

NATURAL CLUSTERS IN KALINGA DISEASE TERMS

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To understand the words the Kalinga¹ use for disease in their own terms, rather than imposing on them the categories of Western medicine, it has proved useful to employ an optimization model to block out semantic areas. This paper is part of a wider ethnolinguistic study on medical terminology, and it is presented more to show the method behind it than for its comprehensiveness, since considerable lexicographic work remains to be done.

By collecting scaled judgments of similarity and difference between pairs of terms for illnesses, focused on specific criteria of similarity, rough cognitive maps emerge that seem to be a natural starting point for investigation of semantic fields. They are especially promising because they cover areas where hierarchies of inclusion,² cannot be established readily.

SCALING

Kalinga is well provided with words that relate to disease. In exploratory elicitation the informant³ gave terms for parts of the

¹ Both authors are affiliated with the Summer Institute of Linguistics; Grimes is also with Cornell University. Kalinga is spoken by around 140,000 people in southern Kalinga-Apayao, Luzon, Philippines. The first author has worked in the language since 1954. Phonemes represented in the transcription are consonants *p t k b d g m n ng s l w y q* (glottal stop) and vowels *a i o u* together with stress, symbolized with an acute accent. See R.F. Barton, *The Kalingas: Their Institutions and Custom Law* (Chicago: University of Chicago Press, 1949); Edward P. Dozier, *Mountain Arbiters: The Changing Life of a Philippine Hill People* (Tucson: University of Arizona Press, 1966); Richard C. Gieser, *The Phonemes of Kalinga*, Oceania Linguistic Monographs No. 3, 1958, pp. 10-23; *A Grammatical Sketch of Kalinga* (Nasuli, Philippines: Summer Institute of Linguistics, 1963); and "The Morphophonemic System of Guininaang (Kalinga)," *Philippine Journal of Linguistics*, Vol. 1, No. 2 (1970), pp. 52-68, concerning the culture and language. This paper was prepared in connection with a seminar held by Grimes at the Mindanao base of the Summer Institute of Linguistics in 1971, partially supported by the National Science Foundation.

² Harold C. Conklin, "Hanunoo Color Categories," in *Language in Culture and Society*, ed. by Dell Hymes (New York: Harper & Row, 1964), pp. 189-192; see also Charles O. Frake, "The Diagnosis of Disease Among the Subanun of Mindanao," *Ibid.*, pp. 193-211.

³ Mr. Alexander Balawag of Bagtayan, Guininaang, acted as informant during the exploratory phase of this study. He is a native speaker of Kalinga, around 60 years of age, with six years experience as assistant sanitary inspector of the Bureau of Health and is aware of both traditional and incoming patterns. His help is gratefully acknowledged. Because of the nature of this study we did not concern ourselves with the problems of sampling and test administration that are involved in extending this kind of research to the entire area, nor with the interpretation of variance in the results.

body, stages of illness, symptoms, causes, remedies, and 51 names of specific diseases. Of these, thirteen were chosen for the pilot study: *tíli* (dysentery), *táqqon* (cholera), *qoláng* (worms), *pangqúl* (viral infections ranging from influenza to the common cold), *pípit* (tuberculosis), *bilibíli* (beriberi), *gagátol* (spreading skin eruption), *busáli* (boil), *qol-tóy* (epilepsy), *dáqo* (malaria), *pílay* (any permanent crippling), *naqam-malóg* (possession by a spirit), and *lápang* (insanity). These terms typify the gamut of familiar diseases. Lack of time prevented including all the diseases in the list; but their incorporation and processing is a matter of a straightforward addition to what is already there, and so should sharpen but not essentially change the conclusions we sketch.

The informant was presented with pairs of disease names and asked to give his judgment on their similarity and difference. This was done in four separate areas: similarity in body parts affected, in symptoms, in causes, and in treatment, in that order. He ranked each pair of disease names on a five point scale: (1) similar, (2) somewhat similar, (3) neither noticeably similar nor noticeably different, (4) somewhat different, and (5) different. The answers he gave went into a square, symmetric matrix in which both rows and columns were labeled with the thirteen disease names (Table 1).

OPTIMIZATION

The results were analyzed using a clustering algorithm developed by the second author for the interpretation of dialect intelligibility tests⁴ but applicable to problems of grouping in general. It is based on the principles of optimization through dynamic programming to take care of the inherent nonlinearity and asymmetry of intelligibility data. In this instance there appears to be no loss in treating the data as linear, thereby, permitting the use of any number of linear programming algorithms for solving what is known as the transportation model with fixed setup costs.⁵ This optimization model has the effect of showing up the tightest networks of association among interrelated points, and the addition of a fixed cost vector to it has the effect of minimizing the number of networks. Here it is networks of related disease terms that are being explored. They are calculated for a series of fixed costs from 1 (similar) through 4 (somewhat different), which establish successively wider groupings.⁶

⁴ Joseph E. Grimes, *Finding Networks of Communication*. (Manuscript)

⁵ Saul I. Gaas, *Linear Programming: Methods and Applications*² (New York: McGraw-Hill, 1964), Chapter 10. See also Richard E. Bellman and Stuart E. Dreyfus, *Applied Dynamic Programming* (Princeton: Princeton University Press, 1962), pp. 70-96.

⁶ The fixed costs are actually set between the response levels in order to minimize degenerate outcomes. The threshold level of 1 is actually calculated at 1.5 and so forth.

MAPPING

Although it is not absolutely necessary for understanding the conclusions, it is convenient to present the results of optimization in the form of a contour map (Figure 1). The terms that are closely associated are enclosed in the same contour line, and the terms that are in distinct areas are kept apart by two or more contour lines depending upon their degree of separation. This mode of presentation requires the terms to be placed on a map somewhere; and for illnesses this placement is arbitrary but constant from map to map.

BODY PARTS AFFECTED

Table 1 gives the data that correspond to the question, "How similar are diseases A and B with respect to the part of the body

TABLE 1
SIMILARITY OF BODY PARTS AFFECTED BY ILLNESS

	DYS	CHO	WOR	VIR	TB	BER	ERU	BOI	EPI	MAL	CRI	SPI	INS
Dysentery	0	1	1	5	4	4	5	5	4	4	5	5	5
Cholera	1	0	2	4	4	4	5	5	4	4	5	5	5
Worms	1	2	0	4	4	4	5	5	5	4	4	5	5
Viral	5	4	4	0	2	4	5	5	4	4	4	2	2
TB	4	4	4	2	0	3	5	5	3	3	3	4	4
Beriberi	4	4	4	4	3	0	4	4	3	2	3	4	4
Eruption	5	5	5	5	5	4	0	1	5	5	5	4	4
Boil	5	5	5	5	5	4	1	0	4	4	4	5	5
Epilepsy	4	4	5	4	3	3	5	4	0	2	2	2	2
Malaria	4	4	4	4	3	2	5	4	2	0	4	2	2
Crippling	5	5	4	4	3	3	5	4	2	4	0	5	5
Spirits	5	5	5	2	4	4	4	5	2	2	5	0	1
Insanity	5	5	5	2	4	4	4	5	2	2	5	1	0

affected?" Figure 1 is the contour map that shows the grouping implied by the answers. It shows that the diseases fall readily into four groups, each of which will be the springboard in the next phase of the study for a series of questions directed at uncovering the fine grained Kalinga organization of anatomy. The skin diseases *gagátol* (spreading skin eruption) and *busáli* (boil) stand sharply apart from the rest as do the ones localized into the abdomen: *tíli* (dysentery), *táqqon* (cholera), and *qoláng* (worms). Diseases that affect the thorax break into tuberculosis and viral infections on the one hand and beriberi on the other. In the informant's view beriberi belongs here because, although it affects the whole body, its ultimate effect is to overload the heart and thereby bring about death; cardiac involvement is therefore behind

its classification as thoracic. The other diseases, which include malaria, crippling, epilepsy, spirit possession, and insanity, group strongly apart from the others. Our guess pending further investigation is that these are taken to be systemic diseases, not "localizable." Even crippling, which usually involves an arm or a leg, is considered systemic partly because of its debilitating effect on the whole body and partly because of the reassignment of functions of which impairment of one part imposes on all the rest of the body.

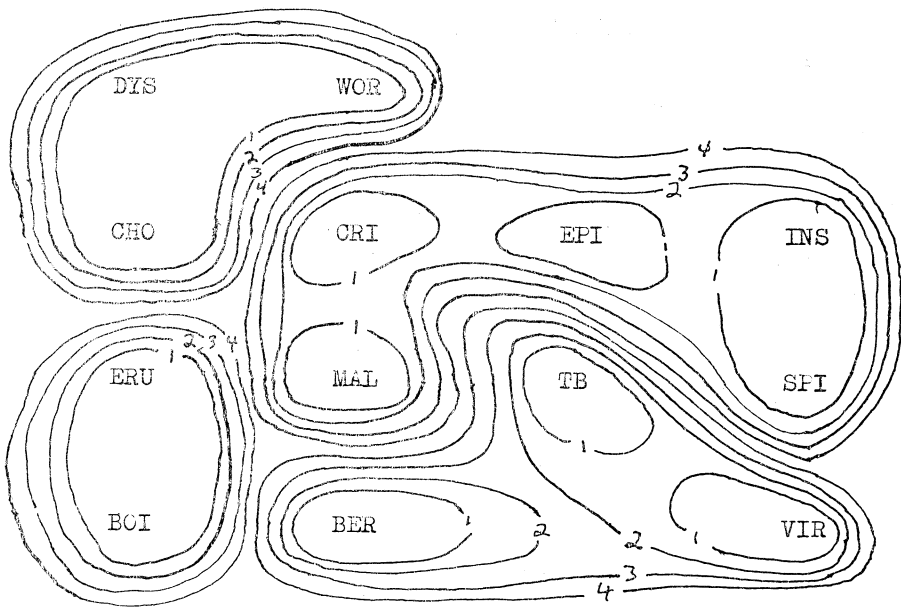


Figure 1. *Similarity of body parts affected by illness.*

The optimization method employed not only finds networks based on closeness of association but also points out the centers of those networks when they exist. The center in this case seems to represent the most typical diseases for the part of the body affected; it may be the most frequent, or it may be a kind of prototype for diseases found in that part of the body. The skin diseases have no center in this grouping; either one represents the affected part adequately. Dysentery is the central disease in the abdominal group, tuberculosis in the thoracic group, and epilepsy in the systemic group.

SYMPTOMS

The grouping implied by the informant's reaction to symptoms differs from the grouping by body parts. We can surmise that in asking, "How similar are diseases A and B with respect to their symptoms?" the informant's attention is directed to aspects of the illnesses that may have not been important in considering their location in the body. Table 2 gives the data for the similarity and difference judgments on

TABLE 2
SIMILARITY OF SYMPTOMS OF ILLNESS

	DYS	CHO	WOR	VIR	TB	BER	ERU	BOI	EPI	MAL	CRI	SPI	INS
Dysentery	0	4	2	4	4	4	5	5	4	4	5	4	4
Cholera	4	0	3	3	4	4	5	5	3	4	5	4	4
Worms	2	3	0	4	4	3	4	4	5	4	5	5	5
Viral	4	3	4	0	4	4	4	4	4	2	4	5	5
TB	4	4	4	4	0	4	5	5	3	4	3	5	5
Beriberi	4	4	3	4	4	0	4	4	4	4	4	5	5
Eruption	5	5	4	4	5	4	0	2	4	4	4	5	5
Boil	5	5	4	4	5	4	2	0	5	5	4	5	5
Epilepsy	4	3	5	4	3	4	4	5	0	3	4	3	3
Malaria	4	4	4	2	4	4	4	5	3	0	4	2	2
Crippling	5	5	5	4	3	4	4	4	4	4	0	4	4
Spirits	4	4	5	5	5	5	5	5	3	2	4	0	2
Insanity	4	4	5	5	5	5	5	5	3	2	4	2	0

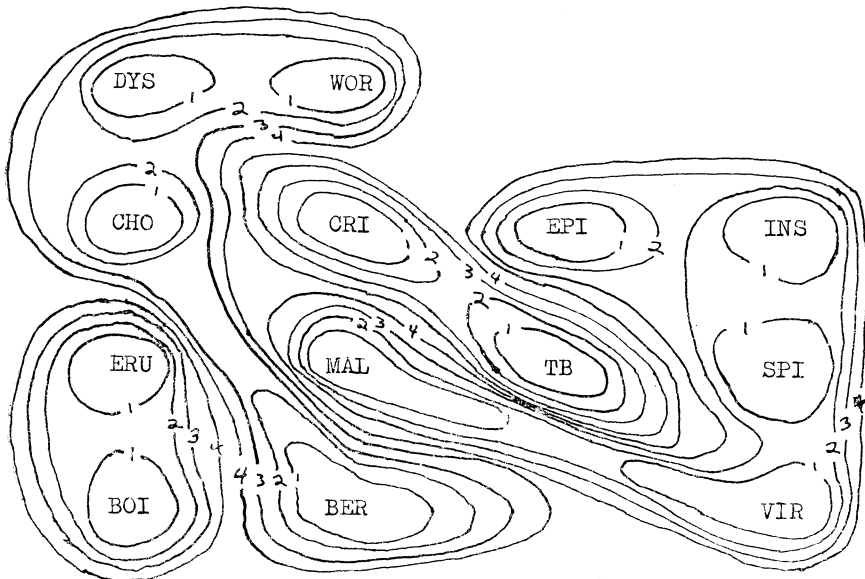


Figure 2. *Similarity of symptoms of illness.*

symptoms. In Figure 2, the skin diseases group closely together just as they did in Figure 1, again without a center. The other groups, however, are not the same. By symptoms, dysentery and worms group closely, then, go together with cholera and beriberi to form a group of what might be called diseases with watery symptoms, or else debilitating diseases, with worms as the center. Tuberculosis and crippling fit together in what could be a group that represents long term symptoms, with tuberculosis as prototype. The remaining diseases, with epilepsy standing slightly apart from viral infections, malaria, spirit possession, and insanity, form a fourth group whose common denominator pending further work seems to be symptoms of shaking. Malaria is the center; it is without doubt the most common in the area.

CAUSES

As Table 3 and Figure 3 show, diseases are most sharply distinguished from each other by their causes. The group caused by some-

TABLE 3
SIMILARITY OF CAUSES OF ILLNESS

	DYS	CHO	WOR	VIR	TB	BER	ERU	BOI	EPI	MAL	CRI	SPI	INS
Dysentery	0	2	2	4	4	4	5	5	5	4	5	5	5
Cholera	2	0	4	4	4	4	5	5	4	4	5	5	5
Worms	2	4	0	4	5	4	4	4	5	4	5	5	5
Viral	4	4	4	0	4	5	5	5	4	4	5	5	5
TB	4	4	5	4	0	4	5	5	2	4	4	5	5
Beriberi	4	4	4	5	4	0	5	5	4	4	4	5	5
Eruption	5	5	4	5	5	5	0	1	5	5	5	5	5
Boil	5	5	4	5	5	5	1	0	5	5	5	5	5
Epilepsy	5	4	5	4	2	4	5	5	0	4	4	4	4
Malaria	4	4	4	4	4	4	5	5	4	0	4	4	4
Crippling	5	5	5	5	4	4	5	5	4	4	0	5	5
Spirits	5	5	5	5	5	5	5	5	4	4	5	0	1
Insanity	5	5	5	5	5	5	5	5	4	4	5	1	0

thing in the intestines remains solid, with dysentery as its center; and so does the skin group, again with no center. Spirit possession and insanity are held to be highly similar in their causes; they are more distinct from each other in their symptoms, in which the first seems to be short term and the second long term. Most of the other diseases, however, remain apart at levels 2 and 3. They group at level 4 with epilepsy as center, giving generalized causes in opposition to the intestinal and skin groups.

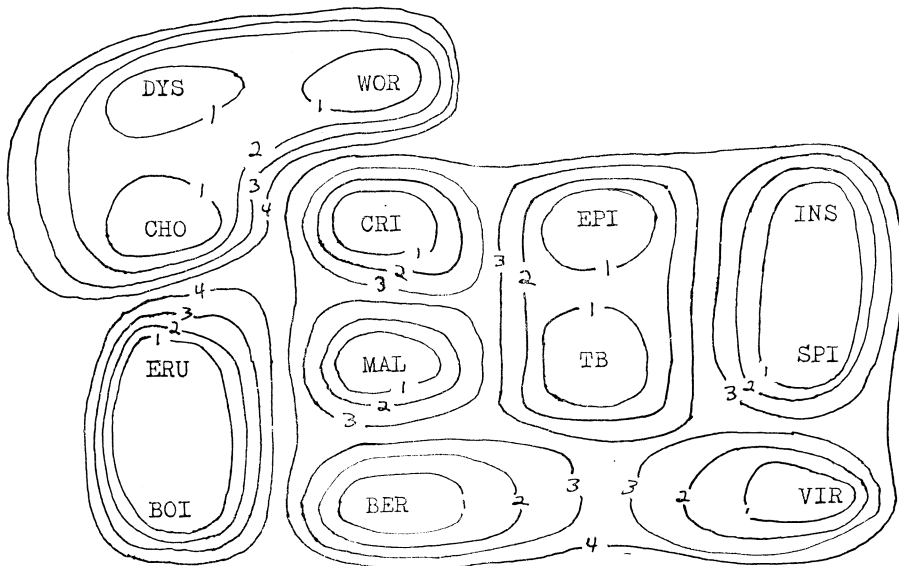


Figure 3. *Similarity of causes of illness.*

Tuberculosis and epilepsy group at level 2 with respect to causes. Both seem to be regarded as hereditary diseases because they tend to follow family groups. Tuberculosis, the more common, is the center.

REMEDIES

Apparently the informant took the question about similarity of remedies in more than one way; the results are less conclusive than for the other areas. This is the aspect of disease in which the most

TABLE 4

SIMILARITY OF REMEDIES FOR ILLNESS

	DYS	CHO	WOR	VIR	TB	BER	ERU	BOI	EPI	MAL	CRI	SPI	INS
Dysentery	0	2	2	3	4	4	2	2	4	4	3	5	5
Cholera	2	0	4	3	3	3	4	4	3	3	3	3	3
Worms	2	4	0	4	5	4	2	2	4	2	4	5	5
Viral	3	3	4	0	3	3	4	4	3	4	4	3	3
TB	4	3	5	3	0	4	4	4	2	4	4	2	2
Berberi	4	3	4	3	4	0	2	2	4	2	4	5	5
Eruption	2	4	2	4	4	2	0	1	4	2	4	5	5
Boil	2	4	2	4	4	2	1	0	5	2	5	5	5
Epilepsy	4	3	4	3	2	4	4	5	0	4	4	2	2
Malaria	4	3	2	4	4	2	2	2	4	0	5	5	5
Crippling	3	3	4	4	4	4	4	5	4	5	0	4	4
Spirits	5	3	5	3	2	5	5	5	2	5	4	0	1
Insanity	5	3	5	3	2	5	5	5	2	5	4	1	0

rapid change is taking place, with injections now accepted alongside with ceremonies and herbal infusions. Both ritual and medical treatment may be applied to the same patient simultaneously. We feel that if questions were put about similarity between remedies before the war and those of the contemporary period, the two patterns would differ but each would be more clearcut.

Nevertheless, since the optimization process takes into account the bearing of the entire matrix on any one similarity judgment, the results are at least suggestive. In the first place, three main groups emerge: (1) enteric remedies of which that for dysentery is typical; (2) nonenteric but explicit and fairly quick acting medical remedies, centered around that for skin eruptions; and (3) rituals, typified by the cure practiced for tuberculosis. In addition, the remedy for crippling groups with the enteric remedies at level 3, and the cure for influenza-like virus infections groups with the ritual remedies at the same level. While it is tempting to suggest that the ritual cure for flu may not really be any less effective than Western pills—seven days for one and a week for the other, as the saying goes—it is more likely that this is simply the point at which the indeterminacy of the question asked affects the results most.

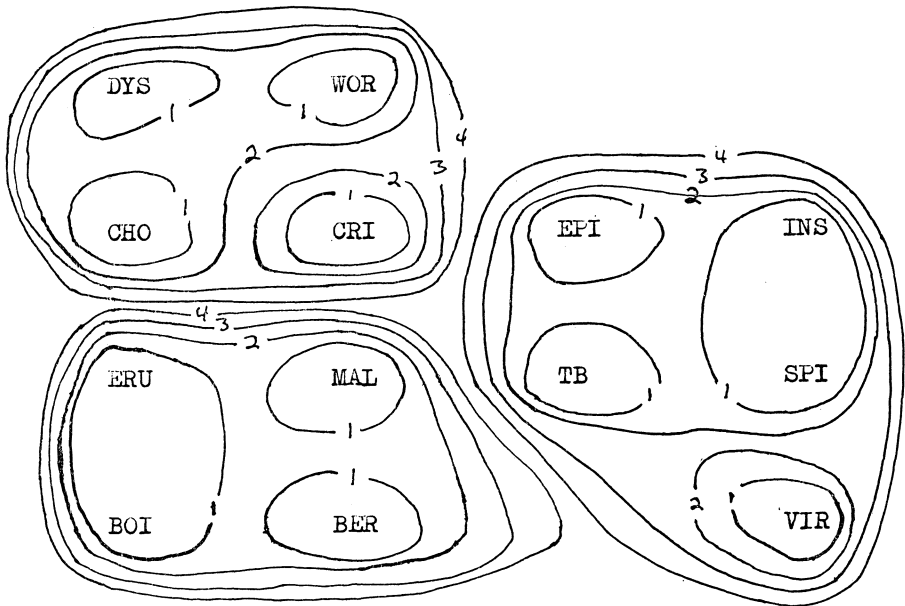


Figure 4. *Similarity of remedies for illness.*

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