's thoughts as they engage with the site, following a sequence of tasks and questions. I am there only as an observer, under instruction not to intervene, even when the user says they cannot do something that I know they could do. As a result, I find the process equal parts illuminating and frustrating.

We have already been through the user evaluation process with two academic researchers, now we are sitting with a non-Indigenous teacher who used to work in a remote Northern Territory school with a bilingual program and an active Literature Production Centre (LPC). She now works in an urban school with a high proportion of Indigenous students, and has tried to incorporate some language into the program, despite her minimal competency in an Indigenous language, and the students' varied language backgrounds.

After some small talk and collection of basic demographic information, we turn our attention to the Living Archive website. The teacher navigates straight to her

old school, and instantly recognises some of the book covers that display next to the map on the home page. She is immediately taken back to the LPC, saying 'I can almost smell what those shelves look like'. She clicks through the map and glances at the 'Respecting ownership' page, saying 'I'm really pleased this is here because I think everyone needs to be reminded that just because it's on the internet it's not open slather.' I notice that she does not read through the text on the screen, just clicks the green button that allows her entrance to the Archive.

Identifying a familiar book, she fondly recalls the traditional owner who told that story – her classificatory grandmother according to Indigenous kinship connections. She clicks on the cover image and as the PDF opens, she comments 'Wow, so these whole books are on here?' Perhaps she thought it was just a catalogue, a window into a collection that was stored elsewhere, but is clearly delighted to see the entire book with its colourful illustrations and a cultural significance she appreciated without ever fully understanding.

The teacher clicks the 'Download' button, and discovers she can save that book to her own device, noting that the PDF is much more flexible outside the constraints of the online view. She wonders about the 'Text' button, but is disappointed that it reveals only a plain text file, so drab compared to the vibrancy of the book itself. Noticing the English translation at the bottom of the text file, she says it would be good to have this alongside the original language – then remembers that the books were created to focus on the language, with the English text only included as a concession to teachers who could not read or speak the language. Then she wonders if she can cut and paste from the text file

to make word cards and worksheets, but hesitates. 'I want to go back and check what I can do with this, I'm conscious that stuff has been ripped off for years, where was that warning again?' She infers that her relationships with people in the community, and her understanding of some of the issues of ownership and sharing of knowledge according to Indigenous law have made her 'overly sensitive, I wouldn't think twice about ripping it off from any other site'.

She finds the arrows at the side of the screen that allow her to scroll through books one at a time, and notes that 'some of it is really old, I don't think current teachers would use it, but linguists would. There's really new flash stuff available now'. She is curious about one title, wanting to check when it was produced, but no date is provided. Later when she discovers a button that enables different sort options she tries to sort by date, but it is clear that missing dates in the metadata are not handled well by the Archive.

My colleague sets her a task in a different collection of books, so she goes to the opposite end of the map, curious about how different the books would be there. She clearly does not have the same connection to these titles, but more of a detached interest. She notes one author with many books attributed to her and comments 'I'd like to know more about her – is she Indigenous? Is that her western name?' She scrolls through a few books, focusing on ones with interesting images, glossing over the 'boring' ones. She expresses uncertainty as she is presented with a large number of books in a language and from a community she does not know: 'I'm not sure what to do with these.' There is no finding aid to help her filter the results: 'if I was looking for material for a

particular class, how would I know what to look for?' Remembering a lesson she is developing about turtles, she wonders if there are any relevant stories in the collection – she types the word into the search box and several books appear in various languages. She is again disconcerted: 'I thought it would only find it for the language I was looking at.' None appear to have the word 'turtle' in the title so 'these must be the words in the other languages'. But how would she know which books might be appropriate for a year 9 science class? She browses through the results, a mix of stories about hunting and cooking turtles, some more scientific texts about the life cycle and habits of turtles, and some creation stories – but she does not comment on the different genres. I think she is simply enjoying the nice pictures of turtles.

She filters for the category 'Song' and clicks on some book covers, asking 'Can I hear the songs? It's not much good if they're just written, I want to hear them'. She thinks about how she might use some materials from the Archive in her current teaching role, where not all the Indigenous students have strong connections to language: 'I could display the book on the interactive whiteboard ... but it would be hard to use if we can't hear the language.' She is not sure how her students would manage navigating the site and says 'it might be nice to have an avatar come to explain stuff'. But she can see potential for using some of the materials in her lessons – 'I'd make sure it was all downloaded and ready' – and decides she could explore more, ending the session with 'I know what I'll be doing this weekend.'

Living Archive of Aboriginal Languages

A digital archive of endangered literature in Indigenous languages of the Northern Territory

Home Map Place Language People Books

Home > Q Books

137 books

Filter

Author (72) +

- 7 Kelantumama, Magdalen
- 7 Kerinaua, Marguerita
- 5 Brennan, Queenie
- 5 Lalara, Gula

Place (18) +

- 36 Maningrida
- 24 Nguiu (Wurrumiyanga)
- 12 Barunga
- 12 Milingimbi

Category (6) +

- 67 Narrative
- 22 Language instruction
- 19 Instruction
- 14 Traditional

Illustrator (55) +

- 8 Puruntatameri, Ancilla
- 7 Westblade, Brett
- 6 Kerinaua, Fiona
- 4 Kerinaua, Marguerita

Language (32) +

- 101 English
- 25 Ndjébbana
- 24 Tiwi
- 17 Yolŋu Matha [multiple languages]



MAKÉDDJA KAKKÓYA RÁNBA

Djibbáma

Makéddja Kakkóya Ránba
Djibbáma, Kim
Ndjébbana: English
Maningrida



Kirijini Jarrakalani

Kerinaua, Marguerita
Tiwi: English
Nguiu (Wurrumiyanga)



Nyirring Leyhmay Wurruyung?

Galmur, Judy: Katherine, Margaret
Jawoyn: Kriol; English
Barunga



Makéddja barrúra barra-ngódjbara-nja

Makéddja barrúra barra-ngódjbara-nja
Ndjébbana: English
Maningrida



Lilboi en te:tul

Bybil Harich
Kriol; English
Barunga



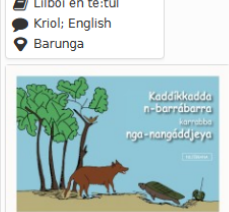
Garriwa

Burarra: English
Maningrida



Al-mangiyi Garri-meyh

Galmur, Judy
Jawoyn: English
Barunga




Kaddikkadda n-barrábarra karrabba nga-nangáddjeya

Mamariyi, Melanie
Ndjébbana: English
Maningrida



Barraróddjiba njanbirridjórkká ránba

Wilton, Monica
Ndjébbana: English
Maningrida



Karri Ngawa Ngintirikirimi Japuja Kukuni

Kerinaua, Marguerita
Tiwi: English
Nguiu (Wurrumiyanga)



Murrinh Ku Menti

Bunduck, Kumyep
Murrinh-Patha
Wadeye (Port Keats)



MUKA DHUWAL DHUKARR MOQUKILINYDJA GAPULIL?

(Beattie, Pat)
Djambarrpuyngu: Yolŋu Matha [multiple languages]



Biddja Djúrna 2

Ndjébbana: English
Maningrida



Ja iIjap Manpiri

Text by MAGGIE MARGALGALA

Figure 13 (Ch6.2): Screenshot of the results of a search for the word 'turtle' in the Living Archive of Aboriginal Languages

This interaction with a teacher left me disconcerted in quite a different way than my experience of working with the Indigenous elder as archive user. It was encouraging to see someone with a connection to the materials and a purpose for engaging with them, but her use of the Archive also highlighted many of the absences and shortcomings of the website and the project work which underlies the site. Several times I have heard users lament the lack of audio – many people who can understand the language but are not literate are excluded from interacting with the materials in certain ways. Yet text-to-speech technology is a long way from automating the process without butchering the pronunciation, and our nascent efforts to record speakers reading books aloud have been limited by time and resources. The ‘old stuff’ in the collection offers opportunities for updating and reworking materials in and for the classroom, engaging students with technologies and stories and people and curriculum, but these affordances may not be visible within the site itself, and busy teachers may not have time or energy to take up the opportunities therein.

The teacher’s uncertainty about what to do when faced with a wide range of resources in languages she is not familiar with piqued my interest. Many of the potential users of the Archive will lack connection to any community or language represented therein, and will need to find ways to navigate the socio-technical relation of thousands of books in dozens of languages. I am constantly seeking more books in more languages, forgetting how overwhelming it may be to some users. I wrote an article suggesting ways of using materials in the Living Archive to resource the cross-curriculum priority of incorporating Aboriginal and Torres Strait Islander histories and cultures in all learning areas of the

Australian Curriculum.²³ The technical arrangement of the Archive is not prescriptive about its navigation. As a project team we had discussed issues of categorisation and classification of materials in the Archive, concerned with serving the needs of non-Indigenous users but wanting to avoid the imposition of a non-Indigenous (mainstream Australian anglophone) set of categories on the corpus. One of the project team has written extensively about the structures of metadata reducing rather than enhancing the productive and creative ways in which words in Aboriginal languages relate and connect across categories, and privilege a western objectivist ontology.²⁴ The materials are forced into certain configurations by the existing metadata and the technical requirements of the database. We chose to limit the browse options to 'Language,' 'Place' and 'People,' and build the search tool to search both metadata and data. While this fails to achieve Christie's unattainable ideal of creating an 'ontologically flat and epistemologically innocent database' which encodes no assumptions about the nature of the world and of knowledge,²⁵ it works towards this by structuring the data at a basic level in terms familiar to both Indigenous and non-Indigenous users, supporting multiple ontologies. These behind-the-scenes negotiations result in an interface that both requires and enables users to make their own connections as they navigate the collection.

²³ C Bow, 'Using authentic language resources to incorporate Indigenous knowledges across the Australian Curriculum', *Learning Communities: International Journal of Learning in Social Contexts*, vol. 20, 2016, pp. 20–39.

²⁴ M Christie, 'Computer Databases and Aboriginal Knowledge', *Learning Communities: International Journal of Learning in Social Contexts*, vol. 1, 2004, pp. 4–12; M Christie, 'Words, Ontologies and Aboriginal Databases', *Media International Australia, Incorporating Culture and Policy*, vol. 116, 2005, pp. 52–63; M Christie, 'Boundaries and Accountabilities in Computer-Assisted Ethnobotany', *Research and Practice in Technology Enhanced Learning*, vol. 1, no. 3, 2006, pp. 285–296; Verran and Christie, 'Using/Designing Digital technologies of Representation in Aboriginal Australian Knowledge practices'.

²⁵ Christie, 'Words, Ontologies and Aboriginal Databases', p. 60.

The teacher's desire to show respect for the materials by adhering to the conditions was encouraging, as I expect users unfamiliar with Indigenous ownership of story to be less concerned by these issues. The 'green button' that acts as a technological gatekeeper to allow or prevent entry to the Archive subjects the user to a regime of copyright law which establishes certain restrictions around use and distribution of materials. The text on the 'Respecting Ownership' page highlights the Indigenous ownership of the stories and briefly outlines what users can and cannot do with the materials in the Archive. Permission was granted by the holders of both copyright and moral rights to publish the books online under a Creative Commons license. Though the text on this page was carefully worded, there is minimal expectation of careful reading, and it barely scratches the surface of the complex interaction of Indigenous and non-Indigenous understandings of intellectual property.²⁶ By clicking the green 'Yes' button, the user agrees to participate in this regime and is permitted entry to the collection. The Indigenous elder may have rejected this invitation to engage with the materials because of concerns about the representations made by the map, while the teacher accepted the invitation, mindful that this would demand certain behaviours of her as she engaged with the materials.

Online survey outcomes

As the Living Archive website was designed to be completely open access, with no barriers to entry such as logins or passwords, it has been difficult to gauge user activity on the site. Google Analytics give some raw figures about page views, number of users, average

²⁶C Bow and P Hepworth, 'Observing and respecting diverse knowledge traditions in a digital archive of Indigenous language materials', *Journal of Copyright in Education and Librarianship*, 3(1), 1–36.
<https://doi.org/10.17161/jcel.v3i1.7485>

time spent, etc.,²⁷ however this information provides little insight into our users and their motivation and engagement. To fill this gap, a simple online survey was created to seek user feedback.

The survey was open for one month in 2018, and promoted on the project's newsletter list and social media channels. A total of 55 people responded to questions about their use of the Archive, along with some basic demographic information.²⁸ This very small sample indicated that most users are non-Indigenous, living in cities or regional towns, but many have some connection with an Australian Indigenous language or community. Users identified as researchers, students, teachers, with a range of 'other' types. Around half have visited the site more than five times, and the most common acquisition was via 'friend/word of mouth' followed by social media. Most respondents said they would visit the site again and tell someone else about it, with some saying they would share content for educational or personal purposes, and the most positive responses ranked access to materials, ease of navigation and selection of materials most highly.

Some of the concerns expressed by the users reported here were echoed in the qualitative feedback from the survey, particularly the desire for the inclusion of audio materials. The teacher's concerns about respectful use of the materials were also reflected in some responses, with requests that the materials be 'updated and improved' or 'corrected, edited and augmented so that they are more usable'. Such comments reflect the

²⁷ Google Analytics showed that in the 12 months from 1 October 2017 the site had over 6000 visits from 3870 users, of which 84% were new visitors, and that each user spent an average of 11 minutes and visited 4.5 pages per session, leading to a total of 27,556 overall page views in one year. This gives an average of just over 16 visits and 10 users per day, and 84% of users were in Australia.

²⁸ A more complete report on the outcomes of the survey can be found at the project's blog site at <http://livingarchive.cdu.edu.au/survey-outcomes/>

tension identified in the project between safeguarding the integrity of the original publications and wanting them to be dynamic and usable in contemporary contexts.

Like the two user stories reported here, there was a general satisfaction that these cultural heritage materials were now available online, with comments such as ‘fabulous archives and love that material is open access’ and ‘a great resource, particularly for a non-Indigenous teacher like me!’ Like the teacher story reported here, having a ‘connection’ with an Indigenous language or community appears to be a key indication of engagement, giving people a purpose and target for their navigation of the site. There was no discussion of the map interface or its claims, which may appear less salient to non-Indigenous users than to Indigenous Australians. The social aspect of the connection to place or language is enhanced in this project by the technical components, which configure the materials and the users in specific ways.

The survey data gave some indication of use of the Archive, but is clearly skewed to those already familiar with the project and sympathetic to its goals. It was not expected to deliver a comprehensive overview of the user base, and in particular was unlikely to evoke responses from remote Indigenous community members, for whom an online survey is not an effective way to elicit feedback. The results of the survey reflected this bias, and therefore represents only a very small and supportive population of users.

Imagining an Archive

I began this paper with a quotation from the first academic article the project team published, not long after the Living Archive website had gone live. The stories of user interactions related above recall ‘the different moment-by-moment decisions made by

countless people who, little by little make it what it is.’ The quote foregrounds the often unacknowledged truth that to a large extent the project team was making it up as we went along, not recklessly but with care, in order ‘to fulfil the somewhat ill-defined purposes which, in our original funding application, we claimed it would serve’.²⁹ I was curious to consider the purposes envisaged in the original application to the Australian Research Council (ARC) in 2011, prior to my involvement as project manager. In revisiting the application document, I sought to relate the particular socio-technical arrangement that was proposed in the application to what actually came to life over the next few years – the Archive that the users in my two stories and survey participants experienced.

The motivation for the application was a shared concern for the fate of printed materials produced for bilingual education programs in the Northern Territory from 1974 to the 2000s. The ARC’s Linkage, Infrastructure, Equipment and Facilities grant scheme is typically used in the natural sciences to fund machinery and tools to facilitate research. An application to collect and digitise vulnerable materials from remote Indigenous communities as infrastructure for humanities and social sciences researchers was relatively unusual and the success of the application was somewhat surprising to the applicants.

The historical context of the application probably contributed to its success. Bilingual education programs in remote schools in the Northern Territory have been through various waves of policy since their establishment in the mid-1970s.³⁰ By the early 2000s, only a few

²⁹ Christie et al., ‘The Birth of the Living Archive’, pp. 52–53.

³⁰ C Nicholls, ‘Death by a Thousand Cuts: Indigenous Language Bilingual Education Programmes in the Northern Territory of Australia, 1972–1998’, *International Journal of Bilingual Education and Bilingualism*, vol. 8, no. 2–3, 2005, pp. 160–177; B Devlin, S Disbray and N Devlin, ‘A Thematic History of Bilingual Education in the Northern Territory’, in BC Devlin, S Disbray and NRF Devlin (eds), *History of Bilingual Education in the Northern Territory*, Springer, Singapore, 2017, pp. 1–10.

programs continued, and these were undermined by the 2008 decision to mandate the first four hours of the school day for tuition in English, relegating first language programs to the margins of the school curriculum. This widely-criticised decision contrasted with increased international concern over the fate of Indigenous languages,³¹ with a renewed emphasis on language documentation and description of endangered languages, and the importance and value of language in education generally and in Indigenous contexts specifically.³²

These policy fluctuations had left vulnerable the vast range of materials produced for vernacular literacy education in these programs. In 2012, a parliamentary enquiry into language learning in Indigenous communities recommended ‘improving community access to language materials through a dedicated Indigenous languages archive at the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) and the sharing of resources with schools and educational institutions’.³³ AIATSIS, Australia’s leading research, collections and publishing institution in the field of Australian Indigenous studies, was undergoing a review, and there were concerns about its capacity to collect and digitise materials, with long waiting times for communities wanting access to their own materials in

³¹ B Devlin, ‘Policy Change in 2008: Evidence-Based or a Knee-Jerk Response?’, in BC Devlin, S Disbray and NRF Devlin (eds), *History of Bilingual Education in the Northern Territory*, Springer, Singapore, 2017, pp. 203–218; J Oldfield, ‘Anangu Muru Wunka - Talking Black Fella: A Critical Policy Analysis of the Northern Territory First Four Hours of English’, PhD, University of Melbourne, Melbourne, 2016; J Simpson, J Caffery and P McConvell, *Gaps in Australia’s Indigenous Language Policy: Dismantling bilingual education in the Northern Territory*, AIATSIS Discussion Paper, Australian Institute of Aboriginal and Torres Strait Islander Studies, Canberra, 2009.

³² NP Himmelmann, ‘Documentary and descriptive linguistics’, *Linguistics*, vol. 3, no. 6, 1998, pp. 161–196; UNESCO, *Education in a multilingual world*, UNESCO Education Position Paper, United Nations Educational, Scientific and Cultural Organization, Paris, 2003; NH Hornberger, ‘Multilingual education policy and practice: Ten certainties (grounded in Indigenous experience)’, *Language Teaching*, vol. 42, no. 2, 2009, pp. 197–211.

³³ House of Representatives Standing Committee on Aboriginal and Torres Strait Islander Affairs, *Our Land Our Languages: Language Learning in Indigenous Communities*, The Parliament of the Commonwealth of Australia, Canberra, ACT, 17 September 2012. p.viii.

the collections.³⁴ In this context of heightened awareness of the need for digital preservation of cultural heritage material, the timing of the Living Archive proposal was significant and the funding application was successful. I was employed on a one-year contract to manage the project, though my background is in linguistics rather than archiving or data management.

In revisiting the origins of this knowledge infrastructure, it is worth considering the characteristics of the institutions involved. The application required a ‘linkage’ between organisations: in this case Charles Darwin University (CDU), a small, young institution based in Australia’s smallest and northernmost capital; the Australian National University (ANU), a medium-sized, prestigious, highly-ranked institution in the nation’s capital; and the Northern Territory Department of Education, which oversaw the bilingual education programs and under whose auspices most of the materials which would make up the collection were created. Beyond partnership between institutions, the application was a collaboration between individuals employed by those organisations, all with close ties with Indigenous communities. Two of the chief investigators had been involved in bilingual education programs in northeast Arnhem Land, and the other connected with various language groups in Central Australia.³⁵ Similarly, the main collaborators from the

³⁴ ACIL Allen Consulting, M Rose and M McMillan, *Australian Institute of Aboriginal and Torres Strait Islander Studies Independent Review*, ACIL Allen Consulting, Brisbane, QLD, 2014, p. 165. Concerns about wait times are mentioned in House of Representatives Standing Committee on Aboriginal and Torres Strait Islander Affairs, *Our Land Our Languages*, pp. 207–208.

³⁵ M Christie, ‘Developing Local Curriculum Materials – Learning Metaphors, Insightful Collaborations, Community Involvement’, in B Devlin, S Disbray and NRF Devlin (eds), *History of Bilingual Education in the Northern Territory*, Springer, Singapore, 2017, pp. 113–126; B Devlin, ‘Language Maintenance in a Northeast Arnhem Land Settlement’, EdD, Columbia University, New York, 1986; J Simpson, *Warlpiri morpho-syntax: A lexicalist approach*, vol. 23, Springer Science and Business Media, Dordrecht, 1991; J Simpson, ‘Warumungu (Australian - Pama-Nyungan)’, in A Spencer and AM Zwicky (eds), *The Handbook of Morphology*, Blackwell, Oxford, 1998, pp. 707–736.

government belonged to the Department of Education's Indigenous Language and Culture team, and also had particular connections with language communities across the Territory. Cognisant that grant funders look for both individual and institutional capacity, the application highlighted CDU's long history of institutional involvement with Indigenous communities and languages, including the longstanding Yolngu Studies program, the innovative Teaching from Country project, and a previous ARC project on Indigenous Knowledge and Resource Management in Northern Australia.³⁶ ANU highlighted the researchers and projects that would benefit from the development of such an archive, including linguistic, anthropological, ethnomusicological work, and the Centre for Aboriginal Economic Policy Research. It seems that ANU had the profile to attract funding for a project of this nature, but its close connections with AIATSIS and PARADISEC precluded it from creating a separate archive for this material, while CDU had the capacity and on-the-ground connections to run the project but not the profile to attract Category 1 funding. The inclusion of the Department of Education as a partner was complex and strategic: their financial and in-kind contribution indicated an investment in the future of the pedagogical products of the bilingual education era, while their policy no longer actively supported bilingual programs from which these products emerged and could continue to be

³⁶M Christie, 'Yolngu Studies: A case study of Aboriginal community engagement', *Gateways: International Journal of Community Research and Engagement*, vol. 1, 2008, pp. 31–47; M Christie, 'Engaging with Australian Indigenous Knowledge Systems: Charles Darwin University and the Yolngu of Northeast Arnhem Land', *Learning Communities: International Journal of Learning in Social Contexts*, vol. 7, 2009, pp. 23–35; M Christie, *Teaching from Country: Increasing the Participation of Indigenous Knowledge Holders in Tertiary Teaching Through the Use of Emerging Digital Technologies*, Australian Learning and Teaching Council, Strawberry Hills, NSW, 2010; M Christie, 'Teaching from country, learning from country', *Learning Communities: International Journal of Learning in Social Contexts*, vol. 2, 2010, pp. 6–17; M Christie, H Verran and W Gaykamangu, *IKRMNA - making collective memory with computers*, Indigenous Knowledge and Resource Management in Northern Australia, 2003.

actively used. They also held copyright over the majority of the materials that made their way into the Living Archive.

The original funding application included several assumptions. First it claimed that there was no existing archive suitable for housing this collection; second it insisted that the Archive should be digital; and third that the work of collecting and digitising hard copies could be achieved in one year. The practice of sending hard copies of books published to the National Library of Australia or AIATSIS makes the materials available to those outside the communities of origin, though it can also have the effect of distancing books from those same communities. New digital infrastructure programs were putting internet access and mobile technologies into remote communities. So a digital archive would have the dual purpose of preserving the materials in a form that could be re-awakened and re-purposed, while also making access possible (in digital forms) for people for whom the books were physically inaccessible. The one-year time-frame was an unrealistic goal, but careful budgeting meant the funds extended to two years, and a second application was successful. Sustainability beyond the funding cycle was provided by CDU Library's offer to host the materials on institutional servers, also providing professional advice on metadata and scanning.³⁷

Concerns about copyright and intellectual property issues are surprisingly absent from the original application, yet from the early days of project work, this topic created much discussion and absorbed much time within the project team. We were not dealing with the type of materials that are often discussed in the literature about Indigenous

³⁷ J Mamtara and C Bow, 'Towards a Unique Archive of Aboriginal Languages: A Collaborative Project', *Journal of the Australian Library and Information Association*, vol. 66, no. 1, 2017, pp. 28–41.

knowledge in archival collections, where Indigenous people are the subjects of the record and not the owners.³⁸ Instead, the Archive contains materials created largely by and for Indigenous users as part of an ostensibly two-way education system, and is consequently subject to the requirements of two knowledge traditions regarding copyright and intellectual property. The original application looks somewhat naïve in its lack of discussion of these issues that ended up taking a great deal of time and energy to find a working (though not completely satisfactory) solution, involving copyright agreements, permission forms and Creative Commons licenses.³⁹

In reviewing the original application, it is possible to discern a tension between what the applicants were hoping to achieve and what the ARC might be willing to fund. It seems that compromises were necessary to obtain funding and to acknowledge the various institutional agendas. Meanwhile the owners of the stories and languages embedded in textual form in the books were rather marginal to the application itself. The benefit to academic researchers was aligned with the value to Indigenous authorities, and how the latter would be supported to engage in ongoing collaborative and multidisciplinary research with interested users. Over the seven-year life of the project, this has yet to materialise. There are various possible reasons for this, including that Aboriginal language

³⁸ J Anderson, 'The Making of Indigenous Knowledge in Intellectual Property Law in Australia', *International Journal of Cultural Property*, vol. 12, no. 3, 2005, pp. 345–371; L Iacovino, 'Rethinking archival, ethical and legal frameworks for records of Indigenous Australian communities: a participant relationship model of rights and responsibilities', *Archival Science*, vol. 10, no. 4, 2010, pp. 353–372; T Janke and L Iacovino, 'Keeping cultures alive: archives and Indigenous cultural and intellectual property rights', *Archival Science*, vol. 12, no. 2, 2012, pp. 151–171; S McKemmish, S Faulkhead, L Iacovino and K Thorpe, 'Australian Indigenous knowledge and the archives: embracing multiple ways of knowing and keeping', *Archives and Manuscripts*, vol. 38, no. 1, 2010, pp. 27–50; K Thorpe, 'Aboriginal Community Archives: A Case Study in Ethical Community Research', in AJ Gilliland, S McKemmish and AJ Lau (eds), *Research in the Archival Multiverse*, Monash University Publishing, 2017, pp. 900–934.

³⁹ Bow and Hepworth, 'Observing and respecting diverse knowledge traditions.'

users and owners were never very interested in the literature in the first place because the idea of preserving knowledge in a printed artefact conflicts with their dynamic language practices.⁴⁰ According to Christie, for Indigenous people ‘the textual objects in the archive are not seen to be representing a world “out there” or “back then” – they are material traces of previous episodes of creative collective action which can now be reinvigorated in new contexts of collective creation’.⁴¹ So while the goal is to preserve and make accessible these artefacts of Indigenous knowledge-making practices, the project has had to use technologies of archiving which appear to be antithetical to traditional Indigenous practices of preserving and sustaining knowledge.

Conclusion

In recording contrasting stories of the Living Archive in use – though under somewhat contrived conditions – and juxtaposing these with a review of the aspirations of the funding applicants, I offer a view of the diverse range of socio-technical arrangements which bring to life a digital archive of literature in Australian Indigenous languages. The project was envisaged by a group of academics with shared concerns and assorted priorities, each with different conceptions of what the Archive might become, attending to their own institutional obligations and seeking to meet the needs of diverse audiences. The Archive was subject to certain technical requirements and expectations determined by the project and has become a knowledge infrastructure that is now available and in use in various

⁴⁰ Christie reflecting on his role as teacher-linguist in a bilingual school program saw unutilised books as ‘ten years of linguistic work continuing to lie on the shelves, rarely having been used in a classroom: a constant reminder that Yolngu teachers and their students were never impressed for a moment by the illusion of objective knowledge we had tried to conjure within each cover, a sign of Yolngu resistance to colonisation’ M Christie, ‘Drawing the Line - A History of Yolngu Literacy’, in D Myers (ed.), *Reinventing Literacy - the Multicultural Imperative*, Phaedrus Books, Rockhampton, QLD, 1995, p. 80.

⁴¹ Christie et al., ‘The Birth of the Living Archive’, p. 55.

contexts. The stories of user interactions expose some of the consequences of those moment-by-moment decisions made by the project team. These entailed various updates and reconfigurations, the formulation of careful wording about authorship, ownership and use, intricate workflows, complex metadata schemas, and ongoing negotiations. Yet the experiences of sitting beside users as they offer commentary on their navigation of the Archive are not solely a product of the configuration of the website and its contents. They also draw on the users' own roles and associations with the languages, books, people, locations, pedagogies and technologies, and the complex interconnections of all these things. The means by which the map configures a specific view of the language and literary landscape of the Northern Territory, the presence and absence of facets and filters to support or inhibit certain kinds of navigation, the means of observing and respecting different legal practices – are just some of the many socio-technical arrangements embedded in the Archive.

Having been intimately connected with this project as it has come to life over the last seven years, I see its strengths and weaknesses, its uniqueness and its idiosyncrasies, its affordances and constraints, recalling the arguments won and lost, the ideas envisioned and redirected. I still have faith that by digitising collections such as these books that were produced in specific educational contexts with their particular classroom-oriented language practices, and by making them freely available online, the Living Archive opens up possibilities for Indigenous community members to engage in (re)interpreting, (re)presenting and (re)using these materials through a trusted repository. While their form as written text makes them somewhat peripheral to collective Indigenous language

practices, such a digital archive is still 'highly relevant to the civil, political and legal rights of Aboriginal people and, importantly, their ability to enjoy these rights.'⁴²

The socio-technical approach considers the individual and institutional or communal creators, stakeholders, audiences and their interaction with the technologies of archiving, digitisation, storage, access, display, navigation, etc. in a complex web. The social will change, as will the technical, so our efforts are necessarily provisional. The project team's goal has been to establish the Living Archive in a careful and respectful way that will allow multiple ontological interactions, new connections and activities as people discover, access and interact with the content now and into the future. The project was undertaken to preserve endangered literature for contemporary and future uses, to support multiple ontologies and enable multiple epistemic interactions. Time will tell if the Living Archive has a re-colonising effect or results in Indigenous language authorities reclaiming these knowledge artefacts. Perhaps in the future when language practices have changed, the value of these remnants of previous language practices will be reassessed, as some old wordlists and narratives of missionaries or pastoralists in the early days of settlement have become rich sources for Indigenous groups whose living language heritage has largely disappeared.

[Note that the journal required use of endnotes, which have been converted to footnotes in this version for the thesis, and no separate reference list is included]

⁴²L Ormond-Parker and R Sloggett, 'Local archives and community collecting in the digital age', *Archival Science*, vol. 12, no. 2, 2012, p. 195.

Chapter 7 (PAPER 5): Collaboratively designing an online course to teach an Australian Indigenous language at university

Bow, C. (2019). Collaboratively designing an online course to teach an Australian Indigenous language at university. *Babel*, 54(1/2), 54–60.

Having explored the Living Archive project in the previous three papers, the next paper shifts to analysis of a different type of digital language infrastructure. Where the Living Archive collected and curated previously created language materials for preservation and online access for any purpose, the Digital Language Shell and Bininj Kunwok online course collect and curate digital language resources for specific pedagogical purposes.

The contribution of this paper is to provide ideas for language teachers about how other Indigenous and less commonly taught languages could be developed into courses with minimal expense and minimal computer literacy. The challenge is to devise collaborative and innovative solutions to support both Indigenous language authorities and language learners.

This paper was written in response to an invitation to contribute to a special issue of the journal 'Babel' about Indigenous language teaching for the 2019 International Year of Indigenous Languages. Babel is the journal of the Australian Federation of Modern Language Teachers Associations Inc (AFMLTA), therefore the paper is written for an audience of language teachers in Australia.

The version presented here is the final published version. See [Appendix 2](#) for permission from the publishers to include this version of the paper in this thesis. The full volume is available online at <https://www.afmlta.asn.au/documents/item/191>.

Abstract

The lack of opportunities to study Indigenous languages at tertiary level in Australia highlights the devaluing of Indigenous languages and cultures in Australia. Innovation in methods of delivery is required, to enable Indigenous language authorities to configure their own arrangements of content and pedagogy in collaboration with university academics, to comply with the different requirements of each group. Some of the identified challenges of developing university courses for Indigenous languages include shortages of resources, teachers, students, and personal connections. This paper describes an experiment in mobilising digital technologies to develop new approaches through the collaborative design of an online university course teaching the Kunwinjku language (Bininj Kunwok) of the Northern Territory, using a Digital Language Shell. This paper argues that collaborative work in this space can serve to create new resources, teachers, students and personal connections in the learning of Indigenous languages. Such work has potential to engage Indigenous language authorities and integrate Indigenous language and knowledge practices in the academic life of Australian universities.

Keywords

Indigenous languages, Australian Aboriginal languages, collaborative design, online teaching, Kunwinjku, Bininj Kunwok

Introduction

The state of Australian Indigenous languages has been in decline since colonisation, with only a small number still being passed on to children as their primary language (Marmion, Obata, & Troy, 2014). In the education system, while there are some encouraging moves towards increased inclusion of Indigenous languages in the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2013; Disbray, 2019; Troy & Walsh, 2013), in higher education there are limited opportunities to learn Indigenous languages. Investment in new courses requires respectful, continuous collaboration and negotiation with Indigenous language authorities, and may be hampered by the perceived shortage of resources, teachers and students. The online learning environment can reduce costs for delivery, but can also create a sense of disconnection between learners and the community of language speakers. The outcomes of the creation of a Digital Language Shell (an online template using free and open source software for presenting language resources) and a pilot course teaching the Kunwinjku language (Bow, 2017) led to the creation of a university level course developed in collaboration with the Bininj Kunwok Language Project. Kunwinjku (ISO 639-3 code [gup]) is the best-known and most documented language of the Bininj ('people') Kunwok ('language') family spoken in the Northern Territory.

This paper describes an experiment in collaboratively designing a university course to teach an Indigenous language, mobilising digital technologies for online delivery. It addresses the apparent shortages of resources, teachers and students, reconfiguring them as opportunities to promote collaborative work between language authorities and

academics as a means of creating new resources, teachers, and students. The project draws on Indigenous pedagogies and social structures to create new modes of personal connection in ways that are appropriate to the university context and the Indigenous language ecology in which the course is situated (see Angelo, Poetsch, Ryan, Hand, Schrieber & Jarrett, this issue). Indigenous collaboration is essential for any language program, and such work is urgent in relation to the endangered status of many Indigenous languages. Without the tools and means to implement collaborative language learning programs, the opportunity to learn these languages will never be made available. Awareness of Indigenous languages as an object of study requires high-level support and advocacy, as students won't seek to study something if they don't know it exists in instructed form. This project explores the affordances and challenges of collaboratively designing a university course to make Indigenous languages more visible in the academy.

The paper begins with a brief background describing the state of teaching Indigenous languages at Australian universities, and identifies some of the inherent challenges. The following section describes the development of the Digital Language Shell and the pilot Kunwinjku course, and its expansion to a university course. The next section addresses some of the perceived shortages, showing how they were overcome in this context, and the final section highlights the implications of this project for the teaching of Indigenous languages in Australia.

Background

Indigenous languages must be regarded as a special case. They are, after all, Australia's unique irreplaceable linguistic heritage. New ways must be found to deliver courses in and about Indigenous languages, and to deliver courses that impart

skills needed for language work in the community and schools. These are life and death issues. (Amery, 2007, p. 346)

The lack of opportunity to study Indigenous languages at tertiary level has been called a “national embarrassment” (Simpson, 2014, p. 57) and is of concern to both Indigenous and non-Indigenous people, as it highlights the widespread devaluing of Indigenous languages in Australia and their lack of visibility in higher education. Prior to 2019, of around 125 Indigenous languages still spoken (Marmion et al., 2014), there were only six language courses available for credit across Australia’s 43 universities (University Languages Portal Australia, 2018). Of these six, three are considered ‘strong’ languages, which are still spoken by all age groups and passed on to children – Yolŋu Matha and Arrernte (taught through Charles Darwin University) and Pitjantjatjara (University of South Australia). Three other languages are in various stages of revival or revitalisation – Gamilaraay (taught through Australian National University and the University of Sydney), Kaurna (University of Adelaide), and Wiradjuri (Charles Sturt University). In addition, Curtin University has developed a MOOC for Noongar language (Kickett & Forrest, 2018), but this does not appear to be currently available for credit as a tertiary course.

The history of Aboriginal language teaching programs in Australian universities since Pitjantjatjara was first offered at the University of Adelaide in 1968 has been erratic (Amery, 2007; Edwards, 1995; Gale, 2011). A large increase in the number of researchers working on Australian languages, and the shift towards collaboration with Indigenous authorities in linguistic research, have failed to increase offerings for language teaching and learning in Australian universities (Amery, 2007). Little has changed since Edwards wrote

in 1995 that “Australian universities have largely failed in their recognition and promotion of Aboriginal languages” (p. 11).

While any programs designed to teach language and culture must be led by Indigenous authorities, it is likely they will involve close ties with other agencies or individuals to realise outcomes. Collaboration with universities is a vital component for educating teachers and researchers (Giacon & Simpson, 2012; Johns & Mazurkewich, 2001), and such collaboration offers an opportunity for universities to engage with Indigenous peoples in new ways. This will yield mutually beneficial outcomes (Campbell & Christie, 2009; Fogarty & Schwab, 2012), recognising the authority of Indigenous knowledge holders in the academy, and potentially encouraging more Indigenous people to become involved in academic life.

Several issues affect the delivery of courses in Indigenous and other less widely spoken languages at university, with reasons commonly cited including lack of resources (textbooks, dictionaries, reading materials), lack of teachers (where speakers may not be educated to teach, or teachers may not be competent speakers), and lack of students (Giacon & Simpson, 2012; Simpson, 2014; Ward, 2004, 2015; Ward & van Genabith, 2003). Language teaching at universities in Australia has seen a decline in enrolments across all languages, including those considered of economic value to Australia (Lo Bianco, 2009; Dunne & Pavlyshyn, 2012). Smaller, or less commonly taught languages are rarely likely to meet minimum class size criteria (Dunne & Pavlyshyn, 2013), and economic rationalisation of university courses means only courses with large numbers are taught (Gale, 2011). This has led to collaborations between institutions to provide offerings for smaller class sizes (Kinoshita, 2018; Pauwels, 2007; White & Baldauf, 2006), with varying success.

In a review of the provision of languages other than English in Australian universities, Lo Bianco & Gvozdenko (2006, p. 138) called for “pedagogy-led technology applications” to facilitate collaboration and innovation in this sector. Computer-assisted language learning (CALL), online learning, Web 2.0 and, potentially, Artificial Intelligence (AI) and virtual reality (VR) technologies provide affordances such as ease of participation, communication, information sharing, and collaboration (Godwin-Jones, 2016; Wang & Vásquez, 2012). In addition, the online environment may enable courses to be run with lower overheads than face-to-face courses, requiring fewer teaching staff and mitigating smaller class sizes (Dunne & Pavlyshyn, 2013; Ward & van Genabith, 2003). There has been an increased use of technology in language teaching for minority, endangered and Indigenous languages in recent years (Galla, 2016; Godwin-Jones, 2013; Hermes & King, 2013; Ward, 2015; Ward & van Genabith, 2003; Winke, Goertler, & Amuzie, 2010). Additional uses of CALL in endangered language contexts can help arouse interest in language, be a catalyst for literacy training, provide a forum for cultural expression, act as a vehicle for language documentation, and support language maintenance and revitalisation efforts (Ward, 2004).

It goes without saying that the issues which affect delivery of Indigenous language courses at university are not due to any deficiencies in the Indigenous languages or speakers or communities themselves. Australian languages, whether in revitalisation or still transmitted across generations, are complex and diverse, and worthy of investigation as both objects of study and means of communication. Rather than seeing the lack of resources, teachers, and students outlined here as further evidence of a ‘deficit’ in the Indigenous context, they should be seen as opportunities to engage more deeply in the

sharing of language and culture, to strengthen, promote and support the aspirations of Indigenous communities.

This project offers an experimental approach, exploring innovative methods of delivery in both the online space and the tertiary education context, using collaborative design to ensure appropriate Indigenous authority over the course materials and delivery. Potential negative effects of teaching these languages online may be that the language is removed from its social context, and may become disconnected from its speech community. The approach is not restricted to the university context, but can be applied to the many alternative avenues for teaching Indigenous languages and cultures, in both formal and informal settings (schools, language centres, community groups, etc). University enrolment is lower for Indigenous students than for non-Indigenous (Behrendt, Larkin, Griew, & Kelly, 2012; Pechenkina, Kowal, & Paradies, 2011), suggesting barriers or disconnection in relation to the higher education context. There can be no assumptions about what effect new programs such as this may have on tertiary participation for Indigenous students, until the language learning opportunity is made available and supported by efforts to promote language awareness and learning.

Digital language shell and pilot

In response to the perceived difficulties of developing new tertiary Indigenous language courses, in 2016 a team from Charles Darwin University (CDU) created a Digital Language Shell (Figure 14), an online template using free and open-source software (Bow, 2017). The aim of this project was to work with Indigenous language authorities to collaboratively design ways of sharing their language and culture online without requiring

large expenditure or high level technical skills. The Digital Language Shell is built on WordPress, a free and open-source content management system commonly used for blogging and developing websites. A selection of themes and plugins were selected from the vast array available, including a learning management system for course delivery. As a WordPress.org site, hosted on a university server, it was not linked to any particular institutional learning management system, but could sit alongside or store materials that could then be copied to institutional platforms. The Digital Language Shell facilitates the assemblage of a range of digital resources that can be sequenced into a curriculum for online delivery of a language program.

The Digital Language Shell was tested through the delivery of a pilot course collaboratively designed with the Bininj Kunwok Language Project to teach Kunwinjku language and culture online. Bininj Kunwok is the name used for a chain of six mutually intelligible dialects stretching across Kakadu National Park and West Arnhem Land in the Northern Territory. There are around 2000 first language speakers, with Kunwinjku the most widely spoken and understood variety. The main community of Kunwinjku speakers is at Gunbalanya, 300kms east of Darwin. The school there had a short history of bilingual education in the 1970s. Currently the language is not in official use at the school, despite most Bininj children speaking the language at home.

The academic team collaborated with the language committee of the Bininj Kunwok Language Project to design four introductory units of ten lessons each, with learning activities encompassing cultural information, vocabulary, pronunciation, grammar, useful phrases and reading. The course materials included a range of video and audio resources created especially for the course, as well as drawing on existing resources from various

sources. The materials were supplemented by a glossary of linguistic terms, and an online forum to support interaction between participants and teachers. Over 100 people participated in the pilot course and gave useful and generally positive feedback on their experience (Bow, 2017). At the request of the language committee, portions of the course remain openly available for interested learners at <https://language-shell.cdu.edu.au/course/bininj-kunwok/>.



Figure 14 (Ch7.1): Screenshot of Digital Language Shell home page

The success of the pilot program led to an invitation from the Australian National University (ANU) to extend the pilot to an accredited course for delivery over a full semester of 12 weeks. The expanded project aligned with the original project aim to increase the number of Indigenous languages available at university level. The work drew on CDU's highly successful Yolŋu Studies program (Christie, 2008; Hayashi, 2019), and CDU agreed to offer the course in parallel with ANU. Administrative issues around enrolment and assessment would be handled at local university level, and the curriculum needed to

comply with requirements from both institutions. This included negotiations over academic assessment and accreditation in line with university standards and practices and with Indigenous pedagogies. There was a desire to facilitate cross-institutional enrolment and allow access for students at different universities, to support the viability of small courses. The Digital Language Shell enabled implementation across both institutions, with students enrolling in their home institution and logging in through their local learning management system (Moodle or Blackboard) to access course materials on the Shell. Undergraduate and postgraduate versions of the course were created with the same content but with variations in the assessment tasks. Thanks to the advocacy of staff at both universities, the first presentation of the course was offered in Semester 1, 2019, with 28 students enrolled.

In addition to the creation of additional course content to expand from four units to 12, significant changes were motivated by feedback from learners in the pilot course. A new first unit provided general introduction to Australian Indigenous languages – their range and diversity, the complexity of their grammars. There was additional scaffolding for navigating the course – how each unit would be laid out, how to use the glossary of linguistic terms, how to read interlinearised grammatical examples, etc. Each subsequent unit began with a revision lesson, and new activities were incorporated into many lessons, particularly self-correcting quizzes to reinforce learning using multiple choice questions, matching activities, gap-fills, etc. Tips for language learners were distributed throughout the course, such as recommending the use of flashcards and mind maps. Learning was self-paced, with new units uploaded weekly, and no set lecture or tutorial times.

Addressing the challenges

From the many challenges identified in the creation and presentation of courses in Indigenous or minority languages, three will be addressed here, plus one specific to the online context. The perceived shortages of resources, teachers and students can be seen as both challenges and opportunities in this context, plus the issue of personal connection, which can affect all online learning. This section will address how these were managed in the Kunwinjku course, highlighting the importance of collaboration between language authorities and academics.

Developing resources

The limited availability of resources is of serious concern in many Indigenous language contexts. Compared to other Australian languages, Kunwinjku is remarkably well resourced, though not in comparison with most languages taught at university level. The language is well documented with a number of linguistic descriptions (Carroll, 1976; Evans, 2003; Garde, 2013; Harris, 1969; Oates, 1964), plus a learners' guide (Etherington & Etherington, 1998). Around 140 small books produced during the short-lived bilingual education program at Gunbalanya have been digitised and made available online ('Living Archive of Aboriginal Languages', 2012; Bow, Christie, & Devlin, 2014). In addition to linguistic resources, there are various materials related to environment, culture, archaeology, mining, health and tourism, due to the region being home to Kakadu National Park and other significant sites around the Arnhem Plateau. Resources such as YouTube clips, academic articles, locally produced videos, blog posts on the Language Centre's website and other multimedia content were identified through a comprehensive audit

process performed in preparation for the pilot course. These resources were examined for content to explain or demonstrate particular linguistic or cultural concepts presented throughout the course.

In addition, the team collaboratively designed new audio and video materials for the course, including cartoons, screencasts, videos of Bininj describing or demonstrating various aspects of language and culture (particularly social structures including kinship and family responsibilities) (Figure 16), recording word lists and reading aloud stories. These were edited, subtitled where appropriate (sometimes in English, sometimes in Kunwinjku) and stored on the CDU library repository, then embedded or linked from within the course. A portion of a pan-dialectal dictionary which had been under development for many years was reconfigured online in draft version, and included in the course for student use and feedback (Bininj Kunwok Regional Language Centre, 2019).



Figure 15 (Ch7.2): Screenshot of Jill Nganjmirra discussing use of skin names

Part of the collaborative design process involved team members proposing resources that could be sourced or developed. While use of digital communications technology is increasingly common across Indigenous communities in the remote Northern Territory, Bininj members of the language committee mostly use mobile phones for talking and texting, with some using social media. With minimal experience of creating multimedia resources or uploading content to web pages, much of that work was done by the academic team members. Some Bininj people became involved in the creation of new materials, with some developing skills such as transcription and translation. The Bininj team members were also interested in how these resources could be used for local purposes, such as developing vernacular literacy for adults, or to address concerns about children using less of their traditional language in various contexts. The collaborative design of resources led to a negotiated pedagogy, which could be aligned with the learning outcomes of a university course as well as community activities.

Strengthening teachers

Bininj people have been transmitting their languages across generations, yet their authority as language teachers is not recognised in the academy. Members of the Bininj Kunwok Language Project are considered authorities for their languages, however there are currently no members of this group with tertiary language teaching qualifications. Co-designing a curriculum was a collaborative effort involving language authorities, linguists and those with previous experience learning the language. The process involved identifying key themes built on the question of ‘What do non-Indigenous people need to know when they come to the community?’ The Bininj committee members prioritised issues of kinship (including skin names and family relationships) and safety (how to look after oneself and

each other, and how to show respect for people and places). Further themes added for the expanded course included food, health, environment, art and song (Figure 16), and resources were collected and selected to accompany these themes. The strong emphasis on cultural understanding within the course meant that students would not only gain language skills, but also gain meaningful cultural knowledge of a specific Indigenous group.

| TOPIC | VOCABULARY | GRAMMAR | PRONUNCIATION | TASK |
|----------------------|---------------------------------|---------------------------|--------------------|-----------------------|
| Indigenous languages | Common words & phrases | Overview | Introduction | Reading |
| Intro to Bininj | Skin names, animals | Simple sentence structure | Alphabet | Simple sentences |
| Introductions | Family terms | Past tense forms | Vowels | Introduce yourself |
| Family matters | Extended family terms | Pronominal prefixes | Nasals | Introduce your family |
| Respect & safety | Various | Questions & answers | h and r/rr | Q&A with partner |
| Food | Plants & animals, cooking terms | Noun classes | Retroflexes | Conversation |
| Time | Seasons, time words | Verbal words | Stops | Create sentences |
| Body & health | Body parts | Noun incorporation | Diphthongs | Online test |
| Land & Nature | Environmental terms | Demonstratives | Long stops | Interlinear glossing |
| Art | Art practices & terms | Adjectives & adverbs | Consonant clusters | Read story aloud |
| Song/music | Musical terms, instruments | Verb classes | Dialect variations | Conversation |
| Revision | | | | Final assignment |

Figure 16 (Ch7.3): Outline of topics and content for semester unit

The collaborative design process enabled a focus on the Bininj committee's determination of what should be taught, while the academic team members worked out how this content could be presented online, including sequencing of information and

explanations in English. This arrangement drew on the existing strengths of the Bininj authorities, rather than requiring native speakers to learn the metalanguage of grammar or non-Indigenous methods of language teaching.

The screenshot displays a web-based learning interface for the '2019 Semester 1 - Bininj Kunwok course'. On the left is a navigation menu with sections for Unit 6 (Grammar, Activity, Njalenjale) and Unit 7 (Time, Revision of unit 6, Introduction, Cultural Information, Pronunciation, Skin and kin, Useful phrases, Reading, Vocabulary, Grammar, Activity, Njalenjale). The main content area is titled 'Unit 7 Assessment task - sentence creation'. It features three illustration prompts: a landscape with people, a person on a tree with a dog, and a pond with a person and a horse. Below the prompts, the task instructions state: 'Your task is to create sentences in Kunwinjku which demonstrate your knowledge of different tenses (past perfective, past imperfective, non-past), using these picture prompts from books in the Living Archive of Aboriginal Languages.' It specifies that undergraduate students should create 5 sentences and postgraduate students should create 8 sentences using all 3 tenses. Submission requirements include both a written version and a recording. The task is worth 10% of the final grade, with 5% for written work and 5% for recording. Evaluation criteria include correct use of vocabulary, appropriate use of grammatical structures, and quality of pronunciation on recording.

Figure 17 (Ch7.4): Screenshot Activity Unit 7 Bininj Kunwok course

One of the key challenges of the project was balancing Indigenous pedagogies and the requirements of university accreditation (for a similar situation, see Marika-Mununggiritj, 1991). Assessment tasks were included in the pilot course, and Bininj language committee members were invited to evaluate the learners' submissions of written sentences and oral recordings in Kunwinjku (see example in Figure 17). The initial responses of the Bininj members were uncritical, simply expressing enthusiasm for the participant's attempts at using the language, and not wanting to find fault or give grades. Over time and with support from the academic team, they increased their willingness to identify areas for improvement. Feedback on some assessments was given orally, with the language speakers recording short texts commenting on each learner's submissions. Not only was this quicker than the

academic team member noting their comments and later typing them into the assessment module of the learning management system, it also built personal connection between teacher and learner, and was highly appreciated by the participants in the pilot course.

As in many Indigenous communities, Bininj people may have health issues or family and community demands, which make it difficult to adhere to a fixed schedule of classes. Gunbalanya is cut off by road for months during the wet season, so travel is restricted. The collaborative nature of this project required flexibility, where the academic team needed to be responsive to the needs of the Bininj authorities, such as when they were available to work. A rich collection of materials in and about the language allowed the course to be delivered with no set lecture or tutorial hours, as it did not rely on the availability of Bininj teachers at specific times.

The collaborative design of this course served to develop skills among both the Indigenous and non-Indigenous members of the team in curriculum development, negotiating pedagogies, evaluating and creating resources, and assessing student work. As a consequence, the apparent lack of language teachers actually serves as an opportunity to strengthen the skills of language speakers who bring their own pedagogical perspectives to the task of language teaching and learning.

Creating student demand

The market for people wanting to learn Indigenous Australian languages may never compete with demand for better-known languages. A call for volunteer learners for the Kunwinjku pilot course in 2016 attracted over 150 applications from people across Australia and internationally. Some of these had connections to Bininj or were familiar with

the area, others were generally interested in learning an Australian language. Not all would be expected to enrol in a university course, considering time commitments and costs in comparison with a free online experimental course, however the level of interest was higher than expected. The first implementation of the university course in 2019 attracted 28 enrolments across two universities, including students from a broad range of disciplines at both ANU and CDU, and two cross-institutional enrolments from other universities. Of particular note was the number of people working in West Arnhem Land enrolling specifically to take this course, and the high level of interest from government departments, health, art, environment and community development sectors wanting to strengthen relationships with Bininj people and communities. The connections between languages and knowledge practices are highly relevant across many disciplines and learning an Indigenous language opens up new opportunities throughout the academy, industry and government.

Challenging the perception that there is no market for Indigenous language courses, this project demonstrates expansion of the potential student body beyond students of languages or linguistics, attracting new students from other disciplines and from outside the university. Amery (2019) outlines the different reasons for studying Indigenous languages compared to well-known languages, yet this project shows that there are still vocational and employment motivations, particularly for languages with active speech communities, in locations with significant needs and opportunities across many disciplines. Therefore, the collaborative design of courses such as this actually serves to create new students, to the benefit of the universities and the local language community, where professionals with familiarity with the language are highly desired by community members.

Agencies involved with the Indigenous communities could be encouraged to promote language training and proficiency as part of orientation, professional development or as desirable components of job applications.

Building connections

Online language learning gives the opportunity for people in various locations to access content that may otherwise not be available to them. This appears to be at odds with Indigenous pedagogies, where knowledge is place-based and owned (Christie, 2006; Marika-Mununggiritj, 1991). The Bininj Kunwok language committee had some questions about people in other places learning their language, particularly when they noted a lack of interest in the language from non-Indigenous people working in their own region. They were very keen to share their language and culture with others, though the online setting seemed somewhat impersonal and decontextualised.

One of the ways identified to foster connection in this project was through the use of skin names. Across West Arnhem Land, as in many Indigenous communities in Australia, every member of the community belongs to a specific subsection which determines how they relate to everyone in the community (Garde, 2013; McConvell, Kelly, & Lacrampe, 2018). Two patrimoieties and two matrimoieties create eight named subsections known as 'skins', which determine all kinship connections. Skin names are also given to outsiders to place them in the social structure. The language committee agreed that the students should have skin names, which would allow them to talk about family and connections from a position within the society, rather than as outside observers. Several lessons in the course were designed to explore the complexity of the system and teach language related to the

skin system and kinship terminology. Students practised terms of address and described relationships with their newly-formed connections in the community.

Using these local means of identification and relationship automatically created personal connections between the students and all members of Bininj society. The use of video recordings of Bininj people introducing themselves and explaining certain aspects of their culture increased the sense of connection. One learner on the pilot course commented that the videos “gave the course life and made it seem less impersonal” (cited in Bow, 2017). The importance of connection was not just on the part of the learners, but the language committee wanted to know the people learning their language. One of the assessment tasks required participants to create a video of themselves talking in Kunwinjku. Seeing and hearing the learners on video built a sense of connection and familiarity for the Bininj language authorities, enhancing the potentially impersonal online environment.

The additional challenge of connecting the students with each other was mitigated by creating assessment tasks involving pairwork and groupwork. Students formed partnerships to work on a task recording themselves asking each other questions in Kunwinjku about a picture. Students in different locations did this via phone or online conferencing. Face-to-face meetups were also encouraged for co-located students in Canberra, Darwin or West Arnhem Land to interact and practise what they were learning.

The course also included opportunities for real-time engagement with a speaker of the language via online video conferencing. A non-assessable task invited students in small groups of three or four to introduce themselves to the Bininj teacher, describe a picture,

and engage in conversation about their family, all in Kunwinjku. An assessable summative task required individuals to engage in a short conversation with the native speaking teacher. For both tasks, the onus is on the student to direct the session according to a lesson plan provided to both the student and the native speaker. One of the academic team is also present, facilitating the technical arrangements and supporting both the student and teacher in the interaction, while assisting the Bininj teacher with grading. Trials of this interaction have given positive results thus far.

These activities attempt to draw on Indigenous cultural practices to reduce the sense of isolation that online students often feel. They aim to connect students across two universities and separate locations, as well as connecting students around the country to the Bininj in the speech community.

Implications

Despite the concerns that impact the development of courses for Indigenous languages, particularly regarding resources, teachers, students and personal connections, this project demonstrates that the process of collaboratively designing language courses can promote the creation of each of these components. Existing resources of various kinds can be reconfigured for delivery in this new pedagogical context, and the need for additional resources can inspire innovative practices to collaboratively design new materials. These can in turn serve multiple roles for the language community, contributing to language documentation and revitalisation, and promoting and sharing the language in other contexts (as outlined in Ward, 2004). The lack of qualified teachers is not only mitigated by the involvement of language authorities, but in turn provides these individuals

with opportunities to develop skills in teaching, curriculum development and assessment. Collaborative design work between academics and language authorities can increase understandings about different kinds of pedagogical practices, and delivery can be facilitated through the online platform, not requiring language authorities to attend university at certain times to deliver classes.

The perceived lack of students remains a concern if universities are focused on commercially-viable class sizes, however this project has uncovered a niche, and perhaps expanding market of existing university students and graduates across a range of disciplines and institutions. In addition to students wanting to expand their understanding of Indigenous languages and cultures, there are professionals working in the Indigenous sector who are willing to invest time and money into such an endeavour. The intensive Pitjantjatjara courses run by the University of South Australia, and the emerging Australian Indigenous Languages Institute (Giacon, 2019) are also tapping into these markets. The potential for universities to attract students to such courses can serve to make universities more welcoming to Indigenous people when they see that their languages and cultures are valued. Learning an Indigenous language opens opportunities for the study of human society, kinship (including with the environment), spirituality, governance, law, health, education, environmental knowledge and management, and many other areas. Students from across disciplines and different universities can include a unit of Indigenous language and culture into their qualification. Such courses can also provide opportunities for professional development for teachers keen to increase their understanding of Indigenous knowledges and cultures, as they seek to incorporate them into their learning areas according to the cross-curricular priority of the Australian Curriculum (ACARA, 2015; Bow,

2016). This may prompt investigation into local languages and cultures, leading to awareness and advocacy of Indigenous issues at the local level. This project opens up avenues for future study into teaching Indigenous languages, with opportunities to explore new methodological understandings in how to teach these rarely taught languages, an area which currently has very few published resources.

With regard to the lack of personal connection, this project demonstrates how the potentially isolating effects of online learning can be mitigated through incorporating Indigenous ways of connecting. The use of skin names gives students an identity in the Bininj world, and connects them to each other and to the Bininj speech community, despite geographic distance. Other activities, such as video conferencing and small group activities online, can strengthen these connections.

The use of an online template such as the Digital Language Shell can serve to mitigate some of the challenges of creating and delivering an online course from scratch. The template is freely available to other groups to use, either as a basis for an online course, or to store resources to supplement classroom-based courses. This project can serve as a model for the development of courses in other languages, and includes some resources that can be reused directly, such as a glossary of linguistic terms and a general introduction to Australian Indigenous languages. This assemblage of resources and knowledge practices for teaching language and culture in a university context (Bow, forthcoming) is built on a range of alliances between people, knowledge systems, technologies, institutions and artefacts, which come together in this case to create a specific language course. Each language ecology and its context involves a unique arrangement of such alliances, all of which are contingent, tentative and vulnerable to threats.

As an experimental approach, this project has many limitations. The Digital Language Shell was assembled from free and open-source tools by non-technical team members, and lacks many of the features of much more complex learning management systems used at universities. Integration of the course materials between the two different platforms used by the participating universities required replication in some cases. Assessment activities had to be created separately on each system, making marking more difficult. Students familiar with their own institution's learning platform had to adapt to a new system and create a separate login to move between the two for administrative and content matters. Currently there is only a single unit available, with no option for students wishing to develop further proficiency in this language. At the time of writing, the course is still in progress, so no evaluation is currently available. Payment of language authorities for curriculum and resource development was provided in this case by the Bininj Kunwok Language Project, so other groups would need to find ways of ensuring appropriate payment for collaborative design processes. Following completion of the course, negotiations with the host universities and the language committee will determine future plans.

The state of Indigenous language teaching in Australian universities is poor, but there is potential for improvement. Increasing awareness of Indigenous languages in the academy, and creating opportunities to learn them can contribute towards better understanding and increased valuing of Indigenous knowledge practices. Concerns about resources, teachers, students and personal connections can be overcome through collaborative design with academics and Indigenous language authorities to promote the development of new resources, teachers, students and connections. Such collaborations will

benefit the university sector, the Indigenous communities involved, and the wider population, as these endangered languages are promoted, valued and shared.

ACKNOWLEDGEMENTS

The pilot project was supported by seed funding from the Australian government's now defunct Office of Learning and Teaching (SD15-5124), and the expansion of the course was supported by a Transdisciplinary & Innovation Grant (TIG842018) from the ARC Centre of Excellence for the Dynamics of Language. This project also formed part of the author's PhD research, supported by an Australian Government Research Training Program Scholarship. The Bininj Kunwok Language Project (now the Bininj Kunwok Regional Language Centre) is funded by the Australian government's Indigenous Languages Support program, and maintains a webpage (www.bininjkunwok.org.au). Consent has been gained for use of each photograph used in this article.

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Chapter 8 (PAPER 6): Identity work in teaching and learning

Indigenous languages online

Bow, C. (unpublished). Identity work in teaching and learning Indigenous languages online

This paper extends the discussion of the Digital Language Shell and the online Bininj Kunwok course by focusing on the identity work that emerged in the creation and delivery of the language course.

The contribution of this paper is in its description of the collaborative design of a curriculum with a specific language group, which allowed the priorities and voices of the language authorities to shape the way the language is taught. The incorporation of identity work throughout the curriculum provided a connection between language owners and learners.

This paper has been submitted to two journals, but rejected both times, in the first case for its lack of reporting on language learning outcomes. Since the focus of the paper was not on the outcomes for learners, this was not addressed, but an updated version was submitted to a different journal, and was under review when this thesis was submitted. It was since rejected by the second journal on the basis of 'lack of concrete empirical data'. The valuable feedback from reviewers of both journals will be considered if I plan to resubmit elsewhere. The rejected version is included here with no further revisions, but **should not be considered a publication on equal standing with the other papers in this thesis.**

Abstract

Learners of Indigenous Australian languages need to grapple with new ways of negotiating identity as they engage with a complex range of vocabulary and alternate conceptions of kinship relations and cultural connections. In negotiating curriculum with language owners for an online course, the importance of identity work became the key concept to be embedded in the course. This paper describes some of the various sorts of identity work that happened as part of the development and delivery of a course teaching and learning one particular Australian Indigenous language. Online delivery has certain affordances and constraints for engaging in identity work in a context where language is strongly connected to place.

Keywords

Indigenous Languages, Learner Identity, Distance/Open Learning and Teaching, Culture

Introduction

Language has many and varied social functions, one of which concerns negotiation of identity. In part, our social and cultural identities are constructed through dynamic processes of linguistic interaction. Learners of additional languages learn alternate ways to negotiate their identity in a new linguistic and cultural context. In Australian Indigenous languages, identity work includes a complex range of naming conventions reflecting the intricate social and kinship relations central to these cultures. People seeking to engage with the speech community in the local language can be explicitly taught these conventions, both as information and as tools for building connections. This paper discusses identity work in a particular instance of teaching and learning an online course involving the language and culture of Bininj people who live in a remote part of Australia's Northern Territory. Certain sorts of identity work were evident amongst members of the language owning community, and amongst the students involved in learning this language.

The concept of identity work as used in this paper involves a process of self-reflection when one becomes engaged in an unfamiliar situation. When one's accustomed ways of speaking or acting are no longer appropriate or accepted, identity work prompts adjustments to these practices. Like Agar's 'rich points', identity work is prompted by departures from one's expectations that signal a difference between one's own languaculture and another's (Agar, 1994, 2000). Learners use tactics of intersubjectivity to build relations through identity work (Bucholtz & Hall, 2004). Research in language learning has come to recognize that language learners have complex, multiple identities, changing across time and space, and reproduced in social interaction, and language is "a

social practice in which experiences are organized and identities negotiated” (Norton, 2008, p. 1811).

Much of the research on language learning and identity work focuses on learners of majority languages, particularly English (Darvin & Norton, 2015; Norton, 2000; Norton & Pavlenko, 2019; Norton Peirce, 1995). Where the research addresses Indigenous identity work, it focuses on Indigenous people and their connection to language (Christie, 2007; Marmion, Obata, & Troy, 2014; Meakins, 2008; Singer, 2018), including heritage learners (Deutschmann, Outakoski, Panichi, & Schneider, 2011; Hornberger, 2005; King, 2000; Lee, 2005; Te Huia, 2017). There is a growing body of work on identity in online language contexts (Klimanova & Dembovskaia, 2013; Thorne, Sauro, & Smith, 2015; Warschauer, 2001; White, 2007), however little or no work has been done on non-Indigenous people’s learning of Indigenous languages, or how this can be facilitated in online contexts.

Australian Indigenous communities have distinct philosophies of language that connect people, places, ancestral journeys, totemic identities and ways of talking (Christie, 1993, 2007; Marika-Mununggiritj, 1991; Merlan, 1981), which can open up interesting questions about identity work for non-Indigenous students.

The empirical data for this research comes from members of the Bininj Kunwok language committee and from learners in various iterations of the online course. Members of the language committee were asked to consider why they wanted to teach their language to non-Indigenous people. Their video-recorded responses were transcribed and translated into English. Learners from each cohort provided feedback on their experience through forum posts, questionnaires and interviews.

This paper outlines the creation of a Digital Language Shell and its coming to life in collaboration with the Bininj Kunwok language committee. The language owners' use of identity work to guide the negotiation of the curriculum to teach non-Indigenous learners is described, and how this was implemented in the course in various ways. Feedback from the learners in the various cohorts demonstrates how they engaged in their own identity work. A consideration of the role of technology in building possibilities for identity work in the design of the language course identifies both affordances and constraints. This exploration of the social function of language as identity work adds to existing research through the perspective of teaching Indigenous language and culture in an online context.

[The Digital Language Shell and Bininj Kunwok course](#)

Of over 120 extant Australian languages (Marmion et al., 2014), only a handful are available to learn at Australian universities (Simpson, 2014; University Languages Portal Australia, 2018). Developing new language courses involves a number of challenges, including careful negotiation with appropriate Indigenous authorities, whose knowledge practices and concerns about knowledge ownership may not fit neatly into the structures of a university (Christie, 2008), and course content may differ from that of other languages (Amery, forthcoming). Other challenges include a possible lack of resources, scarcity of teachers, small class sizes, among others (Amery, 2007; Gale, 2011; Giacon & Simpson, 2012; Simpson, 2014) (though see Bow (2019) for a response to these arguments). One proposed solution is “having courses available online which are as well organized and content-rich as online courses in other languages, and in which native speakers or language owners are heavily involved” (Simpson, 2014, p. 57).

In the absence of any low-cost, ready-made, simple-to-use, configurable system, a team from Charles Darwin University (CDU) developed a template for teaching Indigenous languages online using readily available digital tools.

The Digital Language Shell¹ uses WordPress and a number of plugins to provide a functioning template which can be modified and customized, subject to the needs of language authorities, course designers and various audiences. Plugins such as a learning management system to construct units and lessons, a glossary for explaining technical terms, a forum for communication between learners, and quizzes for interactively testing knowledge, add functionality to the platform. The shell was designed to incorporate lessons teaching basic pronunciation, vocabulary, grammar and cultural information, through a range of digital resources including video, audio, and images that could be hosted on the site or linked from other locations (Bow, 2017). Rather than creating a bespoke program from scratch (Hugo, 2014; Stockwell, 2007), the outcome of this project has turned out not to be a 'product' but rather a method and set of guidelines that other groups can implement and configure to meet their own needs. A language center in NSW has used the platform to deliver online training to heritage learners of the Gumbaynggirr language (Murrumbidgee Aboriginal Language and Culture Co-operative, 2019), demonstrating the need for an off-the-shelf solution to a challenge faced by many small language communities in different contexts.

¹ Seed funding was provided from the federal Office of Learning and Teaching (SD15-5124). Funding for further development was provided by a Transdisciplinary and Innovation Grant from the ARC Centre of Excellence for the Dynamics of Language (20190530). The author's research was supported by an Australian Government Research Training Program (RTP) Scholarship. The shell is available at <https://language-shell.cdu.edu.au/>

The initial implementation of the Shell project involved collaboration with the Bininj Kunwok Regional Language Centre. Bininj ('people') Kunwok ('language') is the name used for a chain of seven mutually intelligible dialects stretching across West Arnhem Land, in the Top End of the Northern Territory (NT). The most commonly used language across the region is Kunwinjku (ISO 639-3 code [gup], Austlang N65), and other varieties are Kundjeyhmi, Kune, Kuninjku, Kundedjnjenghmi and Mayali. There are approximately 2000 speakers of these languages, with the largest community residing in Gunbalanya, 300km east of Darwin. Kunwinjku language is well-documented with a number of linguistic descriptions (Oates, 1964; Harris, 1969; Evans, 2003; Garde, 2013), plus a learners guide (Etherington & Etherington, 1998). Various language projects in recent years have led to the establishment of a regional language center under the authority of a committee of Bininj language owners.² While Bininj Kunwok does not suffer from a lack of resources or speakers in comparison to other Australian languages, there are still concerns about language loss and ongoing transmission and maintenance, and Kunwinjku is categorized on the EGIDS scale as 6b (threatened) (Eberhard, Simons, & Fennig, 2019). Most Bininj people have functional levels of English for interacting with non-Indigenous people, though literacy levels are low. Bininj value sharing their language with others, and if outsiders to the community learn some Bininj Kunwok, this eases the constant pressure on Bininj to switch to English, which contributes to their motivation to share language with newcomers.

The selection of this language group as the focus for the pilot implementation of the Digital Language Shell is the result of a range of alliances of people and resources.

² The Bininj Kunwok Regional Language Centre (Bininj Kunwok Project, 2017) is funded by the Australian Government's Indigenous Languages and Arts Support program, and coordinated by linguist Dr Murray Garde. <https://bininjkwok.org.au/>

Connections with the community through the linguist, the existence of an identifiable authority for decisions about language, the availability of a senior language authority in Darwin (where the CDU project team is based), and existing interest among members of the language project in developing resources to share their language, all combined to make this a suitable starting point for the project. The suggestion to produce an online university course in Bininj Kunwok came from the academic project team rather than the community. When presented with the invitation to participate, members of the language committee accepted the opportunity to explore new ways to share their language, particularly with non-Indigenous people who often visit and work in the community in a range of roles. Bininj authorities were also interested in the opportunity to develop resources to serve local community needs to support language and cultural maintenance.

A collaborative approach to designing the curriculum was taken, to ensure that the language teaching was a form of “collaboration rather than transmission” (Christie, 2008, p. 41). Over a period of several months in 2016, a series of five workshops were held with members of the language committee (around 6-12 Bininj) and the academic team (usually three non-Indigenous people: linguist, project manager and field officer). The purpose of the workshops was to determine the curriculum, select and create resources, and authorise the development of the course, which was then fit into the structures of the Digital Language Shell. It was explained that this kind of course doesn’t require a teacher in a classroom, but would still involve Bininj in teaching, through the creation of recorded materials to explain and demonstrate key learnings. Few members of the committee had experience teaching non-Indigenous learners, so it would be unreasonable to require them to explain grammatical or cultural concepts in English, either face-to-face or in a synchronic

online context. The workshops identified what should be included in the proposed online learning course, for an expected audience of non-Indigenous people (known locally as *Balanda*).

Building possibilities for identity work into the design of a language course

The social function of language as performing identity work can be highlighted in the process of learning an additional language. Depending on the kind of language teaching and the purpose for which the language is being learned, students can develop new identities as they learn to engage in new sociocultural situations and linguistic contexts. As identities are built through language in interaction, individual moment by moment decisions prompt self-reflection and adjustments to practices. Identity work in language learning may be more problematic in an online context, without face-to-face interaction with language speakers or other learners. For the Bininj language committee, language teaching is itself a form of identity work, so the challenge was how to incorporate various kinds of identity work into an online platform.

As the Bininj language committee discussed questions of what Balanda should learn, they drew parallels with teaching children. In raising Bininj children, language is not a separable component, but part of a larger ontology of what it means to function in a Bininj society. Recognizing the role of explicit teaching as complementary to naturalistic teaching within families, they drew on their experience of 'Culture Camps' where groups of children are taken out bush and taught explicitly about Bininj culture. A key outcome was that Bininj

children learnt to talk about themselves, their skin names and sub-sections,³ their country (traditional land), totems and dreamings.

“We want to share how we teach our children in our language – kinship, moieties and culture ... If they are interested in our way, Balanda can come and learn in our way, we welcome them” [BK101b]⁴

All members of the committee had experience of Balanda professionals and visitors coming to their community from government and non-government organizations, as well as cultural and religious groups, to provide services in health, education, justice and other areas. The question of ‘*what should Balanda know about Bininj language and culture to work well in community?*’ helped to frame the discussion of the curriculum. For the Bininj committee, teaching language was a way of introducing Balanda to their obligations while on country dealing with Bininj people and places. Since most members of the language committee had limited experience of online learning, they had to imagine these Balanda learners who may one day come to the community as workers or visitors, and what they should know in order to behave appropriately and act respectfully.

“If you come here to work or help us in other ways, there might be different things you come to do on our country. So we want you to learn language so we all can work

³ Like many Aboriginal groups in Australia, every Bininj is a member of a ‘skin group’ or ‘subsection.’ While the skin systems vary across different groups, in Kunwinjku there are eight different ‘skins’, each one with a female and a male form. These eight skins are based on two moieties, each subdivided into four sections. Skin groups are automatically assigned at birth, and function as marriage categories.

⁴ The codes used for quoting data responses relate to individuals, either Bininj Kunwok authorities (BK) or learners from the various cohorts outlined in Table 1, and the mode of feedback (interview (I), forum (F), questionnaire (Q)). For example, ‘PQ35’ refers to the response of pilot student number 35 to the feedback questionnaire, while ‘SF03’ refers to semester student 3’s forum post. Ethics for data collection was approved by the Human Research Ethics Committees of CDU (H17077) and ANU (2017/403).

together, look after each other and look after our country and language too, and plan things for the community” [BKI07]

In considering Bininj constructions of identity work for children and outsiders, it is useful to draw on the concept of imagined communities, defined as “groups of people, not immediately tangible and accessible, with whom we connect through the power of the imagination” (Norton & McKinney, 2011, p. 76). This conceptual tool is useful for exploring a Bininj understanding of imagined communities as people-in-place, where people and place are inseparable and co-constitutive. The Bininj consistently thought about learners being connected to place, imagining their experience in a Bininj community, and the language and cultural information that would support their engagement on country.

Teaching Balanda adults is unlike teaching Bininj children in various ways, besides the fundamental differences between first and second language acquisition. Although Balanda don't have the same cultural connections as Bininj children, certain aspects of identity are still important for them to learn, to function as potential participants in Bininj contexts, and to understand the ways of Bininj in relating to each other and to the land, which involves identity work.

“When Balanda learn our language then they should get skin names and join a clan group. So Bininj will see them and say "Ah, that's their clan group" ... Then they will call them by a name and will recognize them” [BKI01]

In Bininj society, it is impractical to talk to someone without knowing who they are and where they fit in the system. Respect is not shown by using people's names, but by the careful selection of appropriate terms of address, such as using a skin name or a kin term (Garde, 2013). It is common for outsiders to a Bininj speech community to be given a skin

name to fit them into the local kinship structures. The language committee decided that this should be imitated in the course, inviting learners to select one of eight skin names, with clear indication that this was a temporary surrogate for being 'adopted' into a Bininj family group. The skin name would also provide them with a moiety (*duwa* or *yirridjdja*), into which all human and non-human entities in Bininj worlds are divided. As well as providing recognition by Bininj, this would also involve identity work for the Balanda.

“And this is the sort of thing they can learn while they get their own skin names and clan group membership, so Bininj people will then realize these people already have moiety given to them. And in the same way, these learners can also say “I am *duwa*” or “I am *yirridjdja*.” Then they will understand properly because they will have skin names and belong to clan groups. [BK101]

The concept that having a skin name will improve learners' capacity to understand reflects the inseparability of language and identity for Bininj. Once learners have a skin name, they immediately become kin to all Bininj, and by extension to all Balanda who have skin names. This creates a connection between the learners and the Bininj authorities, which can serve to decrease the sense of distance that can be characteristic of online learning.

The complexity of Bininj person reference required significant explicit teaching throughout the course, even to introduce just some of the issues involved. Beyond skin names, anyone interacting with Bininj will encounter a range of linguistic and cultural concepts of identity, connection, responsibility, obligation and respect. Even if communication with Bininj is largely in English, an understanding of these structures and

the linguistic practices that accompany them would benefit everyone working in a Bininj context.

These components were explicitly presented through specific lessons across all units of the course, each with a different focus, such as skin groups, marriage relations, terms of address and of reference, connections between skin and kin terms, avoidance relationships, alternate systems and triangular kinship terms. Members of the language committee were recorded introducing themselves in Kunwinjku, and these texts were transcribed and presented with same language subtitling, then deconstructed to teach the relevant vocabulary and grammar. Other videos were recorded of Bininj explaining concepts, or describing a chart or family tree, in Kunwinjku language subtitled in English. Written explanations were also provided in English. Each lesson included an activity, often presented as an online quiz, using multiple choice questions such as *“If you are Nabangardi, what is your mother’s skin name?”* and *“What do you call your sister’s daughter’s husband?”* Some activities were more interactive, such as seeing photos of members of the language committee and their skin names, and posting to the forum about what relation the learner has to each one and what term of address they would use. Each of the lessons built on the learning of previous lessons, to gradually build a picture that was complex for Balanda learners, but still only a superficial introduction to what Bininj understand and use daily.

Assessment tasks involved learners speaking in Kunwinjku following the models provided by the Bininj in their videos. Learners introduced themselves and another learner in the course, requiring pairwork interaction. The final assessment task involved learners interacting directly in Kunwinjku with native speakers via videoconferencing. The first of three sub-tasks involved introducing themselves and engaging in some negotiation of

identity. A sample dialogue translated from Kunwinjku involved the learner saying “*My name is ..., my skin name is ..., I come from ..., I live in.... What is your skin name? What do I call you?*” and the Bininj teacher responding and asking “*What is your mother’s skin name? What do you call her?*” These assessment tasks combined the identity work required by the Bininj with the linguistic work required by a university language course. Though the tasks themselves were largely graded according to linguistic criteria, for the Bininj they also represented the learners’ skills in identity negotiation.

Learners didn’t just learn information about the system but were given tools to engage in it directly, necessitating identity work in the process. Other useful phrases such as “*I’m learning Kunwinjku*” were included, as an additional tool to explicate the unusual situation of a Balanda functioning in a Bininj language society.

The various ways in which the social and cultural imperatives of negotiating and communicating identity in Bininj communities were implemented in this online course required learners to undertake identity work. Authorizing learners to have their own skin names gives them an identity in the Bininj world and connects them to each other and to the Bininj speech community, despite geographic distance. Incorporating both the information about the systems and how to use the linguistic tools required to engage with Bininj enabled creation of connections between learners and Kunwinjku speakers, which could mitigate the potentially isolating effects of online learning.

Identity work and imagined communities

“This course will be one of the few courses I’ve taken at uni that will actually change my life and change how I think about the world. It’s been incredibly special to learn about the intimate knowledge, practices and beliefs of Bininj” [SF03]

The social function of language in identity work was embedded in this course in various ways. Adjusting one’s familiar ways of speaking and acting in a new context and recognizing and responding to differences in the new language and cultural context can be challenging for learners, beyond the basics of learning new grammar, vocabulary and pronunciation. This course was designed to incorporate these challenges in line with Bininj pedagogies.

The online Bininj Kunwok course was delivered to three separate cohorts:

1. A pilot course was offered in 2016 as a proof of concept for the Digital Language Shell, with over 100 learners volunteering to work through four trial units. Learners were recruited through the Bininj Kunwok website and mailing list, and thus included a number of people with existing connections to Bininj people and country, as well as those simply curious about learning an Indigenous language.
2. Following an invitation to expand to a full university course, a subsequent version was trialled by university students enrolled in a unit of ‘Teaching Languages’ at the Australian National University (ANU). These learners had not chosen to study Bininj Kunwok, but were given the opportunity by their enrolment in another course.⁵ A

⁵ Note that their assessment was not based on their language learning but their reflection on the task. Their feedback as trainee teachers reflecting consciously on the nature of motivation in an online learning environment and completely unfamiliar language and culture differs from those of volunteer or enrolled participants.

significant number of these learners were international students, many with little or no previous awareness of Australian Indigenous language or culture.

3. The first full semester course (12 weeks) was delivered to enrolled tertiary students across two universities (CDU and ANU) in 2019. These learners were motivated to sign up for the language course, some because they were living or working with Bininj people in West Arnhem Land (10 of the 25 enrolments), others because of connections to other Indigenous groups, or interest in Indigenous affairs. Feedback from each of these cohorts was collected via online questionnaires, interviews and forum posts.

As the research focused on the experience of learning an Indigenous language online, rather than questions of language proficiency, only qualitative data of this nature was collected (Ward, 2018). Table 1 (Figure 18) shows details of the data collected.

The course was designed to invite learners into an imagined community of Bininj people speaking Kunwinjku. Some learners lived in actual Bininj communities, and some had previous experience, but for most learners it was an imagined community which they may never experience directly. The responses of the learners indicated various levels of engagement with this community and the identity work it involved.

| COHORT | TOTAL ENROLLED | STATUS | UNITS (WEEKS) | FEEDBACK DATA TYPE | TOTAL ⁶ RESPONDENTS |
|------------------------|----------------|-------------------|---------------|--------------------|--------------------------------|
| Pilot (P) | 132 | Volunteers | 4 (12) | Questionnaire (Q) | 60 |
| | | | | Interviews (I) | 12 |
| Teaching Languages (T) | 60 | Course component | 4 (4) | Forum posts (F) | 36 |
| Semester (S) | 30 | Enrolled students | 12 (12) | Forum posts (F) | 24 |
| | | | | Questionnaire (Q) | 21 |

Figure 18 (Ch 8.1): TABLE Details of the data collected from the various cohorts who participated in the Bininj Kunwok online course

Some learners were able to imagine themselves in a Bininj community and how they would use the language they were learning.

“If I ever get a chance to work or visit West Arnhem Land and get to know the Bininj, this course has given me a great start in the basics of what to expect and how to communicate with the community in an effective and culturally respectful way” [SF13]

Some imagined travelling north to experience Bininj language and culture firsthand:

“I would now really like to visit the NT where previously I hadn't really ever thought about it (I'm not a fan of the heat!)” [PS07]

⁶ All course participants were invited to give permission for their responses to be used for this research. The total respondents are those who signed consent forms. University students (from both T and S cohorts) were invited after their final grades were released, to ensure that their responses were in no way connected to their grades.

Identity work was built into the first task of the course, in the selection of a skin name.

“The first thing to do is to set our skin name. It's lovely, and makes the language approachable” [TF33]

Some found this a motivating element to begin the course.

“Asking me to choose a skin name is a good way to motivate me to actively participate in the target language learning” [TF34]

Some had certain expectations of the significance of a skin name:

“I chose ‘Ngalkangila’ as my skin name. It has 5 syllables!*(sic)* Actually, I am very interested in the meaning of this name. Does it represent wisdom or beauty? I really hope I could know the meaning of it in the future” [TF24]

This comment from an international student, whose own cultural background ascribes meaning to personal names, reveals quite a different understanding of the significance of a name. Skin names themselves individually mean nothing apart from their role in situating a person within a structure, according to a moiety and matrilineal line, by implicating an individual within a collective. Other Bininj naming conventions for individuals which may involve different connections and significance were not covered in this course.

Having a skin name gives learners a position in the Bininj community from which they can engage. By teaching learners how to introduce themselves in Kunwinjku using the appropriate skin names and kin terms, the learners are equipped to enter into conversation with any Bininj, from which they can expand using the additional linguistic tools given to construct simple sentences. Learners can create connections with people and identify their interlocutors' connections with others – ongoing conversation that holds for any interaction

in Bininj areas. As relationships build, opportunities to extend conversation come out of these connections.

“Everyone is so interconnected that it seems you can always find common ground with people by discussing your kinship relationship. Thus this complex system is a common topic of conversation with Bininj and I am always learning more about how it works” [SF12]

In later units, language was taught for the contexts in which Balanda may engage with Bininj, such as at the clinic or the shop. The imagined community of Balanda and Bininj working together impacted the kinds of functional language that was taught in the course, drawing on how Bininj talk to each other, rather than providing Kunwinjku translations of conversation topics of interest to the non-Indigenous learners. Some learners found this frustrating, such as one learner with no experience in an Indigenous community requesting:

“More focus on the day to day conversations, for example asking how people are, how their day has been, what their plans are for the weekend and so on” [PQ10]

This comment shows an unfamiliarity with Bininj conversational conventions, and an expectation that Balanda conversational strategies could be translated into Kunwinjku to serve the same purpose they do in English. The learner seeks to use familiar linguistic resources to build a relationship, rather than recognizing that different societies have different ways of doing this (Béal, 1992). It may suggest that this learner may be subconsciously seeking to maintain their Balanda identity even if functioning in Kunwinjku language.

Some learners living in Kunwinjku-speaking areas ('on country') with regular opportunities to interact with Bininj saw practical benefit to these detailed explanations in understanding community life.

"I found the most relevant and probably the most helpful is all the kinship and skin names and how what people call each other according to their relationships to people, that really helped me understand how people were related in the community and how people refer to each other, that was probably the most useful for me" [PI10]

Some also commented on the value of this focus for building relations.

"I have found learning skin groups and applying it on the ground has been so cool. I have been practising my introductions on local people and they are so excited with helping me" [SF28]

Others with no direct connection to Bininj also appreciated it as an unexpected focus.

"When I signed on for the course, I imagined it as just learning the language but it has provided a great insight into the culture as well especially in relation to the kinship system and skin names" [SF14]

A number of learners drew on their own cultural background to negotiate identity work in this imagined community. In particular, the Teaching Languages cohort included a high proportion of international students from non-English speaking backgrounds who identified connections to their own cultural and linguistic backgrounds.

"I myself learn Bininj Kunwok using the cultural background of my first language. I found some similarities between my first language and BK in terms of culture, behaviour, and even words. These similarities turn into motivation for me to learn BK" [TF13]

Such responses show how identity work can involve finding a connection between their existing cultural identity and the new identity in an imagined Bininj community. Learners could bypass their identity as an international student in an English-speaking university and forge connections directly with Bininj language and culture.

One learner who had no previous connection to an Indigenous community even found that learning an Indigenous language impacted their own sense of identity as an Australian:

“I don't have any ancestors who are Aboriginal that I know of, I still feel like it makes me feel more connected to this place, like it's actually helping me to build my sense of identity as a person where I fit in here” [PI01]

Some non-Indigenous Australian students identified the value of Indigenous Australian language and culture as part of their own national heritage.

“Boy am I glad that we're learning something directly about Aboriginal culture! Despite the fact that students of this class are more or less forced to learn this language, it still makes me glad that we are getting a source of education about this topic” [TF30]

This kind of identity work does not relate directly to Bininj Kunwok, but could apply to the concept of learning an Indigenous language, no matter which one. Other learners commented on the value of learning for all Australians, supporting local language work of this nature.

“I'm taking this course because I believe that we, as non-Indigenous Australians, have so much to learn about Australia's environment and how to sustain it, from the traditional custodians of this land. Out of respect and interest, I want to learn their language, or one of them, to help breach the language barrier and to be able to better work with Indigenous peoples in the future. I also believe sustainability to be, in part,

a social issue and wish to contribute however I can to keeping their cultures alive in Australia” [SF29]

The identity work inherent in this comment is quite distinct from the identity work the Bininj imagine – which is in place, on country, person to person. The students have their own ‘imagined communities’ to which they apply their identity work, in this case on a national scale.

The course involved some specific identity work for those connected with Bininj communities, with several commenting on the value of learning the language for professional and personal reasons tied to their identity:

“Getting a better grasp of the language will certainly help me find my position I guess, I don't know, get taken a bit more seriously by some people” [PI02]

This perspective can also involve a counterpoint of facing some anxiety about interacting with native speakers.

“It also I think opens up a whole world of friendship and makes people feel more comfortable as well, if you are willing to look like an idiot, like me” [PI04]

Since the learners in the Teaching Languages cohort were not focused on learning Kunwinjku itself, some focused on their identity as language learners.

“Learning an Aboriginal language probably was an unexpected part for a course called 'Teaching Languages'. Yet it can be seen as an activity of encouraging students, us, to review the online teaching method from the user perspective” [TF28]

Others used it to develop their identity as future language teachers.

“Learning with the teaching process firmly in mind, however, proves to be a different experience. I was suddenly prompted to think about content, structure, pacing, and focus in a manner I had not considered as extensively in my learning before” [TF08]

This highly reflective commentary suggests quite sophisticated identity work as a learner and potential teacher.

The earliest iterations of the course did not include the possibility for interaction with native speakers of Kunwinjku. It became clear that this opportunity was sorely missed by students:

“I think that part of my dislike for learning this language is the way we have to learn it as well – online and without native speakers nearby ... learning Bininj Kunwok, a mostly oral language with no way of getting immediate native speaker feedback is quite frustrating” [TF04]

For the Semester cohort, it was possible to incorporate some online synchronous engagement with Kunwinjku speakers. A summative assessment required all Semester students to participate in a five-minute conversation with a Bininj teacher via videoconferencing. The tasks were based on activities done throughout the course – introductions, picture description, questions and answers. The feedback was generally positive:

“I especially found the conversation oral task emotional and heart-warming, as it was the first time I’d ever been able to talk to Indigenous Australians in their own language (even if it was quite stilted and imperfect!)” [SF03]

Another student found it a useful way to identify with Indigenous people’s engagement with English:

“I did find the conversation with native Kunwinjku very nerve racking and difficult ... It gave me a greater appreciation of the difficulties for people whereby English is a second language but especially Indigenous Australians where English might be their third, fourth, fifth, etc language.” [SF14]

This section has examined how feedback from learners with different motivations and levels of investment in learning Bininj Kunwok reveal various types of identity work. Starting with a skin name automatically gives a partial new identity in a Bininj community, from which new connections can be created. The language used for negotiation of relationships was drawn on to populate the more linguistic parts of the course, such as vocabulary, grammar and pronunciation, linking these directly to the identity work that is so necessary in this context. Some learners were able to imagine new identities as participants in a Bininj community and the language and cultural work involved, while others connected to their identity as non-Indigenous Australians or non-Australians. Learners on country valued what they learnt in the course that could immediately be used to build relations and engage with Bininj. The next section addresses the role of technology in mediating this identity work.

The role of technology

In incorporating the desires of the Bininj committee into the curriculum, the affordances and constraints of technology for identity work became apparent. Because the course is not located on Bininj country where language learning would ordinarily take place, the technology provides access that would not otherwise be available. This is both an affordance – as most learners are unlikely to travel to West Arnhem Land to learn Kunwinjku, so consequently envisage an imagined community of Bininj – and a constraint,

as it dislocates the learners from the speech community and from place. This affordance was appreciated by several learners.

“While I prefer face to face learning, I feel that if online learning can allow me to learn an Indigenous language that I would otherwise not be able to learn, then I am 100% for an online language course” [PQ55]

The availability of the course also links to the affordance of flexibility, as online delivery allows users to manage their own time in engaging with the course.

“It is simultaneously true that the flexibility of online is a good thing, and that it is hard to stay motivated. But without online, I may not even sign up, so the online option might produce more contact over time” [PQ60]

This connects to the learners’ identity not in a Bininj community but how learning this language fits in to the rest of their life.

“I could proceed at my own pace, go back and forth when I didn't understand stuff, set the agenda or the way I went about it. I could work it out for myself rather than necessarily having a teacher standing up front having to teach a lot of different people with different speeds” [PI09]

In another example of how online resources were engaged in identity work, learners were invited to include their photo on the site. This request came from members of the language committee who wanted to know more about who was learning their language. One learner commented on this directly.

“We're so used to living this sort of impersonal life where we just correspond with people over the phone or via email ... it was nice that it was important to them to know a little bit about the people who were learning. It wasn't just like, just a

transaction ... they want to feel that they know that person a bit that they're sharing their knowledge with" [PI03]

This comment highlights the added complexity of negotiating identity and making connections online. This learner highlighted their own familiarity with engaging with people online without knowing much about them, and contrasted it with Bininj resistance to people unknown to them being engaged with their language and culture. The role of the technology as an active mediator of identity work does not replace that direct connection but can imitate it in some ways. The design of the platform can play into this surrogate role, through facilitating user profiles (including photos and additional personal details), creating opportunities for interaction between learners and between learners and language authorities, uploading videos and linking to other materials. The use of WordPress in the design of the Digital Language Shell supported maximum flexibility, with the possibility of adding new plugins for various features to support other means of engagement. In future courses, additional opportunities to interact will be embedded, and further possibilities will be explored, such as social media, and potentially tandem learning arrangements with native speakers.

Technology affords access and delivery of multimodal content across geographic boundaries, with flexibility for both teachers and learners with regard to time. Its constraints are that it creates a disconnection between people and place, contradicting the tradition of place-based learning that is a more standard component of Bininj pedagogies. It also cannot replicate an immersive classroom situation, even with the use of video conferencing tools. This push-pull between language being place-based and yet made available across geographic boundaries can be a productive and generative tension.

Technology can support Aboriginal language authorities who are keen to share their language and culture with interested learners, and enable collaboration between academic linguists and language owners to increase the visibility and recognition of Indigenous languages and knowledges within the academy.

Conclusion

This paper has explored the role of technology in work of identity work in the teaching and learning of an Indigenous Australian language in an online university course. The use of a Digital Language Shell to assist language owners to share their language and content on the internet, and to increase the number of Indigenous language courses at Australian universities, led to the development of an online university course for teaching and learning Bininj Kunwok. The Bininj language owners drew on identity work to guide the construction and negotiation of curriculum for teaching non-Indigenous learners about their language and culture. Curated and created materials designed to teach in various ways about identity through cultural concepts such as the skin system, kin relations, terms of address and of reference, family responsibilities, etc., were used to populate the course. These materials were distributed throughout each unit of the course to build a reasonably comprehensive picture for a beginners' course, but only superficially covering the wider understanding of Bininj ways of being and doing. Understanding and learning to use terms relating to identity and relationship give Balanda an entry into Bininj society, even for those who may never physically enter those worlds. As argued elsewhere, this project “draws on Indigenous pedagogies and social structures to create new modes of personal connection in ways that are appropriate to the university context and the Indigenous language ecology in

which the course is situated” (Bow, 2019, p. 54). Learners across three cohorts signaled instances of identity work in their feedback and forum posts, as they engaged with an imagined community of Bininj, or with their own identity as Balanda, either non-Indigenous Australians or international students, as potential language teachers or present or former participants in Bininj community life.

The online context is a challenge for performing identity work without direct engagement with speakers or even other learners, but through the incorporation and focus on identity as a social function of language, this project aimed to support the pedagogies of the Bininj authorities while addressing the needs of online learners of an Indigenous language in a university context.

The collaborative design of a curriculum with a specific language group allowed the priorities and voices of the language authorities to shape the way the language is taught. The incorporation of identity work in the curriculum is proposed as a surrogate for direct entry into the community, providing a connection between language owners and learners. The social function of language as identity work is explored here through the input of the language owners, the complex relations of identity in Bininj society, the requirements of a university language course and the needs of language learners all working together to do the work of identity.

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Chapter 9 (PAPER 7): Sociotechnical assemblages in digital work with Aboriginal languages

Bow, C. (2020). Sociotechnical assemblages in digital work with Aboriginal languages. *Learning Communities: International Journal of Learning in Social Contexts* 26, 12–21.

Having described the three digital language infrastructure projects, their motivation and creation, and the responses of their users, the final paper in this collection brings all three projects together and frames them as sociotechnical assemblages.

The contribution of this paper is to explore the concept of sociotechnical assemblages through these three digital language projects. I consider how these specific assemblages constitute connections and contrive equivalences, drawing on the explorations of ‘sameness and difference’ which occupy some thinkers in the STS space.

The initial motivation for the paper came from a presentation at the international conference of the Society for Social Studies of Science (4S) in Sydney in 2018, which was then also presented at a symposium of Top End STS researchers in Darwin. The focus of the paper shifted significantly from these earlier conference presentations.

The paper was accepted for publication as part of a collection of Top End STS papers in the Learning Communities Journal. This is an open access publication produced by the Northern Institute at Charles Darwin University, and is an important tool of outreach for research extending from the Northern Territory to reach a wide audience which includes government policy-makers and practitioners of all kinds working in the unique environments of northern Australia.

This paper has been published since the original submission of the thesis, and so the version presented here is the slightly revised, having undergone copy editing. This is the final version that appears in the journal publication which came out in November 2020.

Abstract

In this paper I consider how three digital resources for the preservation and transmission of Australian Indigenous language function as ‘sociotechnical assemblages.’ The three projects under consideration are a digital archive of materials from a particular era in Indigenous education in Australia’s Northern Territory, an online template for presenting language data under Indigenous authority, and an online course teaching a specific Indigenous language (Bininj Kunwok) in a higher education context. Considering each of these as a sociotechnical assemblage – collections of heterogeneous elements which entangle the social and the technical – and exploring how they constitute connections and contrive equivalences between different knowledge practices, and how they resist such actions, highlights how they can open up spaces for new collaborative work

Keywords

Sociotechnical assemblage, digital language resources, Indigenous languages,
Northern Territory

Introduction

The use of digital technologies in the service of maintaining, preserving, revitalising and sharing language materials has become a key component of many Indigenous language projects. Collaborative knowledge practices connecting individuals, artefacts, knowledge systems and technologies generate language resources in various forms. Artefacts such as audio recordings, written texts, multimedia objects, etc. are often collected into larger units, including databases, apps, archives, and other resources which can be considered as assemblage of the social and the technical. These assemblages come into being in collaborative knowledge work, bringing together different knowledge practices in a shared space, serving a range of purposes. They also afford further knowledge work in offering possibilities for new sorts of connections and collaborations and new understandings of the nature and work of languages.

The notion of ‘assemblage’ refers to a collection or gathering of things or people, which may or may not be the result of a detailed plan, “a mode of ordering heterogeneous entities so that they work together for a certain time” (Müller, 2015, p. 28). While used in various ways in Science and Technology Studies (neatly summarised by Müller, 2015), the term suggests a sense of contingency and emergence, where what may have originally been envisaged has come into being in quite different ways. The use of the term in this paper draws on the definition of assemblage as provided by Watson-Verran and Turnbull:

Assemblages constitute connections and contrive equivalences between locales in knowledge systems. In research fields and bodies of technoscientific knowledge/practice, otherwise disparate elements are rendered equivalent, general and cohesive ... their common function is to enable otherwise incommensurable and isolated

knowledges to move in space and time from the local site and moment of their production to other places and times (1995, p. 117).

This definition was subsequently developed by Verran through the juxtaposition of two quite disparate projects of “knowledge and culture work involving collection and category making” (Verran, 2009, p. 169), demonstrating how the gathering of disparate elements can produce a new entity. This new entity may be designed to serve particular functions, but should also be sufficiently flexible to allow new purposes which may not have been envisaged.

The term sociotechnical relates to the notion that "technology is never purely technological: it is also social. The social is never purely social: it is also technological" (Bijker & Law, 1992, p. 305). Recognising the complex entanglement of these two notions helps us to look carefully at the ways in which these assemblages are always social and always technical, and the work this allows them to do.

In this paper I consider three specific sociotechnical assemblages of Indigenous language resources I have been involved in as project manager. Through reflection on my own practice in developing and delivering these assemblages, I investigate how they ‘constitute connections and contrive equivalence’ between otherwise disparate elements.

Charles Darwin University (CDU) has a strong history of collaborative knowledge work with Indigenous Australians, including innovative projects exploring how new technologies can be put in service of doing the world differently. These include the longstanding Yolngu Studies program (Christie, 2008), the pioneering Teaching from Country project (Christie, 2010; Christie, Guyula, Gurruwiwi, & Greatorex, 2013), and an inventive project on Indigenous Knowledge and Resource Management in Northern

Australia (Christie, Verran, & Gaykamangu, 2003). These projects have informed the development of digital language infrastructures for the preservation and transmission of language materials through the Living Archive of Aboriginal Languages (2012), and to support the teaching of Indigenous languages through the Digital Language Shell (2016), on which a course in one Indigenous language has been developed ('Bininj Kunwok online course', 2019). Each of these assemblages constitute connections and contrive equivalences between locales in knowledge systems, reconfiguring knowledge objects and opening them up to new knowledge practices.

Assemblage 1: The Living Archive of Aboriginal Languages

The assemblage of materials into the Living Archive of Aboriginal Languages emerged from concern for the fate of materials produced during the era of bilingual education programs in the Northern Territory (NT). These programs began in selected remote communities in the 1970s to enable children who grew up speaking an Indigenous language to develop literacy in their home language prior to transitioning to English (Devlin, Disbray, & Devlin, 2017). Though the policy sought to improve English proficiency rather than to document or preserve Indigenous languages, the process served to create bodies of literature in languages for those communities where bilingual programs were established. Policy changes led to the reduction of these programs over recent decades, leaving vulnerable thousands of books produced as collaborations between literacy workers, teacher linguists and language authorities, often with local illustrations or photos. The Living Archive project was a cooperative effort to collect and digitise these materials, and make them available on an open access website (Bow, Christie, & Devlin, 2014, 2015;

Christie, Devlin, & Bow, 2014). Since 2012, the project has archived over 5000 books in 50 languages of the NT, mostly small booklets of 10-20 pages, containing traditional, scientific and historical knowledge, as well as literacy materials and some translations of English or other children's stories. The assemblage of these materials, including their transition from paper to digital artefacts and then collection into a bespoke knowledge infrastructure, has emerged as something quite different to what its designers imagined (Bow, 2019b).

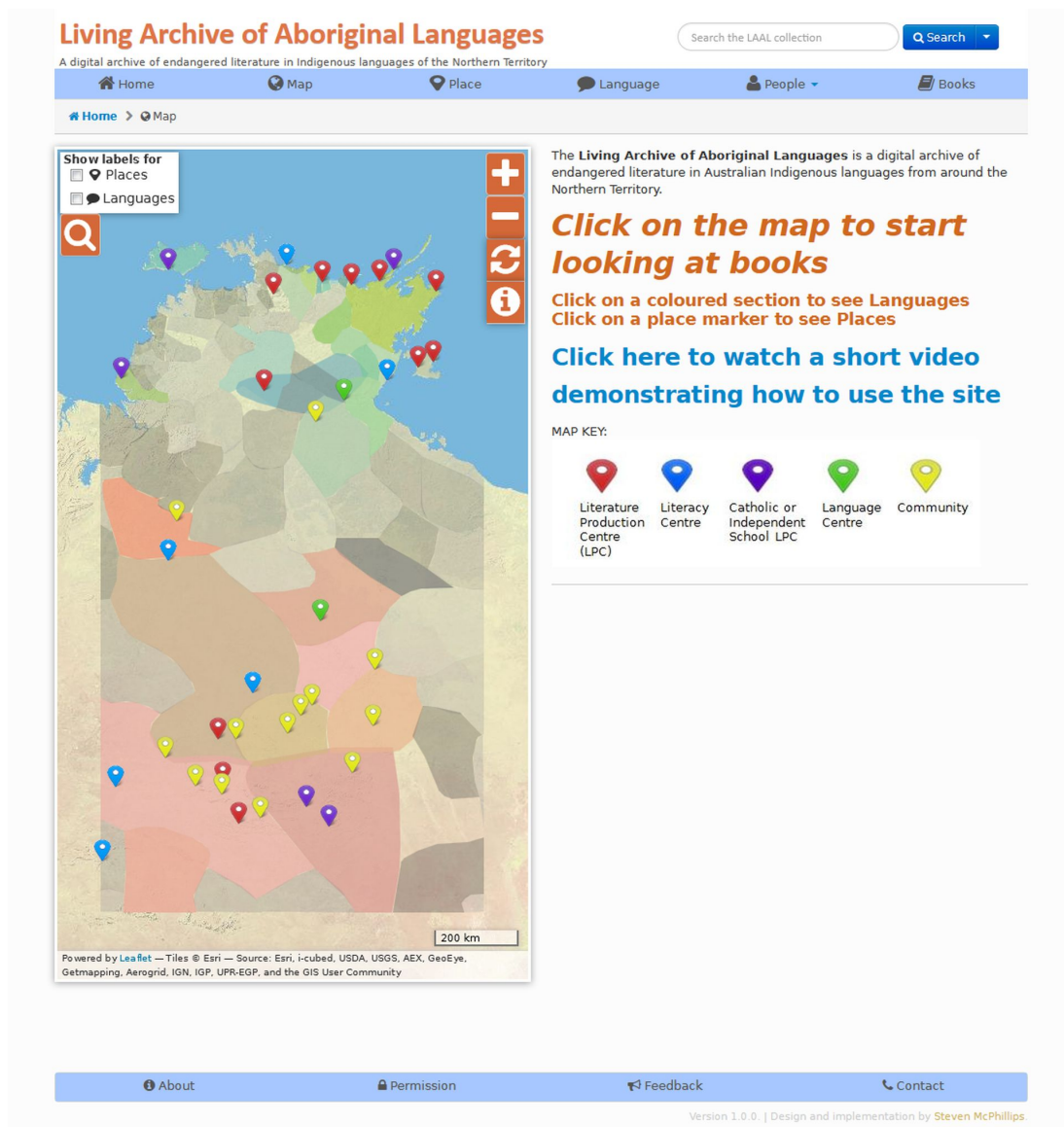


Figure 19 (Ch9.1): [Living Archive of Aboriginal Languages](#) screenshot

The Living Archive contrives connections between disparate elements by gathering all these materials to a single repository for preservation and access. The coding of the archive (intentionally and unintentionally) assumes particular equivalences. It connects the various components of each item – the information inscribed in the metadata, the digitised copy of the book in PDF form, the extracted text file, and the cover image thumbnail – and displays them together as a single record. It links materials to places and languages on a map which functions as the entry point to the collection (see Figure 19), and shows connections between different versions of a story where these are available, such as translations in other languages or updated versions. Search, browse and filter options in the interface were designed to enable users to make their own connections between items – whether people, languages and places, or words, topics and themes. The use of standardised forms, such as ISO 639-3 language codes (SIL International, 2015), OLAC metadata standards (Simons & Bird, 2003), and OAI-PMH protocols for harvesting (Lagoze, Van de Sompel, Nelson, & Warner, 2002) all support connection to other collections and improve the discoverability and accessibility of the Archive and its contents. Hosting the collection on a university repository contrives sustainability into the future, and extensibility into wider linguistic and academic ecologies. Use of a permission form and Creative Commons license create connections between Indigenous and non-Indigenous practices of intellectual property management (Bow & Hepworth, 2019).

The Living Archive constitutes equivalences by enabling diverse groups of users to access these materials. A highly visual online interface was developed to support navigation without requiring high text or technical literacy, while also maintaining standard search and browse options expected by users more familiar with library catalogues. The contents

of the Archive are treated equally, with no hierarchies within the materials: a simple word book with a line drawing on each page has the same status in the Archive as an intricate creation story with complex text and rich illustration. All languages and communities and people are treated the same, whether there are thousands of speakers or none – the only difference is quantitative rather than qualitative, with some groups having greater representation, simply based on the longevity of the bilingual program. A digital archive of Indigenous language materials can take its place alongside archives of other language materials, as a corpus of literature in a recognised western context, that is still connected to its communities of origin. In Watson-Verran and Turnbull's words, the Living Archive enables otherwise incommensurable and isolated knowledges to move from the local site and moment of their production to other places and times.

There are various ways in which the Living Archive does not contrive connections or constitute equivalences – sometimes deliberately, such as not displaying items for which named contributors have not yet given permission, and not imposing classifications on the materials which would likely present a non-Indigenous perspective. Other times this lack of connections or equivalences are unrealised aspirations of the project team, such as the possibility of implementing tools from the digital humanities which could open up the Archive to new forms of visualisation and analysis, e.g. corpus building, annotation and image searching. In some cases, the connections are only partial, such as when metadata is missing which hinders search and browse functions, but also opens up to crowdsourcing of information which may be held within the communities of origin. People involved in the creation of materials can be invited to supplement metadata, e.g. where an author or illustrator is known but not listed in the book (Bow, 2019b). Each page of display only

reveals partial information, and the user is invited to click to discover ‘more’ where possible. Not all metadata fields are considered equal, with information about titles and creators displayed more prominently than ISBNs.

As language materials are enrolled as participants in this assemblage, certain kinds of equivalence and connectivity are assumed. The Archive assumes that a student in an urban Australian classroom can contrive connections with Aboriginal children in a remote NT classroom through the materials in the Archive, and assumes an equivalence of the curriculum that supports the knowledge work in both cases. For example, materials developed in bilingual programs can be repurposed to suit the cross-curricular requirements of the Australian Curriculum to incorporate Indigenous knowledges across all learning areas (Bow, 2016).

Assemblage 2: The Digital Language Shell

The assemblage of technologies into a Digital Language Shell emerged from a concern about the lack of Indigenous language courses available at Australian universities. Reasons given for this lack include the need for complex ongoing negotiations with language authorities, lack of materials, lack of qualified teachers, and low expectations of enrolment numbers of students (Bow, 2019a). This project proposed a technical solution to mitigate some of these challenges, and serve to facilitate universities to offer more Indigenous language courses under Indigenous authority. The Digital Language Shell was developed as an online template using free and open-source tools to allow language groups to collate, store and present their materials online without requiring expensive platforms or detailed technical knowledge (see Figure 20). It functions as an off-the-shelf, low-cost, low-tech

website with a learning management system embedded, allowing users to create courses and lessons using a range of materials including video, text, image, audio, plus various forms of interactivity. Drawing on the experience of the Yolngu Studies program at CDU (Christie, 2008), the project supports the imperative to ensure that Indigenous people maintain authority and control over their materials.



Bininj Kunwok language course

Welcome to the Bininj Kunwok online learning project.

This is a research project investigating ways in which Indigenous authorities can share their language and culture online on their own terms.

Figure 20 (Ch9.2): [Digital Language Shell](#) screenshot

As an assemblage, the Digital Language Shell contrives connections by bringing together many digital language resources into a specific configuration to suit a particular purpose. An audio file can be connected to a particular image or a grammatical explanation. The site can be configured to support various connections the language authorities, developers or users want to highlight, connecting language authorities to their materials and in turn to learners who may be in the same community or long distances away. The assemblage enables connections between the technology and the artefacts, between the

designers / developers and the language authorities and the users, which can include many different kinds of audiences. For example, a range of different plugins can facilitate connections between learners and teachers, such as enabling forum posts, uploading of video and audio files, online quizzes, and synchronous interactivity, opening lines of communication across the various roles.

The ways in which the Digital Language Shell constitutes equivalences is through the equal treatment of all videos, audios, texts, photos, which can be uploaded and configured without discrimination within the limits of the platform. The specific configurations of the Shell mean that no two sites would look the same, as each can be configured with its own aesthetic and functionality. The underlying WordPress platform offers an enormous range of options for various tasks, including themes to develop a unique look and feel, and plugins to enable certain features. This smorgasbord of options can be overwhelming to course designers, so the developers have chosen certain features to implement, and can offer suggestions to users wanting other functionalities. The Shell bears within it an assumption that all Aboriginal people have stories, images and ways of linking to the land, and therefore it constitutes a particular equivalence in that a template should work for any language. The assemblage is designed in such a way as to enhance the integrity of languages of any status, whether sleeping or thriving. A language group with a small range of materials from colonial era documentation, or partial word lists collected from elders with memories of the language before it stopped being used in various contexts, can use the Shell as easily as a language group with an active community of speakers who can create new resources using digital tools.

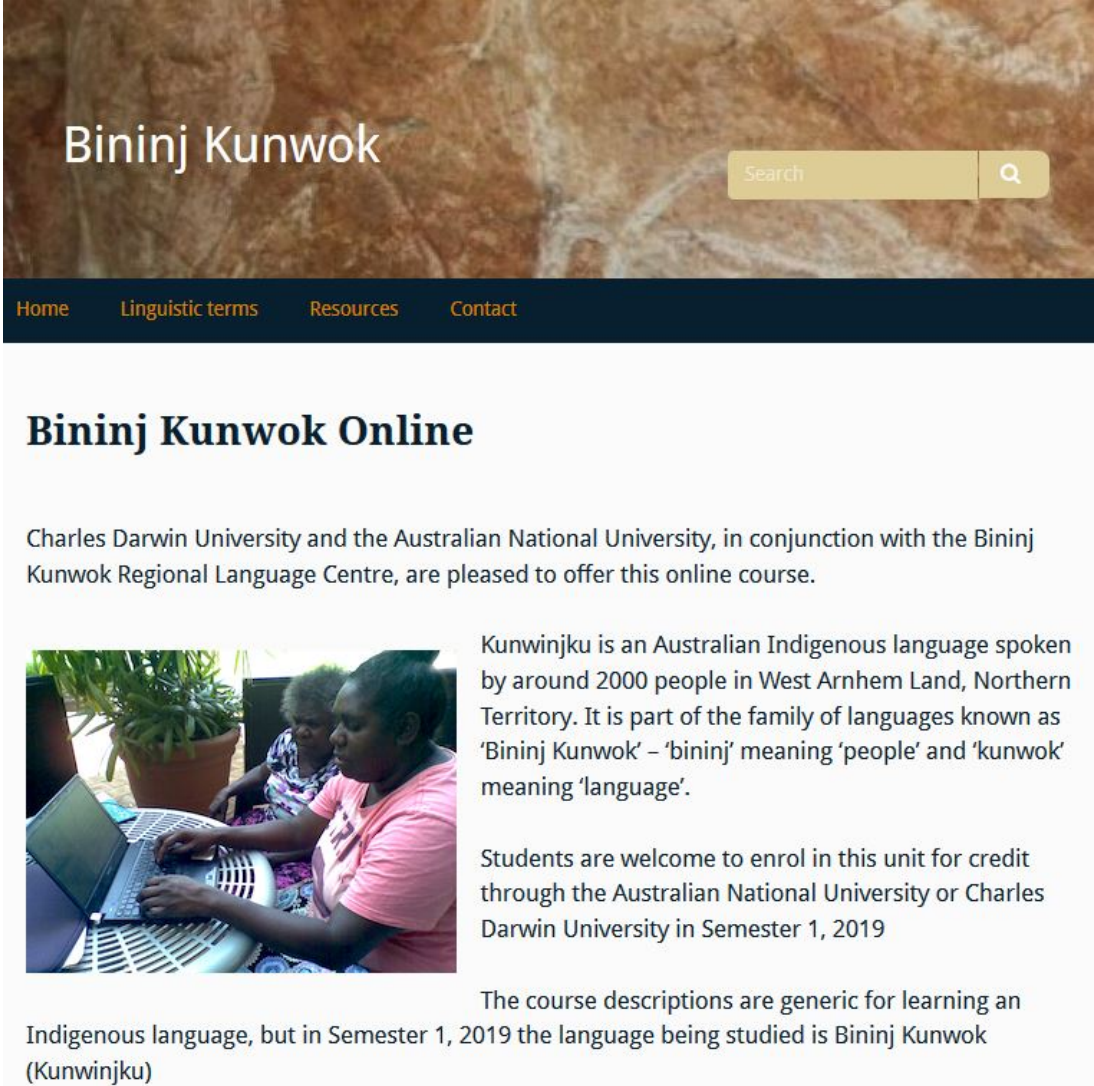
As with the previously described assemblage, certain elements were not connected or rendered equivalent, sometimes by design, such as the use of a login system to restrict access to certain users, and sometimes due to a failure in the system, such as when certain features of the platform did not work well with others due to incompatibilities in the design of the different plugins or themes. Partial connections or equivalences included the use of an institutional server, where other groups may need to invest in a server or partner with an organisation that can provide one. The template gives guidelines but not strict instructions on how it should be designed, ideally giving sufficient information to other users developing their own instantiation, without dictating how it should function.

[Assemblage 3: The Bininj Kunwok online course](#)

The assemblage of materials into an online course teaching Bininj Kunwok language (see Figure 21) was the result of collaborative knowledge work between academics from CDU and the Australian National University (ANU) and members of the Bininj Kunwok Regional Language Centre in West Arnhem Land. It was built as a proof of concept for the Digital Language Shell, a demonstration of its implementation in a specific context (Bow, 2017). A successful pilot project with volunteer learners led to its expansion to a fully-accredited university course for delivery across a twelve-week semester.

The assemblage of materials into a language learning course for Bininj Kunwok contrives connections between disparate elements by gathering language resources and configuring them into a curriculum. For example, a unit on 'Art' uses material from a national art exhibition of a prominent Bininj artist alongside videos from the local art centre in Gunbalanya to make connections with vocabulary and grammar used in these resources.

Books created in short-lived bilingual education program in Gunbalanya in the late 1970s and early 80s are repurposed as readers for learners to practise reading texts which incorporate the grammar and vocabulary covered in various units. The course allows learners in universities in place or online to connect to language authorities and language practices in ways that would not be possible without physically visiting a Bininj community in remote Northern Territory.



Bininj Kunwok

Home Linguistic terms Resources Contact

Bininj Kunwok Online

Charles Darwin University and the Australian National University, in conjunction with the Bininj Kunwok Regional Language Centre, are pleased to offer this online course.

Kunwinjku is an Australian Indigenous language spoken by around 2000 people in West Arnhem Land, Northern Territory. It is part of the family of languages known as 'Bininj Kunwok' – 'bininj' meaning 'people' and 'kunwok' meaning 'language'.

Students are welcome to enrol in this unit for credit through the Australian National University or Charles Darwin University in Semester 1, 2019

The course descriptions are generic for learning an Indigenous language, but in Semester 1, 2019 the language being studied is Bininj Kunwok (Kunwinjku)

Figure 21 (Ch9.3): [Bininj Kunwok online course](#) screenshot

The Bininj Kunwok course constitutes equivalence by assembling disparate elements together, including materials previously created for pedagogical, promotional or entertainment purposes (books from the Living Archive, grammatical descriptions, YouTube videos), and materials newly created to fit the curriculum (audio recordings of vocabulary items and readings of books from the Living Archive, videos demonstrating particular conversational interactions or grammatical patterns) (Bow, 2019a). This assemblage allows Indigenous languages to participate in the wider world of computer-assisted language learning, which has traditionally focused on majority languages which have more resources and more potential learners, gaining recognition in a global context.

Again, there are components that are not connected or equivalent, some deliberately – such as retaining the materials on the Digital Language Shell rather than rebuilding them on institutional platforms such as Blackboard or Moodle – and some due to unforeseen issues – such as the consequent need to duplicate certain information on each institutional platform to meet university requirements, and the non-alignment of semester dates between the two universities offering the course for the first time. Partial connections or equivalences can be seen in the alternate mode of access offered to workers in West Arnhem Land who wanted to take the course without having to enrol in a university degree. The Digital Language Shell enabled their participation independently of the two university structures, though only certain parts of the whole course were made available.

Conclusion

This paper has demonstrated some of the ways in which assemblages of digital language resources constitute connections and contrive equivalences between locales in knowledge systems, enabling otherwise incommensurable and isolated knowledges to move across time and space. In showing how otherwise disparate elements are rendered equivalent, general and cohesive, it is possible to consider how such assemblages enable collaborative knowledge work and can improve the ways in which this can be done.

Through these assemblages, teachers can use books created for a vernacular literacy program in the north of Australia to incorporate Indigenous knowledges into their learning areas of the Australian Curriculum. Non-Indigenous university students have the opportunity to learn an Indigenous language as part of their degree without necessarily visiting the language community in person. Indigenous language authorities become involved in curriculum and resource development to share their language and facilitate cross-cultural communication. The collaborative knowledge work involved in the careful assemblage of digital infrastructures into sociotechnical networks reconfigures existing knowledge objects in 'translating' them into digital formats. The alliances between people, institutions, artefacts, technologies and knowledge systems serve to create knowledge infrastructures to support the ongoing language work of communities as well as opening them up to new knowledge practices. These assemblages produce different understandings of language which are constituted as equivalent and which produce connections.

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Chapter 10: Summary and Conclusion

SECTION 1 Drawing to a close

1.1 Overview

In this thesis, I have examined what happens when particular digital technologies become entangled with different types of Indigenous language work in Indigenous languages of the Northern Territory. Focusing on three particular language infrastructure projects that I have worked with – the Living Archive of Aboriginal Languages, the Digital Language Shell, and the Bininj Kunwok online course – I used three analytic concepts to explore these projects as sociotechnical assemblages made up of heterogeneous elements. Three levels of inquiry framed my analysis – the practical work of developing the projects, the reflective work of writing peer-reviewed academic papers about the projects, and the analytic work of bringing all the components together in this thesis. Use of auto-ethnographic stories situates specific moments of disconcertment and opens up new possibilities for addressing questions that arose. Throughout this research, I noted the emergence of three types of language work (things people do with language) – the work of language in practices of documentation, of pedagogy and of identity-making. This thesis is itself a sociotechnical analysis of an assemblage of heterogeneities – projects, papers, stories, concepts, academic literature, technologies, etc – forming a new sociotechnical assemblage.

In part, this thesis reflects shifts in my own understanding as I analysed the work of developing digital resources to support Indigenous language work. The auto-ethnographic stories shared in the first chapter reveal how some of my assumptions about language were

exposed and challenged by my interactions with Indigenous colleagues. Where I had started this work thinking that 'language' and 'technology' were somehow separate phenomena, using a sociotechnical lens helped me recognise some of the ways in which technical processes and language practices can be entangled in complex, hidden and often productive ways. Seeing the digital resources I was involved in creating as *always* social and *always* technical led me to suspend some of my original assumptions, and take seriously the knowledge practices of my Indigenous collaborators.

My previous expectation, that the use of technology to support Indigenous language practices would be at worst neutral and at best beneficial, was based on an assumption that those knowledge practices were largely the same as my own – that language could be transformed into data and that its preservation, reconfiguration and sharing would be an undisputed good. Through my practical and academic work I began to consider ways in which digital resources can be devised which respect and support Indigenous knowledge practices. Such configurations will be somewhat different from those which focus on the technology or on linguistic structures, rather than on Indigenous authority and the purposes to which Indigenous owners mobilise their languages.

Having introduced various heterogeneous elements in the opening chapters, which were then explored through the seven publications presented as the body of this thesis, in this final chapter I attempt to bring it all together. I start with a story of resource production that encapsulates some of the entanglements encountered in this research, and end with another auto-ethnographic story about the future of one of the assemblages described here. In between, I draw out the various contributions of the research – practical,

methodological, academic and theoretical – before turning to its implications and significance, its limitations and future directions.

1.2 *Kamak bu?* (Is it OK?)

The following story recounts the plot of a multimedia resource developed for the pilot Bininj Kunwok course in 2016. I was not involved in the creation of this resource, it was negotiated between my two Bininj colleagues (Ngalwakadj Jill Nganjmirra and Ngalkangila Seraine Namundja) and my non-Indigenous colleague Andy Peart, who is an advanced learner of Kunwinjku and is heavily involved in the Bininj Kunwok Regional Language Centre. This collaboration allowed the non-Indigenous team members who were working on language as learnable content and structure to work productively with the Indigenous team members who were working with language as identity to make a useful multipurpose resource together. Using basic technological tools (tablet, voice recorder, video editing software), they created a story in Kunwinjku that not only incorporated much of the language covered in the course, but also made clear some fundamentally important aspects of responsible behaviour in Bininj contexts. Together they constructed a script, and recorded it in Kunwinjku, inviting Seraine's son to record the male voices. Andy sketched some simple images on a tablet and added the subtitles, audio file and some simple sound effects, then converted the whole into a video of about 10 minutes in length (available at http://espace.cdu.edu.au/eserv/cdu:59722/BK_cartoon_complete.mp4). The story is recounted here in English (again in a different font) between the two screenshots from the resulting multimedia resource.



Figure 22 (Ch10.1): Screenshot from cartoon story (translation: "We (two) want to go fishing at the Sandbar")

Two Balanda (non-Indigenous) women working in Gunbalanya want to go fishing. Using the Kunwinjku language they've learned, they ask a Bininj colleague if they can go to a popular nearby fishing spot known as the Sandbar. He suggests they ask the traditional owner of that area. They go to see that old man, who gives them permission to go, but warns them of a dangerous animal there. The Balanda women give him some tobacco, and drive out towards the Sandbar.

On the way, they meet another Bininj who asks if he can go with them. They agree, and work out their relationship so they know what to call each other.

On the road to the Sandbar, the Balanda ask about various things they see – buffalo, snake, spider, centipede – and find out which ones are dangerous. They

see some fruit, and learn that mankurdda (poisonous fruit) is not good to eat, but that mandjarduk (bush apple) is good, so they eat some.

It's very hot when they reach the Sandbar, so the women ask if they can swim. But they are told that the dangerous animal there is a crocodile, so they must not swim. But they have a fishing line, so they start to fish. As they catch fish, they ask which ones can be eaten – the djabel (mouth almighty fish) is not good, but the namarnkol (barramundi) is good to eat. They make a fire and cook their catch. A Bininj family comes from nearby to join them. There's no namarnkol left, but they have some tobacco to share. The Balanda women ask about driving further south, but are told it's dangerous, there's a sacred site there.

Afterwards, the Bininj talk together and agree that those Balanda are OK because they are learning to speak Kunwinjku.



Figure 23 (Ch10.2): Screenshot from cartoon story (translation: "There's a dangerous crocodile living there")

This story includes many of the linguistic concepts taught in the Bininj Kunwok online course, including vocabulary (skin names, animals, places, food, etc), useful phrases (asking who, where, is it OK, etc), and grammar (pronominal prefixes, past and non-past verb forms, incorporated nouns, etc). Drawing together the various strands of linguistic information taught in the course into a story form – with audio and subtitles in Kunwinjku, and simple illustrations to support comprehension – gave a rich demonstration of language in context for the language learners. For the semester course the cartoon was divided into sections and spread across four units, with the text provided in Kunwinjku only. An assessment task involved a multiple choice comprehension test, with questions and answers all in Kunwinjku.

But the purpose of the story was not simply to review all the linguistic components of the course. It also describes a common situation in a community in West Arnhem Land, where Balanda need to negotiate with Bininj for a particular outcome. The story provides a model of how Balanda should behave in community, including appropriate use of language, with issues of reciprocity, respect and relationship.

The two Balanda women seek information, permission and assistance from their Bininj colleagues. The Bininj are generous in their responses, and occasionally ask for tobacco in exchange, highlighting the importance of reciprocity in interaction. Without the help of the Bininj, the Balanda could easily get into trouble – swimming in a billabong or eating certain foods could hurt them physically, going to a sacred site could hurt them spiritually, or going to a fishing spot without permission could damage their relationships

in the community. In the final scene, the Bininj speak positively about the Balanda and their behaviour, noting their capacity to learn language, which presumably also entails the sociocultural norms with which they comply.

This example shows Bininj authorities entangling technologies, language and behaviour as they create a sociotechnical assemblage to serve as a pedagogical resource for the Bininj Kunwok course. As they oversaw the development and deployment of resources for teaching their language and culture, their immediate insistence was that learners understand the protocols of appropriate behaviour – asking for advice and permission in order to keep out of danger.

This was a salutary lesson for my research practice, where respect for the knowledge, authority and sovereignty of the language owners is the necessary starting point for productive entanglements, such as those in which I was implicated. It highlights the different focus on ‘language’ and its different types of work – where working on a resource allows productive collaboration on a tool using language in pedagogical practices, which also enables the work of language in identity and in documentation practices to be entangled to serve different purposes.

SECTION 2 Contributions

The research has resulted in a range of contributions to the study of the sociotechnical entanglements of digital technologies and Australian Indigenous languages. In this section I highlight the practical, methodological, academic and theoretical contributions of the present work.

2.1 Practical contribution

The digital language resources described in this thesis – the Living Archive, Digital Language Shell and Bininj Kunwok online course – represent significant contributions to the work of language documentation, preservation and promotion in themselves. They collate and present particular resources in Indigenous languages which would otherwise be inaccessible to a wider audience. They also demonstrate efforts to devise digital resources with Indigenous knowledge practices firmly in mind.

The Living Archive provides access to thousands of books in dozens of languages of the Northern Territory that could otherwise have been lost or destroyed. Digitisation of these materials expands their availability, serves as a form of documentation of these languages, enables new pedagogical practices, and supports identity work for contributors and users. To support the work of language for documentation practices, the Archive gives access to texts, stories, and images that can be used for a variety of purposes such as linguistic analysis, corpus building, language teaching and learning, etc. To support the work of language for pedagogical practices, the materials in the Archive both reflect and provide opportunities for diverse pedagogical contexts, whether in remote schools for vernacular literacy or across the Australian Curriculum. To support the work of language for identity-making practices, the Archive connects people and places and languages and stories.

The Digital Language Shell project provides a highly customisable yet low-cost and low-tech means for Indigenous language and cultural authorities to share their knowledge and materials online under their own authority. It was designed for maximum flexibility, so

people from any language group, no matter its status or range of materials available, can curate and arrange their materials for various purposes. In this way, the project supports the work of language in documentation practices, through enabling both the creation and sharing of language resources, such as creating new videos of cultural information or for language learning, or sharing existing resources from historical sources. Such an assemblage supports the work of language for pedagogical practices, whether for heritage learners, children learning in school, or through the creation of new resources. The project supports the work of language in identity-making practices through providing a low-cost, low-tech platform to enable Indigenous authorities to present their identity on their own terms, and give users the opportunity to engage in their own identity work through connecting with the material and its owners.

The Bininj Kunwok course adds to the small number of Indigenous languages available to learn through Australian universities, while also providing a model for the development of similar courses in other languages. It supports the work of language in documentation practices by gathering a range of heterogeneous resources and collating them in such a way that complete beginners can develop a basic understanding of the language and culture of (in this case) the Bininj people. It supports the work of language in pedagogical practices through incorporating Bininj linguistics and cultural knowledge practices into an academic context of language teaching and learning. It supports the work of language in identity-making practices through enabling Bininj authorities to express their own identity and priorities and cultural knowledge through the course, and requiring learners to engage with their own identity through connection with Bininj language and culture.

The practical contribution of this thesis is through its description and analysis of the development and delivery of these three digital language projects, incorporating feedback and information evaluation from various users. The thesis presents worked examples of ways in which digital tools and resources can be made available and configured in such a way that they remain flexible enough to support and enhance Indigenous knowledge practices, creating environments from which resources for such knowledge work can be procured and configured.

2.2 Methodological contribution

A further contribution to knowledge is made through my methods of iterative inquiry, which enabled me to engage with reflective research as I was developing these digital language resources, producing academic papers and collating all the component parts into a thesis.

In this first level of inquiry, as I worked on developing these three digital language infrastructures, my emerging insights were largely to do with the practical and technical arrangements of the projects. As I began working with Indigenous language authorities and digital resources, my understanding of the entanglements of language and technology began to shift.

In the second level of inquiry, as I reflected upon various aspects of my practical work building the infrastructures, and began reading a range of relevant literature, I was able to start addressing topics relating to the questions arising from the first level of inquiry. These included the various different agendas at work, the emergence of the digital technologies in the context of Australian Indigenous linguistics, catering for contrasting (Indigenous and

academic) cultural, pedagogical and legal practices and traditions. Academic writing allowed me to address these questions for different professional audiences: archivists, language teachers, educators, librarians and others. This process led to the decision to frame my thesis as a PhD by publication.

In the third level of inquiry I analysed the overall process by looking carefully at each project and paper and the links between them, and identified threads which had emerged from my practical and reflective work. This process saw the emergence of particular themes, notably the three types of language work introduced in the first paper, which were then traced through the other papers and projects. The compilation of those papers into this thesis involves including a meta-analysis of the various heterogeneities, which opens up pathways for new theoretical and empirical research.

My particular iterative methods and reflections allowed me to function in the dual roles of practitioner and researcher, as a means of overcoming the widening gap between these two roles which has been acknowledged in some of the literature on applied linguistics (Kramsch, 2015; Pennycook, 2018). There is a tension here, where a high value placed on careful archiving work of language documentation practices is not reflected in the credit given to such work in the academy, which values academic publications more highly than curated collections. This tension has been noted in efforts to have language archiving and similar activities recognised by the academy alongside publications (Thieberger et al., 2016)

The auto-ethnographic stories shared in the opening chapter (section 2.1) were a key part of my methods, as they allowed me to work towards understanding how the

entanglements of Indigenous Australian language practices with technology might allow us to work towards solutions which support Indigenous knowledge practices. I learnt that stories are a better way of sharing information than asking questions that are either too difficult or too vague. Having been frustrated by my failure to elicit a pertinent Kunwinjku grammatical example from my Bininj colleague ([‘Man bites dog’](#)), I recognised that my focus on language in the work of documentation did not match her understanding of language as an intrinsic and inseparable part of being-in-the-world. Another failure to elicit information on my own terms, this time working with a group of Bininj on developing curriculum for the online language course ([‘Runs in the family’](#)) reinforced this contrasting perspective. When considering what and how to teach non-Indigenous learners about Bininj language and culture, the language authorities focused on appropriate behaviour, what outsiders needed to understand to function well in a Bininj community. This work of language in pedagogical practices exposed my misguided suggestions of ‘concepts’ that could be built into the course. Being adopted into a Bininj family ([‘Family matters’](#)) situated me as a learner in relationship to individuals (particularly a grandmother (mother’s mother) whose responsibility it is to share knowledge) and to a whole community. My previous allocation of a skin name in a different language context had enabled me to do some identity work as a non-Indigenous person beginning to engage with Indigenous people and places. Being given an identity in the Bininj world that came out of my working relationship with two Bininj people gave me a much deeper understanding of the work of language in identity for Indigenous people, and changed the way I worked with them. These stories allowed me to open and explore the tensions between elements of the sociotechnical assemblage, particularly the authority and knowledge practices of Indigenous language owners.

2.3 Academic contribution

The academic publications provide worked examples of issues arising in the co-design of digital language resources. The present research highlights how the creation and delivery of such assemblages can be the result of collaborative knowledge work and the heterogeneous engineering of various components which in turn enable new collaborative knowledge work.

In the preface to the thesis ([“The politics of language and technology”](#)), I introduced some of the tensions that prompted my inquiry: different understandings of language and technology and their entanglements as experienced by the gathered group of public servants, language owners, language advocates and linguists. Digital technologies are a useful but not sufficient tool in the work of language maintenance and revitalisation, which challenges the notion of technology as a cure-all for Indigenous language work in Australia.

Paper 1 ([“Technology for Australian Languages”](#)) constitutes a survey of various projects which engage digital technologies in Australian Indigenous language maintenance and revitalisation. I identify some of the ways in which language practices are mobilised for documentation, for pedagogical purposes, and in the politics of identity work. These types of language work became a useful analytic to inform the other papers in this collection. I also challenge the hazardous and uncontested claims about the saving powers of technology.

Having laid out the contexts of technology in Indigenous language work in Australia, the next paper shifted focus to the first project under investigation, the Living Archive of Aboriginal Languages. Paper 2 ([“Towards a Unique Archive of Aboriginal Languages: A](#)

[Collaborative Project](#)'), written for an audience of librarians, explores the collaborative knowledge work involved in preserving and archiving a unique collection of Indigenous language materials. It highlights the mutual benefits of collaborative work among academic librarians, linguists, and technologists, including the shared learning and skills development across different disciplines and practices.

This paper focused mostly on the type of work of language in documentation, where the process of transforming physical books into digital data to be ordered and stored for ease of delivery opened complex questions around who the access was for, how to respect the Indigenous authority of the material while trying to adhere to 'best practice' guidelines for maximal discoverability and searchability.

Paper 3 (['Observing and respecting diverse knowledge traditions in a digital archive of Indigenous language materials'](#)) also addressed different knowledge practices in terms of their governance. Written for a journal focused on copyright issues for educators and librarians, and co-authored with a lawyer, we outlined the legal requirements of Australian Commonwealth law, and contrasted these with the more important but less clearly defined requirements of Indigenous copyright and intellectual property practices (ICIP).

In the context of the Living Archive project, we described how the project team went about addressing these issues in a practical way. Under copyright law, the materials in the Archive appear to support the work of language in documentary and pedagogical work, but the contested understandings of identity (such as individual versus communal authorship, the ownership of knowledge by particular groups determined by ancestral ties) created

specific challenges which needed to be resolved sufficiently to allow the Archive to do its work

Paper 4 ([‘Diverse socio-technical aspects of a digital archive of Aboriginal languages’](#)), written for an audience of archivists, addressed the question of the design of a digital language archive for different kinds of potential users in different contexts. Sharing the Living Archive website with an elder from country opened questions around mapping and the potentials of technology in collating and curating language materials. In retrospect it seems like I was presenting her the work of language in documentation and in pedagogy, where she was seeing it as the work of language in identity, and was concerned about the role of the map in presenting the connection between land and language. Observing a teacher from an urban classroom raised questions of contemporary uses of material in very different contexts to those for which they were created, with the accompanying issues of ownership and authority. Her identity – including her previous connection to a remote school with a bilingual program and her current role in an urban school with Indigenous students – influenced her engagement with the materials and their pedagogical potentials. The creation of the Archive did not simply involve preservation of materials, but incorporated careful complex collaborative decision making around access, imagining a range of different users and their purposes.

The subsequent papers move away from the Living Archive to the two other projects which also mobilised technology to engage users with digital language materials in new pedagogical contexts. The Digital Language Shell and the Bininj Kunwok online course were developed in tandem, one as an ‘innocent’ platform to host a range of resources for various pedagogical purposes, and the other as a ‘proof-of-concept’ to test the capacity of the Shell

as it engaged with an actual language community, developing an online course in an Indigenous language and culture for a university context.

Paper 5 ([‘Collaboratively designing an online course to teach an Australian Indigenous language at university’](#)), written for an audience of language teachers, describes academics and Indigenous language owners co-designing an online language course. The paper identifies the difficulties involved in developing new courses in Indigenous languages – lack of resources, lack of teachers, low enrolments – and considers how an online solution could address these limitations. It demonstrates how respect for the Indigenous ownership of the language can be maintained while devising formats and practices for a university teaching context.

This paper demonstrates how language in its work of documentation was turned into pedagogical materials which facilitate identity work for both teachers and learners. This project can serve as a model for the development of courses in other languages, and promote the collaborative development of new resources, teachers, students and connections.

Paper 6 ([‘Identity work in teaching and learning Indigenous languages online’](#)) explores how Indigenous language pedagogy in an online context generates identity work for both language owners and learners. The work of language in identity-making practices was built into the pedagogy as an imperative from the Bininj language authorities, including the attribution of skin names to position the learners in the community. The learners engaged in various kinds of identity work in their own learning experiences, some

imagining themselves as part of a Bininj community, while others resisted this position but drew on their own identities as Australian citizens or international students.

This paper also addresses the little-studied exigencies of negotiation and delivering pedagogy in Indigenous languages to adults in a university context and online, particularly where those learners have no existing connection with the language (as opposed to heritage learners). It also highlights the unusual position of Bininj Kunwok in a niche space as an endangered language with a small but strong community of speakers, who were willing to explore the use of digital technologies to share their language and culture with non-Indigenous learners.

Paper 7 ([‘Sociotechnical assemblages in digital work with Aboriginal languages’](#)) examines how the three digital language infrastructures function as sociotechnical assemblages. Through a focus on the ways in which these assemblages constitute connections and contrive equivalences between locales in knowledge systems, it shows how otherwise disparate elements are rendered equivalent, general and cohesive. The reconfiguration of the heterogeneous elements into particular assemblages enable otherwise incommensurable and isolated knowledge practices to move across time and space, and facilitate new forms of collaborative knowledge work. This paper takes concepts from the field of Science and Technology Studies and applies them to the context of digital resources for Australian Indigenous languages.

The transdisciplinary approach developed in this thesis – using the writing of academic articles for various audiences to address specific issues across different professional and knowledge practices – allows the research to cross disciplinary

boundaries such as language, linguistics, technology, language learning and teaching, intellectual property, identity, etc. Too often disciplinary reporting is bounded in one domain, so research of this nature enables the breakdown of some of those boundaries.

2.4 Theoretical contribution

This research provides its theoretical contribution largely through the analytic concepts of assemblage, heterogeneities and sociotechnology as they open and address questions around the co-design of digital language resources for Indigenous language work. This has entailed elaborating alternate understandings of language work as demonstrated in documentation, pedagogy and identity practices, and how those types of language work are seen differently by Indigenous language owners, academic linguists, software designers, lawyers, teachers, funding bodies, etc.

Using the analysis of three specific digital language projects, each developed in response to particular emergent sociotechnical scenarios, the research complements and extends the existing theory. Resisting the urge to treat language as *sui generis*, but rather focussing on 'language work' as things people do with language, allows space for Indigenous knowledge practices to be incorporated in the development, mobilisation and evaluation of digital language resources. A focus on the sociotechnical aspects of the assemblages allows for understanding of the relation between language work and digital work as always political, always local, always provisional – even when care is taken to make a digital solution apolitical, universal and atemporal.

This thesis looks at the entanglements of particular language practices and particular technologies at work in particular social and political contexts,

expressing particular values. Through telling and interpreting stories about what happened when particular people, technologies, artefacts, institutions and knowledge practices became entangled in particular contexts in the development, delivery and ongoing work of these sociotechnical assemblages, I reveal various processes that led to the production of these resources. This process makes it possible to identify particular ways which may privilege or marginalise the aspirations, governance and knowledge practices of language owners, or the possibilities of language learners, or other users of the materials in these digital language resources.

In qualitative research in the social sciences and humanities, issues such as 'validity' and 'trustworthiness' can be difficult to gauge. In this thesis I have attempted to balance the focus on process with the concern with product, where both the 'art' and 'science' complement and inform each other, to produce a work that incorporates credibility, authenticity, criticality, and integrity, explicitness, vividness, creativity, thoroughness, congruence, and sensitivity, which have been identified as validity criteria for qualitative research (Whittemore et al., 2001). The potential of research such as this which involves both practice and theory allows for a refiguring of the relationship between the two in the academic context (Candlin, 2000).

SECTION 3 Implications and significance

This research has focused on what happens when digital technologies become entangled in various types of Indigenous language work in the Northern Territory. It shows how Indigenous understandings of the nature of language and how this is manifest in the

work of language in documentation, pedagogy and identity can be placed alongside conventional academic linguistic understandings and practices. It proved useful in my research to think of languages as sets of practices, and look at the practices in collective action, rather than thinking of language in the abstract, as somehow separable from other aspects of life. These different conceptualisations of language and technology can influence the development of digital language resources and how different types of language work are enacted in various ways and can be impeded, supported, enhanced, inhibited and altered through the design and deployment of digital language resources.

The heterogeneous engineering involved in these assemblages provides for carefully designed entanglements of non-Indigenous academic technological and Indigenous philosophical and political practices of language in particular contexts and moments. The digital assemblages in which we invest so much time and effort, are in fact impermanent. While issues of sustainability are important in a technical sense, digital resources can, when locked down into technical infrastructures, compromise Indigenous knowledge practices, inhibiting their traditional work of complex configurations and performances. Attending to the ephemeral and loosely structured nature of technical arrangements, how they always need human input before they become useful, allows us to resist their ossification so that they do not distort or violate Indigenous knowledge practices, and also avoid fetishisation and fossilisation of such resources (Hermes, Bang, & Marin, 2012).

The recognition that language work involves documentation, pedagogy and identity can open up new affordances for tools which can be designed to support such practices for Indigenous and non-Indigenous people. Recognising and incorporating Indigenous people's

different understandings of language and language work can help inform the creation of new and better tools to support different types of language work.

Thinking in this way unpicks the idea of technology as panacea, that if we just create the right tools then languages can be 'saved' or 'preserved.' As well as removing the agency from the language owners, this notion overstates the agency of the tools, which are themselves limited by the sociotechnical arrangements inherent in their structure. The methodological imperative of working collaboratively with Indigenous language owners and authorities in the context of digital work is not only good practice but is necessary for productive and respectful intercultural knowledge work performed in good faith.

3.1 Limitations

Focusing on sociotechnology is a necessarily contingent approach – the social will change, as will the technical, so our efforts are necessarily provisional. The world of digital technologies and the work of Indigenous languages are vast, and both are moving ahead in many different directions. The assemblages described in this thesis are in a sense already out-of-date, as the technologies used have since been overtaken in the ongoing churn of technological change.

A number of areas in this domain have not been included in this study. These include the rich world of social media and the role of Indigenous languages in this space, and the affordances of language technology in products such as grammar checkers, proofreading tools, information retrieval engines, speech recognition and synthesis, machine translation and intelligent interactive systems. Both these areas are briefly mentioned in Paper 1 but

not explored in the remainder of this thesis as they are not immediately relevant to the three projects under investigation here.

The present work focuses on the Australian context, specifically on the Northern Territory but with many links to the rest of Australia. This is not to ignore the significant and interesting work being done in other countries with comparable linguistic ecologies, especially the US, Canada and New Zealand. A comparison with ongoing work in those locations is beyond the scope of this research, and the literature review has only peripherally addressed these as relevant.

I am keenly aware of the limitation of my own involvement in this work. Having been so closely involved with the development of these three projects makes it hard to be objective, but all research is necessarily subjective, and I acknowledge my biases, particularly as a non-Indigenous researcher. A Native American researcher states that “non-Native academics, linguists and anthropologists cannot become a complete part of the community they are working with, nor can they distance themselves in order to make disinterested determinations about what should or should not be done” (McHenry, 2002, p. 106).

3.2 Future directions

This section identifies future directions in two senses, firstly for the three projects and secondly for future research possibilities, and sometimes these are entangled.

The future of the Living Archive project (as outlined in the following section) offers potential for further research as it is transformed from a research infrastructure on a university platform to a community resource in a new context. Documenting and analysing

the transfer and its new affordances opens opportunities to explore issues of sustainability and governance in a different context.

Other language and community groups have expressed interest in using the Digital Language Shell for sharing their own language and cultural materials online, including the Muurrbay Language Centre in NSW. I am interested in continuing to support groups to curate and create resources for their various purposes. As the Shell is mobilised in different contexts – of language vitality, audiences, etc – further opportunities will emerge for exploration of how these technologies interact with various users, owners, and types of language work, and how to keep them entangling productively under Indigenous authority.

Further iterations of the Bininj Kunwok course will require tweaks in response to feedback from previous learners, and the institutional demands of the course providers, while remaining sensitive to the desires and interests of the Bininj language owners. In particular, I'd like to extend the opportunities for interaction between learners and speakers, whether formally within the course or externally, drawing on the idea of 'language buddies'. This would pair a language learner with a speaker and facilitate them to arrange synchronous conversation times – via phone or video-conferencing depending on what is appropriate and available – with a payment to the speaker.

My reflections on the sociotechnical assemblage that is this thesis and the projects, papers, concepts, stories, etc. of which it is composed, will change the way I work in the future. Incorporating more Indigenous co-design from the outset of any new project, and recognising the complex entanglements of language practices and technical design

practices, will inform the development of better products and design practices into the future.

SECTION 4 Conclusion

In describing these three sociotechnical assemblages, and analysing them in various ways across seven academic papers, this research has uncovered some of the ways in which technologies can support, enhance, inhibit and frame language work. The entangling of language practices and digital technologies can enable new and traditional pedagogical practices, identity work, documentation, archiving, etc. but must prioritise the views of the Indigenous language owners. Using a sociotechnical lens to explore the entanglements of Indigenous languages and digital technologies has revealed some ways in which technical decisions can be made to serve the interest of Indigenous language owners and their knowledge work rather than simply exploiting and extending the affordances of technologies.

Digital technologies are an important component of the work of language maintenance and revival, but they are not the solution. Rather than focus on the technologies themselves, the attention needs to stay on what they facilitate for people. Shifting the agency in language maintenance and revival to digital technologies risks bypassing people altogether, but people and their understandings of language and the work it does are completely entangled in the sociotechnical assemblages of digital language resources.

This section closes with another autoethnographic story, which highlights the need for ongoing negotiation regarding the future of one of the sociotechnical assemblages described here, then a final word about respecting my Indigenous colleagues and their knowledge.

4.1 A final ethnographic story

Darwin, February 2020. We've gathered in the meeting room of CDU Library to decide the fate of the Living Archive project. Continuing a discussion that had started over a year ago were representatives from the Northern Territory Library, CDU Library and the Living Archive project team. Our project funding is largely spent, and the software used in the library to host the collection is soon to be decommissioned. Has the project served its purpose? Is it time to shut it down? Is there a way to maintain access to the materials outside the existing infrastructure? After all our work, the ephemeral nature of the Archive is starting to reveal itself, as we seek a concrete commitment to its future existence.

The CDU Library director carefully takes us through the heterogeneous elements that make up the assemblage of the Living Archive – the digital artefacts stored on the institutional repository in various formats, the web interface and search/browse functions that link users to the collection, the interactive map as a point of entry, the project site on Word Press, the 'LAAL Reader' app that allows offline use of the resources, and the database of author names and permission status. Once the components were itemised in this way, the possibility of their disintegration is again made frighteningly clear.

I am encouraged to see the willingness of CDU Library to continue to support the project. Since its inception, the Living Archive had relied heavily on the technical expertise and practical support provided by CDU Library, with little financial reward since our original application had drastically underestimated the cost of this work, and had not attended sufficiently to the long-term future of the collection. We acknowledge the enormous value of their in-kind contribution, particularly now that they are just coming out of a radical upheaval with significant budget cuts and job losses. We have become dependent on the good will of CDU Library to keep the project alive, but in the present milieu it seemed unlikely that they will be able to continue to host it.

The director of the Northern Territory Library reiterates his support for keeping the Archive materials 'alive'. The NT Library has been a partner in the project since 2014, and as part of the National and State Libraries of Australia has a mandate to preserve and provide access to materials of local significance. They are happy to host the collection 'in perpetuity', transforming it from a research infrastructure to a public cultural resource.

His colleague now demonstrates the NT Library's new 'Territory Stories' project, which has been developed as a local version of the National Library's Trove system, harvesting and curating resources from all over to create a one-stop-shop for everything to do with the NT. They're very proud of their work with a user experience designer to make the interface as easy to use as possible.

Their suggestion is to incorporate our materials in this collection, retaining an identity as the Living Archive of Aboriginal Languages as one of many data sets. The way we established the metadata schema and other practices allows for a reasonably straightforward reconfiguration of the resources in the context of Territory Stories. The proposed reassemblage relies on the technological decisions made in our project as much as on the good will of the people involved. The discussion focused on various sociotechnical aspects of what such a shift would mean – identifying the required functionality, managing the transfer of assets, mapping metadata fields, storing the preservation versions, considering which components might be superfluous, determining how permissions and governance should be managed, and preparing a ‘roadmap’ for the move. This new round of negotiations involving the technical, practical, political, administrative, social and legal issues reminded me of our many discussions in creating the Living Archive in the early days of the project – but now it was an actual assemblage to be negotiated, not just an idea waiting to be implemented. A likely casualty of the shift is the interactive map interface that welcomes people to the Living Archive webpage. The map was utterly central to the original imagining of how the materials could be accessed by various Indigenous owners by place, and now it seems as if it could be casually discarded in the interests of the survival of the back-end resources. There’s a possibility that the NT Library will add a map feature to their interface at some point, but after all the years of effort that went into the design and implementation of our own map interface, it was hard to imagine it ‘floating away’.

Would the Living Archive still be 'Living' in its new home? We'd worked so hard to configure it in such a way that it would support and enhance Indigenous knowledge work, and make materials available and accessible to different types of users and uses – would that be lost if it was absorbed into this quite different assemblage? Would the materials just become museum pieces, containers of dead knowledge? Though not many items had been added to the collection in recent years, I'd worked hard to show that the Archive was still 'living', through strategic use of social media and adding stories to our blog, plus involvement in academic conferences and public events. I didn't want our work to be lost to the annals of history, a good idea at the time but, like so many other great projects, no longer a going concern.

I knew this day was coming. I'd fought for a long time to keep the Living Archive as it was – while I can see its many flaws, I'm very proud of the work we've done on it and the work it does. I knew it was time to let it go and find it another home, but it was hard to envisage it being pulled apart and put back together in a different way. I feel like a parent watching their child grow up and move away, struggling to relinquish control, and learning to trust that its future – however disaggregated and ephemeral – will be OK.

4.2 The last word

Throughout this research I have aimed to show respect in my engagements with Indigenous people and their knowledge practices. As a non-Indigenous researcher, I am highly conscious of my outsider status in the world of Indigenous languages. I came to the

NT thinking I could help to provide some solutions to what I perceived were the problems of language loss and disenfranchisement, seeing technology as the way forward. But as many well-intentioned researchers discover, I learned that my role is to listen and learn, to support the aspirations of Indigenous people, and not get carried away with the possibilities of technology. I continue to learn, continue to make mistakes, and continue to try to support where I can.

As much as I would like to share the knowledge gained through this research with my Indigenous colleagues, this thesis is not the best way to communicate to them. Therefore my contribution to them is in the projects created and the new sensibilities I've developed as I continue to engage Indigenous language owners and authorities in language documentation, learning, teaching, and analysis. I continue to consider their pedagogical and linguistic insights and sensibilities, alongside of my own very partial capacities and understandings.

SECTION 5 References

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Note that each chapter of this thesis contains its own reference list – the current one only applies to this Summary and Conclusion chapter.

Appendices

APPENDIX 1: Statements of contribution by co-authors

Appendix 1.1: Paper 2 - Statement of co-authorship



Statement of Contribution

This thesis is submitted as a Thesis by Compilation in accordance with https://policies.anu.edu.au/pp/document/ANUP_003405

I declare that the research presented in this Thesis represents original work that I carried out during my candidature at the Australian National University, except for contributions to multi-author papers incorporated in the Thesis where my contributions are specified in this Statement of Contribution.

Title: Towards a Unique Archive of Aboriginal Languages: A Collaborative Project

Authors: Jaysree Mamtara, Catherine Bow

Publication outlet: Journal of the Australian Library and Information Association

Current status of paper: Published

Contribution to paper: This paper was proposed by Jaysree as part of a conference presentation at the [VALA 2016 conference "Libraries, Technology and the Future"](#). We were invited to expand on the original paper and present it for publication in the newly-renamed Journal of the Australian Library and Information Association. While it was a very collaborative process, Jaysree wrote most of the introduction, the literature review and background about other library projects, the role of the library in the setting up of the archive and the collaboration between the library and researchers that followed. I wrote the background to the project, and issues relating to digitization, access and challenges. Together we wrote the lessons learnt and conclusion. We estimate that the contributions were approximately equal at 50% each.

Senior author or collaborating authors endorsement:

Catherine Bow

19/11/18

Candidate – Print Name

Signature

Date

Endorsed

JANE SIMPSON
Primary ANU Supervisor – Print Name

15/4/2020
Signature 15/04/2020

Date

Kate Mitchell

17/04/2020

Delegated Authority – Print Name

Signature

Date

Appendix 1.2: Paper 3 - Statement of co-authorship



Statement of Contribution

This thesis is submitted as a Thesis by Compilation in accordance with https://policies.anu.edu.au/ppi/document/ANUP_003405

I declare that the research presented in this Thesis represents original work that I carried out during my candidature at the Australian National University, except for contributions to multi-author papers incorporated in the Thesis where my contributions are specified in this Statement of Contribution.

Title: Observing and Respecting Diverse Knowledge Traditions in a Digital Archive of Indigenous Language Materials

Authors: Catherine Bow & Patricia Hepworth

Publication outlet: Journal of Copyright in Education and Librarianship

Current status of paper: Accepted/Published

Contribution to paper: I proposed this paper to my co-author following a presentation about copyright in Australian Libraries, and later we agreed that combining a legal perspective and a project management perspective would be an interesting paper. I wrote the introduction and background to the Living Archive project, and Trish wrote the frameworks of copyright and Indigenous cultural and intellectual property. I wrote the ethnographic stories and most of the sections on addressing copyright issues, and addressing ICIP issues, and we shared the section on Access and usage with a focus on the Creative Commons licensing. I estimate that I wrote 75% of the paper, with Trish providing the professional advice needed to frame it correctly in a legal context.

Senior author or collaborating authors endorsement:

| | | |
|------------------------|-----------|----------|
| Catherine Bow | | 22/11/18 |
| Candidate – Print Name | Signature | Date |

Endorsed

| | | |
|-------------------------------------|-----------|-----------------|
| JANE SIMPSON | | |
| Primary ANU Supervisor – Print Name | Signature | 15/04/2020 Date |
| Kate Mitchell | | 17/04/2020 |
| Delegated Authority – Print Name | Signature | Date |

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Date: Wednesday, 21 February 2018 at 10:56 am
To: Cathy Bow <Cathy.Bow@cdu.edu.au>
Cc: "mkennan@csu.edu.au" <mkennan@csu.edu.au>, Sue McKerracher <Sue.McKerracher@alia.org.au>
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Catherine Bow (2019) Diverse socio-technical aspects of a digital archive of Aboriginal languages, *Archives and Manuscripts*, 47:1, 94-112, DOI: [10.1080/01576895.2019.1570282](https://doi.org/10.1080/01576895.2019.1570282)

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Appendix 2.3 Permission from Babel editors to reproduce Paper 5

From: Andrew Scrimgeour <Andrew.Scrimgeour@unisa.edu.au>
Sent: Monday, 20 January 2020 2:53 PM
To: Anne-Marie Morgan <amorga23@une.edu.au>; Cathy Bow <Cathy.Bow@cdu.edu.au>; editor@afmlta.asn.au
Subject: Re: My Babel article in PhD by publication

yes i agree with Anne-Marie

A

Andrew Scrimgeour
School of Education
University of South Australia, Magill Campus

From: Anne-Marie Morgan <amorga23@une.edu.au>
Sent: Monday, 20 January 2020 3:50:56 PM
To: Cathy Bow; editor@afmlta.asn.au
Cc: Andrew Scrimgeour
Subject: Re: My Babel article in PhD by publication

Dear Cathy

Sorry about the delay on this. I can't see any impediment to you including the paper in your thesis with the acknowledgment you have suggested. I think you should use the final version (post-press), as it is available online, and is also in the Informit and EBSCO data bases. Andrew as editor should have the final ok on this, however.

Best wishes for examination of the thesis!

Kind regards

Anne-Marie

From: Cathy Bow <Cathy.Bow@cdu.edu.au>
Date: Monday, 20 January 2020 at 4:08 pm
To: "editor@afmlta.asn.au" <editor@afmlta.asn.au>, Anne-Marie Morgan <amorga23@une.edu.au>
Subject: RE: My Babel article in PhD by publication

Hi again,

Just following up on my email from before Christmas.

Can you advise on the rules for Babel regarding including my paper in my PhD thesis by publication?

Hope you can help, as I'm intending to submit quite soon.

Warm regards,

Cathy

Cathy Bow
PHD Student CDU and ANU
E: cathy.bow@cdu.edu.au

APPENDIX 3: Links to additional non-peer reviewed materials

Co-authored article in professional magazine promoting the Living Archive project:

Mamtora, J., Godfrey, N., & Bow, C. (2016, June). LAAL: the Living Archive of Aboriginal Languages. *Incite*, Vol. 37(No. 5/6), 18–19.

<https://www.alia.org.au/system/files/incite3d/2016/5.6/html5/index.html?page=18&noflash#>

Report for funding body on Digital Language Shell and Bininj Kunwok pilot course

Bow, C. (2017). Activating community-based Indigenous language and culture resources for university teaching – Report on the development of a digital shell and pilot delivery. Canberra, ACT: Department of Education and Training.

https://ltr.edu.au/resources/SD15-5124_CDU_Christie_Final%20Report_2017.pdf

Article on professional website promoting use of resources on the Living Archive:

Bow, C. (2018, April 26). Teacher resources: Indigenous language materials. Retrieved from *Teacher Magazine website*:

<https://www.teachermagazine.com.au/articles/teacher-resources-Indigenous-language-materials>

Co-authored article on the origins of TopEndSTS for the ‘STS Across Borders’ exhibit at 4S Sydney conference

TopEndSTS. (2018, August 21). Doing difference differently in Northern Australia today: Ground Up mobilisation of Indigenous and STS concepts.

<http://stsinfrastructures.org/content/cdu-sts-researchers-doing-difference-differently-northern-australia-today-ground>

University press releases announcing Bininj Kunwok online course (January 2019)

<https://www.anu.edu.au/news/all-news/preserving-the-kunwinjku-language-of-west-arnhem-land>

<https://www.cdu.edu.au/newsroom/Kunwinjku-language-course>

Co-authored article on TopEndSTS for the European Association for the Study of Science and Technology Review

TopEndSTS. (2019). Doing difference differently in Northern Australia today: The beginnings of TopEndSTS. *EASST Review*, 38(1), 48–51.

<https://easst.net/article/doing-difference-differently-in-northern-australia-today-the-beginnings-of-topendsts/>

APPENDIX 4: Ethics approval documentation

Appendix 4.1: Initial approval from ANU Human Research Ethics Committee (ref 2017/403)

From: aries@anu.edu.au
To: u6016671@anu.edu.au
Cc: human.ethics.officer@anu.edu.au; susy.macqueen@anu.edu.au
Subject: Human Ethics Protocol 2017/403 - Approval
Date: Friday, 15 September 2017 1:37:46 PM

THIS IS A SYSTEM-GENERATED E-MAIL. PLEASE DO NOT REPLY. SEE BELOW FOR E-MAIL CONTACT DETAILS.

Dear Ms Catherine (Cathy) Bow,

Protocol: 2017/403
Investigating the role of digital language resources for Australian Indigenous languages

I am pleased to advise you that your Human Ethics application received unconditional approval by the Chair on the 15/09/2017.

For your information:

1. Under the NHMRC/AVCC National Statement on Ethical Conduct in Human Research we are required to follow up research that we have approved. Once a year (or sooner for short projects) we shall request a brief report on any ethical issues which may have arisen during your research or whether it proceeded according to the plan outlined in the above protocol.
2. Please notify the committee of any changes to your protocol in the course of your research, and when you complete or cease working on the project.
3. Please notify the Committee immediately if any unforeseen events occur that might affect continued ethical acceptability of the research work.
4. Please advise the HREC if you receive any complaints about the research work.
5. The validity of the current approval is five years' maximum from the date shown approved. For longer projects you are required to seek renewed approval from the Committee.

All the best with your research,

Human Ethics Officer
Research Integrity & Compliance
Research Services Division
Level 2, Birch Building 36
Science Road, ANU
The Australian National University
Acton ACT 2601

T: 6125-3427
E: human.ethics.officer@anu.edu.au
W: <https://services.anu.edu.au/research-support/ethics-integrity>

Appendix 4.2: Final report approval from CDU Human Research Ethics Committee (ref H17077)

Office of Research and Innovation, Ethics
T: 08 8946 6063 E: ethics@cdu.edu.au



11 February 2020

Prof Michael Christie and Ms. Cathy Bow
College of Indigenous Futures, Arts and Society
Via email

michael.christie@cdu.edu.au
cathy.bow@cdu.edu.au

Dear Michael and Cathy,

RE: H17077 – Investigating the role of digital language resources for Australian Indigenous languages

Human Research Ethics Committee – Final Report Approval

Thank you for submitting the above-mentioned proposal. The final report has been determined under the procedures of the Charles Darwin University Human Research Ethics Committee (CDU-HREC) to meet the requirements of the *National Statement on Ethical Conduct in Human Research* and is **approved from the date of this letter to the expiry date listed below.**

Congratulations on the completion of your research project.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Marilynne N Kirshbaum'.

Professor Marilynne N Kirshbaum, RN, BSc, MSc, PhD, FHEA
Chair of Human Research Ethics Committee
Charles Darwin University, NHMRC Registration No. EC00154
<http://www.cdu.edu.au/research/ori/human-ethics>

This HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human Research, 2007 (Updated 2018).