Covering diversity: some notes on sampling technique

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TIN-dag, Utrecht, February 2 2008

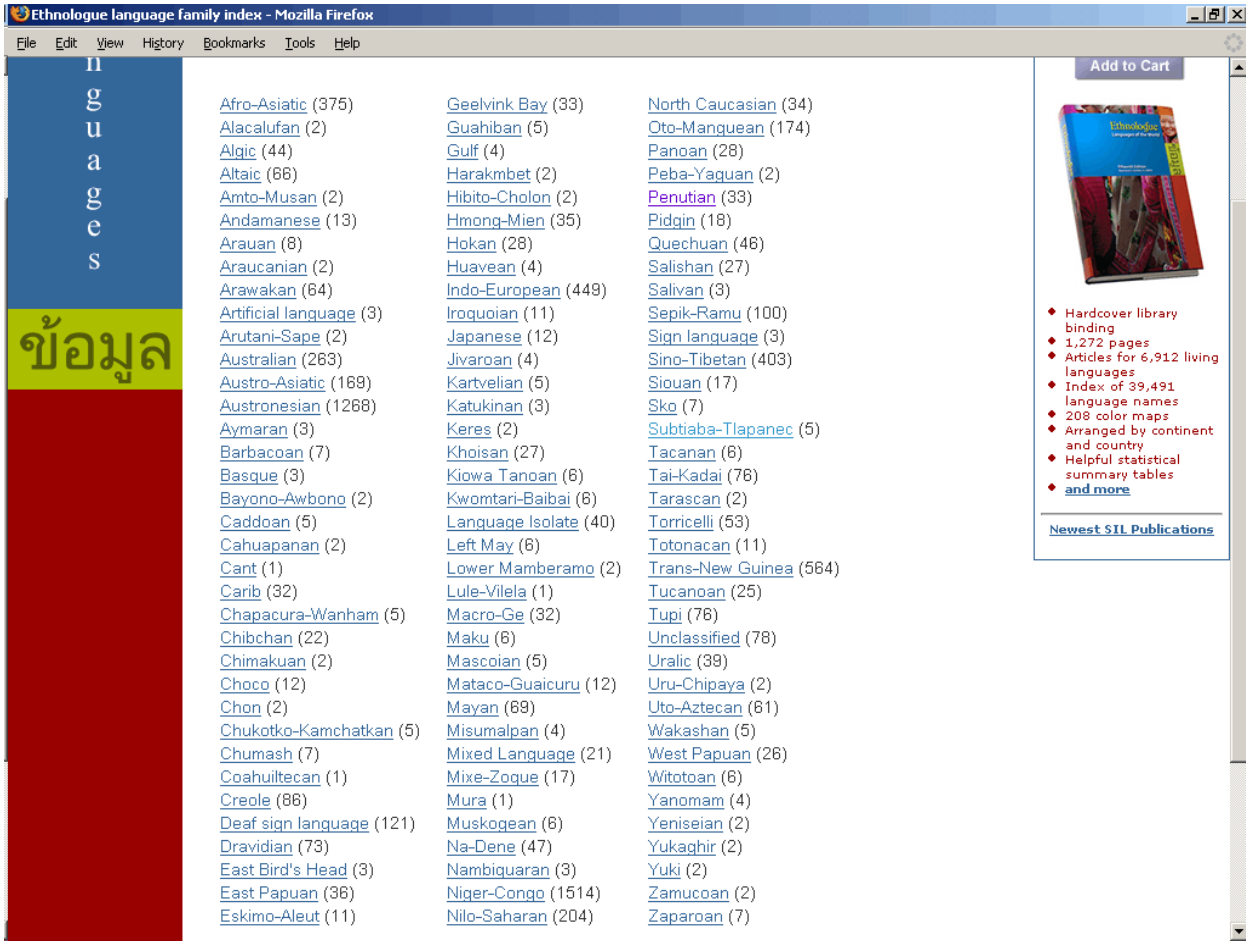
Sampling

- selection out of the world's languages (for survey/comparison)
- use some stratification (language families)
- avoid bias (genetic, geographic)
- **cover diversity** (leave nothing out)

Practical issues

- classification (splitting vs. lumping)
- existence of language descriptions
- availability of language descriptions
- ideal sample size (small for time, large for coverage)

Conservative (splitting) classification: Ethnologue


Ethnologue language family index - Mozilla Firefox
File Edit View History Bookmarks Tools Help
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Add to Cart
Ethnologue

Afro-Asiatic (375)
Alacalufan (2)
Algic (44)
Altaic (66)
Amto-Musan (2)
Andamanese (13)
Arauan (8)
Araucanian (2)
Arawakan (64)
Artificial language (3)
Arutani-Sape (2)
Australian (263)
Austro-Asiatic (169)
Austronesian (1268)
Aymaran (3)
Barbacoan (7)
Basque (3)
Bayono-Awbono (2)
Caddoan (5)
Cahuapanan (2)
Cant (1)
Carib (32)
Chapacura-Wanham (5)
Chibchan (22)
Chimakuan (2)
Choco (12)
Chon (2)
Chukotko-Kamchatkan (5)
Chumash (7)
Coahuiltecan (1)
Creole (86)
Deaf sign language (121)
Dravidian (73)
East Bird's Head (3)
East Papuan (36)
Eskimo-Aleut (11)

Geelvink Bay (33)
Guahiban (5)
Gulf (4)
Harakmbet (2)
Hibito-Cholon (2)
Hmong-Mien (35)
Hokan (28)
Huavean (4)
Indo-European (449)
Iroquoian (11)
Japanese (12)
Jivaroan (4)
Kartvelian (5)
Katukinan (3)
Keres (2)
Khoisan (27)
Kiowa Tanoan (6)
Kwomtari-Baibai (6)
Language Isolate (40)
Left May (6)
Lower Mamberamo (2)
Lule-Vilela (1)
Macro-Ge (32)
Maku (6)
Mascoian (5)
Mataco-Guaicuru (12)
Mayan (69)
Misumalpan (4)
Mixed Language (21)
Mixe-Zoque (17)
Mura (1)
Muskogean (6)
Na-Dene (47)
Nambiquaran (3)
Niger-Congo (1514)
Nilo-Saharan (204)

North Caucasian (34)
Oto-Manguean (174)
Panoan (28)
Peba-Yaguan (2)
Penutian (33)
Pidgin (18)
Quechuan (46)
Salishan (27)
Salivan (3)
Sepik-Ramu (100)
Sign language (3)
Sino-Tibetan (403)
Siouan (17)
Sko (7)
Subtiaba-Tlapanec (5)
Tacanan (6)
Tai-Kadai (76)
Tarascan (2)
Torricelli (53)
Totonacan (11)
Trans-New Guinea (564)
Tucanoan (25)
Tupi (76)
Unclassified (78)
Uralic (39)
Uru-Chipaya (2)
Uto-Aztecan (61)
Wakashan (5)
West Papuan (26)
Witotoan (6)
Yanomam (4)
Yeniseian (2)
Yukaghir (2)
Yuki (2)
Zamucoan (2)
Zaparoan (7)

- Hardcover library binding
- 1,272 pages
- Articles for 6,912 living languages
- Index of 39,491 language names
- 208 color maps
- Arranged by continent and country
- Helpful statistical summary tables
- and more

Newest SIL Publications

Example: Uralic

Ruhlen (1987) *A guide to the world's languages I: classification*. Stanford.

Ethnologue (splitting)

- Finnic (11)
- Finno-Ugric (1)
- Mari (2)
- Mordvin (2)
- Permian (3)
    - Komi
    - Udmurt
- Sami (11)
    - E
    - S
    - W
- Samoyed (7)
- Khanti
- Mansi

Ruhlen 1987 (lumping)

- Yukaghir (1)
- Uralic (23)
    - Samoyed (4)
        - N
        - S
    - Finno-Ugric (19)
        - Ugric
            - Hungarian
            - Ob-Ugric [Xanty, Mansi]
        - Finnic
            - Permic
            - Volgaic [Mari, Mordvin]
            - N Finnic
                - Saamic
                - Baltic Finnic

Previous work on diversity coverage: Rijkhoff et al 1993

- how many languages from each family should the sample contain?
- representative number (based on size) modulo **diversity value** (DV)
- DV calculated by inspecting the family tree
- classification: Ruhlen (1987)
- DV: average number of nodes per level in the family tree
- weighted for tree depth (higher levels count heavier)

Rijkhoff, Bakker, Hengeveld, Kahrel (1993) ‘A method of language sampling.’ *Studies in Language* 17, 169-203.

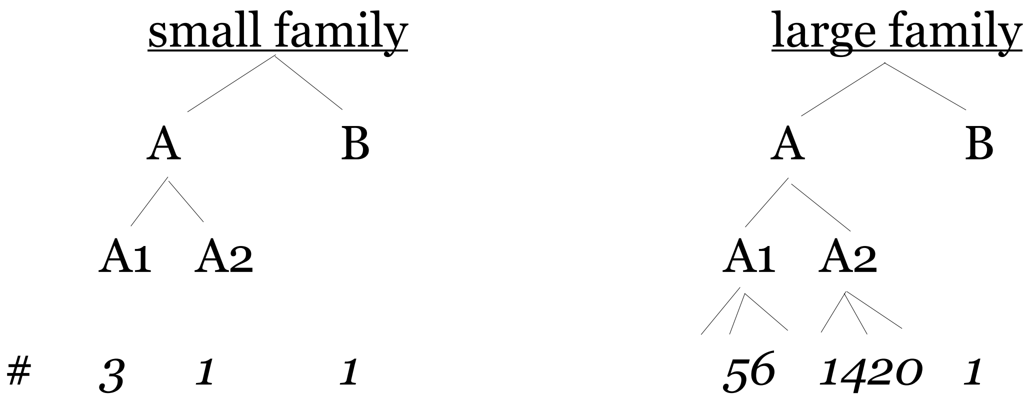
Questions left open

- what is the actual diversity coverage for a given sample ?
- how does addition/deletion of a language affect diversity coverage ?
- does size representativity adjusted for DV suffice for covering diversity ?

E.g. in a 250 language sample, Uralic-Yukaghir is represented by a single language (according to Rijkhoff et al.'s system).

Intuitively, we want small families to be overrepresented and large families to be underrepresented.

Size/representation



small family

A B

A1 A2

# *3* *1* *1*

large family

A B

A1 A2

56 *1420* *1*

- Rijkhoff et al: 1 lg. from small family (regardless size of the sample)
- But diversity coverage requires that we include a language from A and B in both families, so at least 2 lgs. from the small family

Basic approach

- Rationale: every split (in the tree) represents an instance of variation
- splitting classification
- Rule 1: include a language from each family, including every isolated lg. (cf. Rijkhoff et al. 1993:179)
- Rule 2: within a family, include a language from each subfamily (recursive)

First pass

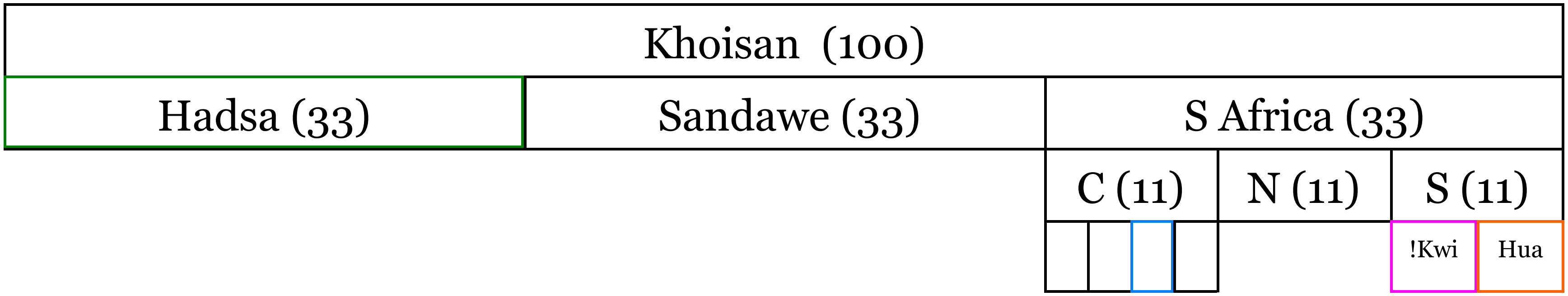
- Count the number of branches represented (again with weighting for depth)
- Problem: more deeply embedded languages yield more points, but not better diversity coverage

level 1	*level 2*	*level 3*	*level 4*	*level 5*
KHOISAN	Hadsa			
	Sandawe			
	S Africa	C	Hain//um	
			Kwadi	
			Nama	
			Tshu-Kwe	4 more
		N		
		S	!Kwi	
			Hua	

Adjustment: counting oppositions

- A branch is represented only if it represents an **instance of variation**
- In the Khoisan example, both Hadsa and Hua represent only one instance of variation: Khoisan vs. non-Khoisan (Level 1)
- If both Hadsa and Hua are present, there is an instance of variation at Level 2 (Hadsa vs. S Africa) as well as at Level 1 (Khoisan vs. non-Khoisan)
- If both Hua and !Kwi are present, there is no instance of variation at Level 2, but there is one at Level 1 and Level 4
- If both Hua and Nama are present, there is an instance of variation at Level 3 (CS Africa vs. SS Africa), but not at level 2 or 4

Scoring


Khoisan (100)

Hadsa (33)

Sandawe (33)

S Africa (33)

C (11)

N (11)

S (11)

!Kwi

Hua

- maximal score per level: 1. 100 2. 100 3. 33 4. 22
  divisor over 4 levels = 255 (*not* 400!)

- if the sample includes: the score is: and the diversity coverage:

if the sample includes:	the score is:	and the diversity coverage:
Hadsa	100/0/0/0	100/255 = .39
Hua	100/0/0/0	100/255 = .39
Hadsa, Hua	100/66/0/0	166/255 = .65
Hua, !Kwi	100/0/0/11	111/255 = .44
Hua, Nama	100/0/22/0	122/255 = .48

Evaluating a sample

#	PHYLUM	LGS	%	SAMPLE 6			COVERAGE			
				lgs	/267	repr	opp	div	cov	
AFRICA										
1	Afro-Asiatic	375	5.43	12	4.49	.032	270	367	.71	
2	Khoisan	27	0.39	2	0.75	.074	122	255	.48	
3	Niger-Congo	1514	21.90	31	11.61	.020	270	384	.70	
4	Nilo-Saharan	204	2.95	7	2.62	.034	163	295	.55	
		2120	*30.67*	*52*	*19.48*	*.025*			*.61*	

TOTAL										
		6912	**100**	**267**	**100**	**.039**			**.64**	

- Khoisan is overrepresented, but has relatively poor coverage

Earlier sample

#	PHYLUM	LGS	%	SAMPLE 4			COVERAGE			
				lgs	/214	repr	opp	div	cov	
				AFRICA						
1	Afro-Asiatic	375	5.43	8	3.74	.021	235	367	.64	
2	Khoisan	27	0.39	2	0.93	.074	122	255	.48	
3	Niger-Congo	1514	21.90	26	12.15	.017	254	384	.66	
4	Nilo-Saharan	204	2.95	5	2.50	.025	150	295	.51	
		2120	*30.67*	*41*	*19.16*	*.019*			*.57*	

				TOTAL						
		6912	**100**	**214**	**100**	**.031**				

Comparison

	number of lgs		representation		coverage	
	S4	*S6*	*S4*	*S6*	*S4*	*S6*
afro-as.	8	12	.021	.032	.64	.71
khoisan	2	2	.074	.074	.48	.48
niger-cg	26	31	.017	.020	.66	.70
nilo-sah	5	7	.025	.034	.51	.55
total *(sample)*	*41* *(214)*	*52* *(267)*	*.019* *(.031)*	*.025* *(.039)*	*.57*	*.61* *(.64)*

- sample growth: 11 lgs.
- effects on representation and coverage made visible

Conclusion

- diversity coverage may be calculated by scoring represented oppositions (sister pairs in a language family tree)

- the method

    - provides a useful tool for comparing (stages of) samples
    - makes it possible to evaluate the effects of adding/deleting languages

- view the sample used in the NWO-research program 'Dependency in Universal Grammar' at:

www.let.rug.nl/zwart/diug