

# Centering the Speech Community

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## Abstract

How can NLP/AI practitioners engage with oral societies and develop locally appropriate language technologies? We report on our experience of working together over five years in a remote community in the far north of Australia, and how we prototyped simple language technologies to support our collaboration. We navigated different understandings of language, the functional differentiation of institutional vs oral languages, and the distinct technology opportunities for each. Our collaboration unsettled the first author’s western framing of language as data for exploitation by machines, and we devised a design pattern that seems better aligned with local interests and aspirations. We call for new collaborations on the design of appropriate technologies for oral languages.

## 1 Introduction

The world’s living languages can be categorised into ~500 *institutional languages* and a further ~6,500 local vernaculars, or *oral languages* (Fig. 1). Institutional languages feature standardised orthographies and widespread literacy. Local languages feature ‘primary orality’ (Ong, 1982), and include ancestral languages with an unbroken history of oral transmission and languages in danger of disappearing. This paper addresses the languages in Figure 1(b), which still play a significant role in intergenerational knowledge transmission, also known as ‘languages with sustainable orality’ (Lewis and Simons, 2016). In such speech communities, people interact with the outside world using a language of wider communication, often a variety of an institutional language.

For example, the speech community in Gunbalanya in the remote north of Australia relies on Kunwinjku [gup] (pop. 2,000) for local interaction, alongside Aboriginal English as the language of wider communication. The latter is the natural target for the usual suite of language technologies,

Language Vitality Status (EGIDS)	Living Languages	Median Population
<b>(a) 490 Institutional Languages</b>		
International (0)	6	263, 318, 175
National (1)	99	6, 260, 290
Provincial (2)	44	1, 802, 500
Wider Communication (3)	172	884, 900
Educational (4)	169	277, 000
<b>(b) 5,241 Oral Languages (learnt by children)</b>		
Developing (5)	1, 637	34, 100
Vigorous (6a)	1, 963	12, 900
Threatened (6b)	1, 641	2, 800
<b>(c) 1,437 Oral Languages (not learnt by children)</b>		
Shifting (7)	438	1, 500
Moribund (8a)	356	250
Nearly Extinct (8b)	313	12
Dormant (9)	330	

Figure 1: Distribution of Languages by Vitality, as measured using the Expanded Intergenerational Disruption Scale (EGIDS, Simons and Lewis, 2013), with statistics drawn from (Eberhard et al., 2023)

including speech to text and machine translation, supporting participation in the global information society (cf. Bird, 2022). What do we offer a local language like Kunwinjku? One answer is that we offer it the same technologies as the institutional languages, under the belief that all languages are equal. Yet all languages are not equal, in the sense that *languages are functionally differentiated within the linguistic repertoire of speech communities*. In light of this reality, how might we engage local speech communities in the design of language technologies?

In this paper, we centre the needs, desires and aspirations of a local speech community as we rethink the design of language technologies. What are good ways in from outside, i.e., approaches for ‘newcomers’ to engage with ‘locals’?<sup>1</sup> Our starting point is respect for the agency of local people and a commitment of newcomers to embrace local

<sup>1</sup>We adopt the terminology of Wagner 2015.

matters of concern. Our contribution is a set of insights about ways of working with local speech communities, along with a machine-in-the-loop design pattern which enhances local agency. Yet this is not an endpoint so much as a first step, and we hope that others will participate in exploring agency-enhancing futures for NLP/AI.

This is qualitative research that could be called *learning to participate*. It is loosely related to participatory design, but where the newcomer was ‘participated’ by locals (Winschiers-Theophilus et al., 2010). It is an instance of autobiographical design, “design research drawing on extensive, genuine usage by those creating or building the system” (Neustaedter and Sengers, 2012). In our interactions with each other, and with all participants, we employed an Indigenous research method known as yarning (Bessarab and Ng’andu, 2010; Ober, 2017). By beginning from a commitment to build on local strengths instead of problematising deficits, this work qualifies as appreciative inquiry (Bushe, 2013).

This paper is organised as follows. We discuss ways in to local communities, including linguistic engagements and the various ways that computer scientists usually build on them (Sec. 3). We present a narrative of the first author’s engagement in a remote indigenous community where the second author is a senior elder (Sec. 4). We report a construct of ‘working together’ in the intercultural or ‘third’ space, where language technologies support the internally-motivated work, including three prototypes that supported our collaboration. Finally, we draw out common themes and discuss wider implications for engaging speech communities (Sec. 5). We begin by setting the scene concerning oral vernacular languages.

## 2 Key Features of Oral Vernaculars

We follow Lewis and Simons (2016, §2) in understanding a speech community as a group that is unified by a shared identity reflected in culture and language. Local communities are often minoritised, sociopolitically marginalised, and economically disadvantaged. As rural communities, they typically share other features: infrastructural problems (internet, transportation), geographic isolation which amplifies the effects of poverty, distrust of outsiders and outside institutions, natural resource extraction, less exposure to technology, particular environmental hazards and health risks, dense so-

cial networks, and a close relationship to the land (Hardy et al., 2019).

Concerning language, a common feature of local speech communities is diglossia, with functional differentiation between two or more languages, e.g., the vehicular language with its external functions including literacy, versus the vernacular language with its local functions including intergenerational knowledge transmission. These local oral languages include emerging speech varieties such as creoles and mixed languages. This is also a space of high morphological complexity, language variation, orthographic variability, language mixing, and uncertain boundaries. Language may be conceived differently to western conceptions, e.g.: as owned, with consequences for data sovereignty; and as a situated and embodied social practice, exceeding the notion of utterance as grammatical form and propositional content.<sup>2</sup>

It is not surprising that some would prefer to keep alive the fiction of a language as a bounded entity with a standardised orthography, and position data scarcity as the remaining challenge. However, there is no need to ‘solve’ these ‘problems’ by shoehorning oral languages into the template provided by institutional languages. The necessary correction, we believe, is to shift our attention from languages to *speech communities*.

## 3 Ways In to Local Speech Communities

### 3.1 Linguistic engagements

The idea of going to a faraway place and learning an undocumented local language has a long history. Guides have been published for linguists, aid workers, missionaries, ethnographers, and the foreign service.<sup>3</sup> Learning the local vernacular shows humility and respect; gives access to deeper insights into the society; helps newcomers inhabit the “discomfort zone of cultural contact”; and adds value to the work being done by newcomers like teachers and health workers (Duranti 1997, p111; Winchitz 2006, p86; Somerville and Perkins 2003; Dixon and Deak 2010).

<sup>2</sup>Many others have explored these topics, e.g., Ong 1982; Tedlock 1983; Fishman 2001, Dobrin et al. 2009; Meakins 2013; Lewis and Simons 2016, pp42ff; Leonard 2017; Littell et al. 2018; Angelo et al. 2022, pp53ff, 82ff.

<sup>3</sup>For example, see Ward 1937; Bloomfield 1942; Gudschinsky 1967; Healey 1975; Brewster and Brewster 1976; Burling 1984; Peace Corps 2000; Thormoset 2011; Thomson 2012.

<sup>4</sup>Notwithstanding the problems with the colonial cliché of experts ‘helping’ Indigenous communities, cf. §5.

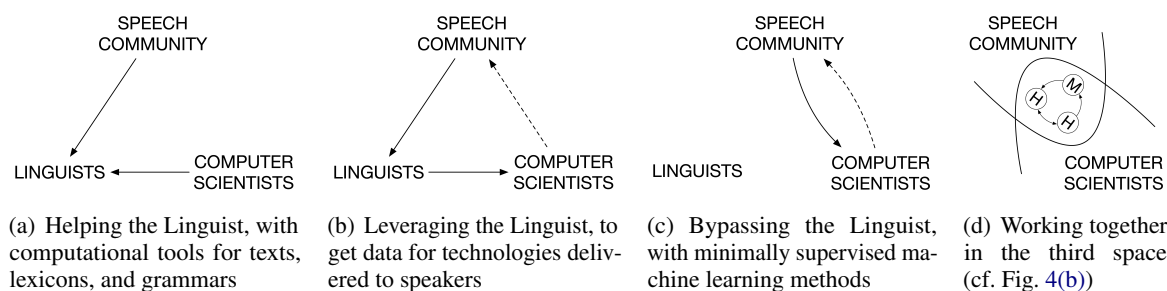


Figure 2: Styles of Computational Engagement in Language Work, Premised on the Assumption of Experts Engaging with Speech Communities<sup>4</sup>

Over the past century, linguists have been developing practices for working with speakers of little-known languages, leading to the ‘Boasian trilogy’ of texts, lexicon, and grammar. A prototypical language documentation involves high-value artefacts: the ancestral code, careful speech, monologue, and no code switching (Hill, 2002; Dobrin et al., 2009), preferences that are inherited by much computational work. There is an urgency to secure data for science while there is still time (Hale et al., 1992; Harrison, 2007; Hermes and Engman, 2017).

Some linguists have reported that “speaking ability contributed greatly to their fieldwork success” (Newman and Ratliff, 2001, p4). By entering as a learner, a linguist establishes a “non-threatening, minimally disruptive social role” (Everett, 2001, p171). Local people may struggle to comprehend a linguist’s fascination with a language, when the same linguist disavows any interest in learning it (Samarin, 1967, p16). On the contrary, “language learning is a natural, enjoyable, and maximally productive way to gain familiarity and understanding of the interactions between different components of the grammar” (Everett, 2001, p170). Evidence of language usage may only arise in informal settings that are created in the course of learning (Marley, 2020, p216). There are many more synergies between language learning and linguistic fieldwork (Schneider, 2011, pp190f). Reflecting on his dissertation fieldwork in Nigeria, Newman regretted his focus on learning the vehicular language instead of the vernacular (Newman and Ratliff, 2001, p5).

Computer-Assisted Language Learning (CALL) is occasionally advocated in the case of indigenous languages, with a focus on learning by the ‘heritage community’ (Holton, 2011, pp381ff). The usual approach is to transpose existing CALL methods into low-resource scenarios and address the resource gaps (Ward and Genabith, 2003; Ward, 2018). However, it is a different matter to support

spontaneous creation of content in oral vernaculars, avoiding the impulse to work through orthography and getting caught up in dialect variation and its impact on written forms (cf. Burling 1984, p22; Jancewicz and MacKenzie 2002; Katinskaia et al. 2017; Lothian et al. 2019).

### 3.2 Computational engagements

By the 1980s, computational tools were being applied to lexicography, morphological analysis, syntactic analysis, and integrated into descriptive workflows (e.g. Lawler and Aristar Dry, 1998; Rice and Thieberger, 2018). Computer scientists offered to ‘help the linguist’ organise their data and ensure its consistency, prioritising machine readable text, computational lexicons, and computational grammars. Linguists occupied the centre (see Fig. 2(a)).

With the rise of documentary linguistics and its emphasis on large scale data collection (Himmelman, 1998), computational support is being applied in capturing and transcribing as much primary data as possible. Linguists’ transcriptional practices aligned with the NLP preference for text. It is commonplace to ‘leverage the linguist’ by having them work with speakers to create annotated data to support machine learning (Fig. 2(b)). The broken arrow represents aspirations to deliver technologies like speech recognition and machine translation back to the community (e.g. Besacier et al., 2006). A final step, corresponding to minimally supervised learning, is to bypass the linguist (Fig. 2(c)).<sup>5</sup>

Our collaboration differs from all of these, in the way we inhabit the intercultural space between local and western lifeworlds (Fig. 2(d), cf. Christie 2006; Bird 2022).

<sup>5</sup>This has led to demarcation disputes, e.g., concerning who has the disciplinary expertise for working with local languages Bird et al. 2013; Brooks 2015; Bird et al. 2015.

## 4 Narrative

### 4.1 Beginnings

Steven: I am a settler Australian descended from English and German immigrants, with professional training in computer science and linguistics and experience of working with minoritised language groups in Africa, Amazonia, Melanesia, and Australia. I entered Arnhem Land in the remote north of Australia in 2016 with the aspiration of collecting a million word corpus of transcribed speech in Kunwinjku, and to bring this language up to speed with all the usual language technologies.

Dean: I am a Gurrgoni man and traditional owner of the Djinkarr estate outside Maningrida. I speak 16 languages, including Kunwinjku, which is the language that Bangardi (Steven) is learning. I helped establish various ranger programs, and we use traditional knowledge in our seasonal burning and in caring for Country. I have worked with many researchers over the years.<sup>6</sup>

Steven: When I first came to work in Arnhem Land, and before I met Bulanj (Dean), I only knew some balanda (non-indigenous) linguists working 3-6 hours' drive away. They helped with advice and introductions, and I got going with language learning and getting to know a few people. It was a lonely few months and I struggled to maintain a positive outlook. I occasionally tried to record stories that I would hopefully transcribe and translate, but no-one was interested.

Dean: I want people coming in to learn how to behave, get trained in cultural competency. It's like a passport. Once they have it, they can move around, go anywhere, sit with people.

Steven: In those early days I didn't have that passport. I was so aware of my cultural ignorance that I didn't really even know appropriate ways to approach people or to take leave. Everything felt so uncomfortable. Over time, people began spending more time with me, and teaching me the things I should know particularly concerning kinship and staying safe. After some months I was 'adopted' by a local elder and given a subsection name (or 'skin name') which made me her son. Through this affinal kinship system I was instantly related to everyone in the community. Now I had a ready topic of conversation, not about the weather which no-one talks about, but about 'how we are related'.

Dean: A lot of the time, balanda call out 'Dean' to me. That's fine when I'm in town, but out here, they should call me Bulanj or a word that shows how we're related, like *ngadjadj* (uncle) or *kanjok* (cross cousin). It's rude just calling out 'Dean' like that. It's too direct, like pointing at someone.

Steven: It took me the best part of a year to learn those words and use them correctly. I learned them like I learned the times table at school, by reciting them and writing them out. I would quiz myself e.g., "what do I call my *kanjok's ngadjadj*?" My rudimentary command of this most basic dimension of local society was a constant reminder that my western academic standing had no currency. When two locals met me in Darwin they were visibly surprised that I was capable of functioning there. I realised they had perceived me to be an outcast.

Meanwhile, I continued to try to recruit people to record stories to transcribe and translate. I spent a lot of time waiting for people who didn't show up, or who only showed up to report that something else was happening and that we could meet 'after'. On a few occasions I was able to sit with elders and talk about language technology and its use for creating texts and accessing knowledge. However, the topic would shift, or there would be an interruption, or people would offer polite excuses and drift away. This was a period of frustration and anxiety.

Dean: We invited Bangardi to come to Kabulwarnamyo (a remote outstation) and work with the Nawarddeken Academy (an open-air school) as a linguist, and help the balanda teachers get more Kunwinjku into the classroom. He also supported the Warddeken Rangers, and taught them how to record what they were doing, like getting stories about the rock art. I supported this decision as chair of the boards of both organisations, and as the local community leader who was appointed by the founder of the community.

Steven: I found my way day by day, supporting activities and field trips with school children, and participating in land management activities with the rangers. I adapted to the rhythm of life in the community, including the need to rest through the heat of the day, and sitting with people in the cool of the early morning or late afternoon.

Over the following three years, we ran 6 two-week workshops for community members on language and technology. My students and postdoc came and demonstrated their prototype language

<sup>6</sup>For a sample of the first author's work see Yibarbuk et al. 2001; Burgess et al. 2009; Altman et al. 2020.

technologies.<sup>7</sup> There was some interest in transcription tasks, but people quickly tired of this (cf. Wilkins, 2000). There was plenty of interest in talking about words and their cultural significance (cf. Lowell et al., 2021), but no-one ever expressed a need for machine translation (cf. Kuhn, 2022, p89). My conversations with Bulanj pushed deeper into the local lifeworld, such as the understanding of controlled burning not just for mitigating the risk of wildfires but as a means of renewing the cycle of life. I came to appreciate how the work of bridging western and local lifeworlds was not lexicogrammatical but metaphysical.

Dean: Bangardi recorded me teaching the children or teaching the rangers. He listened afterwards and tried to get something from the recording, and then we talked in the evenings. I shared my ideas about a Bush University for Arnhem Land, and for creating local pathways for the children, and he put my ideas on paper to show the sponsors.

Steven: Over and over it became clear to me that the enduring interest of locals was knowledge transmission, to children, young rangers, and newcomers. Few locals would participate in my data collection work, but they constantly recruited me in support of their knowledge transmission agenda. People wanted me to learn how to participate, and three priorities emerged: family (Sec. 4.2), work (Sec. 4.3), and Country (Sec. 4.4).

## 4.2 Learning terms of address

As mentioned, the first hurdle for newcomers to Arnhem Land is the subsection system, a feature of many Australian Aboriginal societies (McConvell et al., 2018). “Finding out someone’s subsection is an essential early step in making new acquaintances and allows them to be classified as kin” (Evans, 2003, p55). We came up with an obvious design: take a photo of someone and record their subsection name and the associated terms of address. The first author prototyped an app, only to realise that it was too uncomfortable to take a portrait photo of a new acquaintance. It took a further year before we realised that selfie photos with *two* people – a widespread practice – were the ideal anchor for information about the terms of address they use with each other. We devised the following process using the ‘SpeakingPhoto’ app:

<sup>7</sup>This work has been reported elsewhere, see Lane and Bird 2019, 2020; Le Ferrand et al. 2020; Bettinson and Bird 2021a,b; Lane and Bird 2021; Lane et al. 2021; Bettinson and Bird 2022; Le Ferrand et al. 2022a,b.

1. Establish the formal grounds for the newcomer’s presence in the community;
2. Review our connection in the social network and agree which terms of address to use;
3. Ask permission, “can I take a selfie with you, to help me remember what I call you?”
4. Take a selfie and record a brief conversation about kin terms and clan names;
5. Later, review photos, recalling the address term for a person, then listening to verify.

Steven: I continued using this app over the following years with new acquaintances in various towns and outstations. People felt no sense of being captured, as would be the case with a portrait photograph. They were pleased to participate in a selfie and to record skin names and kinship terms.

Dean: Everyone was happy that Bangardi was learning skin names, and encouraging the other balanda to do it too. Using skin names shows respect, that you know whose Country you are standing on.

## 4.3 Working together

Newcomers enter Arnhem Land for a purpose, and this enables them to obtain an entry permit. They support local government, health, education, construction, land management, and emergency services. Newcomers instruct locals using English, even though locals have limited western-style schooling and limited exposure to western ways. Locals follow their cultural pattern of shame avoidance, so “when they didn’t understand something they smiled and nodded agreeably in the face of authority, waiting for something to make sense” (Christie and Verran, 2014, p259). Newcomers interpret nodding and smiling as a sign of understanding. Yet misunderstanding is commonplace and may lead to conflict, costly mistakes, or injury.

The construct of working together creates opportunities for embodied interaction, a natural place for task-based language learning (Thomas and Reinders, 2010). In Arnhem Land, locals are already highly multilingual and are quick to pick up task-specific English when delivered in context. Newcomers, on the other hand, are typically monolingual, and it is rare to observe them go beyond incorporating a handful of Kunwinjku nouns into their English speech. In order to use the language while working together, newcomers must learn how to use verbs. However, verbs in Kunwinjku are complex, with a dozen conjugation classes, and 15 affix slots (Evans, 2003; Lane and Bird, 2019).

Here, a promising approach is to get started by memorising complete expressions that contain fully

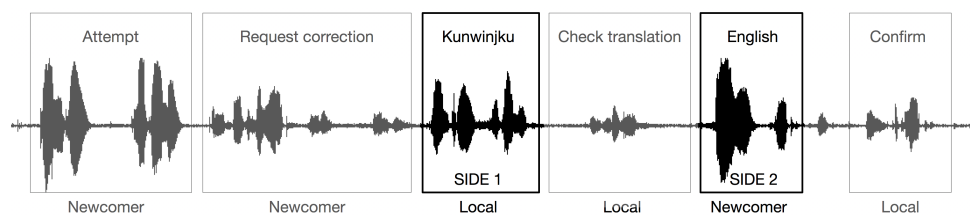


Figure 3: Structure of a Typical Recording Showing Task (above) and Speaker (below)

inflected verbs, the so-called ‘formulaic method’ (Amery, 2016, pp237f). In their efforts to capture such expressions, newcomers try to represent Kunwinjku in writing, extending Australian English orthographic conventions to represent non-English sounds, e.g. “nyadockmayor” [ɲarɔkme] *I’m setting off home*. They struggle to interpret such transcriptions and to produce a recognisable utterance.

Steven: I could represent sounds on paper using the IPA, but it was too slow and I often didn’t capture enough in order to reconstruct the context with a local when I reviewed my notes in the following days. Formal elicitation was impractical, because useful expressions only arose in the course of our activities. I needed something that worked in the moment, and I devised the following method using the Hi-Q voice recorder app:

1. Open the voice recorder on my phone and say the target word or phrase, perhaps incorrectly;
2. The local spontaneously corrects this expression;
3. Ask them to say it again, briefly holding the voice recorder near the local’s mouth;
4. Confirm the meaning of the expression;
5. Speak an English translation, then stop the recording and put the phone away;
6. Later, review recordings, changing the filename to the English expression, then scan the filenames and try to recall the translation, and listen to verify.

The result is a 10-15 second recording with the structure shown in Figure 3. One could possibly extract the regions marked ‘side 1’ and ‘side 2’ to create audio flashcards. However, we discovered that it is equally effective to leave the recordings intact. A longer recording provides context. It presents a higher penalty for forgetting the answer (about 15 seconds instead of 3). With practice, one can make concise recordings. The device is set to save the recording in a file named for the date and time, such as 20180910-0843.wav. Each file is renamed using the English translation, such as *I was coming to see you.wav*. This name can be used as the prompt for testing recall.

Steven: Soon there were too many files, so I prefixed files I wanted to learn with a 1, so they

appeared at the top of the list. Once I was confident recalling this expression, I incremented the prefix and the file appeared lower down the list, and I saw it less often (cf. spaced repetition learning Dempster 1987; Godwin-Jones 2010). Over time I collected hundreds of short recordings, and about half entered the learning process and were numbered 1–7.

Dean: Everyone got used to Bangardi making little recordings on his phone to help him remember words and ask about them later. It was good when he remembered the right words and used them. It showed respect. He didn’t do it all the time and so it didn’t feel like humbug. It was better than when he was writing everything down in notebooks.

Steven: Many activities involved minimal or no recording. I am confident that locals and I understood these as authentic friendships, in which my language learning was inevitable yet secondary.

This practice lent an ‘integrative orientation’ to language learning (Woodrow, 2006). It provided a convenient way to deal with pieces of language as they came up in the course of working together: “If language use in the daily life-world provides newcomers with bits and pieces of the second language, the question arises how language teaching can dock onto experiences with the second language outside of the classroom, support and even enhance them” (Wagner, 2015).

#### 4.4 Connecting to Country

According to the Comprehension Approach to second language acquisition, learners need *comprehensible input* (Krashen 1981; Cook 2016, pp239ff; Vygotsky 1934/1962). In the domain of spoken language, this means speech at or just beyond the learner’s current level, where he or she can leverage context to make meaning.

Steven: I found that speech between locals was too fast and contained too many unfamiliar words and cultural references. Yet when speech was directed at me, it was intended to elicit a response, and I struggled to learn from the input while simul-

taneously composing a response that maintained the interaction. There seemed to be no way for me to experience or to record comprehensible input.

Dean: I didn't want to listen to slow Kunwinjku. It was better when we spoke in English. I told Bangardi to just add Kunwinjku words to his English. Then we could talk about local topics without him getting stuck. It's the same when we discuss things from outside, we add English words to Kunwinjku.

We observed that when visitors arrived in the community, a local would invariably show them around and introduce them to people and places using Aboriginal English. Locals were concerned that visitors would trespass onto sacred sites or wander out of camp where there is a danger of crocodile or buffalo attack or becoming lost in the wilderness. After observing some of these tours, we designed a route which visited diverse locations.

Steven: I asked several people for a tour, and then I led the way, following the same route each time. Everyone I asked was willing to give a tour, and they appeared to enjoy sharing their knowledge. I asked "what's this" in each place. I would sometimes parrot a word while nodding thoughtfully, and this would elicit further detail. I recorded these tours and listened to them later while walking the same path on my own. In each place, particular words began to stand out, and I soon associated these words with their linguistic and spatial context. Now I could learn vocabulary while avoiding indeterminacy of words in isolation (cf. Quine, 1960).

We believe there are several benefits of recording guided tours. First, content is directed by the newcomer. Locals use vocabulary that they think the newcomer will understand, and they are inclined to speak slowly. When the newcomer looks confused, locals offer further explanation. Second, the method works with multiple people, making it possible to elicit diverse content depending on the knowledge and interests of each participant. One can ask for more detail using the vehicular language, e.g. "what happens here?" or "how is this used?" Third, the method is two-way, since locals are called on to deliver tours and inductions to newcomers using English, and some are keen to improve their command of English. Once a newcomer knows the content of a typical tour, he or she can give the tour to a local, in English, and the local can review the recordings later. Fourth, the content only requires the spoken vernacular language. We photographed each location so that meaning could

be anchored in an image instead of a translation. Nothing needs to be written down. Finally, making recordings on the land aligns with how Aboriginal people conduct their lives. "Connection to country ... permeates how Indigenous people manage, access and live and learn ... [and] are strongly linked to many other aspects of their wellbeing, including health, spirituality, identity and standard of living" (Yap and Yu, 2016, 4).

## 5 Discussion

**Relationships.** Working through reciprocal relationships is required for institutional approval of Indigenous research in Australia (NHMRC, 2018; AIATSIS, 2022). Scholars in linguistics and HCI have reported that reciprocity is central to successful research engagements (Samarin 1967, p11; Dimmendaal 2001, p58; Brereton et al. 2014; Taylor et al. 2019; St John and Akama 2022). We observed that language learning offers a natural pathway into these reciprocal relationships, opening the way for local participation. It repositions newcomers as learners, and locals as authorities.

Simple language technologies supported the first author in *learning to participate*, which in turn enabled us to work together more effectively in the school and the ranger program over an extended period. There was a synergy between the local preoccupation with intergenerational transmission of cultural knowledge, and with a newcomer learning to participate in the local lifeworld supported by language technology (Fig. 2(d)). This prospect has been described as *relational language technology* (Taylor et al., 2019). The designs in Section 4 helped to build the capacity of a newcomer, but we have also begun exploring ways that participation by newcomers activates intergenerational knowledge transmission (Wiltshire et al., 2022; Wiltshire, 2024; Hlaváčková and Bird, 2024), leading to mutually-reinforcing actions in the intercultural space (Fig. 2(d); Tomoiaia-Cotisel et al. 2017; Curtin and Bird 2022; Bird 2022, §4.3).

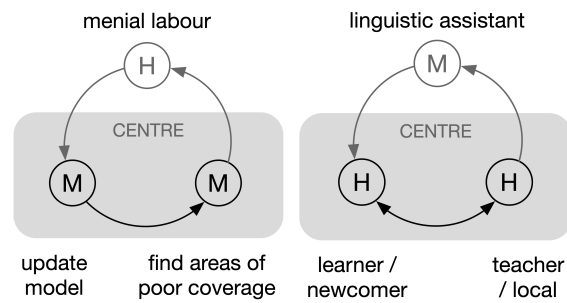
**Agency.** The Eurocentric position begins from the space of institutional languages (Fig. 1), and leads to calls to improve literacy in local languages as a precondition for a bright future for NLP (Adebara and Abdul-Mageed, 2022, p3819), often premised on 'social good' and other externally-driven agendas (Mager et al., 2018; Bird, 2020; Jin et al., 2021; Meighan, 2021); Schwartz 2022, p726; Flavelle and Lachler 2023.

Centering the local speech community is a decolonising practice which recognises the sovereignty of Indigenous communities (Smith, 2012; Stebbins et al., 2017). Indigenous peoples have a right to self-determination, including control over their languages, and not ceding the development of their languages to outside ‘experts’ (United Nations, 2007; Leonard, 2017). Language owners are standing up to exploitation and extraction by NLP/AI practitioners (Mahelona et al., 2023). A better alternative for newcomers is to *centre the other*, visiting and revisiting a community for long enough to understand the local matters of concern, and observing how locals already enact their agency (e.g., Curtin and Bird, 2022). From here it is a natural step to take ‘primary orality’ as the starting point for design (Bidwell and Hardy, 2009).

**People, Practices, Places.** The three designs concern three ways of situating technology. They are as rudimentary as one could imagine: addressing people, using the right vocabulary while working together on a culturally meaningful task, and knowing important facts about the locality. They align with the emphasis of Third Paradigm HCI on the social, cultural, and physical situatedness of users and analysts (Harrison et al., 2011). They relate to local languages and lifeways from inside (Basso, 1996; Christie, 2006). They suggest areas for further work to ‘provincialise’ technology (Srinivasan, 2017).

**Epistemology.** Steven entered Arnhem Land with a western epistemology of language as a bounded lexicogrammatical code, of language as a formal system that can be manipulated by program, and of language as primary data to be fed into technology. As *quid pro quo* for participation he offered promises for technology-mediated literacy development, information access, and language revitalisation. Dean saw the promise of all of this for the school and ranger program, as local institutions that interface with the outside world.

However, locals did not warm to this agenda, and one reason might be that the local epistemology of language is different. The Kunwinjku word for language is *kunwok*, ‘the talk’, which encompasses speech and stories, along with the associated knowledge and Country. If locals talk about teaching *kunwok* it is a metaphysical error for a newcomer to assume this is a statement about grammatical fluency in language-as-code. Such statements usually



(a) Building machine capacity with a human in the loop (cf. Fig. 2(d)) (b) Building human capacity with a machine in the loop (cf. Fig. 2(d))

Figure 4: Two Design Patterns for Human-Computer Interaction in Speech and Language Processing

concern language-as-social-practice (cf. Leonard, 2017), and fluency in *kunwok* as cultural fluency (in which language is always implicated). This explains why Dean encouraged Steven to mix Kunwinjku and English, just as locals do when functioning in the intercultural space.

**Design Pattern.** A popular vision for mainstream NLP/AI is to deliver language technologies to all languages. However, in the case of languages beyond the first 500, languages with primary orality (Fig. 1), there is a pattern of ‘centering the machine’, harnessing a human-in-the-loop to build machine capacity (Fig. 4(a)). This amounts to a net loss of agency, and it perpetuates local disenfranchisement. Westerners are habituated to this, routinely ceding data in exchange for services, and this is leading to the rise of large language models and to societal threats best described as existential. Those Indigenous communities that have remained resilient in the face of centuries of outside pressure have done so by guarding their agency. Thus, it should come as no surprise that a newcomer’s extractive engagement was reformed by locals into an agency-enhancing engagement.

Our designs are all cases of centering the community, using a machine-in-the-loop to build the capacity of humans (Fig. 4(b), Wu et al. cf. 2022). Three linguistic interactions, addressing people, working together, and connecting to Country, involve linguistic productions by a local that are captured in a technology that assists learning by a newcomer. We only scratched the surface, and there is an opportunity for NLP/AI to curate this content for the learner while modelling the learner’s progress. This is still NLP, data processing that uses knowledge of language (Jurafsky and Martin, 2000, p2).



**Novelty.** This approach is distinct from *experiential language learning* which is concerned with adding an experiential element to classroom programs, and from *self-directed language learning* which assumes that there is a teacher and substantial learning resources (Garrison, 1997; Kohonen et al., 2001; Bloom and Gascoigne, 2017; García Botero et al., 2019). It represents a departure from dyadic human-app interactions to interaction with shared objects in a shared space (Harrison et al., 2011, p387). It is offered as an approach to participation in the lifeworld of a local oral society when there is no recourse to formal programs with classrooms, teachers, and learning resources (Burling 1984, p1; Werner and Schoepfle 1987, pp223ff; Clark and Torretta 2018). Instead, we “turn everyday situations between [speakers] and [learners] into ‘sites of language learning’ through the development of information technology tools” (Clark, 2013).

**Generalising.** Reviewers of this and related papers usually saw the focus on locality as a problem, e.g., “It is unclear how much their findings can be applied to other language communities, in particular when there is no common language between the newcomer and the locals.” The common expectation is that technologies should generalise across sites. This happens when “qualitative research ... is being evaluated from the perspective of positivism [leading to] inappropriate demands ... to explain how research conducted in the Global South or with marginalized communities ‘generalizes’ or applies to other settings” (Soden et al., 2024, p40).

There is no shortage of lessons to be learned, only not through induction but rather abduction, inference to the most likely explanation. Failure in recruiting locals led to an epistemological shift – from language-as-data to language-as-social-practice – thence to designs that honoured local agency in setting the agenda. Centering the speech community is a lesson that can be applied anywhere. For example, in the case of the Irish language, making this shift would involve identifying the speech communities, including a bilingual speech community centered on the Gaeltacht with oral transmission of Irish as a first language, distinct from another bilingual speech community of L1 speakers of English who are learning Irish as a second language in which the written form may be more central.

## 6 Conclusion

The first author is often asked for advice concerning “good ways in” to Indigenous communities, and “good ways forward” for staying longer, or going deeper. Some people say they could never engage with an Indigenous community because they “wouldn’t know where to begin.” We hope to have shown that answers to such questions are highly contingent and local. Although our way in and way forward cannot be replicated, some lessons might apply broadly, such as the basic human act of sitting with local people and cultivating a space of openness and possibility. Indeed, this is a well-trodden path: “promoting sociability in which mutually engaging communication can occur” (Christie and Verran, 2014, p261); building shared understanding and realising collective possibilities through *doing* language (Hirsu, 2020); and practicing a type of learning-through-engagement that local people prize as ‘two-way’ (Harris, 1990).

In the space of local oral languages (Fig. 1), technology engagements could adopt the frame of community-based language development (Lewis and Simons, 2016, §3), and seek not to extract but support. In the space of minoritised groups, it is a moral and political act to prioritise the interests of a speech community above acts that treat their language as a data resource. Centering the speech community is an act of alignment. As a US government language technology program manager asked the first author “whose side are you on?” In this contested space, “this underscores the importance of non-Indigenous people developing a moral and political framework through which to be supportive of Indigenous people” (Land, 2015, p202).

How do we centre the local speech community? We have exemplified an appreciative approach that begins with local strengths and with what people are already doing. We have adduced the themes of relating to people on the ground, participating in culturally meaningful practices, all anchored in their old and living connections to their land. We have suggested an agency-enhancing design pattern. It turned out that language acquisition – by humans not machines – was a useful focus in this particular community, and an effective way to support a newcomer to learn to participate in the local lifeworld, and to begin working together with locals. And this is no end in itself, but an ongoing process, commitment, and orientation.

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