CHAPTER 7

Iconicity in spatial deixis

A cross-linguistic study of 180 demonstrative systems

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This paper presents a cross-linguistic analysis of iconicity in demonstrative systems. Several previous studies have observed that the stem vowels of demonstratives correlate with the encoding of distance (e.g. Woodworth 1991). Nevertheless, there is little systematic research on iconicity in spatial deixis (but see Johansson & Zlatev 2013). Analyzing data from a sample of 180 languages, we argue that iconicity in demonstrative systems is a multifaceted phenomenon. In addition to demonstratives' vowels, there are several other formal aspects of demonstratives that are arguably iconic, i.e. tone, vowel lengthening, reduplication, and word length. These results corroborate a growing body of research that emphasizes the importance of iconic motivations for the encoding of meaning and raise new questions for future research.

Keywords: demonstratives, iconicity, spatial deixis

1. Introduction

The term *iconicity* refers to the resemblance between the form and meaning of linguistic expressions. The iconic nature of language was already discussed in antiquity. Yet, after Saussure's (1916) influential claim that most linguistic forms are arbitrary and determined by convention, modern linguistics has paid little attention to the role of iconicity in language (cf. Perniss & Vigliocco 2014). Over the past two decades, however, a number of studies have argued that both lexis and grammar are crucially influenced by iconic motivations (e.g. Perniss et al. 2010; Dingemanse et al. 2015).

For instance, there is compelling evidence for the influence of iconicity on clause order in the domain of syntax. Across languages, speakers tend to arrange main and subordinate clauses according to the temporal order of the events that they describe (Greenberg 1963; Clark 1971; Haiman 1980, 1983; Diessel 2005, 2008;

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Schmidtke-Bode 2009). In the lexical domain, perceptuomotor analogies have been established as the main iconic principle to relate form and meaning (Dingemanse et al. 2015; Perniss et al. 2010). Onomatopoeic expressions, for example, mimic the sounds of the intended referent, and ideophones evoke the size, distance, and/or duration of the objects or events they describe (Dingemanse 2012). There is also evidence that iconicity benefits language use and acquisition. Experimental data from studies on signed and spoken languages suggest that iconic signs are easier to learn and comprehend than arbitrary signs, suggesting that lexical iconicity plays a crucial role in both word learning and communication (e.g. Kelly et al. 2010; Campisi & Özyürek 2013). Since the perceptual and motoric properties of referents are similar worldwide, it is likely that lexical iconicity is a recurring feature of the world's languages (Dingemanse et al. 2015: 604).

In accordance with this view, the current paper explores iconic motivations in the encoding of spatial deixis from a cross-linguistic perspective. More specifically, we investigate aspects of iconicity in demonstrative systems.

Demonstratives are a very special class of deictic expressions (e.g. *this*, *that*) that serve to indicate the location of a referent relative to the so-called "origo" (Bühler 1934). The origo is the center of a coordinate system, or "deictic frame of reference" (Diessel 2014), that is usually determined by the speaker's body and location at the time of the utterance (Stukenbrock 2015). In contrast to most other closed-class function words, demonstratives seem to exist in all languages, i.e. they are likely to be universal (Diessel 1999; Dixon 2003; Breunesse 2019). Demonstratives are an important feature of human language, developing remarkably early in language acquisition (Diessel & Monakhov 2022). By guiding the addressee's attention to the intended referent, they create a joint attentional focus for the speech participants (Clark 1996; Diessel 2006). As such, they play a crucial role in successful communication.

Across languages, demonstratives are organized in paradigms of proximal and distal deictics. While individual demonstratives are not always marked for distance (e.g. French *ça* is distance-neutral), it is commonly assumed that all languages have at least two deictic terms – be they pronouns, determiners or adverbs – that differentiate between proximal and distal referents (see Diessel & Coventry 2020 for a review). In addition, some languages have a third deictic term for referents near the addressee (e.g. Japanese) or in mid distance between a proximal and distal referent (e.g. Spanish). Larger systems with four or more deictic terms are rare from a cross-linguistic perspective (Diessel 2013; Breunesse 2019; Diessel & Coventry 2020). Furthermore, in addition to distance and addressee-orientation, demonstrative systems may encode various other deictic features of the referent. For instance, some demonstrative paradigms signal whether the referent is moving away from or towards the speaker, whether it is located on a higher or lower plane than the speaker, and where it is located in relation to certain aspects of the speech participants' geophysical environment (e.g. Anderson & Keenan 1985; Burenhult 2008; Diessel 1999; Dixon 2003; Breunesse 2019; Forker 2020).

Crucially, several studies have observed that the distance features of demonstratives correlate with particular phonetic properties of their vowels. For example, according to Sapir (1929), the vowels of proximal demonstratives tend to be higher and more advanced than those of the corresponding distal terms. Yet, while Sapir's hypothesis has been confirmed by several later studies (Tanz 1971; Ultan 1978; Woodworth 1991; Traunmüller 2000), most of this research is based on data from relatively small and biased language samples. The only cross-linguistic investigation we know that systematically examined the potential influence of iconicity on demonstrative vowels is a recent study by Johansson & Zlatev (2013).

Drawing on data from a balanced sample of 101 languages, these researchers found a number of phonetic properties in spatial deictics that are arguably iconic. Among other things, their data suggest that the vowels of distal demonstratives are produced with a wider mouth-opening and more protruded lips than the corresponding vowels of distal deictics. The authors interpret this as evidence that the distinction between far and near deixis is iconically indicated by haptic and visual properties of the speech gestures involved in the articulation of demonstratives. However, while these findings are statistically significant, the underlying trends are relatively weak.

The strongest correlation that Johansson & Zlatev (2013) found in their data involves the formant frequency of demonstrative vowels (Ohala 2006). As it turns out, in the majority of their languages, the vowels of proximal demonstratives are produced with a higher second formant frequency than the vowels of the corresponding distal terms (though the reverse pattern is also attested in a substantial number of languages in their sample).[1]

Following the lead of Johansson & Zlatev (2013), this paper further investigates iconic motivations for the encoding of spatial deixis from a cross-linguistic perspective. Our study has two objectives. First, concentrating on second formant frequency, we aim to replicate Johansson & Zlatev's (2013) investigation, offering some modest methodological improvements and additional observations concerning the cross-linguistic distribution of demonstrative vowels. And, second, we explore several other types of iconicity that have not yet been systematically investigated in cross-linguistic research on iconicity in spatial deixis, i.e. the occurrence of different tones, vowel lengthening, reduplication, and word length. Before we

1. Johansson & Zlatev (2013) also investigated the correlation of spatial deixis with consonant frequency, but concluded that there was no relationship between the two.

turn to these issues, however, the next section introduces our language sample and method of data collection.

2. Language sample and data collection

This study is based on data from a sample of 180 languages that were selected according to two general criteria: (i) the genetic affiliation of a language and (ii) its geographical location. Using the Glottolog classification (Hammarström et al. 2018), we selected these languages from a total of 130 language families that are about equally distributed across six large geographical areas, i.e. Africa, Australia, Eurasia, North America, South America, and Oceania and New Guinea (Dryer 1992).[2] When selecting multiple languages from the same family, we aimed for genetic and geographical variation, as well as variety in demonstrative systems. A list of languages included in our sample is given in the appendix. The bulk of our data come from reference grammars and other published sources, but we also consulted native speakers and language specialists if our written sources did not provide sufficient information. Figure 1 shows the geographical distribution of the languages in our sample.

Most languages have multiple sets of demonstratives that differ in terms of their syntactic functions and/or semantic properties (Diessel 1999; Breunesse 2019). For the quantitative parts of this study, we focused on the distance features of demonstrative pronouns. Demonstrative determiners and demonstrative adverbs were disregarded, as were semantic features such as visibility and elevation. If a language has multiple sets of demonstrative pronouns (with different numbers of distance terms), we selected the set that was characterized as the default by our sources.[3] For the quantitative parts of our analysis (viz. the parts about formant

2. Some families and subfamilies are represented by multiple languages. We have selected five languages from different branches of the Afro-Asiatic family; two languages from different branches of Athabaskan-Eyak-Tlingit; six languages from different branches of Indo-European; eight languages from different branches of Nuclear Trans New Guinea; ten languages from different branches of Pama-Nyungan; and three languages from different branches of Uralic. Additionally, we have selected eight Atlantic-Congo languages from three different branches (one from Mel, two from North-Central-Atlantic, and five from Volta-Congo), nine Austronesian Malayo-Polynesian languages from four different branches (including four Oceanic languages from different linkages), three Otomanguean languages from two different branches (two Eastern, one Western), four Sino-Tibetan languages from three different branches (two from different branches of Burmo-Giangic), and four Uto-Aztecan languages (two Northern, two Southern).

3. If there was no obvious default, we analyzed the masculine singular forms of demonstrative pronouns.

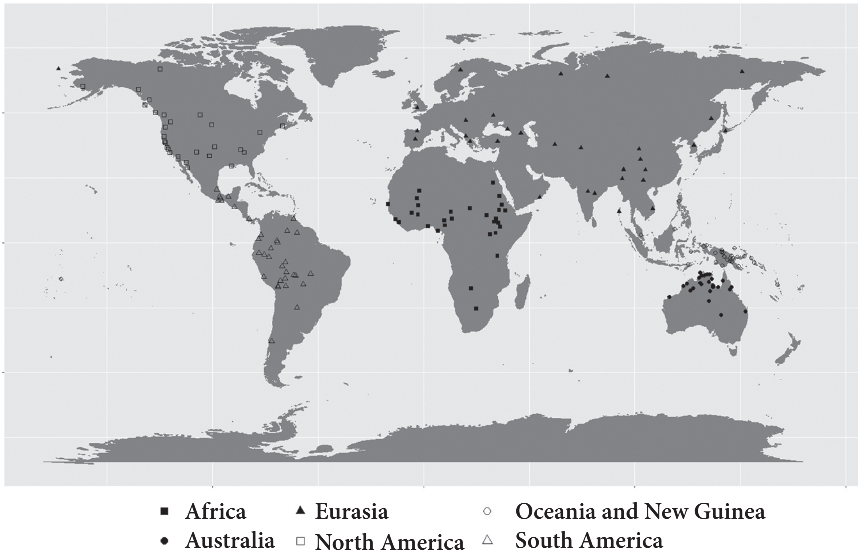

Figure 1. The 180-language sample

frequency, tone, and length), we excluded three distance-neutral languages from the original 180-language sample (Jamsay, Koyra Chiini, and Supyire), as well as twelve languages the description of which was insufficient regarding the phonology of their demonstrative systems (Bororo, Yupik (Central Alaskan), Dom, Goemai, Hmong-Njua, Kewapi, Mosetén, Movima, Mutsun, Riantana, Yakima, Yanyuwa). For the qualitative parts of our analysis, we considered the full range of demonstratives included in our database. All demonstrative forms were uniformly transcribed into the International Phonetic Alphabet and subsequently coded for the relevant features by both authors independently. More detailed information on the exact coding procedure is provided in subsequent sections.

3. Iconicity and second formant frequency

The acoustic properties of vowels are determined by two general aspects of articulation: the fundamental frequency of vocal cords vibration, which is perceived as 'pitch', and the way in which this sound is transformed into particular overtones, known as formants, by the resonances of the human vocal tract. The latter are determined by a number of factors including the position of the larynx, velum, tongue, and lips, as well as the overall size (and shape) of the pharyngeal, oral, and nasal cavities (Ladefoged & Johnson 2015).

There is abundant evidence that the formants of vowels evoke the concept of size. A large resonance chamber (i.e. a large vocal tract) results in low formant frequency, which is associated with large physical size, whereas a small resonance chamber results in high formant frequency, which is associated with small physical size (e.g. Sapir 1929; Newman 1933; Thorndike 1945; Chastaing 1958; Fisher-Jørgensen 1968; Ohala 2006; Perniss et al. 2010: 3–4; see also Bruckert et al. 2006; Collins 2000). Ohala (2006) refers to this association as the "frequency code", which is most prominent with the second formant (F2). To simplify, high front vowels tend to have higher F2 frequencies than low vowels, which in turn have higher F2 frequencies than (rounded) high back vowels (cf. Figure 2).

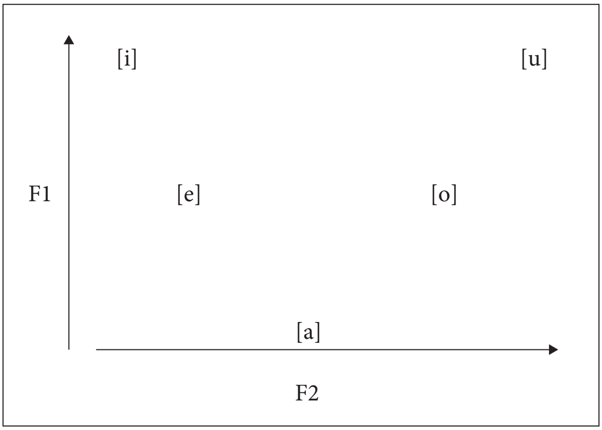

Figure 2. Vowel continuum of F1 and F2 frequencies (*from high to low*)

Building on this finding, it seems reasonable to assume that proximal demonstratives, which indicate *small* distances, tend to include vowels with higher F2 frequencies than their corresponding distal terms, which indicate *larger* distances.[4] Johansson & Zlatev (2013) found good evidence for this hypothesis. However, given that their data are not fully consistent with Ohala's frequency code (22% of the languages in their sample show the reverse pattern), we decided to replicate their investigation by using a somewhat larger and more carefully selected language sample.

Following Johansson & Zlatev (2013), we compared the vowel frequencies of proximal and distal demonstrative pairs according to the scale presented in Figure 3 below, which contains the 21 most frequent vowels, according to Johansson &

4. Johansson & Zlatev (2013: 8) also observe that low frequencies "attenuate with distance less rapidly than high frequencies, so that low frequency sounds can be heard from much larger distances".

Zlatev (2013: 8). Note that, in order to present the data in a clear fashion, we have grouped vowels together in the graphic representations of our data (i.e. in Tables 2 and 3, as well as in Figure 3). In these visual presentations of the data, [i] represents [i] and [ʏ]; [e] represents [e], [ɛ], [ø], [æ], and [ɨ]; [a] represents [a], [œ], [ə], [ɶ], [ɐ], [ʉ], [ʌ], and [ɤ]; [o] represents [ɑ], [ɒ], [ɯ], [ɔ], and [o]; and [u] represents [u].

i	ʏ	e	ɛ	ø	æ	ɨ	a	œ	ə	ɶ	ɐ	ʉ	ʌ	ɤ	ɑ	ɒ	ɯ	ɔ	o	u

Figure 3. F2 frequencies in vowels (from high to low) (from Johansson & Zlatev 2013: 8)

The vowel contrasts were divided into three categories: (i) motivated, (ii) reversed, and (iii) neutral. A pair of distance-marked demonstratives is motivated if the vowel of the proximal term occurs with a higher F2 frequency than the vowel of the corresponding distal term, and it is reversed if it is the other way around, i.e. if the vowel of the distal term has a higher F2 frequency than the vowel of the corresponding proximal demonstrative. Neutral pairs include the same vowels. An example of each pair is given in Table 1, which shows the demonstrative systems of English, Buru (Grimes 1991: 168) and Wappo (Thompson et al. 2006: 22).

Table 1. Examples of motivated, reversed, and neutral pairs of demonstratives

	Motivated [English]	**Reversed [Buru]**	**Neutral [Wappo]**
proximal	this [ðɪs]	*naa*	*he*
distal	that [ðæt]	*dii*	*ce*

Our analysis concentrates on the vowels of demonstrative roots, disregarding the vowels of derivational and inflectional morphemes.[5] Note that a demonstrative root may not include a vowel. Yimas, for example, has a three-term system in which proximal, medial and distal demonstratives have consonantal roots, i.e. proximal -*k*, medial -*m*, and distal -*n* (Foley 1991: 112). Languages like Yimas, as well as languages where a single consonant contrasted with a vowel, were excluded from our analysis.

Note that demonstrative roots can include multiple vowels, or an unequal number of vowels (in different distance terms), which do not always pattern in the same way. In Highlands Chontal, for example, the roots of the demonstrative pronouns (proximal -*iya* and distal -*uwaʔ*) include two vowels: one that occurs in proximal and distal forms (i.e. [a]), and one that is contrastive (i.e. [i] vs. [u]) (Turner 1966: 115). In this case, we concentrated on the pair of contrastive vowels

5. When a language had more than one set of demonstrative pronouns, we selected the class I, singular, masculine, nominative pronouns, unless this set of pronouns was not marked by a vowel contrast.

(which is motivated in Highlands Chontal). If the roots differed with respect to more than one vowel, the pair was only considered motivated if all vowel contrasts are consistent with the frequency code. In Jarawa, for example, the proximal root *li* is monosyllabic, but the distal root *luwə* includes two vowels (Kumar 2012: 85). Since the vowel of the proximal root is produced with a higher formant frequency than both vowels of the corresponding distal term, the Jarawa demonstratives were classified as motivated. If the comparison went in different directions, the pair of demonstratives was excluded from our analysis.[6]

Using this procedure, we were able to classify 155 demonstrative systems according to our coding scheme. Results indicate a clear difference in vowel frequency between proximal and distal terms. In a first step, we looked at the cross-linguistic frequency of five cardinal vowels in proximal and distal deictics (cf. Table 2).

Table 2. Cross-linguistic distribution of vowels in proximal and distal demonstrative pronouns*

	[i]	[e]	[a]	[o]	[u]
proximal	50	35	54	14	9
distal	26	19	66	22	28

* Note that demonstratives with more than one vowel were included more than once in this table.

In accordance with the predictions of the frequency code, front vowels are dominant in proximal demonstratives, whereas back vowels are especially frequent in distal terms. Note that the vowel [a] is also preferred in distal deictics, but the distribution of [a] across proximal and distal terms is less skewed than that of the four other vowels.[7]

Next, we analyzed the occurrence of particular vowel pairs. Concentrating on the comparison between proximal and distal terms, we found that 81 pairs are motivated, whereas only 37 pairs are reversed (the remaining 37 pairs are neutral). A one-tailed binomial test indicates that the proportion of motivated and reversed contrasts is significantly different from an equal distribution ($p < .001$). Moreover,

6. Of the 165 languages that feature in the quantitative parts of our analysis, ten had to be excluded in this analysis of formant frequency: ǂHòã (Africa; Kxa), Apuriña (South America; Arawakan), Begak (Oceania and New Guinea; Austronesian), Burushaski (Eastern) (Eurasia; Burushaski), Fulani (Adamawa) (Africa; Atlantic-Congo), Kunama (Africa; Kunama), Limilngan (Australia; Limilngan-Wulna), Mekens (South America; Tupian), Worrorra (Australia; Worrorran), Wambaya (Australia; Mirndi).

7. The distribution in Table 2 is considerably different from the cross-linguistic distribution of vowels in *PHOIBLE 2.0* (Moran & McCloy 2019), which shows that 92% of the investigated languages include [i], 88% include [u], 86% include [a], 61% include [e], and 60% include [o].

the vowel contrast between medial and distal demonstratives was also significantly more often motivated ($N = 30$) than reversed ($N = 10$) ($p = 0.001$); but the difference between proximal and medial terms did not reach significance ($N_{motivated} = 26$, $N_{reversed} = 21$, $p = 0.28$). Figure 4 shows the precise frequency of individual vowel pairs in our data.

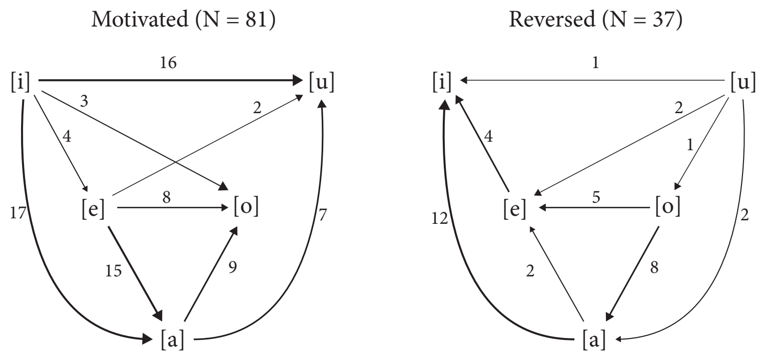

Figure 4. Frequency of vowel pairs in proximal and distal demonstratives

Note that motivated contrasts are especially frequent with the vowels [i] and [u], which are the vowels with the highest and lowest F2 frequencies. Concentrating on demonstratives including [i] or [u], 80% of all deictic pairs are iconically motivated according to the frequency code (cf. Table 3). In contrast, if we look at demonstratives including the vowels [e], [a] or [o], there is a much smaller proportion of motivated pairs. As can be seen in Table 3, if one of the two distance terms includes the vowel [e], only 69% of all deictic systems are motivated (and 31% are reversed); if one of the two terms includes the vowel [a], only 67% are motivated (and 33% are reversed), and if one of the two terms includes the vowel [o], only 59% of all proximal-distal pairs are motivated (and 41% are reversed).[8]

Table 3. Proportions of motivated and reversed contrasts of five cardinal vowels

	Motivated	**Reversed**	**F2**
[u] vs. [i/e/a/o]	81% ($N = 25$)	19% ($N = 6$)	very low
[i] vs. [e/a/o/u]	80% ($N = 40$)	20% ($N = 17$)	very high
[e] vs. [i/o/a/u]	69% ($N = 29$)	31% ($N = 13$)	intermediate
[a] vs. [i/e/o/u]	67% ($N = 48$)	33% ($N = 24$)	intermediate
[o] vs. [i/e/a/u]	59% ($N = 20$)	41% ($N = 14$)	intermediate

8. Note that two reversed [a] → [e] and four reversed [e] → [i] contrasts can be analyzed as iconically motivated when considering F1 frequency (see also Kwon 2015; cf. Figure 2).

Taken together, these results provide compelling evidence for the hypothesis that vowel frequency correlates with the encoding of distance in demonstrative systems. Across languages, proximal demonstratives tend to include vowels with higher F2 frequencies than the vowels of corresponding distal terms. This tendency is especially prominent with high front vowels and high back vowels (i.e. vowels with very high or very low F2 frequencies). Mid vowels and low vowels are more widely distributed across proximal and distal deictics, suggesting that vowels with intermediate F2 frequencies are less strongly influenced by iconicity than vowels from the two ends of the formant-frequency scale.

4. Other types of iconicity

Having analyzed the correlation between F2 frequency and distance, we now turn to other types of iconicity in demonstrative systems. In particular, we will consider iconic motivations for the occurrence of particular tones, vowel lengthening, reduplication, and word length. The iconicity of these features in demonstrative systems has never been systematically investigated from a cross-linguistic perspective.

4.1 Tone

Like formant frequency, tone is based on pitch (or vocal cords vibration). All languages use pitch to express emotions and to indicate boundaries between syntactic units (e.g. between phrases or sentences). However, in some languages, pitch also serves to express semantic contrasts between lexical expressions or inflectional categories, such as present tense and past tense. Languages of this type are known as tonal languages, which are quite common in certain areas of Africa, Southeast Asia and the Americas, but relatively rare in other parts of the world (Maddieson 2013).

Tone is also used iconically to express contrasts in size, so that high tone correlates with small objects, while low tone correlates with large ones (Ohala 2006). This correlation is directly connected with physical size: small animals have small vocal cords that produce sounds with a high fundamental frequency, while large animals have large vocal cords that produce sounds with a low fundamental frequency (Morton 1977). For example, in Gbaya, ideophones with a high tone indicate small objects, whereas ideophones with low tone are associated with objects of large size (Childs 2006: 192). Building on this finding, Johansson & Zlatev (2013: 8) hypothesized that tone may also be used to differentiate between proximal and distal deictics, but they did not follow up on this hypothesis.

There are 30 tonal languages in our sample in which demonstratives carry a particular tone; but in most of them, there is no tonal difference between proximal and distal deictics. Five languages, however, use tone as a phonetic feature to differentiate between distance terms. One of them is Ik, which has three distance-marked demonstratives. Crucially, the only feature that distinguishes the medial and distal forms is tone: "Medial forms have a LH [low–high] melody in the nominative, instrumental, and oblique cases, while the distal forms have LL [low–low] instead" (Schrock 2014: 217). This is exactly what one would have expected according to the frequency code (Ohala 2006).[9]

Apart from Ik, there are two other languages in our sample in which the distance features of demonstratives are exclusively expressed by tone – Bora (Thiesen & Weber 2012) and Dom (Tida 2006) – , and two further languages in which the encoding of distance involves both morphological and tonal features. In Aghem, for example, the roots of proximal and distal demonstratives are not only distinguished by tone, but also by different front vowels and by the occurrence of a nasal consonant in the proximal root (cf. Table 4).[10]

Table 4. Demonstrative pronouns in Aghem (Hyman 1979: 31)

	Demonstrative roots	Demonstrative pronouns
proximal	*-ɨ́n*	*gh-ɨ́n*
distal	*-ì*	*á-gh-î*

Note that tone is also associated with the semantic concept of elevation. In Yag Dii, for example, words denoting high objects carry high tone (Bohnhoff 1982: 12, cited in Childs 2006: 192). Interestingly, some languages have elevational demonstratives that are iconically marked by tone (see e.g. Breunesse 2019; Forker 2020). Abui, for example, has medial and distal demonstratives that differentiate between referents at different levels by using different tones, such that "the high tone indicates the high position, while the low tone the low position" (Kratochvíl 2007: 111–112) (cf. Table 5).

Table 5. Demonstrative pronouns in Abui (Kratochvíl 2007: 111–112)

	Lower plane	Higher plane
proximal	–	
medial	*ò*	*ó*
distal	*wò*	*wó*

9. Transcription of the forms by Schrock (2014); tonal transcription ours.

10. Note that the ɨ-symbol represents [ɪ] in stems without a closing C_2 consonant and [ə] elsewhere (Hyman 1979: 6).

Taken together, these data provide good evidence for the frequency code. However, given that there are only very few tonal languages with iconically motivated distance contrasts in our sample, this seems to be a rare phenomenon. More research is needed to determine the role of iconicity in tonally marked demonstratives.

4.2 Vowel lengthening

Another type of iconicity that is well-known from the literature concerns the relationship between the length of a linguistic expression and the length or size of its referent. Givón (1991) refers to this as "iconicity of quantity", and claims that larger quantities and larger objects are often expressed by longer linguistic forms (see also Jakobson 1965 [1971]: 352; Haiman 1980: 528–529; Lakoff & Johnson 1980: 127).

However, this explanation was challenged by Haspelmath (2008), who argued that frequency of language use provides a more effective explanation for the phenomena that are commonly explained by iconicity of quantity. We will return to this issue below. Here we note that iconicity of quantity and size may not be a uniform phenomenon. There is good evidence from psycholinguistics that children do indeed associate bigger words with bigger objects and vice versa (Ferreiro 1988; Bialystok 1991).

Building on this research, we hypothesized that speakers may lengthen the pronunciation of a distal demonstrative's vowel in order to intensify its distal meaning. This hypothesis is corroborated by the demonstrative system of Chukchi, in which the initial vowels of distal demonstratives are commonly lengthened to indicate a referent that is even farther away, as in (1).

(1) Chukchi (Dunn 1999: 130)
əŋŋin=ʔm *n-ə-ɣrətku-qin* *teŋ-em-rəntəŋet-e* ***ŋaːaːaːaːnqen***
thus=EMPH HAB-EP-slaughter-3SG EMPH-CVB-divide-CVB **yonder.3SG.ABS**
n-ine-lɣi-n-jəqunt-ew-qin=ʔm
HAB-TR-INTS-CAUS-go.far.away-CAUS-3SG=EMPH
'Thus he slaughtered meat, butchering it, **way off yonder** he took it.'

In Chukchi, vowel lengthening is an *ad hoc* strategy to signal greater distance, but there are also languages in which demonstratives are lengthened by convention to indicate a deictic contrast. A good example is Uduk, in which the semantic distinction between "remote demonstratives" and "distal demonstratives" (the latter are used for referents that are farther away) is "a matter of phoneme lengthening". As Killian (2015: 151) explains, "for remote distance, either the consonant or the vowel [of the demonstrative] is lengthened, but not both. For distal distances, both the consonant as well as the vowel must be lengthened" (i.e. *t(t)- ā(ā)n* "remote" vs.

tt-āān "distal"). A similar contrast of lexicalized vowel lengthening seems to occur in distal demonstratives in Koasati (Kimball 1991: 486).

Moreover, there are several languages in our sample in which proximal and distal demonstratives are distinguished by both vowel quality and vowel length. Arikara, for example, has a short [i] in the proximal form *ti* and a long [u] in the distal demonstrative *nuu* (Parks et al. 1979: 231). Similar contrasts between proximal and distal deictics occur in Jamul Diegueño (Miller 1990: 100), Kuuk Thaayorre (Gaby 2006: 255), Samoan (Mosel & Hovdhaugen 1992: 131), and Sisaala Pasaale (McGill et al. 1999: 39).

4.3 Reduplication

Like vowel lengthening, reduplication can be interpreted as an instance of iconicity of quantity (Fischer 2011). Many languages use (partially) reduplicated word forms to indicate emphasis, plurality, intensity, and size (Rubino 2011). All of these phenomena are attested with demonstratives. Example (2), for instance, shows a fully reduplicated demonstrative in Yanyuwa that serves to emphasize the referent. Similar uses of reduplicated demonstratives occur in Comanche (Charney 1993: 95), Ilocano (Rubino 1997: 379) and Semelai (Kruspe 1999: 303).[11]

(2) Yanyuwa (Kirton & Charlie 1996: 68)

Jina	***jina***	*walya*	*jardiwangarn*
this.INDF	**this.INDF**	dugong	flat.backed.turtle

'**This particular** dugong is the jardiwangarni.'

Given that reduplication is commonly used to augment a semantic concept, we may hypothesize that it also serves to indicate an increase in distance in demonstrative reference. Examining the forms in our sample, we have indeed found a few reduplicated demonstratives that seem to be consistent with this hypothesis, though the encoding of distance and intensity are often difficult to disentangle. In Dime, for example, speakers can repeat the prefix *s'uy-* of the distal demonstrative *s'uy-si-nú* in order to "intensify the expression of distance" (Seyoum 2008: 77), and in Malakmalak, the distal demonstrative *katuk* may be reduplicated to augment the spatial meaning (Birk 1976: 34), as in (3).

(3) Malakmalak (Birk 1976: 34)

yin[y]*a*	*yawuk*	*ŋat*[y]	***katuruk***	*yöyö*
man	ADJ	PTCL.EMPH	**DEM**	3SG.M.SBJ.PRS

'The other man is **a very long way away**.'

11. Reduplication of a Semelai demonstrative can also indicate plurality (Kruspe 1999: 167).

Other languages in which reduplication seems to be related to the encoding of distance and/or intensity include Mosetén (Sakel 2004: 164–165) and Uchumataqu (Hannß 2008: 189). Moreover, there is at least one language in our data in which the contrast between proximal and distal deixis is lexically expressed by reduplication. As can be seen in Table 6, in Garrwa, the distal demonstrative *nana-* is formed by reduplicating the proximal root *na-*.

Table 6. Demonstrative roots in Garrwa (Mushin 2012: 114–115)

PROXIMAL	*NA-*
DISTAL	*NANA-*

4.4 Word length

To conclude our investigation, we examined the overall length of proximal and distal demonstratives. There are many different ways to measure the length of a word, but for the purpose of this study, we used the number of syllables to compare the length of different distance terms.

In the majority of languages, proximal and distal demonstratives include the same number of syllables, but there are 39 languages in our sample in which the various distance terms occur with an unequal number of syllables. In Spanish, for example, the roots of proximal and medial demonstratives are monosyllabic (proximal *est-* and medial *es-*), whereas the roots of distal demonstratives are composed of two syllables (distal *aquel-*). In Russian it is the other way around: the proximal demonstrative *этот* consists of two syllables, whereas the proximal demonstrative *tot* is monosyllabic (Hauenschild 1982). A few other examples are given in Table 7.

Table 7. Examples of proximal and distal demonstratives with different numbers of syllables

	Proximal < distal			**Proximal > distal**	
Jarawa	*li* [1]	*luwə* [2]	Aymara	*aka* [2]	*kha* [1]
Malakmalak	*ki* [1]	*katuk* [2]	Jamul Diegueño	*peya* [2]	*puu* [1]
Uchumataqu	*ti* [1]	*naku* [2]	Seri	*hipiix* [2]	*tiix* [1]
Gaagudju	*naarri* [2]	*naabirri* [3]	Yurakaré	*ana* [2]	*naa* [1]
Greek	*toutos* [2]	*ekeinos* [3]	Gooniyandi	*ngirndaji* [3]	*ngooddoo* [2]

As can be seen, the difference in length between proximal and distal deictics can occur in both directions. Yet, the asymmetry is skewed to longer distal forms. Overall, there are 31 languages in our data in which distal demonstratives include at least one more syllable than the corresponding proximal forms, and only 8 languages in which proximal demonstratives include one more syllable than the corresponding distal terms (binomial test: $p < .001$). Considering the full range of demonstratives in our data, the roots of proximal demonstratives have a mean length of 1.28 syllables whereas the roots of distal demonstratives consist of a mean of 1.42 syllables. A paired Wilcoxon test revealed a highly significant difference between these terms ($p < .001$, $V = 156$).

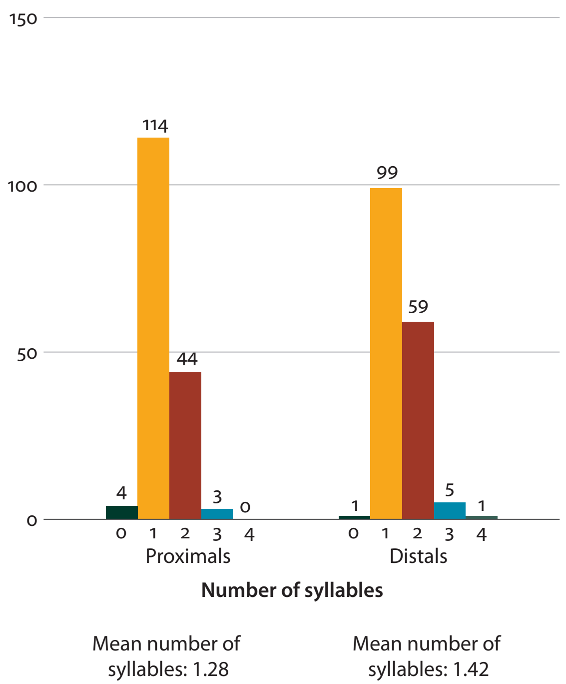

Figure 5. Mean number of syllables in proximal and distal demonstratives

More research is needed to investigate the length of different distance terms in deictic systems, but if future studies confirm that proximal demonstratives tend to be shorter than distal ones, this may be analyzed as another instance of iconicity. Since proximal demonstratives indicate a shorter distance (between referent and origo) than the corresponding distal terms, they are expected to be shorter if word length is indeed motivated by iconicity of quantity, as often argued in the literature (see above).

However, as pointed out above, asymmetries in word length can also be explained by the effect of frequency on language use. Consider, for example, the contrast between singular and plural nouns. There is abundant evidence that, across languages, singular nouns are expressed by shorter word forms than plural nouns, as the latter are commonly marked by an extra morpheme (Greenberg 1963; Croft 2003; Haspelmath & Karjus 2017). In English, for example, most plural nouns occur with the plural suffix *-s* (or *-es*) while singular nouns are "zero-coded" (Haspelmath 2006: 30).

One explanation for this asymmetry is iconicity of quantity. Since plural nouns designate a larger quantity than singular nouns, they take an extra marker to "echo the meaning of numeral increment" (Jakobson 1965 [1971]: 352). However, challenging this account, Haspelmath argues that the encoding asymmetry between singular and plural nouns can be explained by frequency and economy (Haspelmath 2008; Haspelmath & Karjus 2017). Referring to Zipf (1935), he notes that frequency of language use correlates with predictability and word length: other things being equal, frequent signs are more easily predictable in language use than infrequent signs. Since predictable signs are easily recognized, they need less explicit coding than unexpected signs, and as a consequence of this, frequency correlates with word length (see also Haspelmath 2014; Haspelmath et al. 2014; Diessel 2019: 223–252). Since singular nouns are more frequent than plural nouns, there is a cross-linguistic tendency for plural nouns to be longer and more explicitly marked than singular nouns.

Assuming that the various distance terms of demonstratives occur with different frequencies, the same explanation could apply to the asymmetry in the encoding of proximal and distal deixis. There is some evidence in the literature that different distance terms occur with different frequencies (e.g. Botley & McEnery 2001; Wu 2004; Levinson et al. 2018). However, to the best of our knowledge, this has never been systematically investigated from a cross-linguistic perspective. As it stands, we do not know if there are cross-linguistic asymmetries in frequency between proximal and distal demonstratives, making it impossible (at this point) to evaluate the validity of a frequency-based explanation for the difference in length between proximal and distal deixis.

5. Conclusion

In this paper, we have investigated the potential influence of iconicity on the encoding of distance in demonstrative systems. Based on data from a representative sample of 180 languages, we have argued that iconicity in demonstratives is a multifaceted phenomenon. In the first part of the paper, we re-examined the long-standing hypothesis that the encoding of distance correlates with the quality of demonstrative vowels. In accordance with Johansson & Zlatev (2013), we found that the vowels of proximal demonstratives tend to have higher F2 frequencies than the vowels of the corresponding distal terms. This correlation is consistent with Ohala's frequency code and strongest for demonstratives that include vowels from the two opposite poles of the F2-frequency scale (i.e. [i] and [u]).

In the second part of the paper, we explored a number of other iconic principles that have not yet been investigated in previous cross-linguistic research. In particular, we considered iconic motivations for the occurrence of different tones, vowel lengthening, reduplication, and word length.

Like vowel frequency, the occurrence of tone is iconically motivated in some languages, but this seems to be a rare phenomenon. There are only half a dozen languages in our sample in which tone reflects a semantic difference in space.

Vowel lengthening, reduplication and word length concern a different type of iconicity, i.e. iconicity of quantity. There is some evidence in our data that vowel lengthening and reduplication serve to indicate an increase in distance; but this needs to be investigated in more detail.

Examining the number of syllables in demonstrative roots, our data suggest that distal demonstratives tend to be longer than proximal demonstratives; but, while this may be another type of iconicity of quantity, there is another explanation, in which cross-linguistic asymmetries in the encoding of grammatical categories result from usage frequency, predictability and economy.

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Sample languages

Africa: ǂHòã, Aghem, Anywa, Beja, Chabu, Dagik, Dime, Fongbe, Fulani (Adamawa), Goemai, Gumuz, Ik (Icé-Tód), Jamsay, Kalabari, Kanuri, Khimt'Anga, Khwe (Modern), Koyra Chiini, Kunama, Kunuz Nubian, Ma'di, Mani, Masalit, Mende, Noon, Sandawe, Sisaala (Pasaale), Supyire, Tamashek, Uduk.

Australia: Alyawarra, Anindilyakwa, Bardi, Bilinarra, Djambarrpuyngu, Duungidjawu, Gaagudju, Garrwa (Western), Gooniyandi, Kayardild, Kija, Kuuk Thaayorre, Limilngan, Malakmalak, Mara, Martuthunira, Nakkara, Tiwi, Wambaya, Wardaman, Warrongo, Worrorra, Yandruwandha (Innamincka), Yanyuwa, Yidiny.

Eurasia: Ainu (Shizunai), Albanian, Balochi (Western), Basque, Bih, Burushaski (Eastern), Chukchi, Galo, Gondi (Adilabad Dialect), Greek (Modern), Hinuq, Hmong Njua, Hungarian, Jarawa, Jibbali, Ket, Khanty (Eastern), Korean, Mangghuer, Meithei, Nihali, Nuosu, Qiang (Puxi), Saami (Pite), Spanish, Turkish, Ubykh, Udihe, Ukrainian, Welsh, Yukaghir (Kolyma).

North America: Arikara, Assiniboine, Chimariko, Chitimacha (Modern), Comanche, Cupeño, Euchee (Yuchi), Haida (Skidegate), Ineseño Chumash, Jamul Diegueño, Keres (Laguna), Kiowa, Koasati, Kyuquot, Molalla, Musqueam, Mutsun, Nevome, Nisgha, Passamaquoddy, Pomo (Eastern), Salinan, Seneca, Seri, Slave, Tlingit, Wappo, Yakima Ichiskíin, Yupik (Central Alaskan).

Oceania and New Guinea: Awtuw, Bargam, Bariai, Begak (Ida'an), Bilua, Buru, Dani (Western), Dla (Menggwa), Dom, Duna, Fore, Hatam, Ilocano, Imonda, Kewapi, Komnzo, Korafe, Lele, Maybrat, Menya, Nankina, Neverver, Oksapmin, Papapana, Pawaian, Riantana, Samoan, Sawila, Semelai, Sulka, Wutung.

South America: Apurinã, Awa Pit (Cuaiquer), Aymara (Muylaque), Ayutla Mixe (Tukyo'm Ayuujk), Bora, Bororo, Chatino (Yaitepec), Chinantec (Sochiapan), Chol, Chontal (Highland), Epena Pedee, Hup, Jarawara, Kotiria, Kwaza, Macuxi, Mapuche, Matses, Mekens, Mosetén, Movima, Pilagá, Pipil (Cuisnahuat), Sanuma, Tepehua (Huehuetla), Teribe, Trumai, Uchumataqu, Urarina, Wampis, Warao, Wari', Yauyos Quechua (Southern), Yurakaré.

Glosses and symbols

The paper abides by the Leipzig Glossing Rules. Additional or deviant abbreviations include:

-	morpheme boundary	â	falling tone
=	clitic boundary	EMPH	emphatic
ː	lengthened	HAB	habitual
á	high tone	INTS	intensifier
à	low tone	PTCL	particle
ǎ	rising tone		

References

Anderson, John & Keenan, Edward. 1985. Deixis. In *Language Typology and Syntactic Description*, Vol. III: *Grammatical Categories and the Lexicon*, Timothy Shopen (ed.), 259–308. Cambridge: CUP.

Bialystok, Ellen. 1991. Letters, sounds, and symbols. Changes in children's understanding of written language. *Applied Psycholinguistics* 12: 75–89. https://doi.org/10.1017/S0142716400009383

Birk, David B. W. 1976. *The Malakmalak language, Daly River (Western Arnhem Land)*. Canberra: Australian National University.

Bohnhoff, Lee E. 1982. Yag Dii (Duru) ideophones. *Cahier du Département des Langues et Linguistiques* 2(1): 1–14.

Botley, Simon P. & McEnery, Tony. 2001. Demonstratives in English. A corpus-based study. *Journal of English Linguistics* 29: 7–33. https://doi.org/10.1177/00754240122005170

Breunesse, Merlijn. 2019. Demonstratives in Space and Discourse. A Synchronic and Diachronic Analysis. PhD dissertation, Friedrich-Schiller-Universität Jena.

Bruckert, Laetitia, Liénard, Jean-Sylvain, Lacroix, André, Kreutzer, Michel & Leboucher, Gérard. 2006. Women use voice parameters to assess men's characteristics. *Proceedings of the Royal Society B: Biological Sciences* 273(1582): 83–89. https://doi.org/10.1098/rspb.2005.3265

Bühler, Karl. 1934. *Sprachtheorie*. Jena: Fischer.

Burenhult, Niclas. 2008. Spatial coordinate systems in demonstrative meaning. *Linguistic Typology* 12(1): 99–142. https://doi.org/10.1515/LITY.2008.033

Campisi, Emanuela & Özyürek, Asli. 2013. Iconicity as a communicative strategy. Recipient design in multimodal demonstrations for adults and children. *Journal of Pragmatics* 47(1): 14–27. https://doi.org/10.1016/j.pragma.2012.12.007

Charney, Jean O. 1993. *A Grammar of Comanche*. Lincoln NE: University of Nebraska Press.

Chastaing, Maxime. 1958. Le symbolisme des voyelles. Significations des 'i'. *Journal de Psychologie* 53: 403–423; 461–481.

Childs, G. Tucker. 2006. African ideophones. In *Sound Symbolism*, Leanne Hinton, Johanna Nichols & John J. Ohala (eds), 178–204. Cambridge: CUP.

Clark, Eve V. 1971. On the acquisition of the meaning of *before* and *after*. *Journal of Verbal Learning and Verbal Behavior* 10: 266–275. https://doi.org/10.1016/S0022-5371(71)80054-3

Clark, Herbert H. 1996. *Using Language*. Cambridge: CUP. https://doi.org/10.1017/CBO9780511620539

Collins, Sarah A. 2000. Men's voices and women's choices. *Animal Behaviour* 60(6): 773–780. https://doi.org/10.1006/anbe.2000.1523

Croft, William. 2003. *Typology and Universals*, 2nd edn. Cambridge: CUP.

Diessel, Holger. 1999. *Demonstratives. Form, Function, and Grammaticalization* [Typological Studies in Language 42]. Amsterdam: John Benjamins. https://doi.org/10.1075/tsl.42

Diessel, Holger. 2005. Competing motivations for the ordering of main and adverbial clauses. *Linguistics* 43: 449–470. https://doi.org/10.1515/ling.2005.43.3.449

Diessel, Holger. 2006. Demonstratives, joint attention, and the emergence of grammar. *Cognitive Linguistics* 17(4): 463–489. https://doi.org/10.1515/COG.2006.015

Diessel, Holger. 2008. Iconicity of sequence. A corpus-based analysis of the positioning of temporal adverbial clauses in English. *Cognitive Linguistics* 19(3): 465–490. https://doi.org/10.1515/COGL.2008.018

Diessel, Holger. 2013. Distance contrasts in demonstratives. In *The World Atlas of Language Structures Online*, Matthew S. Dryer & Martin Haspelmath (eds). Leipzig: Max Planck Institute for Evolutionary Anthropology. <http://wals.info/chapter/41> (22 July 2019).

Diessel, Holger. 2014. Demonstratives, frames of reference, and semantic universals of space. *Language and Linguistics Compass* 3: 116–132. https://doi.org/10.1111/lnc3.12066

Diessel, Holger. 2019. *The Grammar Network. How Linguistic Structure is Shaped by Language Use*. Cambridge: CUP. https://doi.org/10.1017/9781108671040

Diessel, Holger & Coventry, Kenny. 2020. Demonstratives in spatial language and social interaction. An interdisciplinary review. *Frontiers in Psychology 11*. https://doi.org/10.3389/fpsyg.2020.555265

Diessel, Holger & Monakhov, Sergei. 2022. Acquisition of demonstratives in cross-linguistic perspective. *Journal of Child Language*: 1–32. https://doi.org/10.1017/S030500092200023X

Dingemanse, Mark. 2012. Advances in the cross-linguistic study of ideophones. *Language and Linguistics Compass* 6: 654–672. https://doi.org/10.1002/lnc3.361

Dingemanse, Mark, Blasi, Damián E., Lupyan, Gary, Christiansen, Morten H. & Monaghan, Padraic. 2015. Arbitrariness, iconicity, and systematicity in language. *Trends in Cognitive Sciences* 19(10): 603–615. https://doi.org/10.1016/j.tics.2015.07.013

Dixon, Robert M. W. 2003. Demonstratives. A cross-linguistic typology. *Studies in Language* 27(1): 61–112. https://doi.org/10.1075/sl.27.1.04dix

Dryer, Matthew S. 1992. The Greenbergian word order correlations. *Language* 68(1): 81–138. https://doi.org/10.1353/lan.1992.0028

Dunn, Michael. 1999. A Grammar of Chukchi. PhD dissertation, Australian National University.

Ferreiro, Emilia. 1988. L'écriture avant la lettre. In *La production de notations chez le jeune enfant. Langage, nombres, rythmes, et melodies*, Hermine Sinclair (ed.), 17–70. Paris: Presses Universitaires de France.

Fischer, Olga. 2011. Cognitive iconic grounding of reduplication in language. In *Semblance and Signification* [Iconicity in Language and Literature 10], Pascal Michelucci, Olga Fischer & Christina Ljungberg (eds), 55–81. Amsterdam: John Benjamins. https://doi.org/10.1075/ill.10.04fis

Fisher-Jørgensen, Eli. 1968. Perceptual dimensions of vowels. *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung* 2: 94–98. https://doi.org/10.1524/stuf.1968.21.16.94

Foley, William A. 1991. *The Yimas Language of Papua New Guinea*. Stanford CA: Stanford University Press.

Forker, Diana. 2020. Elevation as a grammatical and semantic category of demonstratives. *Frontiers in Psychology* 11(1712): 1–19. https://doi.org/10.3389/fpsyg.2020.01712

Gaby, Alice R. 2006. A Grammar of Kuuk Thaayorre. PhD dissertation, University of Melbourne.

Givón, Talmy. 1991. Isomorphism in the grammatical code. Cognitive and biological considerations. *Studies in Language* 15(1): 85–114. https://doi.org/10.1075/sl.15.1.04giv

Greenberg, Joseph H. 1963. Some universals of grammar with particular reference to the order of meaningful elements. In *Universals of Human Language*, Joseph H. Greenberg (ed), 73–113. Cambridge MA: The MIT Press.

Grimes, Charles. 1991. The Buru Language of Eastern Indonesia. PhD dissertation, Australian National University.

Haiman, John. 1980. The iconicity of grammar. *Language* 56: 515–540. https://doi.org/10.2307/414448

Haiman, John. 1983. Iconic and economic motivations. *Language* 59: 781–819. https://doi.org/10.2307/413373

Hammarström, Harald, Bank, Sebastian, Forkel, Robert & Haspelmath, Martin. 2018. *Glottolog 3.2*. Jena: Max Planck Institute for the Science of Human History <http://glottolog.org/> (20 February 2018).

Hannß, Katja. 2008. *Uchumataqu. The Lost Language of the Urus of Bolivia. A Grammatical Description of the Language as Documented between 1894 and 1952*. Leiden: CNWS Publications.

Haspelmath, Martin. 2006. Against markedness (and what to replace it with). *Journal of Linguistics* 41: 1–46. https://doi.org/10.1017/S0022226705003683

Haspelmath, Martin. 2008. Frequency vs. iconicity in explaining grammatical asymmetries. *Cognitive Linguistics* 19(1): 1–33. https://doi.org/10.1515/COG.2008.001

Haspelmath, Martin. 2014. On system pressure competing with economic motivation. In *Competing Motivations in Grammar and Usage*, Brian MacWhinney, Andrej Malchukov & Edith Moravcsik (eds), 197–208. Oxford: OUP. https://doi.org/10.1093/acprof:oso/9780198709848.003.0012

Haspelmath, Martin & Karjus, Andres. 2017. Explaining asymmetries in number marking. Singulatives, pluratives, and usage frequency. *Linguistics* 55: 1213–1235. https://doi.org/10.1515/ling-2017-0026

Haspelmath, Martin, Calude, Andreea, Spagnol, Michael, Narrog, Heiko & Bamyaci, Elif. 2014. Coding causal-noncausal verb alternations. A form-frequency correspondence explanation. *Journal of Linguistics* 50: 587–625. https://doi.org/10.1017/S0022226714000255

Hauenschild, Christa. 1982. Demonstrative pronouns in Russian and Czech. Deixis and anaphora. In *Here and There. Cross-Linguistic Studies on Deixis and Demonstration* [Pragmatics & Beyond III:2–3], Jürgen Weissenborn & Wolfgang Klein (eds), 167–186. Amsterdam: John Benjamins. https://doi.org/10.1075/pb.iii.2-3.09hau

Hyman, Larry. 1979. Phonology and noun structure. In *Aghem Grammatical Structure. With Special Reference to Noun Classes, Tense-Aspect and Focus Marking*, Larry Hyman (ed.), 1–72. Los Angeles CA: Department of Linguistics, University of Southern California.

Jakobson, Roman. 1965[1971]. Quest for the essence of language. In *Selected Writings*, Vol. II, 2nd edn., Roman Jakobson (ed.), 263–278. The Hague: Mouton.

Johansson, Niklas & Zlatev, Jordan. 2013. Motivations for sound symbolism in spatial deixis. A typological study of 101 languages. *The Public Journal of Semiotics Online* 5(1).

Kelly, Spencer D., Özyürek, Asli & Maris, Eric. 2010. Two sides of the same coin. Speech and gesture mutually interact to enhance comprehension. *Psychological Science* 21(2): 260–267. https://doi.org/10.1177/0956797609357327

Killian, Don. 2015. Topics in Uduk Phonology and Morphosyntax. PhD dissertation, University of Helsinki.

Kimball, Geoffrey. 1991. *Koasati Grammar*. Lincoln NE: University of Nebraska Press.

Kirton, Jean & Charlie, Bella. 1996. *Further Aspects of the Grammar of Yanyuwa, Northern Australia*. Canberra: Australian National University.

Kratochvíl, František. 2007. *A Grammar of Abui. A Papuan Language of Alor*. Utrecht: LOT.

Kruspe, Nicole. 1999. A Grammar of Semelai. PhD dissertation, University of Melbourne.

Kumar, Pramod. 2012. Descriptive and Typological Study of Jarawa. PhD dissertation, Jawaharlal Nehru University.

Kwon, Nayhun. 2015. The Natural Motivation of Sound Symbolism. PhD dissertation, University of Queensland. https://doi.org/10.14264/uql.2015.1013

Ladefoged, Peter & Johnson, Keith. 2015. *A Course in Phonetics*, 7th edn. Stanford CA: Cengage Learning.

Lakoff, George & Johnson, Mark. 1980. *Metaphors We Live by*. Chicago IL: The University of Chicago Press.
Levinson, Stephen C., Cutfield, Sarah, Dunn, Michael J., Enfield, Nick J. & Meira, Sérgio. 2018. *Demonstratives in Cross-Linguistic Perspective*. Cambridge: CUP. https://doi.org/10.1017/9781108333818
Maddieson, Ian. 2013. Tone. In *The World Atlas of Language Structures Online*, Matthew S. Dryer & Martin Haspelmath (eds). Leipzig: Max Planck Institute for Evolutionary Anthropology <http://wals.info/chapter/13> (10 November 2021).
McGill, Stuart, Fembeti, Samuel & Toupin, Mike. 1999. *A Grammar of Sisaala-Pasaale*. Legon: Institute of African Studies at the University of Ghana.
Miller, Amy W. 1990. A Grammar of Jamul Diegueño. PhD dissertation, University of California at San Diego.
Moran, Steven & McCloy, Daniel. 2019. *PHOIBLE 2.0*. Jena: Max Planck Institute for the Science of Human History <https://phoible.org/> (12 November 2021).
Morton, Eugene S. 1977. On the occurrence and significance of motivation-structural rules in some bird and mammal sounds. *American Naturalist* 111: 855–869. https://doi.org/10.1086/283219
Mosel, Ulrike & Hovdhaugen, Even. 1992. *Samoan Reference Grammar*. Oslo: Scandinavian University Press.
Mushin, Ilana. 2012. *A Grammar of (Western) Garrwa*. Berlin: De Gruyter Mouton. https://doi.org/10.1515/9781614512417
Newman, Stanley S. 1933. Further experiments in phonetic symbolism. *American Journal of Psychology* 45: 53–75. https://doi.org/10.2307/1414186
Ohala, John. J. 2006. The frequency code underlies the sound-symbolic use of voice pitch. In *Sound Symbolism*, Leanne Hinton, Johanna Nichols & John J. Ohala (eds), 325–347. Cambridge: CUP.
Parks, Douglas, Beltran, Janet & Waters, Ella. 1979. *An Introduction to the Arikara Language*. Bismarck ND: Mary College.
Perniss, Pamela & Vigliocco, Gabriella. 2014. The bridge of iconicity. From a world of experience to the experience of language. *Philosophical Transactions of the Royal Society B* 369(1651): 2–14. https://doi.org/10.1098/rstb.2013.0300
Perniss, Pamela, Thompson, Robin L. & Vigliocco, Gabriella. 2010. Iconicity as a general property of language. Evidence from spoken and signed languages. *Frontiers in Psychology* 1: 227–241. https://doi.org/10.3389/fpsyg.2010.00227
Rubino, Carl. 1997. Reference Grammar of Ilocano. PhD dissertation, University of California at Santa Barbara.
Rubino, Carl. 2011. Reduplication. Form, function and distribution. In *Studies on Reduplication*, Bernhard Hurch (ed.), 11–28. Berlin: Mouton de Gruyter.
Sakel, Jeanette. 2004. *A Grammar of Mosetén*. Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110915280
Sapir, Edward. 1929. A study in phonetic symbolism. *Journal of Experimental Psychology* 12: 225–239. https://doi.org/10.1037/h0070931
de Saussure, Ferdinand. 1916. *Cours de Linguistique Générale*, Charles Bally, Charles-Albert Sechehaye & Albert Riedlinger (eds). Paris: Payot.
Schmidtke-Bode, Karsten. 2009. *A Typology of Purpose Clauses* [Typological Studies in Language 88]. Amsterdam: John Benjamins. https://doi.org/10.1075/tsl.88

Schrock, Terrill B. 2014. *A Grammar of Ik (Icé-Tód). Northeast Uganda's Last Thriving Kuliak Language*. Utrecht: LOT.
Seyoum, Mulugeta. 2008. *A Grammar of Dime*. Utrecht: LOT.
Stukenbrock, Anja. 2015. *Deixis in der Face-to-Face-Interaktion*. Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110307436
Tanz, Christine. 1971. Sound symbolism in words relating to proximity and distance. *Language and Speech* 14(3): 266–276. https://doi.org/10.1177/002383097101400307
Thiesen, Wesley & Weber, David. 2012. *A Grammar of Bora with Special Attention to Tone*. Dallas TX: SIL International.
Thompson, Sandra A., Park, Joseph S.-Y. & Li, Charles N. 2006. *A Reference Grammar of Wappo*. Berkeley CA: University of California.
Thorndike, Edward L. 1945. On Orr's hypothesis concerning the front and back vowels. *British Journal of Psychiatry* 36: 10–14.
Tida, Syuntarô. 2006. A Grammar of the Dom Language. A Papuan Language of Papua New Guinea. PhD dissertation, Kyoto University.
Traunmüller, Hartmut. 2000. Sound symbolism in deictic words. In *Tongues and Texts Unlimited. Studies in Honour of Tore Janson on the Occasion of his Sixtieth Anniversary*, Hans Aili & Peter af Trampe (eds), 213–234. Stockholm: Stockholm University.
Turner, Paul R. 1966. Highland Chontal Grammar. PhD dissertation, University of Chicago.
Ultan, Russell. 1978. Size-sound symbolism. In *Universals of Human Language, Vol. II: Phonology*, Joseph H. Greenberg, Charles A. Ferguson & Edith A. Moravcsik (eds), 525–568. Stanford CA: Stanford University Press.
Woodworth, Nancy L. 1991. Sound symbolism in proximal and distal forms. *Linguistics* 29: 273–299. https://doi.org/10.1515/ling.1991.29.2.273
Wu, Yi'an. 2004. *Spatial Demonstratives in English and Chinese* [Pragmatics & Beyond New Series, 126]. Amsterdam: John Benjamins. https://doi.org/10.1075/pbns.126
Zipf, George K. 1935. *The Psycho-Biology of Language. An Introduction to Dynamic Philology*. Boston MA: Houghton Mifflin.