

## CHAPTER 6

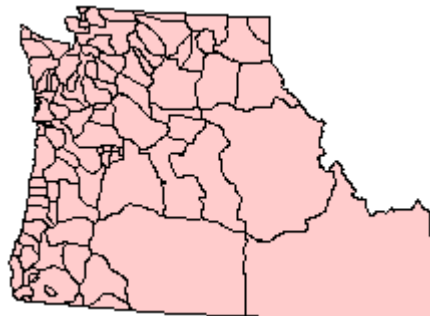
# Aboriginal Tribal Territories

Being in a combined Sociology/Anthropology Department exposed me to ideas and information sources I might otherwise have missed. The separate studies reported in this chapter are due, in large part, to the influence of my then-colleagues in Anthropology, both faculty and students.

## The "Old Oregon Country"

In the Spring of 1971 Ted Allen, an Assistant Professor in Anthropology, showed me a book<sup>[1]</sup> concerned with the Klamath Indians in south-central Oregon. It contained a map of the state showing aboriginal tribal territories at the time of Caucasian contact (the "ethnographic present"). What struck both of us was the similarity between that map and the present day one of county boundaries: smaller units near the coast, with larger ones inland.

**FIG. 6-1. TRIBAL TERRITORIES IN THE "OLD OREGON" COUNTRY**



I might not have pursued the matter further except for an announcement by a graduate student, Steve Wright, that he was dropping out of the M.A. program. He said he was unable to complete a thesis. After questioning him about his efforts, I realized he had been advised to

undertake projects too vast for completion in a doctoral program, let alone the masters. I suggested a simpler project: that he check with Ted about the map of tribal territories in Oregon and that he try to relate these to Indian population densities also from the "ethnographic present".

He reluctantly, and then enthusiastically, undertook the study. He found that the Oregon map was part of a larger one by Schaeffer<sup>[2]</sup> showing tribes and language groups in the "Old Oregon Country", covering the same area as the Oregon Territory shown in Fig. 2-2. The tribal boundaries are shown in Fig. 6-1.

Using a much-enlarged version of this



map<sup>[3]</sup> Steve measured the area of each unit using a mechanical planimeter I had obtained with a \$75 grant (!) from Western's Bureau for Faculty Research. (There's an excellent explanation and simulation of a planimeter and how it works, by Larry Leinweber, [here](#). To compensate for measurement errors (Steve's eyesight, unlike mine, was excellent, but the machine still gave varying results) each unit was measured three times and the results were then averaged. The estimates are shown in Table 6-1.

**Table 6-1. TRIBAL TERRITORIES OF THE "OLD OREGON" COUNTRY**

Density Category			Density Category		
Tribe	Area (km <sup>2</sup> )	rank	Tribe	Area (km <sup>2</sup> )	rank
<b>0.75-5 persons</b>			<b>12-30 persons (cont.)</b>		
Northern Paiute	61,564	3	Puyallup	4,009	28
Shoshoni	137,125	1	Samish	419	*92
Colville	2,280	*47.5	Semiahoo	314	96
Coeur D'Alene	13,602	6	Skagit	5,136	21
Kalipse	10,929	10	Skykomish	2,080	49
Kutenai	2,516	*38.5	Snohomish	1,037	73
Lakes	5,110	22	Snuqualmi	2,322	45
			Southwestern Sound	982	75

Methow	3,700	29	Stillaquamish	2,437	41
Nespelem	2,489	40	Suiattle-Sauk	602	*85
Sanpoil	3,616	31	Suquamish	1,651	*54.5
So. Okanogan	6,997	15	Swallah	1,231	*67
Unnamed Area	12,668	9	Swinomish	471	*90
5-12 persons			Thompson	2,358	43.5
			Twana Skokomish	3,286	33
Cascades	681	*83.5	30-75 persons		
Cayuse	26,773	4			
Chelan	2,909	*34.5	Alsea	1,493	*57.5
Columbia	13,523	7	Applegate Creek	550	*86.5
Entiat	1,336	*63.5	Chasta Costa	1,100	*71
Hood River	701	82	Chetco	1,179	*68.5
Kittitas	4,890	23	Clackamas	5,268	*19
Klamath	10,378	11	Clatsop	471	90
Klickitat	6,447	17	Copalis	393	93
Kalmiut	1,493	*57.5	Cowlitz	3,302	*32
Mary's River	1,258	66	Galice Creek	314	*96
Modoc	2,909	*34.5	Hanis Coos	1,415	61.5
Nez Perce	73,385	2	Hoh	828	*80
Northern Molla	5,268	*19	Humptulips	1,100	*71
Palus	7,836	13	Kathlamet	943	76.5
Santiam	7,312	14	Klallam	2,411	42
Southern Molala	5,268	*19	Klatakanie	2,673	*36
Spokane	13,209	8	Kwalhiokwa	1,651	54.5
Taidnapan	2,594	37	Lower Chelais	891	79
Tualitin	1,472	59	Lower Umpqua	2,319	46
Umatilla	18,005	5	Makah	283	*98
Unnamed Area II	1,466	60	Miluk Coos	550	86.5
Wanapam	3,695	30	Ozette	377	*94
Wasco	681	*83.5	Queets	1,415	*61.5
Wenatchi	4,245	25	Quileute	1,887	51.5
White Salmon	235	99	Quinault	1,320	65
Wishram	471	*90	Satsop	912	78
Yamhill	4,088	26	Shasta	1,022	*74
Yonkalla	6,840	16	Shoalwater Chinook	1,887	*51.5
12-30 persons			Siletz	1,100	71
			Takelma	9,985	12
Chemakum	943	*76.5	Tillamook	4,036	*27
Dduwamish	1,336	*63.5	Tolowa	314	*96
Lower Skagit	1,179	*68.5	Tututni	2,280	*47.5
Lummi	157	100	Upper Chehalis	2,516	*38.5
Mickleshoot	1,525	56	Upper Coquile	2,358	43.5
Nisqually	2,020	50	Upper Umpqua	4,717	24
Nooksak	1,703	53	Wynooche	516	88
			Yaquina	786	81

\* tied with one or more other ranks

There were two areas which showed no tribal name. What these were (oversights?) we were unable to find out (Schaeffer had died). We included them in the study as "unlabeled area I" and "unlabeled area II".

Another problem with the map was that some portions

of tribal territories were arbitrarily lopped off by the outer boundary of the map itself. But since these territories lay in very arid country, no doubt **lightly settled**, such areas made arbitrarily **small** would do no damage to our test of the size-density hypothesis.

Our next problem was to obtain information about the distribution of native populations. The obvious solution would be to obtain estimates of tribal populations, then compute the appropriate densities from these and our area estimates. No good population data was available. As Herb Taylor, then Dean for Faculty Research as well as Professor of Anthropology, had pointed out,

... reliable estimates for most aboriginal North American groups are difficult to achieve because the first governmental censuses were normally performed after a radical though indeterminate population decline had occurred.<sup>[4]</sup>

Even where data were available there was a problem of definition. What one researcher recognized as a tribe, another might not. For example, in the area around Bellingham, WA, Schaeffer's map distinguished the Lummi, Nooksack and Samish tribes. Kroeber<sup>[5]</sup> aggregated the Lummi and Nooksack populations, and Mooney<sup>[6]</sup> aggregated all three.

What is a tribe? I had a number of discussions and arguments with colleagues about the meaning of the word<sup>[7]</sup> and whether the research question was even legitimate (some argued that natives here didn't view territorial boundaries the same way westerners did). Such arguments seem metaphysical to me, not resolvable by any empirical means. In any case, I was not an anthropologist while Schaeffer, Mooney, Kroeber and the others were.

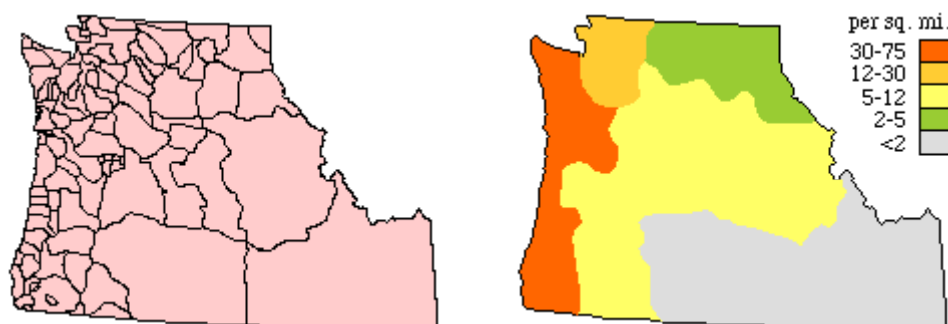
Sociologists have debated for years the definition of a "social system". My view of such metaphysical disputes is more in harmony with the physicists'<sup>[8]</sup>:

On a *physical system*, by which is meant any object of interest to physics or chemistry, numerous observations or measurements can be made. The quantities so observed or measured, such as size, energy, position and momentum, are called *observables*. It is well to think of these observables without ascribing to them the intuitive qualities they possess in classical mechanics. Position, or energy, is not so much *possessed by* a system as it is characteristic of a certain measuring process which can be carried out upon it. The measurement of an observable upon a system yields a number.

I had no way of asking people who had been dead for a century and a half what those boundaries might have once meant to them. To me they were boundaries which, once measured, would yield numbers for analysis.

In place of (unavailable) computed density figures, we used a portion of a map published by Kroeber<sup>[9]</sup> showing average regional densities at the time of Caucasian contact. An adaptation of that map is shown in Fig. 6-2.

**FIG. 6-2. ABORIGINAL DENSITIES IN THE OLD OREGON COUNTRY**



We projected Schaeffer's tribal map over Kroeber's density map and located each tribal territory in whatever density group characterized most of its area. This grouping is shown in Table 6-1. Kroeber's lowest density category (0.75-2 people per sq. km.) contained only the Northern Paiute and Shoshoni tribes. We combined this category with the next one for purposes

of statistical analysis.

We couldn't use regression analysis because the values of our independent variable were ranges rather than numbers. We couldn't use analysis of variance because the variances were not equal across our categories.<sup>[10]</sup>

We used the nonparametric Kruskal-Wallis<sup>[?]</sup> test for analysis of variance by ranks, obtaining  $H = 30.6$  with 4 degrees of freedom. As a result we, using the accepted ritual academic phrase, rejected the null hypothesis ( $p < .001$ ). Let's face it: we showed support for the size-density one.

We wrote up the results for publication, submitting the paper first, in April of 1972, to the *American Journal of Sociology*. They sat on it without response for over a year, finally rejecting the paper as "too anthropological" (whatever that means). We published it that June through a journal edited in our local Geography Department.<sup>[11]</sup>

## **Africa**

During Christmas break 1971/2 an undergraduate, Lucky Tedrow, expressed interest in doing some research with me. It happened that Garland Grabert, an archaeologist in our Department, had just shown me a map (much too large to be reproduced here) showing tribal territories in Africa,<sup>[12]</sup> so I suggested a study of Africa to Lucky.

He numbered the 838 tribal territories shown on the map and, using a table of random numbers, selected 100 of them for analysis. He measured each territory three times with the planimeter and averaged the results. He identified density categories for each tribe from their location on a regional density map.<sup>[13]</sup> His area estimates, within density categories, are shown in Table 6-2. The average areas within each density category are shown in Table 6-3.

**Table 6-2. TRIBAL TERRITORIES IN AFRICA**

Density Category		Density Category		Density Category	
Tribe	Area (km <sup>2</sup> )	Tribe	Area (km <sup>2</sup> )	Tribe	Area (km <sup>2</sup> )
<2.5 persons		Kababish	203,245	Shashi	14,960
		Lambya	5,343	Sena	23,081
Akposo	2,565	Lese	12,396	Swazi	29,707
Azjer	399,010	Mahafaly	16,029	Tigon	4,702
Bajun	7,908	Mittu	22,868	Yanqi	14,746
Bararetta	211,366	Nefuse	15,174	Zigula	9,617
Berabish	287,663	Ngombe	11,968		
Bonog	22,654	Sakata	32,912	40-160 persons	
Duaish	63,047	Yaka	51,078		
Fertit	15,815			Afo	1,282
Gadames	9,190	10-40 persons		Ana	3,847
Gimma	19,235			Auyokawa	9,617
Heikum	58,986	Arusa	106,431	Bauchi	15,174
Huykwe	20,089	Balante	5,984	Darasa	9,617
Jalo	16,029	Builsa	2,565	Gisiga	4,702
Kapere	8,335	Chewa	74,801	Gurage	11,327
Kharga	68,176	Dakakari	9,190	Gusii	7,053
Lunda	36,973	Dogon	24,150	Katab	4,916
Mimi	5,985	Fipa	11,541	Kurama	2,565
Namib	46,849	Gafsa	3,847	Mbula	1,282
Nkoya	14,319	Gimira	7,480	Podokwo	641
Padang	28,211	Guang	31,203	Shawia	42,530
Riyah	26,692	Hemama	54,949	Sokoto	24,791
Rolong	72,236	Jibu	3,847	Sukuma	36,973
Somrai	12,823	Kam	1,496	Tripolitan	45,308
Songomeno	13,678	Kamant	5,343	Tulama	45,094
Sumbwa	7,266	Kisi	3,205	Wakura	1,710
Totela	17,739	Koalib	15,601	Wallaga	28,638
Yao	91,471	Konjo	18,593		
		Koro	3,206	>160 persons	
2.5-10 persons		Limba	4,274		
		Lugura	15,601	Egba	26,074
Beanzin	10,472	Maji	3,633	Ekiti	19,786
Bemba	47,569	Makonde	31,416	Ijebu	7,053
Dagu	10,472	Mayogo	3,633	Iyala	2,778
Dekakiri	7,480	Pende	171,097	Kipsigi	6,625
Fajulu	13,892	Pia	5,984	Maguzawa	11,754
Ishaak	100,447	Pondo	13,250	Soga	13,678

**Table 6-3. AVERAGE AREAS BY DENSITY**

Density	Area (km <sup>2</sup> )	N
<2.5	61,221	26
2.5-10	37,423	15
10-40	17,973	32
40-160	14,982	20
>160	12,548	7

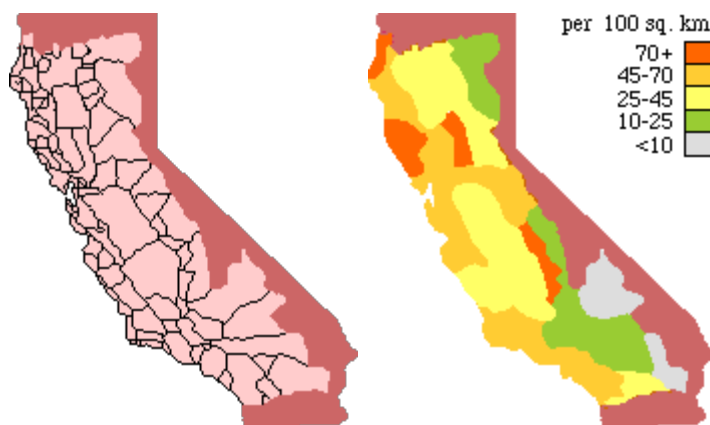
Average size declines monotonically with increasing density. Since there are five categories, and five things can be arranged in five- factorial ways, the number of possible outcomes would be  $5! = 5*4*3*2*1 = 120$  ways. The probability that our results arose through chance is one out of 120,  $p = 1/120$  or .008. [14]

A paper reporting these results was submitted to the *Pacific Sociological Review* and published in July of 1974. [15]

## California

In Fall, 1972 I began working on a third cross-cultural study with another undergraduate student, Dave Myers. This was a direct replication of the study I had earlier done with Steve Wright. Our boundary map in this case showed tribal boundaries for California prior to 1770. [16] We excluded from this study any territories which bordered on the present state line (this is indicated by the shaded portion of Fig. 6-3). Planimeter measurements, transformed to square kilometers, are shown in Table 6-4. Density categories were again determined from Kroeber's map.

**FIGS. 6-3,4. CALIFORNIA BOUNDARIES AND DENSITIES**



**Table 6-4. TRIBAL TERRITORIES IN CALIFORNIA**

Density Category			Density Category		
Tribe	Area (km <sup>2</sup> )	Rank	Tribe	Area (km <sup>2</sup> )	Rank



## 0-25

Atsugewi	25,560	18
Achomawai	58,046	8
Pass Cahuilla	11,115	40
Cepeno	1,698	85
Serrano	70,743	4
Mohiueyam	69,087	5
Alliklik	20,197	28
Kitanemuk	22,960	23
Kawaiisy	99,305	3
Tabatulabal	48,326	11
Monache	42,286	12
Northern Yana	1,701	84

## 25-45

Okwanchu	8,426	51
Knomihi	1,360	88
New River Shasta	4,756	70
Desert Cahuilla	65,570	6
Mount Cahuilla	12,266	36
Southern Maidu	60,838	7
Northwstrn Maudi	35,828	13
Bay Miwok	7,012	59
Central Penutian	52,228	10
Northern Penutian	4,934	69
Playano	8,438	50
Migueleno	22,577	24
Antonano	16,964	30
Chimakiko	5,734	64
Yahi	8,650	49
Southern Yanan	10,282	41
Central Yana	9,643	45
Buena Vista	23,281	22
Southern Yokuts	104,482	2
Northern Yokuts	113,710	1

## 45-70

Bear River	17,721	29
Cuyama	24,466	20
Emig Diano	6,468	62
Ventureno	24,169	21
Barbareno	6,814	61
Ynexeno	8,249	53
Purisimeno	11,668	39
Obispeno	8,306	52
Soledad	8,916	47
Rumsen	12,143	37

## 45-70 (cont.)

San Juan Bautista	14,508	34
Santa Cruz	10,247	42
Santa Clara	20,412	27
San Francisco	5,056	68
San Pablo	5,457	67
Hupa	4,235	76
Whilkut	6,929	60
Luiseno	57,723	9
Juaneno	5,580	65
Gabrielino	24,498	19
Fernandeno	7,645	57
Mattole	1,781	83
Southern Miwok	20,486	26
Central Miwok	25,570	17
Norther Miwok	28,466	16
Plains Miwok	2,505	79
Coast Miwok	16,893	31
River Penutian	34,585	14
Hill Penutian	35,211	15
Esselen	8,741	48
Northeastern Pomo	1,566	86
Northwestern Pomo	1,870	82
Nongatl	12,083	38
Lassik	4,687	72
Shelter Dove	5,964	63
Lolangkok	4,425	75
Eal River	3,098	78
Pitch Wailaki	5,463	66
Kato	2,482	80
Karok	21,772	25
Yuki	14,991	32
Huchnom	3,187	77
Coast Yuki	1,999	81
Wappo	8,195	54

## 70+

Wiyot	4,518	74
Coast Yurok	1,535	87
Yurok	9,065	46
Southwestern Pomo	4,666	73
Southern Pomo	10,242	43
Eastern Pomo	4,720	71
Central Pomo	7,751	56
Northern Pomo	14,880	33
Poso Creek	12,415	35
Tule-Kawesh	9,996	44
Kings River	7,221	58
Northern Hill	8,150	55

We used the Kruskal-Wallis test<sup>[?]</sup> and computed a value of  $H = 11.89$ . With 3 degrees of freedom,  $p\{H=0\} < .01$ . Had we used the same reasoning as in the Africa test, we would have found, for the four

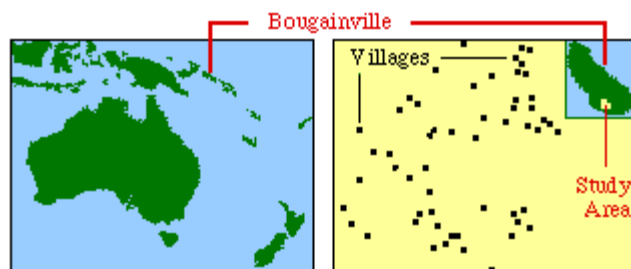
density categories, average areas of 39,252, 28,849, 12,596, and 7,930: four numbers with 4! or 24 permutations, only one of which fit the hypothesis.  $1/24 = .04$ , so we could still reject the null hypothesis at  $p < .05$ .

We submitted a report of this research to the *Pacific Sociological Review*; in May of 1973 it was rejected as "too anthropological" (that again). It ultimately appeared in *Anthropology UCLA* in Fall, 1974.<sup>[17]</sup>

### The Siwai of Bougainville

Jay Callen was an undergraduate in our department when he and I were introduced by another of our Anthropologists, Professor Angelo Anastasio, in Spring, 1975. I worked on a number of projects with Jay, including this one concerning the Siwai, Bougainville Island. The Siwai are a Papuan-language group inhabiting the inland rain forest of southwestern Bougainville Island (155° E, 6° S) in the Solomon Islands. The ethnography on which we relied<sup>[18]</sup> covered the pre-war years 1938-9, when the Siwai were estimated to have a population of 4,700 people distributed over an eighty square mile area.

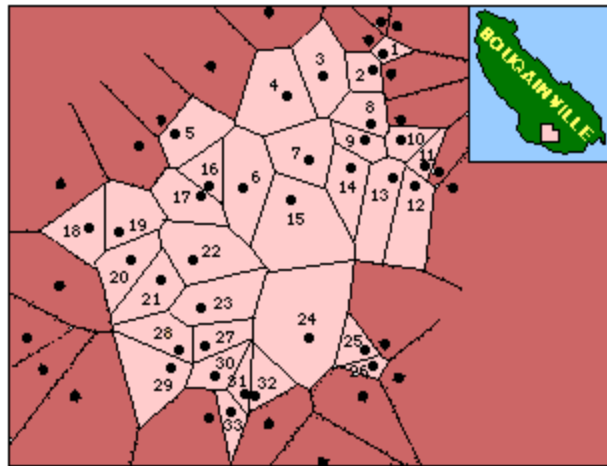
**FIG. 6-5. SIWAI VILLAGES ON BOUGAINVILLE ISLAND**



Oliver provided population figures for villages<sup>[19]</sup>, but did not indicate the areas served by them. On the assumption that a point would be served by the village nearest it, we constructed Thiessen polygons<sup>[20]</sup> around each village as shown in Fig. 6- 5.

**FIG. 6-6. THIESSEN POLYGONS**

### SURROUNDING SIWAI VILLAGES



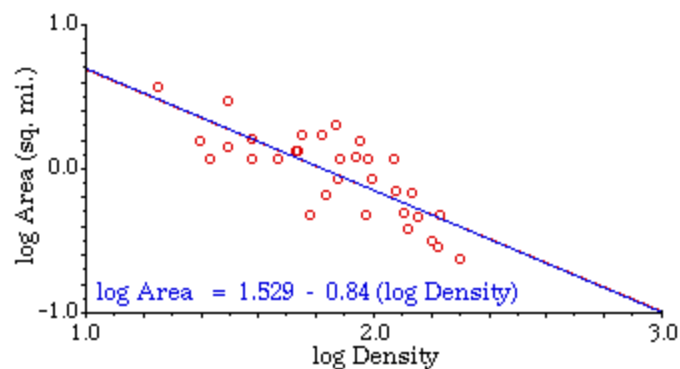
As can be seen, some of the polygons are bounded by the boundary of the study area itself; we excluded these from our study, numbering the remaining 33 villages for identification. We were unable to obtain a population figure for village #16, so it also was dropped from study. The area figures were estimated with a planimeter.

**Table TABLE 6-5. DATA FOR SIWAI VILLAGE POLYGONS**

id#	Village	Population	Area	id#	Village	Population	Area
1	Noronai	48	0.24	18	O'sakori	32	1.18
2	Maisua	81	0.48	19	Tonu	138	1.18
3	Ukuntu	39	1.57	20	Siroi	111	1.17
4	Kontai	147	1.99	21	Amiu	89	1.17
5	Rapauro	107	1.23	22	Kaparo	98	1.75
6	Panakei	116	1.75	23	Toittoi	62	1.64
7	Kinirui	72	1.34	24	Kunitua	66	3.69
8	Turungom	94	0.69	25	Kereiso	67	0.47
9	Rennu	64	0.50	26	Hurai	48	0.29
10	Novei	45	0.48	27	Hirei	63	0.84
11	Ku'hinna	50	0.38	28	Koropo	85	0.86
12	Raku	44	1.41	29	Unanai	139	1.56
13	Mataras	72	1.33	30	Karikaku	45	0.66
14	Jeku	55	1.18	31	Rakempa	51	0.32
15	Kapana	91	2.94	32	Sihuruhinna	84	0.71
17*	Nukui	44	1.16	33	Kirinoru	29	0.48

\* village 16 not included due to missing data

**FIG. 6-7. SIWAI VILLAGE POLYGONS**



As Fig. 6-6 shows, there is a negative size-density slope for these polygons ( $r^2 = .62$ ;  $t_0 = -6.923$ ;  $p\{\beta_0\} < .0005$ ). The slope was not significantly different from the "world regression line" slope of  $-2/3$  ( $t_{-2/3} = -1.410$ ;  $p\{\beta_{-2/3}\} = \text{n.s.}$ ).

We published our results through the Chicago Field Museum<sup>[21]</sup>.

## Next Chapter

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### NOTES:

[1] Theodore Stern, *The Klamath Tribe: A People and Their Reservation*, Seattle: University of Washington Press, 1966.

[2] Claude Schaeffer "Indian Tribes and Languages of the Old Oregon Country: A New Map", *Oregon Historical Quarterly*, 60:129-133, 1959

[3] A large colored sheet of Schaeffer's map, produced by the Oregon Historical Society (Portland, no date).

[4] Herbert C. Taylor, Jr., "The Utilization of Archeological and Ethnohistorical Data in Estimating Aboriginal Population," *Bulletin of the Texas Archeological Society*, 32:121- 39. 1961.

[5] A. L. Kroeber, *Cultural and Natural Areas of Native North America*, Berkeley: University of California Press, 1939.

[6] James Mooney, *The Aboriginal Population of America North of Mexico*, Smithsonian Institution Miscellaneous Collections, Vol. 8, No. 7., 1928.

[7] June Helm (editor), *Essays on the Problem of Tribe (Proceedings of the 1967 Annual Meeting of the American Ethnological Society)*, Seattle: University of Washington Press, 1968.

[8] Henry Morgenau and George Moseley Murphy, *The Mathematics of Physics and Chemistry*, (2nd edition), 335, Princeton: D. Van Nostrand Company, 1956.

[9] A. L. Kroeber, *Op. cit.*, 154.

[10] by Bartlett's test, in A. Hald, *Statistical Theory with Engineering Applications*, 190-1, New York: Wiley, 1952.

[11] G. Edward Stephan and Stephen M. Wright, "Indian Tribal Territories in the Pacific Northwest: A Cross-cultural Test of the Size-Density Hypothesis," *Annals of Regional Science*, 7:113- 23, 1973.

[12] George P. Murdock, *Africa: Its Peoples and Their Cultural History*, New York: McGraw-Hill, 1959.

[13] Else Schmidt and Paul Mattingly, *Population Density in Africa about 1960*. Berlin: Georg Westermann Verlag, 1966. The original map showed 9 density categories, from "uninhabited" to "> 160 per sq. mi." These were so fine that he had difficulty locating tribes, so we collapsed several categories into those shown in Table 6-2.

[14] This tidy little "test of significance" was suggested by Professor Charles Gossman, a sociologist in our Department.

[15] G. Edward Stephan and Lucky M. Tedrow, "Tribal Territories in Africa: A Cross-cultural Test of the Size-Density Hypothesis," *Pacific Sociological Review*, 17:65-9, 1974.

[16] R. F. Heizer and M. A. Whipple, "Map of Native Tribes, Groups, Dialects and Families of California Prior to 1770", *The California Indians*, :frontispiece, Berkeley: University of California Press, 1971.

[17] David E. Myers and G. Edward Stephan, "Tribal Territories of the California Indians," *Anthropology UCLA* , 6:59:65, 1974.

[18] Douglas L. Oliver, *A Solomon Island Society*, Boston: Beacon Press, 1967.

[19] *ibid*, p. 16.

[20] *Thiessen polygons*: These are a set of polygons (aka the Dirichlet Tessellation or the Voronoi Diagram) which enclose the area geographically closest to a defined central place (among a set of such central places); conversely, any point is included in the polygon surrounding the central place nearest it. We obtained the straight lines comprising the polygons by connecting intersections of circular arcs drawn with equal radii from adjacent villages. Peter Haggett, *Locational Analysis in Human Geography*, 247, London: Edward Arnold Publishers, 1965 cites examples of the use of Thiessen polygons by the U.S. Weather Bureau to regionalize the rainfall reports of local weather stations, and by Donald Bogue to determine the boundaries of metropolitan regions in the United States.

[21] Jay S. Callen and G. Edward Stephan, "Siwai Line Villages: Thiessen Polygons and the Size-Density Hypothesis", *Solomon Island Studies in Human Biogeography*, Number 4, Chicago: Field Museum of Natural History, 1975.