129. Hand and Arm

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1.   Defining the values

This map shows the distribution of the two primary ways in which languages lexically recognize major segments of the human upper limb. The major segments are 'hand,' from the fingertips to the wrist, and 'arm,' from the fingertips or from the wrist to the shoulder. Two values are represented:

@	1.	Identity: a single word denotes both 'hand' and 'arm'		228
@	2.	Differentiation: one word denotes 'hand' and another, different word denotes 'arm'		389
			total	617

English is an example of a **differentiating** (type 2) language, with *hand* and *arm*. Another example is Ngawun (Pama-Nyungan; Queensland, Australia), with *marl* 'hand' and *palkal* 'arm.'

If there is no 'arm' term in a language, but one or more words denote respectively one or more major segments of 'arm' other than 'hand' such as the forearm and the upper arm, the language is also included in type 2. An example is Chai (Nilo-Saharan; Ethiopia), having a word for 'hand,' *síyó*, and a word for both 'forearm', *múní*, and 'upper arm', *yíró*, while lacking a term for 'arm.' Differentiating languages such as Chai that lack a word for 'arm' are rare among languages sampled for the map.

Examples of **identity** (type 1) come from Lonwolwol (Oceanic; Vanuatu), Czech, and Gurma (Gur, Niger-Congo; Burkina Faso), respectively showing the terms *va:, ruka,* and *nu,* all of which denote both 'hand' and 'arm.'

Some languages included on the map are type 1 but nonetheless also have a term for 'hand' and/or one for 'arm' that does not show 'hand/arm' polysemy. For example, Bambara (Mande; Mali) uses *bolo* for both 'hand' and 'arm,' but has an alternate term, *tègè,* used for 'hand' (and also denoting 'palm' and 'foot'). Semai (Mon-Khmer; Malay Peninsula) shows *tek*, which polysemously denotes both 'hand' and 'arm', and also *kengrit,* which designates only 'arm.' Jicarilla Apache (Athapaskan; New Mexico) denotes both 'hand' and 'arm' with *gan* but also designates the former with *l–lá* and the latter with *gani.* The convention followed here is that if a language shows the same term for both 'hand' and 'arm,' type 1 (identity) is judged present, even if there are other terms in its lexicon denoting just 'hand' or 'arm.'

In some languages, a word denoting 'hand' also extends polysemously to a larger upper limb segment other than 'arm' that includes 'hand' as a part. For example, the Indonesian word for 'hand,' *tangan*, also denotes the forearm (with *lengan* referring to 'arm'). Indonesian is judged to be a differentiating language. In Kadazan (Austronesian; Borneo), *hongon* denotes both 'hand' and 'forearm', but since it also refers to 'arm,' the language is judged to be type 1.

2.   Geographical distribution

In the language sample used for this map, type 2 (differentiating) languages are about one and a half times more common than type 1 languages. There is a geographical distributional pattern: the percentage of type 1 languages occurring at latitudes closer to the equator is considerably greater than the percentage of type 1 languages found at latitudes more distant from the equator. In addition, among both type 1 and type 2 languages considerably removed from the equator (north of 35°59'N and south of 9°59'S), the percentage of type 2 languages is substantially greater than the

percentage of type 1 languages. In other words, type 1 languages tend to occur more frequently nearer the equator and less frequently away from the equator. The statistical association between latitudinal location and values is strongly positive (gamma = .61, p < .001, see Table 1).

Table 1. Association between latitude and 'hand'/'arm' values

Latitude	Values	
	Differentiation	Identity
70°N – 36°N, 10°S – 55°S	231	60
35°59'N – 9°59'S	158	168
gamma = .61	p < .001	N = 617

A geographical summary is as follows. Of the map's 60 languages native to Australia (and Tasmania), all but one, Yulparija, are differentiating. Among native languages of South America, differentiation is the dominant pattern. Differentiation is also dominant in Europe. Native languages of most of North America north of Mexico are differentiating with the exception of those of the U.S. Southwest and southern California, which mainly show identity. Languages manifesting identity dominate in southern Mexico, Central America, and the equatorial zones of Africa, Asia, and the Pacific.

3.   Genealogical distribution

In some instances, genealogically related languages distributed broadly across latitudes show heterogeneous values (both type 2 and type 1). In such cases, often languages closer to the equator tend more strongly to show identity than their closely related sister languages located further from the equator (which tend to show differentiation). For example, this is seen in the distribution of values across Uto-Aztecan languages and

dialects (North America) ranked by latitude from north to south (cases of identity are given in bold):

Table 2. Uto-Aztecan languages ranked by latitude

41°N	Shoshone	2
39°N	Northern Paiute	2
38°N	Comanche	2
37°N	Tümpisa Shoshone	2
37°N	Ute	2
36°N	**Hopi**	**1**
36°N	Kawaiisu	2
35°N	Chemehuevi	2
33°40'N	**Cahuilla**	**1**
33°30'N	**Luiseño**	**1**
32°N	**O'odham**	**1**
29°N	**Tarahumara (Central)**	**1**
28°10'N	Mayo	2
28°N	Tubar	2
22°30'N	**Cora**	**1**
21°20'N	**Huichol**	**1**
19°30'N	**Sierra de Zacapoaxtla**	**1**
19°N	**Tetelcingo Nahuatl**	**1**
18°30'N	**Pajapan Nahuatl**	**1**
18°N	Huauchinango Nahuatl	2
18°N	Xalitla Nahuatl	2

Only 12.5 percent of Uto-Aztecan languages spoken north of 34°N show identity, while 69.2 percent of these languages located south of 34°N show identity. Conversely, 87.5 percent of Uto-Aztecan languages north of 34°N show differentiation, while only 30.8 percent south of 34°N show differentiation.

A similar pattern is observed for Benue-Congo languages of Africa:

Table 3. Benue-Congo languages ranked by latitude

6°40'N	**Igbo**	1
6°10'N	Babungo	2
5°N	**Efik**	1
4°25'N	**Ogbronuagum**	1
3°N	**Yaka**	1
0°30'S	Nkore–Kiga	2
4°S	**Kituba**	1
5°S	**Nyamwezi**	1
5°S	**Kongo**	1
6°30'S	**Swahili**	1
10°S	Bemba	2
18°S	**Shona**	1
20°S	Kalanga	2
22°S	Tswana	2
30°S	Zulu	2

And the pattern holds for Athapaskan languages of North America:

Table 4. Athapaskan languages ranked by latitude

67°N	Slave	2
67°N	Kutchin	2
65°N	Koyukon	2
65°N	Lower Tanana	2
63°N	Northern Tutchone	2
63°N	**Tanaina**	1
62°N	Ahtna	2
62°N	Degexit'an	2
60°N	Slavey	2
59°N	Chipewyan	2
53°20'N	Carrier	2
41°20'N	Hupa	2
38°N	Navajo	2
36°N	**Jicarilla Apache**	1
34°N	**Western Apache**	1

32°N   Chiricahua Apache   2

And for Indo-European languages of South Asia:

Table 5. Some Indo-European languages ranked by latitude

34°N	Kashmiri	2
31°N	Panjabi	2
26°N	**Maithili**	**1**
21°N	**Kotia Oriya**	**1**
19°N	**Marathi**	**1**
7°N	**Sinhala**	**1**
6°N	**Vedda**	**1**

Genealogically related languages broadly distributed from north to south do not always show heterogeneous values. For example, languages of the Australian phylum, with one exception, are uniformly differentiating despite distribution across roughly 30 degrees of latitudinal space. Another example involves Tupian languages of South America (Chiriguano, Guaraní, Tapieté, Mundurukú, Omagua, Guajajara, Tupi, Urubú-Kaapor, and Wayampi), which are distributed across 25 degrees of latitude, but are found to be uniformly differentiating.

Other groups of genealogically related languages show homogeneous values. All seven Numic languages (Shoshone, Northern Paiute, Comanche, Tümpisa Shoshone, Ute, Kawaiisu, and Chemehuevi) among the Uto-Aztecan languages listed in Table 2 are differentiating; all of these are spoken in the same region (Great Basin and abutting areas). The 12 Arawakan languages of South America (Amuesha, Arawak, Axininca Campa, Baniwa, Bare, Campa Pajonal Asheninca, Machiguenga, Nomatsiguenga, Piapoco, Piro, Resigaro, and Goajiro), spoken close to the equator between 13°N and 13°S, are all, with the single exception of Nomatsiguenga, differentiating.

Other genealogical groups show heterogeneous values but, unlike the Uto-Aztecan, Benue-Congo, Athapaskan, and

Indo-European groups cited above, show no special distributional patterns. Of the 21 Altaic languages of the sample, which range from 57°N to 34°20'N, 15 show identity (Tatar, Khakas, Kazakh, Solon, Udihe, Khalkha, Noghay, Kalmyk, Kumyk, Manchu, Azerbaijani, Uzbek, Ainu, Turkmen, and Mangghuer) and six are differentiating (Evenki, Buriat, Karachay-Balkar, Kirghiz, Turkish, and Moghol). The 18 Tucanoan languages of South America, all spoken within one degree of latitude of the equator, are heterogeneous. Thirteen of these are differentiating (Barasano, Carapana, Desano, Guanano, Cubeo, Macuna, Northern Barasano, Secoya, Siriano, Retuarã, Tatuyo, Tuyuca, and Yuruti), and five (Koreguaje, Orejón, Siona, Piratapuyo, and Tucano) show identity.

Most of the Indo-European languages of the map, most of which are spoken at latitudes considerably removed from the equator (in areas north of 31°N), show differentiation. (Indo-European languages spoken south of 31°N show identity; see above discussion.) The Slavic and Baltic languages of Indo-European are exceptional. All of these (Belorussian, Czech, Lithuanian, Polish, Russian, Serbian-Croatian, Slovak, and Ukrainian) are spoken in regions north of 43°N, yet all but one (Polish) show identity.

4.   Explanatory framework

The association between values and latitudinal location was first observed by Witkowski and Brown (1985). These authors propose that the existence of extensive wearing apparel in human groups negatively influences the occurrence of upper limb polysemy. The presence of tailored clothing covering the arms greatly increases the distinctiveness of arm parts and renders more likely their labeling by separate terms. In addition, ancillary apparel such as gloves and mittens also increases the salience of arm parts. Since nonequatorial zones where cold weather is frequent are usually associated with the presence of

tailored clothing and other arm gear, languages spoken in these areas are significantly more inclined to lexically distinguish 'hand' and 'arm' than those spoken in equatorial zones.

Latitudinal location is only an indirect index of temperature. While there is a strong correlation between values and latitudinal location (see Table 1), there may be an even stronger association between values and average annual temperature if the Witkowski-Brown hypothesis is correct. Unfortunately, data of a detailed nature facilitating plotting of values (type 1 and type 2) across isotherms is not available at this stage in the development of world climatological science. Another potentially fruitful investigatory strategy would be to cross-tabulate values against the tailoring technologies of peoples who speak each of the 617 languages of the sample – an enormous research effort this author must leave to future investigators.

5.   'Finger,' 'hand,' and 'arm'

Map 130 plots the distribution of languages using a single term to denote both 'finger' and 'hand.' Some languages sampled on the current map are three-ways polysemous, using a single term to denote all three of the referents, 'finger,' 'hand,' and 'arm.' These are Cahuilla (Uto-Aztecan; California), Cocopa (Yuman; Arizona), Comecrudo (isolate; Mexico), Mesa Grande Diegueño (Yuman; California), Eudeve (Uto-Aztecan; Mexico), Hawaiian (Polynesian; Hawaii), Pacoh (Mon-Khmer; Vietnam and Laos), Quileute (Chimakuan; Washington State), Seri (isolate; Mexico), Tahitian (Polynesian), Tuamotuan (Polynesian; French Polynesia), Western Apache (Athapaskan; Arizona), Yagaria (Trans-New Guinea; Papua New Guinea), and Yukpa (Carib; Colombia and Venezuela).