LANGUAGE DOCUMENTATION & CONSERVATION

Vol. 17 (2023), pp. 221-253
http://nflrc.hawaii.edu/ldc/
http://hdl.handle.net/10125/74736
Revised Version Received: 01 May 2023

Same, similar, or different: Lexical overlap across Australian Indigenous signed languages

Jennifer Green
The University of Melbourne

Eleanor Jorgensen
The University of Melbourne

To date, studies that investigate lexical overlap in signed languages have mainly considered the relationships between deaf community signed languages. The alternate sign languages of Indigenous Australia provide an opportunity to take another perspective – they are perhaps amongst the oldest known sign languages in the world, their main users are hearing, and senior people are the acknowledged experts, at least in some domains of sign knowledge and use. We developed a comparative list of signs as one tool in an investigation of dimensions of similarity and difference in nine language communities from Central and Northern Australia. We coded the data for the articulatory parameters of handshape, place of articulation, and movement, and developed a comparison matrix that captured similarity by using alphanumerical labels for unique sign forms. In doing so, we accommodated the existence of both inter- and intra-signer variation within single communities, a factor that has been overlooked in some previous studies. Our results support earlier observations that correlate sign diversity with geographical distance. We identify two distinct clusters of communities within which are higher percentages of lexical overlap. The first of these includes the Warlpiri, Anmatyerr, Alyawarr, and Arrernte language groups, while the second cluster includes Gurindji, Mudburra, and Kukatja. We note a general stability in lexical overlap (i.e., shared lexicon) in comparison to earlier records, but also an increase in similarity, suggesting some convergence might be taking place. Finally, we point to the need to unpack the complex sociocultural and linguistic factors that interact to drive similarity and difference in these signing practices. The list of commonly known signs, and the methods we have developed, is a useful resource that can inform future comparative studies.

1. Introduction[1] Australian Indigenous sign languages are predominantly used by hearing people as an alternative to speech when speech is either impractical or disal-

[1] We thank the many signers who have participated in sign language documentation projects in Central and Northern Australia over the years. This research has been supported by the Batchelor Institute of Indigenous Tertiary Education (BI) and funded by the ILA (the Australian Government's Indigenous Languages and Arts program); by ARC Fellowships (DP110102767, DE160100873, and IN150100018); and by the Centre of Excellence for the Dynamics of Language (CoEDL) (CE140100041). This research has been approved by the University of Melbourne Human Research Ethics Committee (HREC no: 1646778.1). A version of this article was presented at the Australian Linguistics Society conference in December 2021. We thank members of the University of Melbourne postdoctoral reading group, two anonymous reviewers, and the editors of this journal for their constructive and thoughtful feedback.

Licensed under Creative Commons
Attribution-NonCommercial 4.0 International
E-ISSN 1934-5275

lowed for cultural reasons.[2] Sign languages such as these are often termed *alternate* sign languages, and they have been documented in various world contexts, either when silence is required or speaking is impractical. They include sign languages used in some monastic communities in Europe and other parts of the world (Quay 2015), sign systems used in noisy workplace environments (e.g., Sawmill Sign Language, North America), and hunting signs, such as those from Northern Botswana (Mohr 2015) (see Pfau 2012: 528–551; Jepsen et al. 2015). Alternate sign may also serve as a *lingua franca* in places where there are many spoken languages and no shared vernacular, as reported for Plains Indian Sign Language used by Native Americans in the United States and Canada (Davis 2015).

In the Australian context, sign is a stand-alone form of communication in some circumstances, but it is often supported by other semiotic systems such as speech, drawing, and gesture (Green 2014). Sign may also function as a shared communicative resource in some multilingual communities, for example in Arnhem Land (Elwell 1982). Although estimates vary, the original spoken languages of the Australian continent number over 250 (Australian Government 2020: 14), so one question that arises is whether Australian Indigenous sign systems exhibit equivalent diversity. And, if we propose to try and answer these questions, what methods and metrics of similarity and difference would be appropriate for sign languages such as these?

This article addresses one aspect of similarity by investigating lexical overlap in Australian Indigenous sign languages. We define lexical overlap as the extent to which signers use the same, or similar, signs for a particular referent. As a preliminary evaluation of the current state of sign diversity, we use lexicostatistical methods to compare the form and meaning of a set of 109 signs from nine language communities across Central and Northern Australia. Our comparison is based on video recordings of sign made by research teams between 2011 and 2021. The signs have been annotated in ELAN (Wittenburg et al. 2006) and then assessed for similarities in three macro parameters of sign articulation – handshape, place of articulation, and movement – drawing on methods outlined in Kendon (2013[1988]) and Jorgensen et al. (2021). As some early comparisons from the late nineteenth and early twentieth centuries were based partly or wholly on written descriptions, drawings, or photographic stills, the availability of video records now enables a better assessment of similarities and differences in sign forms.

In a previous study, Adam Kendon concluded that geographically distant Australian Indigenous communities share fewer signs than do close ones, and adjacent groups have more in common in sign regardless of the relatedness of the spoken languages used (Kendon 2013[1988]). Although several languages (Anmatyerr, Warlpiri, and Mudburra) and two of the communities we consider (Ti Tree and Elliott) were included in Kendon's comparisons, the diversity of languages and the geographical range of the signing practices we discuss go well beyond the scope of his original study and allow for a more comprehensive assessment of the correlation

2 In this article we use the term *Indigenous* to refer to Australian Aboriginal and Torres Strait Islander peoples, although preferences vary across the continent. See https://aiatsis.gov.au/explore/australias-first-peoples (accessed 2022-02-08).

between lexical difference and spatial distance. Our study provides a synchronic snapshot of lexical overlap across Australian Indigenous signing communities from Central and Northern Australia and establishes a methodological foundation for further comparative work. Our aim is not to make categorical distinctions between sign languages, speculate on their historical relationships, or make definitive statements about the mutual intelligibility of sign varieties. We assume that the shared communicative ecology includes not only sign but also the gestural strategies of the broader community – sign is one component in the overall "semiotic plurality of communication" (Ferrara & Hodge 2018: 2). Rather, quantifying the extent of lexical overlap provides a more nuanced understanding of the range of signing practices that exist within and across communities.

The article is structured as follows: in §2, we give a brief description of the signing communities in our study. §3 gives an overview of lexicostatistical methods and introduces issues that arise when using this methodology to compare sign languages. §4 examines the approach Kendon took when comparing Australian Indigenous sign lexicons and his conclusions about similarities and differences in signing practices across Australia. In §5, we discuss our methodology – the development of a comparative list, data annotation, and how we compared the data across language groups. In §6, we present our results and compare these findings with Kendon's. In §7, we discuss the roles that geographical distance and other interrelated historical and social factors may play in determining patterns of lexical overlap across the nine groups. We also briefly discuss the complex concept of iconicity, as this presents another challenge to understandings of the relationships between sign languages – if two communities both use the same semantically motivated form for a sign, it may be difficult to tell if this is due to historical relatedness, borrowing, or parallel invention. A final comparison between Auslan and a small set of signs in the nine groups in our study illustrates this point. In §8, we summarise our findings.

2. The communities and languages in our study

Figure 1. Map showing the communities included in the study. Spoken language names are capitalised (Map: J. Green).

The nine main spoken languages and communities in our study are i) Warlpiri (*Nyirrpi*, *Willowra*, *Ti Tree*); ii) Central Anmatyerr (*Ti Tree*); iii) Arrernte (*Alice Springs*); iv) Alyawarr (*Amperlatwaty*, *Arnkawenyerr*); v) Ngaanyatjarra (*Warburton*, *Tjukurla*); vi) Gurindji (*Kalkaringi*); vii) Mudburra (*Elliott*); viii) Kukatja (*Balgo*); and, lastly, ix) Ndjébbana, Burarra/Gunnartpa, Wurlaki/Djinang, and Kuninjku (*Maningrida*). Figure 1 shows the locations of these communities and spoken languages (see also Table 1). One characteristic of many of these communities is a tendency for widespread multilingualism in spoken languages. For example, in Ti Tree both Anmatyerr and Warlpiri are spoken (as well as other languages such as Kaytetye and English). In Kalkaringi, people speak Gurindji and Gurindji Kriol, as well as having facility in some neighbouring languages (e.g., Warlpiri). The broader region of Arnhem Land is acknowledged as a 'hotspot' for linguistic diversity. In Maningrida, a community of several thousand, up to fifteen languages are used on a daily basis (Vaughan 2018).

Sign performs a range of functions in these communities. It is used in certain types of gender-restricted ceremonies and in other ritual situations where speaking is inappropriate or disallowed. Sign may be used when hunting or fishing and for communication over distance when interlocutors are visible but out of earshot. A switch to sign may signal the circumspection required of sensitive or taboo topics, and sign is one of the resources drawn upon to mark respect. For elderly people who lose either their speech or hearing, sign can become a very important communicative option later in life. In some communities, sign is used instead of speech by particular kin in the context of extended periods of bereavement, often called 'sorry business'. For example, in some Central Australian communities, widows traditionally observed speech bans during periods of mourning, which could last up to a full year, and partial restrictions on speech in these contexts continue to this day. Although not much is known about the acquisition of sign by small children in this region, our observations show that at least some signs are learnt early in life. Sign may be used at the same time as speech, with sign functioning as a parallel track of communication, providing complementary or supplementary information to speech as part of a multimodal utterance. The number of conventionalised signs in everyday use may be less than 200 in some communities, while in others the number of signs may extend to well over a thousand, as Kendon (2013[1988]) found for the Warlpiri of Central Australia. While there has undoubtedly been loss of knowledge of sign, at the same time these are dynamic repertoires, and new signs are developed to fulfil changing communicative needs.

Community-sanctioned or widely used names for signed language varieties in Indigenous Australia are uncommon. The practice of signing is frequently referred to by terms based on spoken language words for 'hand' – for example, in Anmatyerr *iltyem-iltyem* (*iltya* 'hand'), in Warlpiri *rdakardaka* (*rdaka* 'hand'), and in Ngaanyatjarra *mara yurriku* (*mara* 'hand', *yurriku* 'shake or move'). In Arnhem Land, the term 'action' may apply to these conventionalised repertoires, and in other contexts,

English phrases such as 'finger talk' or 'hand talk' have been used.[3] While there are clear advantages in having succinct ways to refer to signing practices, the choice of nomenclature may have the negative effect of prioritising some sign varieties over others in multilingual contexts, of obscuring variation, and of simplifying what is in fact a complex situation where no precise boundaries can be drawn (see Snoddon & De Meulder 2020: 155, 158). It assumes that there is consensus as to where the community focus of a particular sign variety lies and that this remains static. These issues about nomenclature are not unique to the Australian Indigenous context (see, e.g., Johnston 2003: 66). While we acknowledge that it is a simplification, in the remainder of the article we use spoken language terms to refer to the nine groups, except for Maningrida, where speakers of four languages are represented in the dataset.

3. Lexicostatistical methods for signed languages Lexicostatistical methods using Swadesh-like lists of vocabulary have been used to investigate historical relatedness among both signed and spoken languages. These methods enable linguists to compare and determine the degree of similarity between a small number of basic lexical items, usually by categorising them as the 'same', 'similar' (sometimes 'related'), or 'different'. Judgements about the relatedness of languages are then made based on the percentage of signs that are the same across the selected individuals or communities. Historical linguists working with spoken languages tend to use lists of around 200 words, originally developed by Morris Swadesh in the early 1950s (Swadesh 1950; 1952). The lexical items chosen for comparison are assumed to be core vocabulary: pronouns, numerals, body parts, terms for family members, geographical features, basic actions, basic colours, and some other common descriptive words. These core terms are claimed to be relatively stable and resistant to change from borrowing. Swadesh also suggested percentage thresholds to determine what constitutes belonging to the same language family (>36%) or being dialects of the same language (>81%), though it is not clear why these percentages have been chosen as the cut-off points between different degrees of relatedness.

When it comes to sign, Woodward (1978; 1991) devised a list of a hundred items (excluding pronouns and body parts, which tend to be signified by pointing actions) for use in comparative studies. Many lexicostatistical studies of deaf community signed languages have employed this list (McKee & Kennedy 2000; Guerra Currie et al. 2002; Johnston 2003; Xu 2006; Aldersson & McEntee-Atalianis 2008; Al-Fityani & Padden 2010; Stamp 2013; Hurlbut 2014; Clark 2017). Most focus on the relationship between sign varieties in a number of communities within the same region or nation-state, though there are a few that compare sign languages that are assumed to be unrelated (e.g., Guerra Currie et al. 2002; Börstell et al. 2020). An extended list adapted for sign, with just over 300 items, has been used by some (Woll

[3] There are four Australian entries in the Ethnologue under the category 'Shared-signing language'. These include Australian Aborigines Sign Language (asw), Miriwoong Sign Language (rsm), Yan-nhangu Sign Language (yhs), and Yolngu Sign Languages (ygs). See https://www.ethnologue.com/ (accessed 2023-04-04).

et al. 2010; Börstell et al. 2020).

There have been critiques of the validity of lexicostatistical methods in their application to both spoken languages and signed ones (Palfreyman 2014; Mudd et al. 2020). In particular, there are several problems with using these methods for comparing signed languages. The first is the suitability of this method for determining their historical relatedness. While signs clearly have sublexical structure, the absence of a historical record for many sign languages means there have been few studies of diachronic phonological change, and without these, it is difficult to make judgements about how signed languages may be related. Furthermore, as this method only compares lexical items, it can never paint the full picture of a language. Morphological and syntactic structures, nonlexicalised communicative strategies within signed languages, and evidence from patterns of social interaction are other factors that should be considered when investigating the relationship between languages. While lexicostatistical methods are traditionally used to measure lexical overlap in order to assess historical relationships between languages, our aim in this article is to outline overlapping communities of practice in the nine groups. We find that these methods, and in particular the use of comparative lists, are a useful tool for this purpose.

There are other issues with these methods that remain. What constitutes 'basic' vocabulary differs across languages, and some items on standardised lists may be over- or underspecified or completely irrelevant due to environmental or cultural differences between communities (see Safar 2021). As Johnston (2003: 49) points out, there are problems with ensuring that the dictionary definitions of signs are equivalent across languages and problems in taking these definitions at face value. Signs may have more than one sense, resulting in semantic mismatches when attempting to compare signs across languages. Both Mudd et al. (2020) and Börstell et al. (2020: 21) emphasise the difficulty of 'concept matching', whereby equivalence of meanings is established in the languages being compared.

A further issue is an assumption, implicit in the methodology, that each sign has a citation form and that there will only be one sign elicited for each item on the Swadesh-like list. In practice, we can expect that signers may know and use more than one sign for a given prompt, and there may be individual and intracommunity variation as to how a sign is produced. Palfreyman (2014: 10) refers to the issue of variation as perhaps the method's "most notable shortcoming" and suggests that most, if not all, lexicostatistical studies avoid the question of whether signers have knowledge of more than one sign variant. The kinds of variation found in fluent signing are also underrepresented. Where there is mention of intraindividual variation, it is often unclear how methodologies have been adapted – if at all – to deal with this issue. Börstell et al. (2020) and Johnston (2003) prove to be exceptions. Börstell et al. (2020) captured multiple sign variants in Sign Language of the Netherlands, Chinese Sign Language, and International Sign from the online lexical database Global Signbank (Crasborn et al. 2020). Their solution to variation was to choose the "best-match sign pair" (Börstell et al. 2020: 25) when comparing two signed languages; whichever variants shared more of the articulatory parameters used as metrics for lexical similarity were selected for comparison. Johnston (2003) compared Australian Sign Language (Auslan), British Sign Language (BSL), and New Zealand Sign

Language (NZSL), using two techniques to form his dataset: firstly, a Swadesh list and, secondly, a comparison of randomly selected signs from the dictionaries of these languages. He also took a 'best match' approach so that "two signs were scored as identical in each of two sign languages if at least one variant form in one language matched at least one main or variant form in another" (2003: 49). He concluded that Auslan, BSL, and NZSL should be considered as varieties of the same sign language because they have a high degree of lexical overlap (Johnston 2003: 47). This 'best match' approach to variation was found to be unsuitable for our data as we have no evidence of a standard or citation sign form – and so to not compare all variant forms would misrepresent the reality of signing practices in these communities. Some methods used by others for comparing signs, based on iconicity of sign forms, are briefly discussed in §7.1.

4. Previous comparisons between Australian Indigenous sign languages The only other attempt to compare the lexicons of Australian Indigenous sign languages was undertaken by Kendon. His fieldwork was concentrated in what he termed the North Central Desert (NCD) from 1978 to 1986, particularly with the Warlpiri (*Yuendumu*), Anmatyerr (*Ti Tree*), Kaytetye (*Tara*), Warumungu and Warlmanpa (*Tennant Creek*), and Mudburra and Jingulu (*Elliott*). In the twelfth chapter of his 2013[1988] publication *Sign Languages of Aboriginal Australia,* Kendon examines differences within the NCD group as well as comparisons between the NCD and what was known about sign elsewhere in Australia, drawing on a range of documentary sources. For the intra-NCD comparison, he selected 250 sign meanings, covering all semantic domains (2013[1988]: 375).[4] Kendon defined a sign as being the *same* if it was identical in three aspects – 'actor' (handshape, arm position, and hand orientation), 'location' (in space or on the body), and 'action' (movement of the hand, arm, wrist, or fingers) (see Kendon 2013[1988]: 462–473). Signs were deemed to be *similar* if they differed in one aspect and *different* if more than one parameter varied (Kendon 2013[1988]: 375). Kendon acknowledged that, although signs may be judged to be different by these criteria, they may nevertheless be "variants on a theme" because of similar choices of base selection (the underlying concept from which a sign form is derived) and strategies of representation (Kendon 2013[1988]: 377). Within the NCD groups, he found the percentage of *same* signs to range from 19% to 61%. A small number of signs were found to be the *same* or *similar* throughout: BOOMERANG, HORSE, BOY, ECHIDNA, ONE, TWO, FEW, MANY, AXE, FORGET, FAR, and WAIT (Kendon 2013[1988]: 392).

As mentioned previously, Kendon concluded that geographical distance is the strongest factor governing the degree of similarity or difference between signed vocabularies (Kendon 2013[1988]: 381). This especially applies between areas where sign has similar functions, for example in communities where the tradition of avoiding speech during bereavement is observed (Kendon 2013[1988]: 399). We also see that sign language vocabularies are more similar between groups than spoken language ones, or, as Kendon puts it, "signs cross linguistic boundaries more readily

[4] The actual number of items compared ranged between 164 and 256.

than words" (2013[1988]: 384). He suggested several explanations for this. The first is that sign is not generally regarded as being closely linked to linguistic identity and to geographical regions or 'country' in the ways that Australian Indigenous spoken languages usually are. Another possible factor is that signed forms do not become taboo in the ways that spoken language words do (Kendon 2013[1988]: 384–387). Kendon also made some comparisons beyond the NCD based on signs documented by Roth (1897) in Queensland; by the Lutheran missionary Carl Strehlow, who lived at the Hermannsburg Mission in Central Australia from 1894 to 1922 (Strehlow 1915); and by Wick Miller (1971), an American linguistic anthropologist who worked with Western Desert peoples at Warburton Ranges Mission between 1969 and 1970. He also compared twenty sign meanings, looking beyond the NCD to include an even wider geographical scope. This study included twenty-four groups, based on a range of documentary sources (Kendon 2013[1988]: 396–397).

Regarding these findings, Kendon alerts us to several caveats. In early documentations, ambiguities are introduced by inaccurate identification, particularly of flora and fauna, and by the nonuniform application of sign glosses or 'translations'. These early records also predate video records, and so we cannot be certain of a sign's form. Some are written descriptions, such as the following, at times with accompanying line illustrations.

> ***ara*** (red kangaroo) One first puts 1 on the tips of 3,4, puts the contracted 2,5 against 3,4 and then proddingly thrusts the hand (back of hand facing up) forwards a few times, letting the fingers snap off the thumb and extending them as they spread out. (Strehlow 1915)

Other factors make it difficult to replicate Kendon's study: the lists of signs used in the comparisons are generally not accessible, except for the twenty-sign comparison. The extent to which Kendon included multiple signs or variations elicited for the same lexical item in his calculations is unclear. These choices could have strongly impacted his results.

5. Methodology

5.1 Recording sign and developing the comparative list The sign data for this study were recorded between 2011 and 2021 by teams of researchers, mostly led by the first author and in partnership with the Batchelor Institute in Alice Springs. One of the objectives of this research has been to engage collaboratively with communities and work with Indigenous people and organisations to make resources that support knowledge of sign (Green et al. 2017; Green et al. 2019: 397–434; Green et al. 2020).

The development of the list of signs for elicitation was iterative. In some communities, Indigenous co-researchers workshopped the signs that they wanted to record. In others (e.g., Ti Tree), Kendon's original documentation of signs used there provided a baseline for exploring sign knowledge, some forty years on. In most contexts, the sign elicitation prompts were in local spoken languages. The signers were almost all hearing, and the team of linguists and community researchers included speakers

of local languages. Written forms of these languages (or of English) were not used, thus avoiding any issues arising from variable literacy skills of the participants. In several communities, we also trialled some image-based 'director-matcher' tasks as well. These types of stimuli, and other photo, drawing, or video recognition and description tasks, have been used in some other studies of signed languages (e.g., de Vos 2012; Zeshan & Sagara 2016; Reed 2019; Mudd et al. 2020; Lutzenberger et al. 2021; Horton 2022). However, as others have pointed out, picture stimuli are well suited to some domains – particularly the representation of concrete entities – and less suited to others (Safar 2021: 42).[5] The signing sessions were filmed using high-resolution video recorders, and a blue film backdrop was used to facilitate the analysis of sign features by providing a uniform background. Examples of the recordings can be accessed on the sign website and dictionary *iltyem-iltyem* (Green et al. 2011; Carew & Green 2015; Campbell et al. 2021[2013]).[6]

The sign list used in this study consists of 109 signs (Appendix 1). It is not an a priori list – rather the signs were chosen to maximise the number of signing communities that could be included in the comparison. To enable a wide geographical comparison, we needed to discount signs that relied on the specifics of local ecologies and compare like with like. The signs were assigned ID glosses (Johnston 2010: 123), usually keywords in a spoken language (in this instance English) that partially reflect the meaning of the sign. This enabled effective searches across multiple datasets. Sign ID glosses are conventionally represented in small caps. They are 'generic', as they are indicative of concepts found in sign across Indigenous Australia, even as the exact meanings of a particular sign, and the polysemous networks they are part of, may differ across communities.

Our comparative list excludes several domains:

- Signs for body parts – in most cases these are achieved by pointing to the relevant body part (Kendon 2013[1988]: 169–173).
- Signs for pronouns – pronominal functions are achieved by pointing, although there is some variation across communities.
- Most signs for colours – in Indigenous Australia, there are few signs for colours that do not have another primary meaning, such as RED OCHRE/RED and GRASS/GREEN (see Adone et al. 2012).
- Ecology-specific flora and fauna, aspects of the environment, and artefacts – for example, BOAT, MANGROVE WORM, WITCHETTY GRUB, SANDHILL, and SEA.

For our purposes, whether signs are from the native lexicon or borrowings, or whether they are prone to change over time, was not relevant. We were not limited to certain vocabulary items on an existing list, and this gave us the scope to develop an appropriate list for elicitation in Australian Indigenous signing communities.

---

[5] Reed (2019: 73) found that only half of the images that she tested in her study of sign in the Western Highlands of Papua New Guinea achieved a consistent response, either because the images were unclear or because they prompted descriptive paraphrases.

[6] See http://iltyemiltyem.com (Accessed 2021-07-04).

Some items in the Woodward list were included in our investigation (see Appendix 1); however, at least 20% were not, largely because of differences in the semantic distinctions that drive differentiation in signed vocabulary (cf. Kendon 2013[1988]: 369). These may be the consequence of differences in ecosystems (ICE, SNOW, SEA) and the ways that cultural taxonomies of flora and fauna are organised in lexicons – items in the Woodward list such as ANIMAL, TREE, FLOWER, and WORM tend to be signed in Indigenous Australia with signs that refer to distinct species. Some modern artefacts (e.g., ROPE) do not have sign equivalents in Indigenous Australia. Items that appear as distinct entries in the Woodward list (WHAT, WHEN, WHERE, WHO) are usually accounted for by one multipurpose sign (WH.QUESTION) in Australian Indigenous sign (see Zeshan 2006).

5.2 Sign annotation The data were annotated in ELAN (Wittenburg et al. 2006) using a shared template. For each of the nine sign groups, the first pass involved tagging examples of each sign from the comparative sign list. Sign tokens which were produced identically within a group were not tagged multiple times. If there was variation in sign production or multiple signs were produced in response to the elicited item, all unique sign tokens were tagged. The datasets varied in size, and none of the groups had examples of all 109 signs on the comparative list. Likewise, the number of tokens for each group differed depending on the amount of variation in sign production and whether multiple signs were elicited for the same sign ID. Table 1 summarises the number of sign IDs and tokens for each group, and the number of signers recorded.

Table 1. Sign ID count and sign token count per community dataset

Language and Community	Sign ID Count	Token Count	Signers[7]
Warlpiri (*Nyirrpi, Willowra*)	72	81	9
Anmatyerr (*Ti Tree*)	105	119	10
Arrernte (*Alice Springs*)	106	123	1
Alyawarr (*Amperlatwaty, Arnkawenyerr*)	106	136	7
Ngaanyatjarra (*Warburton, Tjukurla*)	97	134	6
Gurindji (*Kalkaringi*)	101	166	27
Mudburra (*Elliot*)	83	97	4
Kukatja (*Balgo*)	45	58	4
Ndjébbana, Burarra/Gun nartpa, Wurlaki/Djinang, Kuninjku (*Maningrida*)	55	73	16
Total		987	84

Each sign token was coded for the articulatory parameters of handshape, place of articulation, and movement of each signing hand. These articulatory parameters were chosen as the basis for our sign comparison as they are widely accepted as macrolevel organising features of sign phonology (Liddell & Johnson 1989; Sandler 1989; van der Hulst 1993; Brentari 1998). They also appear to be more salient to contrastiveness in Australian Indigenous sign languages compared to other aspects of sign production, such as orientation, nonmanual features, and handedness. For instance, orientation of the palm can be seen as an interaction between the active part of the hand and place of articulation and, in our data, proved highly variable even across multiple tokens produced by the same signer. None of the nine groups appeared to use nonmanual features for lexical contrast. Signing with one hand or both hands did not result in a change in meaning, nor did switching between left- and right-hand dominance.[8] The three parameters of handshape, place of articulation, and movement are also generally comparable to Kendon's parameters of 'actor', 'location', and 'action' and are included in a number of other studies (e.g., McKee & Kennedy 2000; Johnston 2003; Xu 2006; Woodward 2010; Al-Fityani & Padden 2010; Hurlbut 2014; Clark 2017).

To code handshape, we employed the numerical codes developed by Kendon for NCD handshapes (Kendon 2013[1988]: 461–73). For signs that involve a change in

[7] These numbers represent the total number of signers recorded for each group. As not every instance of a particular sign was included, not every signer is represented in the data.

[8] Nonmanuals and handedness were also disregarded in Johnston's (2003) comparison of Auslan, BSL, and NZSL.

handshape (i.e., finger movement), both the initial and final handshapes were coded. Place of articulation was coded as either 'neutral space' – the area in front of the signer's body – or in relation to a particular body part. The list of body locations used in coding follows Jorgensen et al. (2021). Any contact with the body was coded either as 'simple' – the beginning or end point of path movement – or 'durational', where body contact was maintained throughout the movement. Both path trajectory (toward, away, up, down, sideways, and circular) and wrist movements (flexion, extension, supination, pronation, and deviation) were coded, as well as identical and bidirectional repetition and alternation in two-handed signs.

The language-specific sense(s) of the sign tokens, based on accompanying speech and other contextual information, were also coded. Some items in the sign list represent commonly expressed polysemies across Australian Indigenous sign languages, but the distribution of these polysemies varies from language to language. They may be based on a perception of shared attributes: for instance, the sign CHILD is also used to mean 'small' and 'young (of an animal)' in some sign communities but not in others. Structural aspects of social organisation also determine polysemies in the kinship domain: in the languages surveyed in Maningrida, FATHER'S MOTHER and MOTHER'S FATHER are signed the same way, whereas in Anmatyerr and Warlpiri, these signs are distinct (Green et al. 2018). The sign AUNT ('father's sister') may be the same as both the sign FATHER and the sign NEPHEW/NIECE ('son or daughter of a male sibling') in some languages (e.g., Warlpiri, Anmatyerr), whereas they are distinct signs in other languages (e.g., Ngaanyatjarra), so the three sign IDs (AUNT, FATHER, and NEPHEW/NIECE) were retained. Extensions of meaning based on patterns of interaction include signs for objects, which also convey the sense of *using* the object, such as AXE/CHOP, CAR/DRIVE CAR, and BOOMERANG/THROW BOOMERANG. Capturing the range of senses was important to ensure that we were comparing like with like, even if two signs had slightly different scopes of use.

5.3 Representing variation using alphanumerical labels Rather than selecting a particular variant for comparison, we developed a comparison matrix that captures similarity by using alphanumerical labels for unique sign forms. For each sign ID in the comparative list, we looked across the examples from all nine sign groups and assigned a number to each sign form. Tokens that differed in the realisation of more than one articulatory parameter were assigned different numbers (e.g., 1, 2, 3…). Tokens that showed variation in only one parameter were all assigned the same number, along with a letter (e.g., 1a, 1b, 1c…). Identical sign forms were given identical number (and if necessary, letter) values. If there was more than one sign token for a given community, all were assigned values.

Exported ELAN file → **Comparison matrix**

Sign ID	Language	Hand shape	Location	Movement
MAN	L1	28	chin	toward-SC
MAN	L2	23	chin	toward-SC
MAN	L2	23	chest	side-DC
MAN	L3	28	temple	s-circle
MAN	L4	28	chest	side-DC

Sign ID	L1	L2	L3	L4
MAN	1a	1b, 2a	3	2b

Figure 2. Assigning alphanumerical labels to sign tokens for the sign ID MAN

An example of this process is seen in Figure 2. The matrix on the left is a subsection of the annotation values coded in ELAN for four language groups (L1–L4). Each row is a token of the sign ID MAN. Signers of languages L1, L3, and L4 use an index finger (handshape 28 in the appendix in Kendon 2013[1988]), while those of language L2 use an open hand (handshape 23). All four groups produce the sign MAN in relation to a body part but differ in the location: chin, temple, or chest. Movement also varies – 'toward-SC' is a path trajectory with simple contact at the body location; 'side-DC' is durational contact horizontally across the surface of the body part; and 's-circle' is a circular trajectory along the sagittal plane. Based on these annotations, the sign forms can be grouped. Language L1's sign and one of the signs used by language L2 are very similar, differing only in handshape, and so are assigned the same number but different letter values – 1a and 1b, respectively. The other sign that L2 uses is very similar to L4's sign, again only differing in handshape. These are also assigned the same number but a different letter value – 2a and 2b, respectively. The sign in L3 is not used in any of the other groups and differs by more than one parameter, so it is assigned a different number – 3 – and does not need a letter. The alphanumerical values given to the sign forms from each sign group are summarised in the matrix on the right of Figure 2. In this matrix, the row represents the sign ID MAN, and each value (1a, 1b, 2a, 3, 2b) in the row represents a token of that sign ID.

This method allows all sign forms used in a language group for a particular sign ID to be compared with all sign forms used in another group for the same sign ID, giving a more accurate and complete picture of lexical overlap. A further benefit of using alphanumerical labels is the immediate transparency of the relationship between sign tokens. To calculate lexical overlap, for every sign ID we compared each language group to every other language group. The standard analytical categories for lexicostatistics are whether the lexical items are the *same* (identical), *similar*, or *different*. A common metric for this is how many articulatory features the sign forms share. This differs across studies as different numbers of articulatory features are compared. We define our categories as follows:

1. Two tokens from two different groups are considered the *same* if their alphanumerical value is identical (e.g., both groups have token '1a' for a particular sign ID).

2. Two tokens from two different groups are considered *similar* if their numerical value is the same but their letter value differs (e.g., the first group uses '1a' and the second group uses '1b' for a particular sign ID).

3. Two tokens from two different groups are considered *different* if their numerical value is different (e.g., the first group uses '1' and the second group uses '2' for a particular sign ID).

The number of signs that are the *same* in two groups is thus a count of how many of their sign tokens are identical. The count of signs that are *similar* between two groups is a count of how many tokens they share, which have the same numerical value but a different letter value. The count of signs that are not shared between two groups is determined by calculating symmetrical difference: how many numerical values are used by the first group and not by the second, plus how many are used by the second group and not the first. Counts were done using R (R Core Team 2021), standardised to correct for disparities in the total number of comparable signs for each set of two groups.

Examples of pairs of signs from the data that were found to be the *same*, *similar*, or *different* are illustrated in Figures 3, 4, and 5.

a) b)

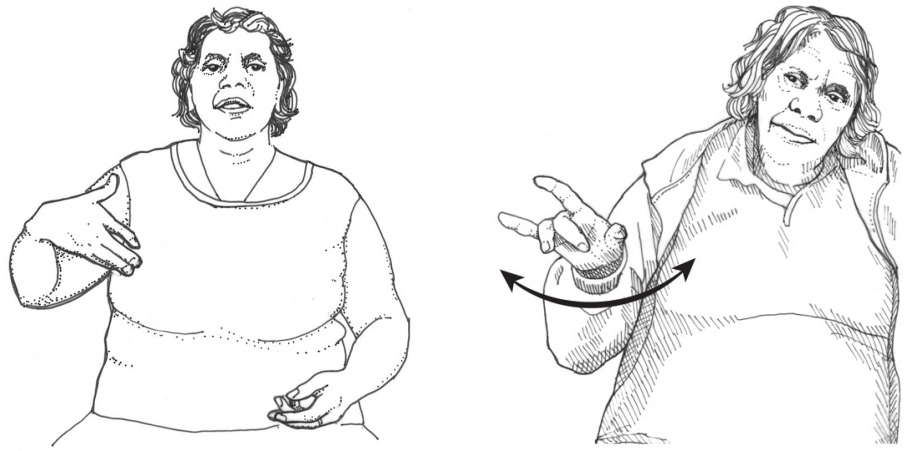
Figure 3. Example of two *same* sign forms: a) POLICE in Gurindji (*Kalkaringi*) (Green et al. 2017) and b) POLICE in Ndjébbana (*Maningrida*)

All nine groups use the same sign for POLICE (Figure 3). The sign is two-handed, articulated with the same handshape (a fist), in the same place of articulation (neutral space), and with the same movement (the wrist of the dominant hand moving to contact the wrist of the nondominant hand).

a) b)

Figure 4. Example of two *similar* sign forms that differ in handshape: a) MOTHER'S MOTHER in Ndjébbana (*Maningrida*) and b) MOTHER'S MOTHER in Gurindji (*Kalkaringi*) (Green et al. 2017; Green et al. 2020)

The sign for MOTHER'S MOTHER (Figure 4) in Ndjébbana and in Gurindji shares the same realisation in two of the three parameters – place of articulation and movement – but differs in handshape. In Ndjébbana, an index finger is used, while in Gurindji, both the index and middle fingers are extended.



a) b)

Figure 5. Example of two *different* sign forms: a) MOTHER in Ngaanyatjarra and b) MOTHER in Anmatyerr (Green et al. 2018)

The Ngaanyatjarra and Anmatyerr signs for 'mother' (Figure 5) differ in terms of all three parameters – handshape, place of articulation, and movement. The Ngaanyatjarra sign involves touching the breast, while the Anmatyerr sign uses a 'horns' handshape and bidirectional wrist rotation in neutral space. They are unambiguously distinct signs.

Alphanumerical labelling also allows us to compare sign tokens produced by signers from the same group. This allows us to investigate the degree of difference we might expect within a given community and thus gain a better sense of what constitutes significant lexical overlap. Figure 6 shows an example of intracommunity variation in the production of the sign DOG by Gurindji signers.

a) b) c)

Figure 6. Variant forms of the sign DOG produced by Gurindji signers

The first sign form (Figure 6a) is based on the hand representing a dog's mouth, with finger movement imitating barking. In the second and third sign forms (Figures 6b and 6c), the handshapes represent the paw of a dog (and the shape of the track it leaves). The signs differ only in the movement used to imitate the digging action of the dog. The first sign differs from the others in two parameters, and so by these metrics is a *different* sign. The second and third sign differ from each other in only one parameter and so are categorised as *similar*.

6. Results Of the 109 sign IDs on the comparative sign list, four (3.6%) were found to be produced identically in every group: AXE/CHOP, POLICE, TWO, and THREE. A further twelve (11%) share two out of the three parameters in all the signing groups for which there was an example: BRING, BURN/COOK, COME, DRINK, GIVE, GO, GOANNA, NOTHING/NO, WAIT, WALLABY, WH.QUESTION, and WRITE. It is no surprise that counting signs are widely shared – there are only a few of them, they consist of presenting the requisite number of fingers, and we have detected little significant variation across the communities as to the ways this is done (see Zeshan & Sagara 2016). Useful expressions such as NOTHING/NO and WH.QUESTION are also widely known and found even in the repertoires of young children. The least similarity is found in signs for attributes, including physical qualities such as TALL and emotions such as FRIGHTENED, and signs for time such as TOMORROW and LONG TIME AGO.

Some language groups show intraindividual variation in how they sign the sixteen *same/similar* signs or produce multiple signs for the same concept, but for each of these signs, at least one variant appears to have widespread usage. Any amount of lexical overlap across all nine signing groups is an interesting finding as it suggests a base level of similarity in the lexicon, regardless of the geographical distance or degree of social ties. The reason for the extensive use of a similar sign form across many communities is something we cannot determine with any certainty, but it is important to note that almost all these signs are semantically motivated or potentially based on shared gestural practices.

When comparing only two languages at a time, the degree of overlap increases, ranging from 6% between Warlpiri and Gurindji to 38% between Warlpiri and Anmatyerr. However, looking only at identically produced signs does not capture the entire picture of lexical overlap due to intraindividual and intracommunity variation. If we widen our scope to consider both *same* and *similar* signs (i.e., identical signs and signs that differ in only one parameter), the least amount of overlap is 29%, found between Warlpiri and Ngaanyatjarra (8% *same* and 21% *similar*), as well as between Anmatyerr and Ngaanyatjarra (7% *same* and 22% *similar*). The highest degree of lexical similarity is between Warlpiri and Anmatyerr with an overlap of 77% (38% *same* and 39% *similar*). This is not surprising as Warlpiri and Anmatyerr peoples are linguistic neighbours with close sociocultural ties. In the community of Ti Tree, both Anmatyerr and Warlpiri are spoken by many. The percentage of *same* and *similar* signs across all groups is shown in Table 2.

Table 2. Lexical overlap: Percentage of signs that were the *same* (upper %) or *similar* (lower %) for each pairing across the nine groups

	Arrernte	Alyawarr	Anmatyerr	Warlpiri	Kukatja	Gurindji	Mudburra	Maningrida languages	Ngaanyatjarra
Arrernte (*Alice Springs*)	N/A								
Alyawarr (*Amperlatwaty, Arnkawenyerr*)	20% 34%	N/A							
Anmatyerr (*Ti Tree*)	17% 33%	24% 40%	N/A						
Warlpiri (*Nyirrpi, Willowra*)	24% 32%	19% 38%	38% 39%	N/A					
Kukatja (*Balgo*)	7% 37%	14% 29%	12% 34%	12% 27%	N/A				
Gurindji (*Kalkaringi*)	10% 35%	12% 44%	10% 32%	6% 34%	16% 31%	N/A			
Mudburra (*Elliot*)	20% 26%	20% 32%	16% 26%	19% 23%	19% 37%	21% 39%	N/A		
Various languages (*Maningrida*)	15% 23%	11% 27%	11% 25%	11% 27%	18% 27%	22% 34%	16% 24%	N/A	
Ngaanyatjarra (*Warburton*)	12% 32%	15% 26%	7% 22%	8% 21%	20% 26%	14% 40%	12% 24%	15% 23%	N/A

The data in Table 2 are perhaps better visualised as a heatmap (Figure 7). The solid line that dissects the map diagonally represents the self-match line, and the results are mirrored on either side. As can be seen, two clusters of signing groups exhibit greater lexical overlap than others. The first of these clusters, A, includes the Warlpiri, Anmatyerr, Alyawarr, and Arrernte language groups. The second cluster, B, includes the Gurindji, Mudburra, and Kukatja. However, within a cluster, lexical overlap does vary. While 77% of Warlpiri's and Anmatyerr's sampled lexicons are the *same* or *similar*, only about half of the signs are shared when comparing the Anmatyerr and Arrernte groups. Alyawarr has more lexical similarity to Anmatyerr, and Arrernte has more similarity to Warlpiri. Likewise, Gurindji and Mudburra have a *same/similar* overlap of 60%, but Kukatja has greater overlap with Mudburra (56%) than with Gurindji (47%) despite Balgo being geographically much closer to the Gurindji community of Kalkaringi. Kukatja also links to cluster A through similarity with signs used by the Anmatyerr group, while Gurindji and Mudburra are more aligned with the Alyawarr group.

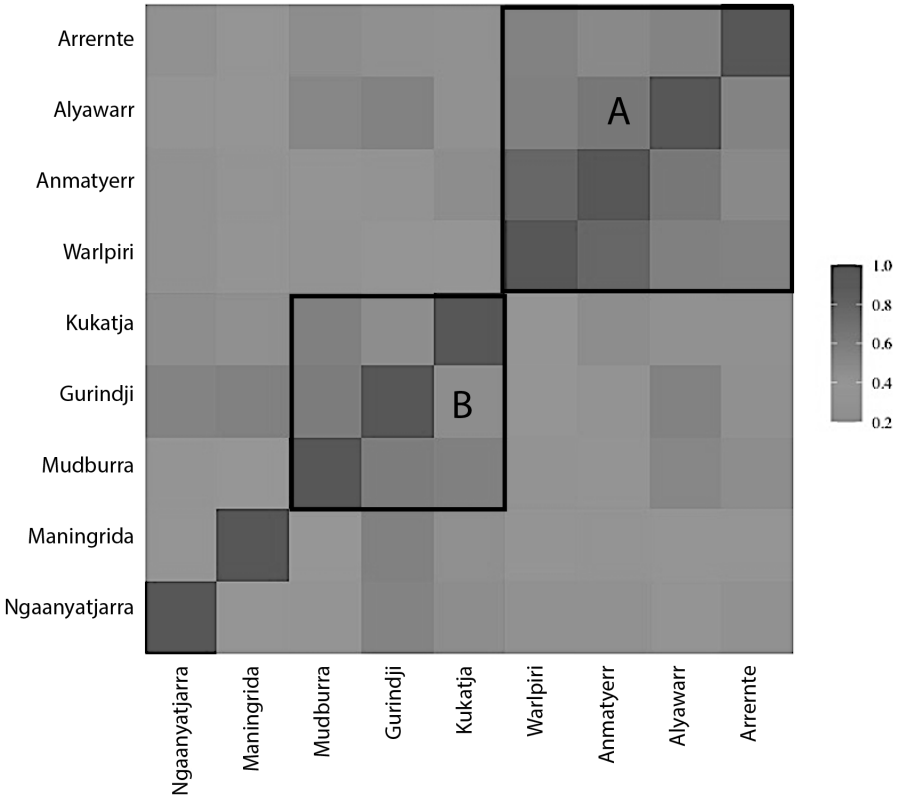


Figure 7. *Same* and *similar* lexical overlap between the nine sign groups

The Ngaanyatjarra and the Maningrida groups are outliers, as may be expected as these language communities are the most geographically distant from the others in the study (see Figure 1). Signs used in Maningrida do appear to be more like those used by the Gurindji and Kukatja groups (56% and 45%, respectively), and less like the more distant cluster A. However, the Mudburra language group, which is geographically the closest to Maningrida, shares the fewest signs, with a *same/similar* overlap of 40%. Maningrida and Ngaanyatjarra have almost the same amount of overlap (38%) as Maningrida and Elliot (40%) despite the former communities being much further apart than the latter. The group with which both Maningrida and Ngaanyatjarra have the most lexical overlap is Gurindji (56% and 54%, respectively). Signs used in the Ngaanyatjarra group are also similar to Kukatja (46%), as is expected considering that both communities are part of the Western Desert region. More interestingly, Ngaanyatjarra shares twice as many signs with Arrernte and Alyawarr than it does with the closer Warlpiri and Anmatyerr groups. Looking at these patterns of lexical similarity, it appears that, though geographic distance is a

salient factor in the development of shared signing practices as Kendon (2013[1988]) suggests, there are clearly other factors at play.

6.1 Comparisons with Kendon's findings Although interpretations of comparisons between our study and Kendon's must be treated with caution – there are some mismatches between communities, the lists of signs that formed the basis of the comparisons are different, and there are some differences in our methodologies – there are general trends that are worth commenting on. Kendon (2013[1988]: 389–391) found the proportion of *same* signs within the NCD groups to be 19–61%, whereas in comparisons between each of the NCD groups with signs from further afield – Queensland, the Western Desert (Ngaanyatjarra), and the Hermannsburg Arrernte (Aranda) – the *same* range drops to 5–22%. The percentage of *same* signs in our study for the nine communities is 6–38% (less than Kendon's 19–61% for the NCD, as is to be expected because the geographical range of communities we considered was far broader than the NCD). For the NCD groups, Kendon found the proportion of *similar* signs to be 10–20%, compared to 11–24% for the broader region. Our *similar* count across the nine groups (21–44%) is significantly higher than what Kendon found for the NCD and his estimates for the broader comparison (see Table 3).

Table 3. Comparisons of *same* and *similar* signs based on Kendon (2013[1988]) and the current study

Communities	Same	Similar
Within NCD (Kendon)	19–61%	10–20%
NCD and other (Kendon)	5–22%	11–24%
Our study	6–38%	21–44%

We can add considerable time depth to our understandings of these signed lexicons with pair-wise comparisons between the language communities that are present in both studies (Table 4). We find no substantial change in the percentages of *same* and *similar* signs shared between Ngaanyatjarra and Warlpiri and between Ngaanyatjarra and Anmatyerr. The sampled lexicons for Ngaanyatjarra and Arrernte have maintained a stable percentage of *same* signs but show an increase over the time frame in *similar* signs. The number of *same* signs slightly increases when comparing Arrernte with Warlpiri, and there is also an increase in *similar* signs. Anmatyerr comparisons with both Arrernte and Warlpiri show decreases in *same* signs and an increase in *similar* signs. When we compare Warlpiri and Anmatyerr overall, lexical overlap (*same/similar*) appears to be stable at 77–78%. This is despite a different sign set, a different Warlpiri community (our Warlpiri data came from Nyirrpi and Willowra, whereas Kendon's was from Yuendumu), and a time gap of around forty years (Kendon 2013[1988]: 380). However, looking at *same* and *similar* signs independently, it appears that there are substantially fewer identical signs across the two lexicons and substantially more *similar* signs.

Table 4. Pair-wise comparisons of *same* and *similar* signs based on Kendon (2013[1988]) and the current study

Language	Same	Similar	Trends
Ngaanyatjarra & Warlpiri (Kendon)	8%	18%	No change in *same* signs; slight increase in *similar* signs
Ngaanyatjarra & Warlpiri (current study)	8%	21%	
Ngaanyatjarra & Anmatyerr (Kendon)	7%	18%	No change in *same* signs; slight increase in *similar* signs
Ngaanyatjarra & Anmatyerr (current study)	7%	22%	
Arrernte & Ngaanyatjarra (Kendon)	12%	24%	No change in *same* signs; some increase in *similar* signs
Arrernte & Ngaanyatjarra (current study)	12%	32%	
Arrernte & Warlpiri (Kendon)	21%	18%	Slight increase in *same* signs; large increase in *similar* signs
Arrernte & Warlpiri (current study)	24%	32%	
Arrernte & Anmatyerr (Kendon)	22%	15%	Some decrease in *same* signs; large increase in *similar* signs
Arrernte & Anmatyerr (current study)	17%	33%	
Warlpiri & Anmatyerr (Kendon)	61%	17%	Large decrease in *same* signs; large increase in *similar* signs
Warlpiri & Anmatyerr (current study)	38%	39%	

In summary, while the number of signs in these comparisons is relatively small, our study suggests several trends that require further investigation. In broad terms, and as predicted, we see that communities that are distant from each other have fewer signs in common. Secondly, enabled by the diachronic snapshots outlined above, we see some indications that measures of shared sign lexicons are quite stable, over a period ranging from forty years to over a hundred. At the same time, we also see an emerging trend for the proportion of signs that are *similar* (differing in only one parameter) to be on the rise. This trend towards increased similarity may reflect the substantial variation we find in our data. With both intraindividual and intracommunity differences in how a sign is produced, any convergence in sign form that may have occurred between communities would be uneven, depending not just on which community's sign form is used, but also which variant from within that community

is considered. Likewise, in the case of Warlpiri and Anmatyerr, a decrease in *same* signs and an increase in *similar* signs might be explained by the two groups continuing to share lexical items, but with greater variation in production overall.

7. Discussion It is generally accepted that the forces that drive sociolinguistic variation and change in both spoken- and signed-language communities are broadly similar (Schembri & Johnston 2013). However, we know little beyond the anecdotal about how these processes unfold in the original sign languages of Australia. In further explorations of this topic, the notion of spatial proximity needs to be refined to account for complex interrelated factors – multilingualism and language contact, mobility, ceremonial networks, community resources and infrastructure, education, marriage, generational and gender differences, and so on. For example, it could be hypothesised that cultural mobility is being increasingly enabled by television and social media, a factor that was not present in remote communities until quite recently. However, the absence of adequate quantitative measures for many of these factors makes it difficult to evaluate their effect on signed repertoires (Horton 2022: 3). We do know that particular sign forms are recognised as being locally distinctive. For example, the sign MOTHER with the 'horns' handshape is known by some signers at Kalkaringi, but it is associated with their Warlpiri neighbours to the south. The respectful elbow action from Maningrida, which denotes the avoidance relationship between particular kin categories, such as between a man and his mother-in-law, or a woman and her son-in-law (Green 2019), is known by Arrernte-speaking desert dwellers who may have contact with communities in the north through marriage and other family connections.

Further corpus-based studies with larger coded datasets would enable the kinds of bidirectional comparisons – from form to meaning and meaning to form – outlined in Börstell et al. (2020: 24). No doubt this would throw up both true and false 'friends' and enrich understandings of the semantic networks of polysemy and overlaps of meanings of particular sign forms. Corpus-based studies would also provide the capacity to shed more light on the variation between individuals within language communities, based on factors such as age and gender. Our research also provides methodological foundations for further comparisons in regions of rich linguistic diversity such as Arnhem Land. A comparison of a small set of signs from Maningrida with those found in the handbook of Yolŋu Sign Language (James et al. 2020) shows that a high proportion (74%) of signs appear to be shared.[9]

To understand the ecologies of communicative action, we also need to know more about the distribution of conventionalised gestures, both in communities where an alternate sign system is acknowledged and in those which do not appear to use any form of alternate sign. To date, there has been no attempt to map out the distribution of such 'actions' across different Indigenous Australian communities, regardless of whether they are viewed as part of a sign language system or not. In a study of lexical variation in four Yucatec Maya Sign Language communities from Mexico,

[9] These comparisons could only be based on the photographic images that appear in the handbook, so some dimensions of sign articulation, such as movement, could not be included.

Safar (2021) found that signs that are derived from conventional gestures, based on the depiction of everyday activities or those that are culture-specific, are less prone to variation and show greater similarity across individuals and communities. On the other end of the spectrum, signs that have no link to co-speech gestures and do not lend themselves to iconic representations are more prone to variation. While Safar describes a very different sociocultural context, interacting semiotic systems and semantically motivated signing – which we discuss below – are both relevant factors that may drive lexical overlap across Australian Indigenous signing communities.

7.1 Other methods for comparing signs The role of iconicity, a multidimensional complex phenomenon found in human language, regardless of modality (Perniss et al. 2010; Perlman et al. 2018), presents another challenge to understanding the relationships between geographically distant sign languages of diverse origins. Iconic mappings are shaped by cultural knowledge, and similarities in form between signs from different communities may be the consequence of shared human experiences and perceptual tendencies (Lutzenberger et al. 2021: 4). Signs from different sign languages may be formally similar because they share the same semantic motivation, perhaps giving the illusion that these languages are more closely related than they are. Of the Australian context, Kendon suggests that signs that are semantically motivated or iconic are less likely to change form if borrowed – and that this may partly account for the higher proportion of s*ame/similar* signs in adjacent groups (Kendon 2013[1988]: 387). As Johnston (2003) noted in his explorations of lexical overlap in Auslan, BSL, and NZSL, and then in a further comparison of this group (which he collectively termed BANZL) with ASL (American Sign Language), similarity "cannot be explained by genetic or historical relationships alone" (2003: 47).

Some studies have attempted to measure variation within signing communities by considering the iconic motivation underlying sign forms, alongside other factors (Lutzenberger et al. 2021; Horton 2022). Signs can be compared across individuals and communities by looking at the hypothesised reasons underlying particular form-meaning couplings, in terms of both the choice of base – the underlying concept from which a sign form is derived – and the techniques of representation (see Kendon 2013[1988]: 164–185). For instance, the sign DOG may take as its base the paws of the dog, the action of its mouth as it barks, the shape of its ears, the act of petting it, and so on (see Figure 6). The choice of which aspect of a referent to take as a sign base introduces a degree of arbitrariness to semantically motivated signs and represents a point at which the practices of signing communities may diverge from or converge on each other. Methods that draw on iconic principles that underly sign forms have been used in situations where signs do not appear to have a standardised sublexical structure or where there is a high degree of variation in sign production. For example, Mudd et al. (2020) use iconicity as a diagnostic for grouping sign variants in a comparative study of Kata Kolok, a shared sign language from Bali. Reed (2019) uses sign-base comparison as an alternative method to sublexical parameter

comparison in a study of homesign[10] social networks in the Papua New Guinea Highlands. However, a flaw in this approach, and one that Reed herself points out, is that signs with bases that appear similar to the researcher may be differently motivated in the minds of consultants. Additionally, two signing communities may select the same sign base but still end up with different sign forms, or they may use multiple base types for one sign form. The motivation behind the sign form may be opaque to outsiders or even signers themselves. Judgements about iconicity are variable, culture-specific, and difficult to operationalise (Napoli 2017: 521; Occhino et al. 2017). It may be the case, as Horton (2022: 4) suggests, that taking iconicity into account leads to higher estimates of lexical overlap than would be found if formal criteria such as handshape, movement, or place of articulation were used. However, larger datasets and more consistent methodologies are needed to determine whether this is so.

If we had used base comparison as a method in this study, then the Ndjébbana and Gurindji signs for MOTHER'S MOTHER (Figure 4) would probably be merged, although we are still uncertain of the motivation linking this kin category with the sign location on the forehead. This is a good example of the motivation opacity referred to above. Two of the Gurindji signs DOG (Figures 6a and 6b) would be treated as one, as their base is the paws of the dog, collapsing the distinction between *same* and *similar* forms, and the other (Figure 6c) would be regarded as different. Another issue that, in the Australian Indigenous context at least, makes it difficult to operationalise the parity of sign bases in comparative studies is the extent to which signs have different though overlapping semantic extensions in the languages considered. Again, to take an example from the kinship domain, two versions of the sign forms AUNT, FATHER, and NEPHEW/NIECE may share the body part 'chin' (and a likely metonymic association with a beard/whiskers) as their base yet be realised by forms that differ in the handshape used and have a different range of meanings.

The dangers of assuming historical relationships between signed languages based solely on lexical items are exemplified when we compare the lexicons of the nine Indigenous sign groups with that of Auslan, sourced from Signbank (Johnston & Cassidy 2008).[11] There are, as yet, no detailed studies of shared communicative practices in Indigenous communities where there is a minority deaf population and where there may have been some contact with Auslan. However, impressionistically we see no evidence that any signs have been borrowed from Auslan (or vice versa) in any of the nine groups in our study, other than a few rare instances of finger spelling (see Green et al. 2022). If lexical overlap was an accurate measure of relatedness, we would expect a low percentage of lexical similarity between Auslan and the nine signing groups. Yet, of 109 sign IDs, thirty-four Auslan signs are identical to at least one of their counterparts in an Indigenous sign group (e.g., MAN and LOOK/SEE in Auslan, Gurindji, and Kukatja) and a further nineteen signs are *similar* (e.g., in An-

[10] Homesign refers to signed systems of communication used by deaf individuals in the absence of an established signed language.

[11] See https://www.auslan.org.au/dictionary/ (accessed 2022-02-16).

matyerr, Alyawarr, Arrernte, Gurindji, Warlpiri, and Ngaanyatjarra, the sign MONEY differs from Auslan only in the handshape of the dominant hand). Auslan shares *similar* forms with the nine signing groups for 23–54% of the sampled lexicon. In the absence of evidence for relatedness or long-term language contact, this degree of overlap may be the result of parallel invention, with convergence on a *similar* form made more likely through the selection of semantically motivated sign forms. This sort of finding underscores the importance of caution when determining historical relationships between sign languages based solely on the lexicon.

8. Conclusion In our study, we have examined lexical overlap across nine signing communities from Central and Northern Australia by developing a comparative list of signs suitable for Australian Indigenous communities. Our intent was to delineate dimensions of similarity and difference rather than to make judgements about historical relationships between these community practices. We coded the data for the articulatory parameters of handshape, place of articulation, and movement and then developed a comparison matrix that captures similarity by using alphanumerical labels for unique sign forms. Crucially, we acknowledged and accommodated the existence of both inter- and intra-signer variation within single communities. This factor has in general been overlooked in some previous comparative studies, but understanding variation is essential if we are to achieve a more accurate picture of signing practices and lexical overlap. To our knowledge, this study is the first to provide a synchronic snapshot of variation in alternate sign languages. Although variation in alternate sign varieties is noted in other places – for example in North America (Davis 2015: 911) – documentation of these is uneven and affected by language endangerment and changing cultural practices. Our list of commonly known signs is a useful resource that can inform future comparative studies.

The results of our study, conducted almost forty years on from Kendon's comparative study of Australian Indigenous sign languages, confirm his observation that the degree of similarity or difference between signed vocabularies can be broadly predicted by spatial proximity. However, our research expands the geographical scope on which these comparisons are based by including signs from Arnhem Land, from two communities in Western Australia, and from several additional communities in Central Australia. From a comparison of *same* and *similar* signs across the nine groups, two distinct clusters of higher lexical overlap emerge – the first comprising Warlpiri, Anmatyerr, Alyawarr, and Arrernte, and the second comprising Gurindji, Mudburra, and Kukatja. Ngaanyatjarra and the Maningrida groups prove to be outliers to these clusters. We have also been able to add time depth to the comparative exercise, as seen in the comparison of some of our results with Kendon's, which shows that measures of shared sign lexicons are quite stable, over a period ranging from forty years to over a hundred. At the same time, communities have shown a trend towards possible convergence for some of the lexicon, with the number of *similar* signs (differing in only one parameter) increasing. We have had the benefit of being able to access video records of sign, and this has made the processes of annotation and comparison more robust and replicable.

The distances between communities in our study that demonstrate the least lexi-

cal overlap in sign are vast. Maningrida is around 1,500 kilometres by road from Ti Tree and almost 2,000 kilometres from Nyirrpi, but the broad-brush metric of distance alone does not explain how the lexicons of Australian Indigenous sign come to be shared, differentiated, and reinvented. Explorations of what signers perceive to be the signatures of sign similarity and difference are required, as are ethnographic approaches for investigating the multilingual repertoires and life histories of signers. Through these methods and the kind of lexical comparisons we have detailed in this study, we can achieve a more complete understanding of the role of sign and of other forms of communicative action in the rich semiotic ecologies of Indigenous Australia.

References

Adone, Dany, Anastasia Bauer, Keren Cumberbatch, & Elaine L. Maypilama. 2012. Colour signs in two indigenous sign languages. In Zeshan, Ulrike & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, vol. 4, 53–86. Berlin: De Gruyter Mouton. doi:10.1515/9781614511496.53

Aldersson, Russell & Lisa McEntee-Atalianis. 2008. A lexical comparison of signs from Icelandic and Danish Sign Languages. *Sign Language Studies* 9(1). 45–87. doi:10.1353/sls.0.0007

Al-Fityani, Kinda & Carol Padden. 2010. Sign languages in the Arab world. In Brentari, Diane (ed.), *Sign languages*, 433–450. Cambridge: Cambridge University Press. doi:10.1017/CBO9780511712203.020

Australian Government. 2020. *National Indigenous languages report*. Canberra: Department of Infrastructure, Transport, Regional Development and Communications (DoITRDC), Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS), and Australian National University (ANU).

Börstell, Carl, Onno Crasborn, & Lori Whynot. 2020. Measuring lexical similarity across sign languages in Global Signbank. In Efthimiou, Eleni, Stavroula-Evita Fotinea, Thomas Hanke, Julie Hochgesang, Jette Kristoffersen, & Johanna Mesch (eds.), *Proceedings of the LREC2020 9th workshop on the representation and processing of sign languages: Sign language resources in the service of the language community, technological challenges and application perspectives*, Marseille, 16 May, 21–26. Paris: European Language Resources Association.

Brentari, Diane. 1998. *A prosodic model of sign language phonology*. Cambridge: MIT Press.

Campbell, April, Margaret Carew, Jennifer Green, & Ben Foley. 2021[2013]. Iltyemiltyem - Australian Indigenous sign languages. Alice Springs: Batchelor Institute. (https://www.iltyemiltyem.com) (Accessed 2023-04-04.)

Carew, Margaret & Jennifer Green. 2015. Making an online dictionary for Central Australian sign languages. *Learning Communities: International Journal of Learning in Social Contexts* (Special Issue: Indigenous Sign Languages) 16. 40–55. doi:10.18793/LCJ2015.16.04

Clark, Brenda. 2017. Sign language varieties in Lima, Peru. *Sign Language Studies* 17(2). 222–264. doi:10.1353/sls.2017.0003

Crasborn, Onno, Inge Zwitserlood, Els van der Kooij, & Ellen Ormel (eds.). 2020. *Global Signbank*. Nijmegen: Radboud University. (https://signbank.science.ru.nl) (Accessed 2023-04-04.)

Davis, Jeffrey. 2015. North American Indian Sign Language. In Jepsen, Julie Bakken, Goedele De Clerck, Sam Lutalo-Kiingi, & William McGregor (eds.), *Sign languages of the world: A comparative handbook*, 911–931. Berlin: De Gruyter Mouton.

de Vos, Connie. 2012. *Sign-spatiality in Kata Kolok: How a village sign language in Bali inscribes its signing space*. Nijmegen: Radboud University. (Doctoral thesis.) (https://repository.ubn.ru.nl/bitstream/handle/2066/99153/99153.pdf?sequence=1) (Accessed 2023-04-04)

Elwell, Vanessa. 1982. Some social factors affecting multilingualism among Aboriginal Australians: A case study of Maningrida. *International Journal of the Sociology of Language* 36. 83–104. doi:10.1515/ijsl.1982.36.83

Ferrara, Lindsay & Gabrielle Hodge. 2018. Language as description, indication, and depiction. *Frontiers in Psychology* 9. 716. doi:10.3389/fpsyg.2018.00716

Green, Jennifer. 2014. *Drawn from the ground: Sound, sign and inscription in Central Australian sand stories* (Language Culture and Cognition). Cambridge: Cambridge University Press. doi:10.1017/CBO9781139237109

Green, Jennifer. 2019. Embodying kin-based respect in speech, sign, and gesture. *Gesture* 18(2–3). 370–395. doi:10.1075/gest.20015.gre

Green, Jennifer, Gail Woods, & Ben Foley. 2011. Looking at language: Appropriate design for sign language resources in remote Australian Indigenous communities. In Thieberger, Nick, Linda Barwick, Rosey Billington, & Jill Vaughen (eds.), *Conference proceedings for Sustainable data from digital research: Humanities perspective on digital research*, University of Melbourne, 12–14 December, 66–89. Melbourne: Custom Book Centre, the University of Melbourne.

Green, Jennifer, Cassandra Algy, Felicity Meakins, & Karungkarni Art. 2017. *Takataka: Gurindji Sign Language posters*. Batchelor, NT: Batchelor Press.

Green, Jennifer, Anastasia Bauer, Alice Gaby, & Elizabeth Marrkilyi Ellis. 2018. Pointing to the body: Kin signs in Australian Indigenous sign languages. *Gesture* 17(1). 1–36. doi:10.1075/gest.00009.gre

Green, Jennifer, Margaret Carew, & Carolyn Coleman. 2020. *Maningrida kin sign posters*. Batchelor, NT: Batchelor Press.

Green, Jennifer, Felicity Meakins, & Cassandra Algy. 2022. Tradition and innovation: Using sign language in a Gurindji community in Northern Australia. *Australian Journal of Linguistics* 42(2). 139–164. doi:10.1080/07268602.2022.2105137

Green, Rebecca, Jennifer Green, David Osgarby, Amanda Hamilton, Felicity Meakins, & Rob Pensalfini. 2019. *Mudburra to English dictionary*. Canberra: Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS).

Guerra Currie, Anne-Marie, Richard Meier, & Keith Walters. 2002. A crosslinguistic examination of the lexicons of four signed languages. In Meier, Richard, Kearsy Cormier, & David Quinto-Pozos (eds.), *Modality and structure in signed and spoken languages*, 224–236. Cambridge: Cambridge University Press. doi:10.1017/CBO9780511486777.011

Horton, Laura. 2022. Lexical overlap in young sign languages from Guatemala. *Glossa: A Journal of General Linguistics* 7(1). doi:10.16995/glossa.5829

Hurlbut, Hope. 2014. *The signed languages of Indonesia: An enigma*. (SIL Electronic Survey Reports 2014-005). Dallas: SIL International.

James, Bentley, Dany Adone, & Elaine Maypilama. 2020. *The illustrated handbook of Yolŋu Sign Language of North East Arnhem Land*. Melbourne: The Australian Book Connection.

Jepsen, Julie Bakken, Goedele De Clerck, Sam Lutalo-Kiingi, & William McGregor. 2015. *Sign languages of the world: A comparative handbook*. Berlin: De Gruyter Mouton. doi:10.1515/9781614518174

Johnston, Trevor. 2003. BSL, Auslan and NZSL: Three signed languages or one? In Baker, Anne, Beppie van den Bogaerde, & Onno Crasborn (eds.), *Cross-linguistic perspectives in sign language research: Selected papers from TISLR 2000*, 47–69. Hamburg: Signum.

Johnston, Trevor. 2010. From archive to corpus: Transcription and annotation in the creation of signed language corpora. *International Journal of Corpus Linguistics* 15(1). 106–131. doi:10.1075/ijcl.15.1.05joh

Johnston, Trevor & Steve Cassidy. 2008. Auslan Signbank. (http://www.auslan.org.au) (Accessed 2023-04-04.)

Jorgensen, Eleanor, Jennifer Green, & Anastasia Bauer. 2021. Exploring phonological aspects of Australian Indigenous sign languages. *Languages* 6(2). 81. doi:10.3390/languages6020081

Kendon, Adam. 2013[1988]. *Sign languages of Aboriginal Australia: Cultural, semiotic and communicative perspectives*. Cambridge: Cambridge University Press.

Liddell, Scott & Robert Johnson. 1989. American Sign Language: The phonological base. *Sign Language Studies* 64(1). 195–277. doi:10.1353/sls.1989.0027

Lutzenberger, Hannah, Connie de Vos, Onno Crasborn, & Paula Fikkert. 2021. Formal variation in the Kata Kolok lexicon. *Glossa: A Journal of General Linguistics* 6(1). 119. doi:10.16995/glossa.5880

McKee, David & Graeme Kennedy. 2000. Lexical comparisons of signs from American, Australian, British, and New Zealand Sign Languages. In Emmorey, Karen & Harlan Lane (eds.), *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima*, 49–76. London: Lawrence Erlbaum Associates.

Miller, Wick. 1971. *Western Desert Sign Language*. Canberra: Library of the Australian Institute of Aboriginal Studies.

Mohr, Susanne. 2015. Tshaukak'ui – hunting signs of the Ts'ixa in Northern Botswana. In Jepsen, Julie Bakken, Goedele De Clerck, Sam Lutalo-Kiingi, & William McGregor (eds.), *Sign languages of the world: A comparative handbook*, 933–953. Berlin: De Gruyter Mouton. doi:10.1515/9781614518174-044

Mudd, Katie, Hannah Lutzenberger, Connie de Vos, Paula Fikkert, Onno Crasborn, & Bart de Boer. 2020. The effect of sociolinguistic factors on variation in the Kata Kolok lexicon. *Asia-Pacific Language Variation* 6(1). 53–88. doi:10.1075/aplv.19009.mud

Napoli, Donna Jo. 2017. Iconicity chains in sign languages. In Bowern, Claire, Laurence Horn, & Raffaella Zanuttini (eds.), *On looking into words (and beyond): Structures, relations, analyses,* 517–546. Berlin: Language Science Press. doi:10.5281/ZENODO.495464

Occhino, Corrine, Benjamin Anible, Erin Wilkinson, & Jill Morford. 2017. Iconicity is in the eye of the beholder: How language experience affects perceived iconicity. *Gesture* 16(1). 100–126. doi:10.1075/gest.16.1.04occ

Palfreyman, Nick. 2014. Applying lexicostatistical methods to sign languages: How not to delineate sign language varieties. (Unpublished manuscript.) (http://clok.uclan.ac.uk/37838) (Accessed 2023-04-04.)

Perlman, Marcus, Hannah Little, Bill Thompson, & Robin Thompson. 2018. Iconicity in signed and spoken vocabulary: A comparison between American Sign Language, British Sign Language, English, and Spanish. *Frontiers in Psychology* 9. 1433. doi:10.3389/fpsyg.2018.01433

Perniss, Pamela, Robin Thompson, & Gabriella Vigliocco. 2010. Iconicity as a general property of language: Evidence from spoken and signed languages. *Frontiers in Psychology* 1. 1–15. doi:10.3389/fpsyg.2010.00227

Pfau, Roland. 2012. Manual communication systems: Evolution and variation. In Pfau, Roland, Markus Steinbach, & Bencie Woll (eds.), *Sign language: An international handbook*, 513–551. Berlin: De Gruyter Mouton.

Quay, Suzanne. 2015. Monastic sign language from medieval to modern times. In Jepsen, Julie Bakken, Goedele De Clerck, Sam Lutalo-Kiingi, & William McGregor (eds.), *Sign languages of the world: A comparative handbook*, 871–900. Berlin: De Gruyter Mouton. doi:10.1515/9781614518174-041

R Core Team. 2021. *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. (https://www.R-project.org/) (Accessed 2023-04-04.)

Reed, Lauren. 2019. *Sign languages of Western Highlands, Papua New Guinea, and their challenges for sign language typology*. Canberra: The Australian National University. (Master's thesis.)

Roth, Walter Edmund. 1897. *Ethnological studies among the North-West-Central Queensland Aborigines*. Brisbane: E. Gregory, Government Printer. (http://archive.org/details/ethnologicalstu00rothgoog) (Accessed 2023-04-04.)

Safar, Josefina. 2021. What's your sign for TORTILLA? Documenting lexical variation in Yucatec Maya Sign Languages. *Language Documentation & Conservation* 15. 30–74. (http://hdl.handle.net/10125/24970) (Accessed 2023-04-13.)

Sagara, Keiko & Ulrike Zeshan. 2016. Semantic fields in sign languages – A comparative typological study. In Zeshan, Ulrike & Keiko Sagara (eds.), *Semantic fields in sign languages: Colour, kinship and quantification* (Sign Language Typology), vol. 6, 3–38. Berlin: De Gruyter Mouton. doi:10.1515/9781501503429-001

Sandler, Wendy. 1989. *Phonological representation of the sign: Linearity and nonlinearity in American Sign Language*. Dordrecht: Foris Publications.

Schembri, Adam & Trevor Johnston. 2013. Sociolinguistic variation and change in sign languages. In Bayley, Robert, Richard Cameron, & Ceil Lucas (eds.), *The Oxford handbook of sociolinguistics*, 503–524. Oxford: Oxford University Press.

Snoddon, Kristin & Maartje De Meulder. 2020. Introduction: Ideologies in sign language vitality and revitalization. *Language & Communication* 74. 154–163. doi:10.1016/j.langcom.2020.06.008

Stamp, Rosemary. 2013. *Sociolinguistic variation, language change and contact in the British Sign Language (BSL) lexicon*. London: University College London. (Doctoral thesis.)

Strehlow, Carl. 1915. *Die Aranda-Und Loritja-Stämme in Zentral-Australien*. Frankfurt am Main: Joseph Baer & Co.

Swadesh, Morris. 1950. Salish internal relationships. *International Journal of American Linguistics* 16. 157–167.

Swadesh, Morris. 1952. Lexico-statistic dating of prehistoric ethnic contacts. *Proceedings of the American Philosophical Society* 96. 452–463.

van der Hulst, Harry. 1993. Units in the analysis of signs. *Phonology* 10(2). 209–241.

Vaughan, Jill. 2018. Meet the remote Indigenous community where a few thousand people use 15 different languages. *The Conversation*, December 4. (https://theconversation.com/meet-the-remote-indigenous-community-where-a-few-thousand-people-use-15-different-languages-107716) (Accessed 2023-04-04.)

Wittenburg, Peter, Hennie Brugman, Albert Russel, Alex Klassmann, & Han Sloetjes. 2006. ELAN: A professional framework for multimodality research. In Calzolari, Nicoletta, Khalid Choukri, Aldo Gangemi, Bente Maegaard, Joseph Mariani, Jan Odijk, & Daniel Tapias (eds.), *Proceedings of the Fifth International Conference on Language Resources and Evaluation (LREC'06)*, Genoa, 24–26 May, 1556–1559. Paris: European Language Resources Association.

Woll, Bencie, Onno Crasborn, Els van der Kooij, Joanna Mesch, & Brita Bergman. 2010. *Extended Swadesh list for signed languages*. (https://concepticon.clld.org/contributions/Woll-2010-301) (Accessed 2023-04-13.)

Woodward, James. 1978. Historical bases of American Sign Language. In Siple, Patricia (ed.), *Understanding language through sign language research*, 333–348. New York: Academic Press. (http://www.cslds.org/v4/resources/InternalAdmin/publicationB/16/_Woodward_1978_HistoricalBasesOfASL_.pdf)(Accessed 2023-04-04.)

Woodward, James. 1991. Sign language varieties in Costa Rica. *Sign Language Studies* 73. 329–346.

Woodward, James. 2010. Some observations on research methodology in lexicostatistical studies of sign languages. In Mathur, Gaurav & Donna Jo Napoli (eds.), *Deaf around the world: The impact of language*, 38–53. Oxford: Oxford University Press. doi:10.1093/acprof:oso/9780199732548.001.0001

Xu, Wang. 2006. *A comparison of Chinese and Taiwan Sign Languages: Towards a new model for sign language comparison*. Ohio: Ohio State University. (Master's thesis.)

Zeshan, Ulrike (ed.). 2006. *Interrogative and negative constructions in sign languages* (Sign Language Typology). Nijmegen: Ishara Press. doi:10.26530/OAPEN_453832

Zeshan, Ulrike & Keiko Sagara. 2016. *Semantic fields in sign languages: Colour, kinship and quantification* (Sign Language Typology), vol. 6. Berlin: De Gruyter Mouton. doi:10.1515/9781501503429

Jennifer Green
jag@unimelb.edu.au

Appendix A: Signs used in the comparison between the nine groups

1. AUNT FZ [kinship]
2. AXE/CHOP [artefact, verb]
3. BABY/SMALL [human, attribute]
4. BAD, NO GOOD* [attribute]
5. BE QUIET [verb]
6. BIG [attribute]
7. BILLYCAN, CUP [artefact]
8. BIRD* [animal] BITE [verb]
9. BITE [verb]
10. BLIND [attribute]
11. BOOMERANG [artefact]
12. BRING [verb]
13. BULLOCK, CATTLE [animal]
14. BURN/COOK [verb]
15. BUSH TURKEY [animal]
16. CAR/DRIVE A CAR [artefact, verb]
17. CHILD* [human]
18. CLOTHES [artefact]
19. COLD/SHIVER/WINTER [attribute, verb]
20. COME [verb]
21. CRY/SULK [verb]
22. DAMPER/BREAD [fire/food]
23. DANCE* [verb]
24. DEVIL [human]
25. DIG [verb]
26. DIGGING STICK/CROWBAR [artefact]
27. DOG* [animal]
28. DRINK [verb]
29. EAT/FOOD [verb, fire/food]
30. ECHIDNA [animal]
31. EGG* [fire/food]
32. EMU [animal]
33. FAT, FATTY* [attribute]
34. FATHER* [kinship]
35. FIRE* [fire/food]
36. FLY (TO FLY) [verb]
37. FLY (INSECT) [animal]
38. FOOD-VEG/EAT [fire/food]
39. FRIGHTENED [attribute]
40. GET UP/ARISE [verb]
41. GET, GATHER [verb]
42. GIRL/TEENAGE GIRL [human]
43. GIVE [verb]
44. GO [verb]
45. GOANNA [animal]
46. GOOD ONE!* [attribute]
47. GRANDPARENT FF [kinship]
48. GRANDPARENT FM [kinship]
49. GRANDPARENT MF [kinship]
50. GRANDPARENT MM [kinship]
51. HAT [artefact]
52. HIT/KILL* [verb]
53. HOME/CAMP/HOUSE/BUILDING [environment]
54. HORSE/RIDE HORSE [animal, verb]
55. HUNGRY [verb]
56. HUSBAND, WIFE* [kinship]
57. KANGAROO [animal]

58. KEYCARD [artefact]
59. LIE DOWN/SLEEP* [verb]
60. LIQUID/WATER/PETROL/FLOODWATER [environment]
61. LISTEN/HEAR [verb]
62. LONG TIME AGO [time]
63. LOOK/SEE [verb]
64. MAN* [human]
65. MANY [counting]
66. MONEY [artefact]
67. MOTHER* [kinship]
68. NEPHEW/NIECE (SON OR DAUGHTER OF A MAN) [kinship]
69. NEPHEW/NIECE (SON OR DAUGHTER OF A WOMAN) [kinship]
70. NOTHING, NO [useful expression]
71. ONE [counting]
72. PERSON – INDIGENOUS* [human]
73. PERSON – NON-INDIGENOUS* [human]
74. PHONE [artefact]
75. PICK [verb]
76. POLICE [human]
77. POOR THING [useful expression]
78. PUT, PLACE [verb]
79. RAIN* [environment]
80. RIVER, CREEK* [environment]
81. ROCK, STONE, HILL* [environment]
82. SIBLING ELDER* [kinship]
83. SIBLING YOUNGER* [kinship]
84. SIT* [verb]
85. SKY [environment]
86. SMALL/THIN [attribute]
87. SNAKE* [animal]
88. SPEAK, TALK [verb]
89. SPEAR/SPEAR SOMETHING[artefact, verb]
90. STAND* [verb]
91. STRAIGHT/TRUE, CORRECT [attribute]
92. SUN* [environment]
93. SWIM/DIVE [verb]
94. TALL [attribute]
95. THREE, A FEW, SEVERAL [counting]
96. TOBACCO [fire/food]
97. TODAY, NOW [time]
98. TOMORROW [time]
99. TWO [counting]
100. UNCLE [kinship]
101. WAIT [verb]
102. WALLABY [animal]
103. WASH [wash]
104. WH QUESTION* [useful expression]
105. WIND/WHIRLY WIND* [environment]
106. WOMAN* [human]
107. WOMAN OLD [human]
108. WRITE [verb]
109. YESTERDAY [time]

Note: Highlighted items appear in Kendon's comparison of twenty sign meanings (2013[1988]: 396). Items with an asterisk are found in Woodward's (1978) list although glosses are not always equivalent.