Sampling Methods and Interpretation of Correlation: A Comparative Analysis of Seven Cross-Cultural Samples[1]

RICHARD P. CHANEY
University of Oregon

ROGELIO RUIZ REVILLA
Centro Nacional de Cálculo
Instituto Politécnico Nacional
Mexico City

The degree of agreement between the results of a comparative analysis of seven cross-cultural samples is dependent upon both the nature of the samples and the nature of the variables. All three of the smaller samples examined are demonstrated to be subject to a fatal amount of sampling error. The study incorporates the Tylor-Galton problem and makes an epistemic correlation between the concepts by postulation, historical-diffusional and functional or causal aspects, and the empirical findings of statistical correlation. It speaks in terms of realms of order in sociocultural phenomena and of different degrees of invariant relationship and contingency. Many philosophical puzzles and many problems in theoretical anthropology have, at least in part, empirical solutions. Any theoretical inquiry into questions such as "the nature of culture" should be closely allied with an examination of empirical data. The present approach is an attempt to integrate rational analysis with empirical data.

MANY MISUSES OF statistics in cross-cultural studies have been pointed out as being due to inaccurate measurement or classification of cases, inappropriate comparisons, technical errors, sampling methods and misinterpretation of correlation (Chaney 1966a, 1966b; Driver 1961b; Driver and Chaney in press; Driver and Schuessler 1967; Jorgensen 1966; Köbben 1952, 1967; McEwen 1963; Murdock 1957, 1966, 1967; Naroll 1961, 1962, 1964a, 1964b; Naroll and D'Andrade 1963; Sawyer and Le Vine 1966; Schapera 1953; Whiting 1961).

The present study deals with only two of the above problems: sampling methods and interpretation of correlation.

THE TYLOR-GALTON PROBLEM: AN INDETERMINANT SITUATION

> the fallacy of selection, of attributing to the whole class what is true only of our selected instances [Morris Cohen (1931) 1964:352].

The central problem in anthropological cross-cultural studies has been the extent to which one may generalize from the results of an analysis of a sample of societies to the universe of known societies. In 1889, Sir Frances Galton, in commenting upon a comparative study by E. B. Tylor of avoidance of parents-in-law and descent, remarked:

> It would be extremely desirable for the sake of those who wish to study the evidence for Dr. Tylor's conclusions that full information should be given as to the degree in which the customs of the tribes and races which are compared are independent. It might be that some of the tribes had derived from a common source, so that they were duplicate copies of the same original [Tylor 1889: 270].

This same basic problem of selecting a sample of societies for the study of functional relationships is now conceived of as being two-fold: the sample must be representative of the universe of human societies and yet not possess plural representatives of what should be only one case.

The vexing problem of selecting a repre-

Accepted for publication 6 November 1968.

sentative sample for the study of functional relationships is readily brought out by examining some of the samples that have been used in the past in terms of Murdock's (1967) recent 412 culture clusters. As Table 1 indicates, all these samples are either unrepresentative of the universe of 412 culture clusters or possess plural representatives of what should be only one case or both. Further, as Table 2 shows, all the samples express different degrees of geographical representativeness in terms of the six main geographical areas of the world.

The question thus arises as to whether one would derive different results from the examination of the relationship between the same variables of culture in the different samples. Further, one might ask whether the degree of agreement among the samples in correlational results depends solely on the degree of difference between the societies in the samples, as is commonly believed by cross-cultural researchers, or whether the degree of agreement between the samples in terms of correlational analysis of cultural variables is also influenced by "the nature of the variable studied" (Chaney 1966a:1469, 1966b:1475). But first let us examine the thinking behind the selection of the samples examined.

THE SAMPLES

In the past many cross-cultural researchers believed that a representative sample of world societies might be derived by selecting a large number of societies distributed around the world. Murdock called attention to this problem by pointing out that when the

> major statistical correlations of *Social Structure* (Murdock 1949) were recalculated from two worldwide samples of 300 cultures each, one completely unselected and the other carefully chosen to give equal representation to all culture areas of the world. Though no startling reversals appeared, the results from the two samples differed so markedly in enough instances to demonstrate the imperative need for a much more systematic sampling procedure [1957: 193].

Thus, Murdock published coded information on thirty cultural characteristics for 565 societies based upon the following ideas:

> A truly satisfactory ethnographic sample must obviously be adapted both to the quality of the descriptive literature and to the structure of the particular universe which is the known range of cultural variation. It must give representation to every distinctive cultural type and subtype for which information is available, even where these include only a single known example. It must similarly represent all the culture areas and subareas of the world. It must include examples of recorded ancient civilizations, of the contemporary complex civilizations of Europe and Asia, of European and African cultures transplanted to other continents, and of acculturated native peoples on the same basis as indigenous ethnographic cultures, i.e., approximately in proportion to their degree of cultural diversity [1957:665].

Concerning historical relatedness, Murdock stated that:

> The mere fact of historical relatedness does not disturb the author, for the evidence now seems clear that societies borrow from one another, as much as they invent for themselves, cultural elements for which they have a need and which are at least reasonably consistent with preexisting usages, and that borrowed like invented and traditional elements undergo a continual process of integrative modification leading to the emergence of new independent configurations. Diffusion negates the independence of two cultures only if it has occurred too recently for the integrative process to have run its course [1957:667].

(Cf. Malinowski 1944:214–215; Steward 1963:182; Wittfogel 1939:175–176.)

Murdock attempted to control against the selection of duplicate cases by avoiding

> the selection of two cultures from the same area that are either (a) geographically contiguous or (b) characterized by mutually intelligible languages unless they revealed such major differences in their basic economy, their social organization, or in the former instance their languages, as to assure that they have achieved independent integration [1957:667].

A comparison of the societies in the World Ethnographic Sample (Murdock

TABLE 1. DISTRIBUTION OF THE SOCIETIES OF VARIOUS SAMPLES IN TERMS OF MURDOCK'S 412 CULTURE CLUSTERS

Culture Clusters	*Samples of Societies**						*Culture Clusters*	*Samples of Societies**					
	1	*2*	*3*	*4*	*5*	*6*		*1*	*2*	*3*	*4*	*5*	*6*
001 Pygmies	1	2	1	1	0	0	049 Guinea	3	1	0	0	0	0
002 Bushmen	2	3	1	1	1	0	050 Tenda	2	1	1	0	0	0
003 Hottentot	1	2	2	0	0	0	051 Senegal	2	2	1	1	0	0
004 Nguni	5	3	2	0	0	0	052 Sedentary Fulani	2	1	1	0	0	0
005 Sotho	3	2	2	0	0	0	053 Nuclear Mande	4	3	1	1	0	0
006 Shona-Thonga	4	3	1	0	1	2	054 Marka	1	0	0	0	0	0
007 Ila-Thonga	2	1	1	0	1	0	055 Niger fishermen	1	1	1	0	0	0
008 Barotseland	1	1	1	0	0	0	056 Habe	2	1	1	0	0	0
009 Southwestern Bantu	3	2	2	0	0	0	057 Senufo	2	1	0	0	0	0
010 Western Angola	1	1	1	0	0	1	058 Lobi	2	2	1	0	0	0
011 Lower Congo	5	1	2	0	0	0	059 Grusi	4	2	1	0	1	0
012 Kasai	5	2	1	0	0	0	060 Mole	2	1	1	1	0	0
013 Lunda	4	2	1	0	0	0	061 Borgu-Mango	3	2	0	0	0	0
014 Bemba-Lamba	5	2	2	0	0	0	062 Middle Niger	3	1	0	0	0	0
015 Maravi	3	0	0	0	0	0	063 Jos Plateau	4	2	2	0	0	0
016 Yao-Makonde	1	1	1	0	0	0	064 Tiv-Jukun	3	2	3	0	1	0
017 Ngonde	2	1	1	0	0	0	065 Wute	1	1	1	0	0	0
018 Rukwa	4	1	0	0	0	0	066 Chamba-Yungur	3	3	0	0	0	0
019 Nyamwezi	2	1	0	0	0	0	067 Mandara highlands	4	2	2	0	0	0
020 Hatsa	1	1	0	0	0	0	068 Adamawa	3	0	0	0	0	0
021 Rift	3	2	2	0	0	0	069 Logone	1	0	0	0	0	0
022 Rufiji	2	1	1	0	0	1	070 Bagirmi-Sara	2	0	0	0	0	0
023 Luguru-Zigula	1	1	0	0	0	0	071 Banda-Baya	4	2	2	0	0	0
024 Swahili	2	0	1	0	0	0	072 Azande	1	1	1	1	1	1
025 Nyika	3	1	0	0	0	0	073 Mangbetu	2	1	0	0	0	0
026 Kenya highlands	4	2	2	0	1	1	074 Moru-Madi	6	2	1	1	0	0
027 East Nganza	3	1	1	1	0	0	075 Nuba	6	2	1	0	0	0
028 East Lacustrine Bantu	4	2	2	0	1	0	076 Fung	2	2	2	0	0	0
029 West Lacustrine Bantu	7	0	1	0	0	0	077 Koma	2	1	0	0	0	0
030 Luba	2	1	1	0	0	0	078 Northern Nilotes	3	2	1	1	1	0
031 Mongo	2	1	1	0	0	0	079 Bari-Lotuko	4	1	1	0	0	0
032 Riverain Congo	3	1	0	0	0	0	080 Southern Nilotes	3	3	2	0	0	0
033 Babwa-Bira	2	1	2	0	0	0	081 Beir-Didinga	3	1	0	0	0	0
034 Ngombe	2	0	0	0	0	0	082 Karamojong	5	2	2	0	0	0
035 Fang-Dzem	2	1	1	0	0	0	083 Nandi	3	1	1	0	0	0
036 Biafra coast	2	1	1	0	0	0	084 Dorobo	1	1	1	0	0	0
037 Middle Cameroon	2	0	0	0	0	0	085 Masai	1	1	1	0	0	0
038 Cameroon highlands	5	1	1	0	0	0	086 Southern Cushites	1	1	1	0	0	0
039 Cross River	1	1	1	0	0	0	087 Afar-Somali	2	2	1	1	0	0
040 Coastal Nigeria	3	1	0	0	0	0	088 Galla	4	1	0	0	0	0
041 Ibo-Edo	4	1	0	0	0	0	089 Sidamo	4	0	0	0	0	0
042 Nupe-Idoma	3	2	1	0	0	0	090 Konso	2	1	1	0	1	0
043 Yoruba	3	1	1	1	0	0	091 Northern Rudolf	1	0	0	0	0	0
044 Ewe-Fon	2	1	1	0	0	1	092 Western Cushites	4	1	0	0	0	0
045 Akam	4	2	1	0	1	1	093 Central Ethiopia	3	1	1	0	0	0
046 Kru	2	1	1	0	0	0	094 Barea-Kunama	2	1	0	0	0	0
047 Southern Mande	3	0	0	0	0	0	095 Beja	1	3	1	0	0	0
048 Mende-Temne	7	3	2	0	0	0	096 Nubians	3	2	2	1	0	0

* Column 1—862 societies (Murdock 1967); column 2—565 societies (Murdock 1957); column 3—400 societies (Murdock et al., 1963); column 4—112 societies (Whiting 1966); column 5—60 societies (Spiro 1965); column 6—48 societies (Bacon, Child and Barry 1963).

Culture Clusters	*Samples of Societies**					
	1	*2*	*3*	*4*	*5*	*6*
097 Baggara	1	0	1	0	0	0
098 Darfur	1	1	0	0	0	0
099 Lake Chad	1	1	1	0	0	0
100 Bornu	2	1	0	0	0	0
101 Bolewa-Tera	2	2	1	0	0	0
102 Hausa	2	1	1	1	0	0
103 Pastoral Fulani	3	1	0	0	0	0
104 Songhai	1	1	1	1	0	0
105 Tuareg	3	1	0	0	1	0
106 Teda	1	1	1	1	0	0
107 Oasis Berbers	2	2	2	1	0	0
108 Bedouin Arabs	6	5	2	1	1	0
109 Moroccan Berbers	2	3	2	0	1	0
110 Canary Islands	1	1	0	0	0	0
111 Algerian Berbers	1	2	1	0	0	0
112 Arabs of littoral N. Africa	2	1	1	0	0	0
113 Ancient Egypt	1	1	0	0	0	0
114 Greeks	1	0	0	0	0	0
115 Albanians	1	1	1	1	1	0
116 Italians	1	2	1	0	0	0
117 Spanish-Portuguese speaking	2	3	2	1	0	0
118 Basques	1	1	1	1	0	0
119 French speaking	1	2	1	0	1	0
120 English speaking	3	3	3	2	0	0
121 Dutch-German speaking	1	3	2	0	0	0
122 Scandinavians	1	2	1	0	0	0
123 Lapps	1	1	1	1	1	0
124 Finnic Peoples	1	2	1	0	1	0
125 Balto-Slavs	1	1	0	0	0	0
126 Eastern Slavs	4	3	2	0	0	0
127 Hungary-Romania	1	2	0	0	0	0
128 Southern Slavs	2	2	2	1	0	0
129 Kipchak Turks	1	0	1	0	0	0
130 Circassians	1	1	1	1	0	0
131 Osset	1	2	0	0	0	0
132 Checheno-Lesghians	1	1	0	0	0	0
133 Georgians	1	2	1	1	1	0
134 Armenians	1	1	0	0	0	0
135 Kurds	1	1	0	0	0	0
136 Ottoman Turks	1	1	0	0	0	0
137 Jews	1	1	1	0	0	0
138 Sedentary Arabs	3	1	1	0	0	0
139 Marsh Arabs	1	0	0	0	0	0
140 Ancient Mesopotamia	1	1	0	0	0	0
141 Iranians	1	1	0	0	0	0
142 South Iran nomads	2	1	1	1	0	0
143 Indus Valley	1	1	1	0	0	0
144 Hazara	2	1	1	1	0	0
145 Pushtu	1	2	1	0	0	0
146 Dard	3	2	3	0	1	0
147 Burusho	1	1	1	1	0	0
148 Turkestan	1	3	2	1	0	0
149 Mongols	4	5	5	0	1	0
150 Samoyed	1	1	1	1	0	0
151 Ostyak	1	1	0	0	0	0
152 Yeniseians	1	1	1	0	0	0
153 Yakut	1	1	1	0	0	1
154 Ykaghir	1	1	1	1	0	0
155 Paleo-Siberians	2	2	2	1	0	1
156 Gilyaks	1	1	1	1	0	0
157 Ainu	1	1	1	1	0	0
158 Tungus	1	1	0	0	0	0
159 Manchuria	1	1	1	1	0	0
160 Korea	1	2	1	1	0	0
161 Japan	1	1	1	0	0	0
162 Ryukyu Islands	1	1	1	1	0	0
163 North China	1	1	0	0	0	0
164 South China	1	1	1	1	0	0
165 Hainan	1	0	0	0	0	0
166 Miao-Yao	1	1	1	1	1	0
167 Lolo-Nosu	1	1	1	0	0	0
168 Minchia	1	1	1	0	0	0
169 Upper Brahmaputra	1	1	1	0	0	0
170 Tibet	1	1	1	0	0	0
171 Sikkim	1	1	1	1	1	1
172 Nepal	1	1	0	0	0	0
173 Kashmir	1	0	0	0	0	0
174 North India	2	2	2	0	0	0
175 Bhil	1	1	1	1	0	0
176 Munda	4	4	5	1	1	1
177 Northern Dravidians	3	3	2	1	0	1
178 Indian hunters and gatherers	1	1	1	0	0	1
179 Southeast India	3	3	2	0	1	0
180 Nilgiri Hills	1	1	1	0	0	0
181 Southwest India	1	1	1	0	0	0
182 Sihalese	1	1	1	0	0	0
183 Vedda	1	1	1	0	0	0
184 Malagasy	4	3	2	1	0	1
185 Nicobar Islands	1	1	1	1	0	0
186 Andaman Islands	1	1	1	1	1	1
187 Chittagong Hills	2	1	0	0	0	0
188 Kuki-Chin	4	2	2	0	0	0
189 Garo	1	1	1	0	0	0
190 Khasi	1	1	1	0	1	0
191 Naga	4	3	1	0	0	0
192 Kachin	1	1	1	0	0	0
193 Palaung-Wa	1	1	0	0	0	0
194 Burmese	1	1	1	0	0	0
195 Karen	1	1	1	1	0	0
196 Thai	1	1	1	0	0	0
197 Akha	1	1	1	0	0	0
198 Lamet	1	1	1	0	0	0
199 Mudng	1	1	0	0	0	0
200 Vietnamese	1	1	1	1	0	0
201 Moi	1	0	1	0	0	0
202 Cham-Jarai	2	0	0	0	0	0

Culture Clusters	*Samples of Societies**						*Culture Clusters*	*Samples of Societies**					
	1	*2*	*3*	*4*	*5*	*6*		*1*	*2*	*3*	*4*	*5*	*6*
203 Khmer	1	1	1	0	0	0	256 Massim	3	2	2	1	1	1
204 Semang	1	1	1	1	1	0	257 Louisades Archipelago	1	1	0	0	0	0
205 Senoi	1	0	0	0	0	0	258 Buka	1	1	1	1	0	1
206 Malays	1	1	1	0	0	0	259 Bougainville	1	1	1	1	1	0
207 Sea Gypsies	2	1	1	0	0	0	260 Choisevl-Eddystone	1	0	1	0	0	0
208 Formosan aborigines	6	2	2	2	0	0	261 Malaita-Ulawa	1	2	1	0	0	0
209 Highland Luzon	3	2	2	0	1	0	262 Santa Cruz Islands	1	0	0	0	0	0
210 Central Filippinos	1	1	0	0	0	0	263 Banks Islands	1	1	1	0	0	0
211 Southern Filippines	3	5	3	0	0	0	264 Malekula	1	2	1	1	0	0
212 Borneo	2	3	2	0	0	0	265 Ambrym-Pentecost	1	1	1	0	0	0
213 Batak	1	1	1	0	0	0	266 Southern New Hebrides	1	1	0	0	0	0
214 Sumatran Malays	1	1	1	0	0	0	267 Loyalty Islands	1	1	1	0	0	0
215 Offshore Sumatran Islands	1	1	1	0	0	0	268 New Caledonia	1	1	1	0	0	0
216 Indonesian hunters and gatherers	1	1	0	0	0	0	269 Fiji	2	2	1	1	0	3
217 Java	1	1	1	0	0	0	270 Rotuma	1	1	1	0	0	0
218 Bali	1	1	1	0	1	1	271 Polynesian outliers-Micronesia	1	1	0	0	0	0
219 Sumba-Sumbawa	1	1	0	0	0	0	272 Polyn. outliers-C. Melanesia	1	2	1	0	0	0
220 Buginese-Macassare	1	1	1	0	0	0	273 Polyn. outliers-E. Melanesia	1	1	1	0	0	1
221 Celebes	1	1	1	0	0	0	274 Western Polynesians	8	5	4	0	1	2
222 Flores	1	1	0	0	0	0	275 Southern Polynesians	1	1	1	0	1	1
223 Alor-Solor	1	1	1	0	1	0	276 Eastern Polynesians	8	7	4	0	1	0
224 Timor-Roti	1	2	2	0	0	0	277 Western Eskimo	4	2	1	0	1	0
225 Tanimbar	1	1	1	1	0	0	278 Interior Eskimo	2	1	0	0	0	0
226 Kei-Aru	1	1	0	0	0	0	279 Central and Eastern Eskimo	7	1	2	1	0	0
227 Moluccas	1	1	0	0	0	0	280 Cree-Montagnais	4	2	2	0	0	0
228 Halmahera	1	1	0	0	0	0	281 Maritime Algonkians	1	2	1	0	0	0
229 Northwestern Australia	2	3	3	0	1	0	282 Ojibwa	7	1	1	0	1	0
330 Central Australia	3	4	3	1	0	0	283 Northeastern Athapaskans	6	1	0	0	0	0
231 Southeast Australia	1	1	0	0	0	0	284 Carrier-Nakani	3	2	1	1	0	1
232 Tasmania	1	1	0	0	0	0	285 Upper Yukon	1	1	0	0	0	0
233 Northeast Australia	1	1	1	0	0	0	286 Lower Yukon	1	0	1	0	0	0
234 Southeast New Guinea	5	1	0	0	0	0	287 South Central Alaska	3	2	2	0	0	0
235 Gulf of Papua	3	2	1	0	0	0	288 Tlingit-Haida	2	2	1	0	0	0
236 Merauke	3	1	1	1	0	0	289 Tsimshian-Haisla	2	0	1	0	0	0
237 West Papuans	1	0	0	0	0	0	290 Kwakiutl-Bellacoola	4	1	1	1	1	1
238 West New Guinea highlands	2	1	1	1	0	0	291 Nootka-Quileute	3	2	0	0	0	0
239 East New Guinea highlands	4	1	1	0	0	0	292 Coast Salish	8	2	1	0	0	0
240 East Papuans	4	1	1	1	0	0	293 Chinook	2	1	0	0	0	0
241 North Papuans	4	2	1	2	1	2	294 Oregon seaboard	4	2	1	0	0	0
242 Northwest New Guinea	1	1	1	1	0	0	295 Northwest California	7	3	1	1	0	0
243 Northeast New Guinea	3	1	1	1	0	0	296 Northeast California	3	2	1	0	0	0
244 Palau	1	1	1	1	0	0	297 Maidu-Wintun	5	2	1	0	1	0
245 Yap	1	1	1	1	0	0	298 Pomo-Yuki	6	3	1	0	0	0
246 Marianas Islands	1	1	0	1	1	0	299 Miwok-Yokuts	5	2	2	0	0	0
247 Central Caroline Islands	4	2	2	0	1	3	300 Kern River	2	1	1	0	0	0
248 Eastern Caroline Islands	2	2	1	0	0	0	301 Southwest California	5	1	0	0	0	0
249 Nauru	1	1	0	0	0	0	302 Diegueno	2	1	1	0	0	0
250 Marshall Islands	2	1	1	0	0	0	303 Washo	1	1	1	0	0	0
251 Gilbert Islands	2	1	1	0	0	0	304 Central Great Basin	9	3	1	0	0	0
252 Western Islands	1	1	0	0	0	0	305 Southern Paiute	5	1	0	0	0	0
253 Admirality Islands	2	1	1	0	0	1	306 Plateau Yumans	5	2	1	1	0	0
254 New Ireland	1	1	1	1	0	1	307 Eastern Great Basin	6	1	1	0	0	0
255 New Britain	1	1	1	1	0	0	308 Lutuami	2	1	0	0	1	0

Culture Clusters	*Samples of Societies**					
	1	*2*	*3*	*4*	*5*	*6*
309 Sahaptin	3	1	1	0	0	0
310 Interior Salish	4	1	1	0	0	1
311 Northern plateau	4	1	0	0	0	0
312 Kutenai	1	1	1	0	0	0
313 Northwest Plains	5	3	2	0	0	0
314 Northeast Plains	5	1	1	0	1	0
315 Upper Missouri	3	2	2	0	0	0
316 Southern Plains	5	3	3	0	0	2
317 Caddo	2	2	2	0	0	0
318 Pawnee-Arikawa	2	1	1	0	0	0
319 Prairie Siovans	5	3	2	1	0	0
320 Central Algonkians	5	4	2	0	0	0
321 Iroquois	2	2	1	0	1	0
322 Middle Atlantic Algonkians	1	1	1	0	0	0
323 Cherokee-Yuchi	2	2	1	0	0	0
324 Muskogee	3	3	3	1	0	0
325 Lower Mississippi	1	1	1	0	0	0
326 Texas coast	1	1	0	0	0	0
327 Apache	4	1	1	0	0	0
328 Eastern Pueblos	4	3	1	1	0	0
329 Central Pueblos	4	2	2	1	0	0
330 Western Pueblos	4	3	2	2	0	1
331 Navaho	2	2	1	0	1	2
332 River Yumans	5	2	1	0	0	0
333 Pima-Papago	2	1	1	1	1	1
334 Seri	1	1	1	0	0	0
335 Cahiti	1	1	0	0	0	0
336 Tarahumara	1	2	1	1	0	0
337 Huichol	1	1	1	0	0	0
338 Chichimec	1	0	0	0	0	0
339 Tarascans	1	1	0	0	0	0
340 Totonac	1	2	1	1	0	0
341 Aztec	1	1	1	0	0	0
342 Puebla Nahuatl	1	0	0	0	0	0
343 Chinantec-Mazatec	1	2	2	1	0	0
344 Mixe-Zoque	2	2	1	1	1	0
345 Mixtec-Zapotec	1	1	0	0	0	0
346 Lowland Maya	3	2	2	1	0	0
347 Highland Maya	2	2	2	0	0	0
348 Lenca-Jicaque	1	1	0	0	0	0
349 Miskito-Ulva	1	1	1	1	0	0
350 Talamanca	1	2	1	0	0	0
351 Cuna	1	1	1	1	1	1
352 Choco	1	0	1	0	0	0
353 Antillean Arawac	1	1	0	0	0	0
354 Antillean Carib	2	2	2	0	1	0
355 Sierra Nevada de Santa Marta	1	1	1	0	0	0
356 Goajiro	1	1	1	1	0	0
357 Paraujaro	1	0	1	0	0	0
358 Motilon	1	1	1	0	0	0
359 Guahibo	1	1	1	0	0	0
360 Middle Orinoco	1	1	1	1	0	0
361 Saliva	1	0	0	0	0	0
362 South Venezuelan Arawak	3	1	1	0	0	0
363 Orinoco-Ventuari Carib	3	2	2	0	0	0
364 Yanoama	1	0	0	0	0	0
365 Shiriana	1	0	0	0	0	0
366 Guiana Carib	5	2	2	1	1	0
367 Orinoco Delta	1	1	1	1	0	0
368 Coastal Arawak	1	1	0	0	0	0
369 Bush Negroes	1	1	1	0	0	0
370 Palikur	1	2	1	0	0	0
371 Lower Amazoan Tupi	2	2	2	0	0	0
372 Maue-Munduruca	2	2	1	0	1	0
373 Siriono Guarayu	1	1	1	1	1	1
374 Pano	3	1	0	1	0	0
375 Upper Amazon	1	1	0	0	0	0
376 Tucuna	1	1	1	0	0	0
377 Peba	1	1	1	1	0	1
378 Tucano	1	1	1	1	0	0
379 Witoto	1	1	1	0	0	0
380 Jivaro	1	1	1	1	0	1
381 Tunebo	1	0	1	0	0	0
382 Chibcha	1	1	1	0	0	0
383 Paez	1	1	1	0	0	0
384 Cayapa	1	1	1	0	0	0
385 Campa	1	2	1	0	0	0
386 Highland Peru	1	1	1	0	0	0
387 Aymara	1	2	1	1	1	1
388 Araucanians	1	1	1	1	1	0
389 Alacaluf	1	1	1	1	0	0
390 Yahgan	1	1	1	1	0	0
391 Patagonians	2	2	2	0	0	0
392 Guaycuru	3	2	2	1	1	0
393 Mascoi	1	1	0	0	0	0
394 Mataco	2	2	2	1	0	0
395 Chiriguano	1	1	1	0	0	0
396 Zamuco	1	1	1	1	0	0
397 Terena	1	1	1	0	0	0
398 Guato	1	1	1	1	0	0
399 Nambicuara	1	1	1	1	0	0
400 Paressi	1	1	0	0	0	0
401 Bororo	2	2	1	1	0	0
402 Bacairi	1	1	1	0	0	0
403 Camayura	1	1	1	0	1	0
404 Trumai	1	1	1	1	0	0
405 Caraja	1	1	1	1	0	0
406 Southern Ge	1	1	1	0	0	0
407 Apinaye Coroa	2	1	1	0	0	0
408 Timbira	1	1	1	1	0	0
409 Guarani	1	1	0	0	0	0
410 Caingang	1	1	1	1	0	0
411 Botocudo	1	1	1	0	0	0
412 Coastal Tupi	1	1	1	0	1	0

TABLE 2. GEOGRAPHICAL DISTRIBUTION OF THE SOCIETIES OF EACH SAMPLE IN TERMS OF THE SIX MAIN GEOGRAPHICAL AREAS

Total societies	*Africa*	*Circum-Mediter-ranean*	*East Eurasia*	*Insular Pacific*	*North America*	*South America*	*Average*
862 societies (Enthnographic Atlas Summary, Murdock 1967)	239	95	93	128	218	89	144
565 societies (World Ethnographic Sample, Murdock 1957)	116	78	85	99	110	77	94
412 societies (412 Culture Clusters, Ethnographic Atlas Summary, Murdock 1967)	85	55	66	70	69	67	69
400 societies (Ethnographic Atlas, Murdock et al. 1963b)	80	45	70	70	70	65	67
112 societies (World Linguistic Sample, Whiting personal communication)	10	16	24	21	16	25	19
60 societies (Spiro 1965)	10	10	10	10	10	10	10
48 societies (Bacon, Child and Barry 1963)	8	0	8	17	11	5	6

1957) with Murdock's 412 culture clusters indicates that 34 culture clusters are not represented in the World Ethnographic Sample and that of the 378 culture clusters that are represented, 132 are represented more than once (see Table 1). Thus, if we assume that Murdock's sample of 412 culture clusters is the most representative sample to date, there has admittedly been a significant improvement in sampling representativeness during the intervening ten years. This comparison also gives us the first indication that some of the correlations found in studies such as Coult and Habenstein's "Cross Tabulation of Murdock's World Ethnographic Sample" (1965) may be subject to sampling error.

In 1962, Murdock et al. began presenting a new Ethnographic Atlas Sample in the journal *Ethnology*, "selected with due regard to geographic distribution and cultural variation" (Murdock et al. 1962:533). By the fifth installment the total number of societies reached 400:

> The new societies have been selected primarily to round out a representative sample of the world's known cultures. This sample includes 80 societies from Africa, 45 from the Circum-Mediterranean region, 70 from East Eurasia, 70 from the Insular Pacific, 70 from North America, and 65 from South America. Any further expansion would probably tend to distort the geographical distribution [Murdock et al. 1963a:109].

A comparison of this sample of 400 societies from the Ethnographic Atlas with the 412 culture clusters indicates that 101 culture clusters are not represented in the Ethnographic Atlas "400" and that of the 311 culture clusters that are represented, 71 are represented more than once (see Table 1). This comparison is of special interest because it suggests that this sample of 400 societies is no more or less representative of the 412 culture clusters than are the 565 societies of the World Ethnographic Sample. Further, it suggests that studies based on an analysis of the Ethnographic Atlas "400," such as Textor's (1967), may be subject to some sampling error.

In the sixth installment of the Ethnographic Atlas, Murdock et al. (1963b:249) initiated their attempt to go beyond a sample merely "selected as presumably representative." They proposed:

> to identify with precision a universe consisting of all known culture types. By "culture type" we mean either a single unquestionably distinctive culture or a group of cultures which differ from one another to a degree not significantly greater than the local variation to be expected in the culture of any homogenous society of substantial geographical extent.

In 1967, Murdock carried out his idea of "culture type" by publishing the Ethnographic Atlas Summary, which contains 862 societies structured into 412 culture clusters from which a sample of 412 societies may be drawn, one society from each of the culture clusters or from which may be drawn a smaller sample selected at random.

Murdock specifies five principles on which the universe of 412 culture clusters is based:

(1) "The universe from which a world sample should be drawn consists, not of the totality of the world's culture bearing units, but of clusters of such characterized by close genetic relationships" (1967:111–112).

(2) "No world sample should include any two societies located geographically so close to one another that diffusion is likely to have jeopardized the essential independence of their cultures" (1967:112).

(3) "The universe from which a world sample may appropriately be drawn consists, not of all the societies or clusters which are known to exist or to have existed, but only of those whose cultures have been adequately described in sources that are generally available" (1967:113).

(4) "The universe from which a world sample is properly drawn should consist of all societies and clusters whose cultures have been adequately described without arbitrary limitations of time, area, or the languages in which the ethnographic accounts have been written" (1967:113).

(5) "Any known and adequately described society must have an unimpeded chance of being drawn in any world sample, and all clusters must enjoy an essentially equal chance of being represented" (1967:113).

Although Murdock's sample of culture clusters is determined without any explicit inductive technique, his world ethnographic knowledge is conceded to surpass that of any other anthropologists by most cross-cultural researchers. "Even though his types can eliminate only the more recent historical contacts of the last few centuries, they constitute an important taxonomical advance" (Driver and Chaney in press).

Whiting (personal communication) has recently drawn a world-wide linguistic sample of 112 societies according to the following criteria:

(1) No two of them are reported to speak a language of the same subfamily.

(2) No two of them are classed in the same culture area as defined in the Ethnographic Atlas.

(3) No two of them have borders that are contiguous.

(4) In cases where two or more societies satisfied these criteria, the one judged to have the best ethnographic converage was chosen.

(5) When such a judgement could not be made, the choice was made by lot.

(6) The sample was drawn from the first 700 societies listed in the Ethnographic Atlas.

Whiting has thus attempted to control for the influence of historical-diffusional factors (actually, for culture heritage-migration) in a study of functional relationships. However, as Driver and Chaney (in press) have pointed out:

> Using the rough estimate of time from glottochronology, Whiting's units are separated by a minimum of 1000 years of linguistic distance. Whiting is assuming that language classification matches culture classification to a high degree and that linguistic distance and culture distance are definitely related for all combinations of two ethnic units. A glance at the language family and culture area classifications and maps of almost any area in the world (e.g., North America, in Driver, 1961) shows that this is far from true in every instance.

In addition, Whiting apparently has not taken into account the rather large geographical difference in linguistic complexity in the world (see Table 2). Thus, all sociocultural relationships that are substantially historical-diffusional will be either over- or underrepresented in a sample of this kind. For example, in a study of the configuration descent-family-household, the combinations unilateral-independent-small and unilateral-extended-small, which are so prominent in Africa, would be underrepresented (see Chaney 1966a:1468, Table 16). As a result, if only the worldwide relationship of sociocultural variables is examined in this type of sample, spurious correlations or spurious interpretations of valid correlations may be produced.

The majority of the other samples that have been used in cross-cultural studies have even less claim to being representative. All the studies of the more rarely reported aspects of culture have used samples that were selected to a large extent in terms of whether information on the variables examined was available for a given society. Although these samples generally contain societies geographically sprinkled around the world, the nature of their selection precludes more than a weak approximation to representativeness.

Thus, Bacon, Child, and Barry (1963:291) state that the 48 societies used in their study of crime are "scattered over the world."

> They were taken from a larger group of 110 societies which were selected on the basis of geographical diversity and adequacy of information on aboriginal child training practices. The present sample consists of those societies whose ethnographies were searched and found to provide sufficient information to permit comparative ratings on criminal behavior by three independent research workers.

This rather cavalier attitude toward the vexing problem of sampling gives a degree of pause to the more cautious cross-cultural researcher. As an examination of Tables 1 and 2 indicates, not only are the societies unrepresentative of the world's societies in terms of geographical representation, but about one third of the 48 societies are plural representatives of what should be one case, according to Murdock (1967).

Spiro (1965), on the other hand, avoids plural representation in his sample of sixty societies by selecting only one society from each of Murdock's sixty culture areas in the World Ethnographic Sample (see Table 1 and 2). But he did not draw a random sample from the World Ethnographic Sample, because the selection of a society from each of the sixty culture areas was not at random. If Spiro had drawn a random sample, he would have at least been in the position to say that his results agreed "closely" with the results that would have been obtained had the entire universe of the World Ethnographic Sample been subjected to study. Further, he could have then *suggested* that both his sample of sixty societies and the larger universe from which it was drawn reflect the state of affairs in the universe of all known societies (Chaney 1966b:1474). His results may have been negated by later research, but at least the reader would have had a better idea as to what universe one

could generalize to from the sample of societies being examined.

The majority of the small samples (especially those containing fewer than a hundred societies) that have been used in cross-cultural research can be best characterized as accidental samples. In the absence of a systematic sampling plan, one has no idea of what, if any, universe they represent.

In summary, all the samples used in anthropological cross-cultural studies have been either judgmental samples or random (Jorgensen 1966:161–163) or nonrandom samples drawn from judgmental samples. The process of selection has not been a random one from a known universe of all societies for the very good reasons that we lack knowledge of even the existence of many societies of the hypothetical universe of all societies that have existed, and we lack adequate information on many of the societies that make up the universe of known societies. Thus, the selection of a sample of societies in anthropology has been by necessity one of "expert selection."

Whereas in general statistics the cases "are independent if the probability that one of them will have a certain outcome is the same no matter what the outcome of the others," in anthropological cross-cultural studies the term independence refers to whether each correlation is to be viewed as either based on a sample of societies of which every society is historically independent (matter of degree) or as a function of the interdependence of the societies in the sample due to recent historical-diffusional factors. The characteristics of anthropological data indicate that a judgmental sample be made from the universe of known societies that controls for recent historical contact as Murdock has done with his culture clusters. From that judgmental universe a sample can then be drawn randomly using the above statistical idea of independence.

The "best" judgmental sample in anthropology is the one that is thought to be the closest approximation to representativeness at any given time. The present analysis assumes that Murdock's most recent sample of 412 culture clusters (1967) is the most representative to date, and all the other samples are examined and evaluated in terms of it.[2]

PROCEDURE

The appearance of Murdock's Ethnographic Atlas Summary (1967) has made it possible to make a comparative analysis of various samples in terms of the results obtained from an intercorrelation of the same sociocultural variables in each of the samples. The punchcards used in the present study for the various societies of each sample were all selected from a deck of punchcards containing all the societies in the Ethnographic Atlas Summary. Thus, the same "biased" data are being used for each sample of societies. All problems concerning identification of societies were cleared up through a personal communication from Murdock.

Only two societies, Tepoztlan and Jamaicans (Rocky Roaders), had to be dropped from the sample of 48 societies because they (or an appropriate substitute) were not included in the World Ethnographic Summary. The base sample of 412 societies was selected at random from Murdock's 412 culture clusters (1967), one society at random from each of the 412 culture clusters.

Scaling

Ten sociocultural variables that possess good worldwide reporting were selected from the much longer list of variables that are coded in the Ethnographic Atlas Summary (see Table 3). This selection was necessitated by the poor worldwide reporting on many of the variables not used. Also, since this study is a preliminary examination of sampling methods and interpretation of correlation, we wanted to make the results as transparent as possible by limiting the number of intercorrelations presented. As it is, the ten variables intercorrelated two at a time yield 45 intercorrelations

$$\frac{N(N\text{-}1)}{2}.$$

TABLE 3. SCALING OF THE 10 VARIABLES

Variables	*Categories*		
	1	*2*	*3*
(1) Family organization (1)	Independent nuclear: M, N	Independent polygymous: O, S, P, R, Q	Extended: G, F, E
(2) Family organization (2)	Extended monogamy or limited polygyny: M, N	Extended polygyny: R, S, Q, P	No extended
(3) Marital residence	Patrilocal virilocal: P, V	Optional: B, D, N, O	Matrilocal, avunculocal, uxorilocal: M, A, U, C
(4) Settlement pattern	Nomadic or semisedentary: B, S, T	Impermanent or dispersed: W, N, H	Permanent: V, X
(5) Jurisdictional hierarchy, local	0, 1, 2 levels	3 levels	4 levels
(6) Jurisdictional hierarchy, beyond local	0 levels	1 level	2, 3, 4 levels
(7) Subsistence economy	Gathering, fishing, or hunting: G, F, H	Pastoral: P	Agriculture: N, E, I
(8) Descent	Patrilineal: P	Duolateral, bilateral, Quasi-lineages or ambilineal: D, B, Q, A	Matrilineal: M
(9) Class stratification	Absence: O	Wealth or elite: W, E	Dual or complex: D, C
(10) Succession of headman	Patrilineal: P, Q	Matrilineal: M, N	Nonhereditary or absence of office: A, S, I, E, C, O

Each of these ten variables is scaled according to a three-category breakdown. In order to compare Pearson's C coefficients, all the tables must be the same size. These categories are grouped to allow for relative homogeneity within each level and as much difference as possible between levels while still retaining acceptable marginal totals. This was done by having the computer print out the frequencies for the different categories of each variable as coded in the Ethnographic Atlas Summary. From this empirical information on the nature of the continuum, personal judgment was then used to determine the scaling of the categories along a continuum. We wish to emphasize that there is no "best" type of scaling for all the intercorrelations. That is, one type of scaling of a variable is appropriate for some comparisons with some variables, whereas other types of scaling are more appropriate with other variables. For example, with a sample of sixty societies, when the variable stratification was scaled (1) absence of wealth distinctions, (2) elite or hereditary aristocracy, (3) complex social classes, stratification correlated 0.23 with family organization (2) and 0.24 with subsistence economy. When

stratification was scaled (1) absence of wealth distinctions, (2) wealth distinctions or elite, (3) hereditary aristocracy or complex social classes, stratification correlated 0.08 with family organization (2) and 0.34 with subsistence economy. If the other variables in the comparison are also rescaled at the same time, all types of fluctuation from one intercorrelation to the next start occurring in the magnitude of association. The majority of both the invariant and contingent sociocultural variables are apparently able to plug into the continuum of the politicoeconomic realm in a number of ways and levels. The problem of scaling, direction of relationship, and interpretation of correlation will be dealt with in a forthcoming paper.

Coefficient of correlation

The degree of association between the cultural variables is measured by Pearson's C, also known as the coefficient of contingency. This coefficient is stated in terms of χ^2:

$$C = \sqrt{\frac{\chi^2}{N + \chi^2}}$$

where

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

O is the observed frequency (not percentage) and E is the expected frequency for a given cell. As McNemar has pointed out:

> This strength of association is not to be interpreted as indicating the same degree of relationship as an ordinary (or biserial or tetrachoric) coefficient of the same magnitude. One reason for this is that the upper limit for the contingency coefficient is a function of the number of categories. The upper limit for a 2 by 2 table is $\sqrt{\frac{1}{2}}$; for a 3 by 3 table, $\sqrt{\frac{2}{3}} \cdots$ for a k by k table, $\sqrt{k-1/k}$ [1955:205].

In the present case, the upper limit for Pearson's C is 0.82.

> Despite having varying maximal values, contingency coefficients have a decided advantage over other measures of relationship; no assumptions involving the nature of the variables need be met—continuous or discrete variables, normal or skewed or any shaped distributions for underlying traits, ordered or unordered series, and combinations thereof are permissible [McNemar 1955:205].

Also, unlike some other coefficients, C can never be negative (C is described in McNemar 1955; Peatman 1947; Siegel 1956).

In order to compare the degree of variance between the coefficients of an intercorrelation of the same two variables in each of the samples, some measurement of the standard error of their difference had to be employed. The method chosen here was to transform the coefficients of contingency to Z values and then compare the difference between Z values with the standard error of their difference. This was done for a number of reasons; the most important was:

> If we have two independent estimates of a correlation coefficient, and wish to test whether they differ significantly, it is absolutely asking for trouble in the case of small samples to rely on using the standard error of the correlation coefficient itself [Moroney 1967:314].

Since it is tacitly assumed in the present analysis that the distributions of the same variables in the various samples do not follow the normal distribution, the coefficients were transformed to Z values, and the difference of the values was then evaluated in terms of the standard error of their difference:

$$\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}$$

where N_1 equals the number of societies in the first sample and N_2 equals the number of societies in the second sample of a comparison. R. A. Fisher originally invented the Z transformation for the handling of sampling errors of r.

$$Z = 1.15 \log_{10} \frac{1 + r}{1 - r}$$

Z is distributed with a standard error of:

$$\frac{1}{\sqrt{N - 3}}$$

TABLE 4. A THREE DIMENSIONAL REPRESENTATION OF PEARSON'S *C* COEFFICIENTS FOR SEVEN SAMPLES*

	1	*2*	*5*	*3*	*8*	*10*	*7*	*4*	*6*	*9*
	.70									
	.70									
1	.70									
	.70									
	.70	.44	.44							
	.70	.56	.56							
2	.70	.52	.50							
	.48	.47								
	.49	.35	.49	.31	.17					
	.48	.42	.48	.41	.30					
5	.49	.38	.48	.29	.37					
	.26	.20	.26							
	.22	.37	.20	.34	.26	.25	.55			
	.21	.30	.15	.21	.21	.13	.53			
3	.18	.25	.15	.23	.28	.43	.61			
	.18	.15	.26	.60						
	.14	.28	.16	.39	.28	.16	.57	.48	.63	
	.21	.15	.16	.20	.28	.09	.56	.35	.58	
8	.22	.18	.15	.23	.29	.32	.56	.46	.53	
	.18	.14	.16	.41	.55					
	.18	.30	.18	.17	.17	.24	.43	.15	.54	.27	.30	
	.12	.26	.14	.25	.16	.29	.43	.22	.57	.37	.29	
10	.15	.16	.13	.20	.18	.25	.39	.26	.55	.37	.13	
	.07	.08	.30	.14	.27	.13				
	.06	.53	.09	.50	.26	.38	.16	.29	.31	.39	.10	.35	.59	
	.11	.27	.07	.30	.26	.26	.15	.25	.37	.40	.11	.31	.60	
7	.12	.23	.13	.23	.26	.23	.16	.17	.28	.17	.11	.04	.59	
	.11	.17	.22	.09	.17	.12	.56			
	.15	.29	.17	.19	.18	.22	.05	.35	.18	.38	.11	.52	.59	.33	.47	
	.15	.17	.09	.12	.23	.25	.10	.17	.29	.31	.10	.35	.61	.53	.51	
4	.11	.29	.15	.36	.22	.31	.14	.28	.25	.37	.06	.21	.59	.32	.29	
	.21	.15	.26	.21	.24	.21	.33	.27	
	.15	.40	.15	.28	.21	.36	.19	.33	.24	.34	.19	.47	.37	.33	.24	.43	.57	
	.16	.18	.09	.07	.17	.41	.20	.24	.26	.18	.17	.22	.39	.33	.29	.41	.51	
6	.18	.25	.14	.32	.17	.27	.22	.22	.22	.26	.22	.25	.36	.43	.30	.26	.58	
	.15	.14	.28	.16	.15	.20	.36	.30	.54	
	.13	.14	.22	.17	.12	.18	.32	.27	.53	
	.13	.11	.23	.17	.08	.17	.29	.28	.51	
9	.12	.11	.26	.16	.09	.17	.35	.31	.53	

* Samples represented in each ascending diagonal:
48 societies
60 societies
112 societies
400 societies
565 societies
862 societies
412 culture cluster societies

STATISTICAL ANALYSIS OF ASSOCIATIONS IN TERMS OF PEARSON'S *C*

A three dimensional representation of Pearson's *C* coefficients for seven samples is shown in Table 4. The first value in each ascending diagonal is for the base sample of 412 culture-cluster societies. The remaining six values in each ascending diagonal refer to the same intercorrelation in each of the

other six samples of societies: second—862 societies, third—565 societies, fourth—400 societies, fifth—112 societies, sixth—60 societies, and seventh—48 societies.

The variables have been rearranged to form subsets of the most highly associated traits. With the scaling employed in the present analysis, three clusters of variables are found. As is readily observable, the clustered traits express nearly the same magnitude of association in all the samples, whereas many of the other intercorrelations are fluctuating from sample to sample. *Cluster 1:* Variables 1 and 2 (which both refer to family organization, but with the categories scaled somewhat differently) are highly associated with each other and with variable 5, jurisdictional hierarchy at the local level. *Cluster 2:* Variables 3, 8, and 10, marital residence, descent and succession of local headman, respectively, form another highly associated subset. *Cluster 3:* The third cluster of variables is made up of 4, 6, 7, and 9, settlement pattern, jurisdictional hierarchy beyond the local level, subsistence economy and class stratification, respectively. There are, however, no sharp breaks between these clusters. For example, as the sample of 412 culture-cluster societies indicates, both cluster 1 and cluster 2 are linked to some degree to cluster 3 through subsistence economy. That is, variable 5 of cluster 1, jurisdictional hierarchy at the local level, is associated to some extent with variable 7 of cluster 3, subsistence economy. Variable 5 of cluster 1, jurisdictional hierarchy at the local level, is associated with both variables 3 and 8 of cluster 2, marital residence and descent. Although these relationships between clusters are not exceptionally strong, the associations do, however, tend to hold up in all the samples. This visual examination of the matrices gives us the first indication that the degree of agreement and disagreement between the statistical analysis of the same variables in the various samples is influenced both by the nature of the samples' selection and by the nature of the variables examined. But before making an examination of the differences in a stricter manner, let us first examine each sample separately in terms of the levels of significance needed for the associations.

LEVELS OF SIGNIFICANCE FOR EACH SAMPLE SIZE

For the sake of argument, let us view each sample separately and assume that each sample of societies is representative of the universe of societies. This method of simulated ignorance is used to underscore the problems of using small samples even when they are assumed to be representative.

The coefficients of contingency were first transformed to Z values (see Table 5). The Z values in each sample were then evaluated for their level of significance in terms of the standard error in each sample. As Table 6 shows, different magnitudes of association are needed in the various samples to reach the same level of significance. The magnitude of association required is inversely related to sample size. Table 7 gives the levels of significance that the various intercorrelations in each sample have reached. The number 1 indicates that the association is significant at the 0.003 level, the number 5 at the 0.05 level, and zero (0) indicates that the relationship is not significant at the 0.05 level. The 45 intercorrelations have been arranged to allow the associations that are most significant to be at the top and those least significant to be at the bottom of the list.

Among the four larger samples, nearly all the associations reach the 0.003 level of significance, and only four intercorrelations fail to reach the 0.05 level of significance. Among the three smaller samples, only 37 percent of the correlations reach the 0.003 level of significance, and 23 percent fail to reach the 0.05 level of significance. Thus, from the point of view of confidence in generalizing from the results, one would be much safer in generalizing from the results of a statistical analysis of a larger sample. Although the size and representativeness of the sample influences the correlational results, it is to be emphasized that the associated variables that were found in clusters 1, 2, and 3 in Table 4 are the same ones

TABLE 5. Z VALUES FOR THE 45 INTERCORRELATIONS IN THE SEVEN WORLDWIDE SAMPLES

Variables intercorrelated	*Samples*							*Average difference of the three smaller samples from the base sample*
	412 base	*862 societies*	*565 societies*	*400 societies*	*112 societies*	*60 societies*	*48 societies*	
01 1 Family organization 1 02 Family organization 2	.87	.88 (.01)	.88 (.01)	.88 (.01)	.87 (.00)	.88 (.01)	.88 (.01)	.01
02 1 Family organization 1 03 Marital residence	.19	.22 (.03)	.23 (.04)	.27 (.08) 1	.41 (.22) 2	.45 (.26) 1	.37 (.18) 1	.22
03 1 Family organization 1 04 Settlement pattern	.11	.16 (.05)	.15 (.04)	.12 (.01)	.24 (.13) 1	.28 (.17) 1	.59 (.48) 3	.26
04 1 Family organization 1 05 Juris. hierarchy local	.54	.54 (.00)	.55 (.01)	.53 (.01)	.58 (.04)	.63 (.09)	.48 (.06)	.06
05 1 Family organization 1 06 Juris. hierarchy b. local	.18	.20 (.02)	.16 (.02)	.22 (.04)	.30 (.12) 1	.18 (.00)	.31 (.13)	.08
06 1 Family organization 1 07 Subsistence economy	.13	.12 (.01)	.07 (.06)	.07 (.06)	.16 (.03)	.27 (.14) 1	.32 (.19) 1	.12
07 1 Family organization 1 08 Descent	.23	.22 (.01)	.15 (.08) 1	.19 (.04)	.26 (.03)	.31 (.08)	.40 (.17) 1	.09
08 1 Family organization 1 09 Class stratification	.12	.13 (.01)	.14 (.02)	.15 (.03)	.26 (.14) 1	.19 (.07)	.42 (.30) 1	.17
09 1 Family organization 1 10 Succession headman	.16	.12 (.04)	.19 (.03)	.19 (.03)	.19 (.03)	.16 (.00)	.29 (.13)	.09
10 2 Family organization 2 03 Maritial residence	.16	.16 (.00)	.21 (.05)	.21 (.05)	.31 (.15) 1	.44 (.28) 2	.33 (.17) 1	.20
11 2 Family organization 2 04 Settlement pattern	.16	.10 (.06) 1	.18 (.02)	.18 (.02)	.24 (.08)	.31 (.15) 1	.55 (.39) 2	.21
12 2 Family organization 2 05 Juris. hierarchy local	.52	.52 (.00)	.54 (.02)	.52 (.00)	.56 (.04)	.64 (.12)	.47 (.05)	.07
13 2 Family organization 2 06 Juris. hierarchy b. local	.14	.10 (.04)	.15 (.01)	.16 (.02)	.38 (.24) 2	.12 (.12)	.19 (.05)	.10
14 2 Family organization 2 07 Subsistence economy	.14	.07 (.07) 1	.09 (.05)	.08 (.06)	.21 (.07)	.27 (.13)	.18 (.04)	.08
15 2 Family organization 2 08 Descent	.16	.16 (.00)	.16 (.00)	.16 (.00)	.24 (.08)	.22 (.06)	.36 (.20) 1	.11
16 2 Family organization 2 09 Class stratification	.11	.12 (.01)	.14 (.03)	.14 (.03)	.33 (.22) 2	.08 (.03)	.29 (.18) 1	.14

TABLE 5. (*Continued*)

Variables intercorrelated	*Samples*							*Average difference of the three smaller samples from the base sample*
	412 base	*862 societies*	*565 societies*	*400 societies*	*112 societies*	*60 societies*	*48 societies*	
17 2 Family organization 2 10 Succession headman	.13	.14 (.01)	.19 (.06)	.15 (.02)	.24 (.11) 1	.20 (.07)	.42 (.29) 1	.16
18 3 Marital residence 04 Settlement pattern	.14	.11 (.03)	.05 (.09) 1	.10 (.04)	.18 (.04)	.27 (.13)	.31 (.17) 1	.11
19 3 Marital residence 05 Juris. hierarchy local	.29	.22 (.07) 1	.26 (.03)	.27 (.02)	.40 (.11) 1	.31 (.02)	.17 (.12)	.08
20 3 Marital residence 06 Juris. hierarchy b. local	.22	.21 (.01)	.20 (.02)	.22 (.00)	.29 (.07)	.18 (.04)	.37 (.15)	.09
21 3 Marital residence 07 Subsistence economy	.16	.16 (.00)	.17 (.01)	.15 (.01)	.27 (.11) 1	.23 (.07)	.16 (.00)	.06
22 3 Marital residence 08 Descent	.64	.63 (.01)	.65 (.01)	.70 (.06)	.71 (.07)	.60 (.04)	.63 (.01)	.04
23 3 Marital residence 09 Class stratification	.17	.18 (.01)	.18 (.01)	.16 (.01)	.23 (.06)	.25 (.08)	.35 (.18) 1	.11
24 3 Marital residence 10 Succession headman	.42	.47 (.05)	.46 (.04)	.44 (.02)	.50 (.08)	.37 (.05)	.52 (.10)	.08
25 4 Settlement pattern 05 Juris. hierarchy local	.23	.23 (.00)	.18 (.05)	.23 (.00)	.24 (.01)	.28 (.05)	.40 (.17) 1	.08
26 4 Settlement pattern 06 Juris. hierarchy b. local	.32	.31 (.01)	.25 (.07) 1	.28 (.04)	.30 (.02)	.57 (.25) 1	.51 (.19) 1	.15
27 4 Settlement pattern 07 Subsistence economy	.68	.71 (.03)	.68 (.00)	.65 (.03)	.69 (.01)	.70 (.02)	.68 (.00)	.01
28 4 Settlement pattern 08 Descent	.26	.31 (.05)	.19 (.07) 1	.18 (.08) 1	.18 (.08)	.43 (.17) 1	.42 (.16) 1	.14
29 4 Settlement pattern 09 Class stratification	.32	.29 (.03)	.29 (.03)	.31 (.01)	.27 (.05)	.44 (.12)	.46 (.14)	.10
30 4 Settlement pattern 10 Succession headman	.06	.10 (.04)	.11 (.05)	.12 (.06)	.04 (.02)	.33 (.27) 1	.37 (.31) 1	.20
31 5 Juris. hierarchy local 06 Juris. hierarchy b. local	.18	.18 (.00)	.22 (.04)	.27 (.09) 1	.33 (.15) 1	.26 (.08)	.23 (.05)	.09

TABLE 5. (*Continued*)

Variables intercorrelated	*Samples*							*Average difference of the three smaller samples from the base sample*
	412 base	*862 societies*	*565 societies*	*400 societies*	*112 societies*	*60 societies*	*48 societies*	
32 5 Juris. hierarchy local 07 Subsistence economy	.27	.27 (.00)	.27 (.00)	.32 (.05)	.26 (.01)	.31 (.04)	.25 (.02)	.02
33 5 Juris. hierarchy local 08 Descent	.30	.29 (.01)	.29 (.01)	.28 (.02)	.47 (.17) 1	.13 (.17) 1	.26 (.04)	.13
34 5 Juris. hierarchy local 09 Class stratification	.27	.24 (.03)	.22 (.05)	.29 (.02)	.28 (.01)	.44 (.17) 1	.38 (.11)	.13
35 5 Juris. hierarchy local 10 Succession headman	.19	.17 (.02)	.17 (.02)	.17 (.02)	.34 (.15) 1	.09 (.10)	.16 (.03)	.09
36 6 Juris. hierarchy b. local 07 Subsistence economy	.38	.41 (.03)	.39 (.01)	.35 (.03)	.34 (.04)	.59 (.21) 1	.35 (.03)	.09
37 6 Juris. hierarchy b. local 08 Descent	.23	.27 (.04)	.25 (.02)	.25 (.02)	.39 (.16) 1	.33 (.10)	.40 (.17) 1	.14
38 6 Juris. hierarchy b. local 09 Class stratification	.59	.57 (.02)	.60 (.01)	.61 (.02)	.67 (.08)	.56 (.03)	.66 (.07)	.06
39 6 Juris. hierarchy b. local 10 Succession headman	.23	.18 (.05)	.20 (.03)	.22 (.01)	.22 (.01)	.37 (.14) 1	.59 (.36) 2	.17
40 7 Subsistence economy 08 Descent	.29	.39 (.10) 1	.33 (.04)	.29 (.00)	.39 (.10)	.39 (.10)	.29 (.00)	.07
41 7 Subsistence economy 09 Class stratification	.38	.30 (.08) 1	.33 (.05)	.38 (.00)	.46 (.08)	.35 (.03)	.35 (.03)	.05
42 7 Subsistence economy 10 Succession headman	.11	.12 (.01)	.10 (.01)	.13 (.02)	.13 (.02)	.31 (.20) 1	.31 (.20) 1	.14
43 8 Descent 09 Class stratification	.10	.09 (.01)	.13 (.03)	.15 (.05)	.27 (.17) 1	.19 (.09)	.35 (.25) 1	.17
44 8 Descent 10 Succession headman	.62	.66 (.04)	.61 (.01)	.62 (.00)	.60 (.02)	.66 (.04)	.74 (.12)	.06
45 9 Class stratification 10 Succession headman	.18	.18 (.00)	.19 (.01)	.20 (.02)	.26 (.08)	.23 (.05)	.51 (.33) 2	.15
Average	.27	.27	.27	.28	.34	.35	.40	
Average difference		.03	.03	.03	.08	.10	.15	

TABLE 6. MAGNITUDE OF ASSOCIATION REQUIRED FOR DIFFERENT LEVELS OF SIGNIFICANCE

	Samples						
	412	*862*	*565*	*400*	*112*	*60*	*48*
$p < .05$	.10	.06	.08	.10	.20	.26	.30
$p < .003$	.15	.09	.12	.15	.30	.39	.45

that are significant in all the samples and cluster at the 0.003 level of significance end of Table 7. Although the variables that are found to be associated in all the samples are the same ones that are most significant in all the samples, one cannot argue in the other way from an analysis of a small sample; that is, one cannot argue that a significant association of variables discovered in the analysis of a small nonrandom sample would also be found in an analysis of some other sample. The so-called "significant relationship" might have arisen because of some bias in the selection of the sample.

STANDARD ERROR OF Z VALUES DIFFERENCES

In order to investigate in a stricter manner the difference between the coefficients for the intercorrelation of the same two variables in the base sample and in each of the other six samples, the differences between the Z values in the base sample and in each sample were evaluated in terms of the standard error of their difference. Table 8 gives the standard error for the difference between the Z values for each sample and the base sample. As is indicated, the standard error of Z-value differences is much larger for the smaller samples than for the larger samples. Table 5 lists the Z values for each of the 45 intercorrelations in each of the seven samples. The amount of difference between the Z value in each sample and the same Z value in the base sample is given in brackets. The number to the right of the bracketed difference refers to the number of standard errors each correlation differs from the base sample. One standard error of their difference has a $p < .32$; two standard errors of their difference, $p < .05$;

TABLE 7. LEVELS OF SIGNIFICANCE ATTAINED BY THE 45 INTERCORRELATIONS IN THE SIX WORLDWIDE SAMPLES

Intercorrelations	*Samples*						
	862	*565*	*400*	*412*	*112*	*48*	*60*
1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1
27	1	1	1	1	1	1	1
38	1	1	1	1	1	1	1
44	1	1	1	1	1	1	1
24	1	1	1	1	1	1	5
36	1	1	1	1	1	5	1
2	1	1	1	1	1	5	1
10	1	1	1	1	1	5	1
26	1	1	1	1	5	1	1
29	1	1	1	1	5	1	1
40	1	1	1	1	1	0	1
41	1	1	1	1	1	5	5
37	1	1	1	1	1	5	5
39	1	1	1	1	5	1	5
11	1	1	1	1	5	1	5
34	1	1	1	1	5	5	1
5	1	1	1	1	1	5	0
19	1	1	1	1	1	0	5
31	1	1	1	1	1	0	5
45	1	1	1	1	5	1	0
28	1	1	1	1	0	5	1
33	1	1	1	1	1	0	0
35	1	1	1	1	1	0	0
7	1	1	1	1	5	5	5
25	1	1	1	1	5	5	5
15	1	1	1	1	5	5	0
20	1	1	1	1	5	5	0
23	1	1	1	1	5	5	0
32	1	1	1	1	5	0	5
21	1	1	1	1	5	0	0
13	1	1	1	5	1	0	0
9	1	1	1	1	0	0	0
8	1	1	1	5	5	5	0
17	1	1	1	5	5	5	0
43	1	1	1	5	5	5	0
3	1	1	5	5	5	1	5
16	1	1	5	5	1	0	0
42	1	5	5	5	0	5	5
30	1	5	5	0	0	5	5
6	1	5	0	5	0	5	5
14	1	5	0	5	5	0	5
18	1	0	5	5	0	5	5

three standard errors, $p < .003$. That is, viewing each correlation separately, one would expect an observed difference of more than one standard error of their difference to occur in about one chance in three, if no interfering factor were at work; more than two standard errors of their difference —less than one chance in twenty; more than three standard errors of their difference—less than three chances in a thousand. In the present analysis a difference of more than one standard error of their difference is viewed as a slight indication that there is an interfering factor. A difference of more than two or three standard errors of their difference is viewed as highly significant; that is, there is an interfering factor. Further, it is held that when a number of different intercorrelations vary more than one standard error of their difference from the base sample, some interfering factor is at work.

A comparison of the correlational results of the samples of 565 societies and 400 societies with the base sample indicates that they are giving nearly the same results (see Table 5). Only four of the Z values in the sample of 565 societies differ more than one standard error from the base sample. At most, an analysis of the association between the variables with the sample of 565 societies will lead to a slight over- or underestimation of the degree of association between the variables. Likewise, only three intercorrelations with the sample of 400 societies were found to fluctuate more than one standard error of their difference from those of the base sample. Again, the cross-cultural researcher would at most merely over- or underestimate a few intercorrelations. Neither of these two larger worldwide samples would lead the researcher astray in terms of postulating relationships that do not in fact exist. However, this is from the worldwide point of view. As will be pointed out in the later discussion of the significance of areal differences, all worldwide samples without regional breakdowns can lead the researcher to spurious interpretation of correlation.

TABLE 8. STANDARD ERRORS OF THEIR DIFFERENCE AND THEIR LEVELS OF SIGNIFICANCE

Samples	*Standard errors*		
	1 $p<.32$	*2* $p<.05$	*3* $p<.003$
412–48	.16	.32	.48
412–60	.14	.28	.42
412–112	.11	.22	.33
412–400	.07	.14	.21
412–565	.07	.14	.21
412–862	.06	.12	.18

With the sample of 862 societies, only five intercorrelations vary more than one standard error of their difference from those of the base sample. Surprisingly, even the sample that possesses many plural representatives of the same case (see Table 1) would not lead the researcher to postulate relationships that do not in fact exist from the worldwide point of view. Before these results were viewed, we thought that one would be able to assess the relative influence of historical-ecological and functional aspects by comparing the results of an intercorrelation of the same variables in a sample that contains societies that are *not* historically independent (sample of 862 societies) with the results from a sample of societies that are more historically independent (sample of 412 societies). However, this rather crude hierarchical classification of cultures in the present analysis did not allow for a greater statistical validity in the determination of different degrees of invariant relationship and contingency. The problem is that the base sample of 412 societies is controlling only for the most recent historical contact. As Driver (1965:328) has emphasized, "Historical dependence or independence is obviously a matter of degree, not of kind" (Cf. Naroll 1961). The influence of regional historical-ecological circumstances is at work in both the sample of 862 societies and the sample of 412 societies. And, with samples this large on anthropological data, the differences between the regions tend to cancel each other out when summed

up in contingency tables for the overall, worldwide correlation.

The three smaller samples, on the other hand, are giving results that are significantly different from those of the base sample. The smallest sample of 48 societies is giving the most discrepant results. Twenty-one of the 45 intercorrelations differ more than one standard error from those of the base sample. Of even more significance, three of these differ more than two standard errors and one more than three standard errors from the base sample. Thus, this sample is obviously subject to a fatal amount of sampling error. With the sample of 112 societies, we find that fifteen of the intercorrelations differ more than one standard error, and, of these, three differ more than two standard errors from the base sample. With the sample of sixty societies, we discover that thirteen of the intercorrelations differ more than one standard error, and one of these differs more than two standard errors from the base sample. Also, it should be emphasized that many of the intercorrelations that are classified as differing more than one standard error actually fall just short of being two standard errors different. This analysis in terms of standard error of their difference establishes that all three of these small samples are referring to a universe of societies different from the base sample. Also, it is to be stressed that each of these small samples is differing from the base sample in different ways as a result of different biases in their selection; that is, different intercorrelated variables in each of the three samples are significantly different from those of the base sample.

The reader should keep in mind that a rather large difference in association is needed for these small samples to be more than one standard error different. Thus, intercorrelation number 43 in Table 5 for the sample of 48 societies differs only one standard error from the base sample and yet yields a value of 0.35 in comparison to only 0.10 in the base sample. As a result, the cross-cultural researcher using this sample would go more astray in interpreting his results than even a comparison of difference in terms of standard errors would indicate.

Although the magnitude of association between two variables fluctuates among the three small samples for the majority of the intercorrelations, it is to be emphasized that this is not true for all of the intercorrelations. For example, intercorrelations 1, 4, 9, 12, 20, 22, 24, 27, 29, 32, 38, and 44 (Table 5) all hold up in each of the samples. Thus, the nature of the variable is also important; that is, some combinations of two variables examined at the same time are less sensitive to a biased sample than are other combinations.

In any interpretation of these results, it should be kept in mind that Pearson's C (and the Z values) when used with a three-by-three table as is encountered in the present analysis is not necessarily measuring a linear relationship but rather is measuring any systematic departure from independence or total nonpredictability. Although a difference between coefficients reflects a true difference between the samples, a similarity in coefficients does not necessarily mean that the two samples are giving the same results; that is, two samples may express the same degree of association between two variables, but the association in each sample may be due to different systematic departures from independence. Thus, if anything, the coefficient of association used in this analysis with a three-by-three table is underestimating the difference between the samples. This was substantiated by an analysis of the actual cell frequencies for the same intercorrelations in the different samples. Although different systematic departures from independence were not a problem in the larger samples when compared with the base sample, these did come into play occasionally among the three smaller samples. Among the three smaller samples the cell frequencies in the three rows and columns were sometimes found to be skewed in different ways from those found in the base sample even when the coefficients were similar in magnitude.

As a result of different biases in the selection of the societies in the three small samples, different kinds of association were sometimes found to be favored. However, no systematic departures were found to exist for all three small samples; that is, each small sample did not necessarily differ from the base sample in the same way. (This problem will be discussed further under areal differences.)

It is also of interest that the frequency distribution of coefficients in the three smaller samples tends to be higher than those in the four larger samples (Table 9). The contingency tables for small nonrandom samples are especially sensitive to small cell fluctuations.[3] Such cell fluctuations can easily result if there is any bias in the selection of the sample. With anthropological data, a bias in the selection of the sample of societies can often cause certain combinations of variables to be overemphasized because the sample overrepresents some geographical regions. Thus, we find that the sample of 48 societies, which is least geographically representative (Table 2) and which contains the most plural representatives of the same case, i.e., ⅓ of the societies (Table 1), is also the sample that gives the most discrepant results from the base sample (see Table 5). Further, we see that Whiting's linguistic sample of 112 societies yields somewhat more discrepant results than the smaller sample of sixty societies, which has a better geographical representation. Thus, controlling for linguistic distance does not necessarily control for cultural distance. As will be later demonstrated in a discussion of areal differences, historical and ecological factors in the six major geographical regions can affect all associations of sociocultural phenomena, both "functional" and "nonfunctional." Since there are rather large differences in linguistic complexity in the world (see Table 2), the use of a linguistically based sample leads to other problems connected with differing historical and ecological circumstances in the different geographical regions. Historical and ecological circumstances are apparently stronger than any linguistic barriers that may exist. This is not to deny the influence of linguistic barriers but rather to underscore that the problem is much more subtle than is often presented.

TABLE 9. FREQUENCY DISTRIBUTION OF *Z*'S FOR EACH OF THE SEVEN SAMPLES

	Samples						
	412	*862*	*565*	*400*	*112*	*60*	*48*
.81–.90	1	1	1	1	1	1	1
.71–.80	0	1	0	0	1	1	1
.61–.70	3	2	3	4	2	4	3
.51–.60	3	3	3	2	3	4	6
.41–.50	1	2	1	1	4	4	6
.31–.40	4	3	3	4	9	11	17
.21–.30	11	11	10	13	19	12	6
.11–.20	20	17	20	17	5	7	5
.00–.10	2	5	4	3	1	1	0

In summary, all three of the small samples are subject to a fatal amount of sampling error. This view is based on the assumption that the base sample is representative. Further, it is suggested that all the accidental samples (especially those of less than 100 societies) that have been used by anthropologists, sociologists, social psychologists and other behavioral scientists are subject to sampling error. All of these studies based on a handful of societies are no doubt yielding some inaccurate results. And the real thorn is that we have no way of determining which results are valid and which are invalid short of a complete reanalysis with a more representative sample.

A few cross-cultural researchers have, however, felt somewhat uneasy when generalizing from small nonrandom samples and have made attempts to evaluate the present state of knowledge in some areas that is based on these accidental samples. Thus, when evaluating the determinants of mental illness Barry (MS) stated that:

> Even with all their shortcomings, the cross-cultural data seem to give meaningful information about relationships of child training to cultural health and pathology. None of the studies by itself is highly convincing,

but in the aggregate they point to a consistent pattern.

The problem of whether the "consistent pattern" is not also influenced to a large extent by many of the researchers using similar theoretical assumptions and more or less the same societies in their researches remains. All the studies on child rearing are based on the relatively few societies for which we have information. For example, a number of studies have been based on Bacon and Barry's sample of 110 societies rated on socialization (Bacon, Child, and Barry 1963; Barry, Child, and Bacon 1959; Barry, Bacon, and Child 1957; Brown n.d.; Child, Storm, and Veroff 1958). At the present time, one has no idea to what universe, if any, one can generalize from these studies. The present analysis, for example, has demonstrated that the sample of 48 societies used by Bacon, Child, and Barry (1963), which was drawn from the larger sample of 110 societies, is subject to a fatal amount of sampling error. Although not all the results based on an analysis of a small biased sample are necessarily invalid, the problem is that, a priori, one has no way of distinguishing between the results that would be substantiated and those that would not be substantiated by an analysis of the same associations in a more representative sample of societies.

SIGNIFICANCE OF AREAL DIFFERENCES

In order to examine the nature of the association in the 45 intercorrelations and the influence of historical-diffusional circumstances on these associations, areal differences were examined in the base sample of 412 societies. The significance of areal differences on worldwide correlations has been pointed out by a number of individuals (Chaney 1966a:1468–1469, 1966b:1475; Driver 1961b:326; Driver and Schuessler 1967:336–346; Jorgensen 1966:161–169; Murdock 1940:369; Romney in Hymes 1965:393; Sawyer and LeVine 1966:719–727; Wilson 1952:134–138). In general, the view is that truly functional relationships should hold up across geographical regions, whereas associations that are not functional are more influenced by historical, ecological, and diffusional circumstances in the various continental regions.

A three-dimensional representation of Pearson's C coefficients for six regional subsamples is given in Table 10. The six values in each ascending diagonal refer (respectively) to Africa, Circum-Mediterranean, East Eurasia, Insular Pacific, North America, and South America. As is readily observable, some associations tend to hold up in all the regions, whereas other associations fluctuate from sample to sample. However, this association across geographical regions is not an all-or-nothing affair; rather one discovers different degrees of invariant relationship and contingency among the variables.

Cluster 1: The associations between the two types of family organization (variables 1 and 2) and jurisdictional hierarchy at the local level (variable 5) are consistently high in all the regions. *Cluster 2:* The associations between marital residence (variable 3) and descent (variable 8) and between descent (variable 8) and succession of local headman (variable 10) are consistently high in all the regions. However, the relationship between marital residence (variable 3) and succession of local headman (variable 10) does not hold up in either the Circum-Mediterranean or South American regions. An examination of the contingency tables reveals that the lack of association in the Circum-Mediterranean area is brought about largely by the absence of matrilocal residence in this region. In South America, on the other hand, there is in fact little departure from independence or nonpredictability between the variables. In the other four regions the basic relationship between the two variables is the same as that found in the analysis of the worldwide relationship in all 412 culture-cluster societies. Thus, here we encounter an association that is seemingly functional in its worldwide perspective but is

TABLE 10. A THREE DIMENSIONAL REPRESENTATION OF PEARSON'S *C* COEFFICIENTS FOR SIX REGIONAL SUBSAMPLES*

	1	*2*	*5*	*3*	*8*	*10*	*7*	*4*	*6*	*9*
	.70									
1	.70									
	.70									
	.69									
	.69 .55	.55								
2	.70 .61	.59								
	.38	.42								
	.48	.50								
	.46 .45	.46 .30	.40							
5	.54 .20	.53 .14	.31							
	.17	.12	.14							
	.16	.16	.21							
	.27 .23	.27 .14	.44 .17	.46						
3	.32 .23	.28 .15	.31 .35	.51						
	.28	.12	.29	.54						
	.24	.27	.31	.60						
	.33 .32	.42 .17	.46 .21	.51 .18	.61					
8	.35 .25	.16 .23	.36 .35	.69 .57	.49					
	.30	.23	.20	.40	.51					
	.30	.33	.41	.45	.57					
	.19 .12	.36 .32	.42 .22	.13 .26	.60 .37	.46				
10	.26 .25	.18 .22	.32 .44	.60 .07	.60 .20	.06				
	.26	.18	.33	.08	.15	.22				
	.57	.36	.32	.21	.17	.15				
	.26 .19	.23 .24	.32 .20	.23 .41	.16 .32	.22 .24	.53			
7	.41 .15	.11 .23	.27 .39	.18 .31	.25 .10	.20 .18	.52			
	.28	.29	.45	.12	.28	.22	.54			
	.35	.35	.38	.22	.22	.19	.69			
	.33 .32	.36 .16	.25 .14	.24 .16	.29 .31	.24 .60	.54 .20	.27		
4	.32 .17	.12 .19	.36 .32	.25 .30	.38 .14	.25 .40	.57 .30	.33		
	.39	.37	.15	.14	.11	.39	.26	.39		
	.43	.38	.31	.30	.25	.43	.49	.40		
	.26 .30	.31 .28	.24 .36	.24 .23	.38 .31	.34 .39	.39 .35	.53 .18	.58	
6	.29 .31	.13 .23	.18 .42	.16 .30	.24 .29	.14 .36	.25 .04	.29 .29	.40	
	.24	.27	.21	.19	.15	.40	.42	.39	.52	
	.27	.26	.38	.29	.26	.16	.53	.49	.56	
	.31	.22	.26	.22	.37	.33	.50	.41	.44	
9	.23	.17	.24	.19	.25	.19	.26	.25	.60	

* Samples represented in each ascending diagonal:
South America
North America
Insular Pacific
East Eurasia
Circum-Mediterranean
Africa

disturbed by historical-diffusional circumstances in two of the six major geographical regions of the world. *Cluster 3:* The associations between settlement pattern (variable 4) and subsistence economy (variable 7) and between jurisdictional hierarchy beyond the local level (variable 6) and class stratification (variable 9) are consistently high in all regions; however, the other four combinations of the six possible relationships between these four variables, that is, the interlinking relationships, fluctuate somewhat

TABLE 11. *Z* VALUES FOR THE 45 INTERCORRELATIONS IN THE SIX REGIONAL SAMPLES

	Entire 412	*Africa*	*Circum-Mediter-ranean*	*East Eurasia*	*Insular Pacific*	*North America*	*South America*	*Average difference of regional correlations from the worldwide correlations*
01	.87	.88 (.01)	.85 (.02)	.86 (.01)	.88 (.01)	.88 (.01)	.88 (.01)	.01
02	.19	.34 (.15)	.29 (.10)	.16 (.03)	.17 (.02)	.21 (.02)	.49 (.30)	.10
03	.11	.33 (.22)	.35 (.24)	.37 (.26)	.30 (.19)	.16 (.05)	.19 (.08)	.17
04	.54	.62 (.08)	.50 (.04)	.53 (.01)	.41 (.13)	.72 (.18)	.63 (.09)	.09
05	.18	.30 (.12)	.27 (.09)	.46 (.28)	.41 (.23)	.18 (.00)	.34 (.16)	.15
06	.13	.44 (.31)	.27 (.14)	.65 (.52)	.27 (.14)	.26 (.13)	.13 (.00)	.21
07	.23	.37 (.14)	.35 (.12)	.25 (.02)	.29 (.06)	.24 (.01)	.24 (.01)	.06
08	.12	.24 (.12)	.33 (.21)	.28 (.16)	.25 (.13)	.32 (.20)	.31 (.19)	.17
09	.16	.27 (.11)	.20 (.04)	.31 (.15)	.32 (.16)	.26 (.10)	.34 (.18)	.12
10	.16	.30 (.14)	.28 (.12)	.17 (.01)	.13 (.03)	.15 (.01)	.31 (.15)	.08
11	.16	.13 (.03)	.38 (.22)	.37 (.21)	.30 (.14)	.29 (.13)	.25 (.09)	.13
12	.52	.60 (.08)	.51 (.01)	.55 (.03)	.45 (.07)	.69 (.17)	.62 (.10)	.08
13	.14	.14 (.00)	.33 (.19)	.41 (.27)	.39 (.25)	.20 (.06)	.17 (.03)	.13
14	.14	.12 (.02)	.24 (.10)	.38 (.24)	.19 (.05)	.22 (.08)	.33 (.19)	.11
15	.16	.16 (.00)	.45 (.29)	.28 (.12)	.12 (.04)	.16 (.00)	.14 (.02)	.08
16	.11	.18 (.07)	.23 (.12)	.28 (.17)	.28 (.17)	.24 (.13)	.29 (.18)	.14
17	.13	.18 (.05)	.38 (.25)	.35 (.22)	.24 (.11)	.24 (.11)	.17 (.04)	.13
18	.14	.26 (.12)	.25 (.11)	.23 (.09)	.12 (.02)	.32 (.18)	.44 (.30)	.14
19	.29	.32 (.03)	.48 (.19)	.21 (.08)	.14 (.15)	.33 (.04)	.42 (.13)	.10
20	.22	.17 (.05)	.25 (.03)	.31 (.09)	.15 (.07)	.32 (.10)	.17 (.05)	.06
21	.16	.19 (.03)	.23 (.07)	.22 (.06)	.08 (.08)	.07 (.09)	.28 (.12)	.08
22	.64	.86 (.22)	.57 (.07)	.70 (.06)	.62 (.02)	.57 (.07)	.51 (.13)	.10
23	.17	.19 (.02)	.23 (.06)	.31 (.14)	.20 (.03)	.31 (.14)	.24 (.07)	.08
24	.42	.70 (.28)	.14 (.28)	.49 (.07)	.43 (.01)	.65 (.25)	.19 (.23)	.18
25	.23	.39 (.16)	.26 (.03)	.40 (.17)	.49 (.26)	.42 (.19)	.21 (.02)	.14
26	.32	.31 (.01)	.60 (.28)	.43 (.11)	.42 (.10)	.35 (.03)	.28 (.04)	.10
27	.68	.66 (.07)	.61 (.07)	.86 (.18)	.62 (.06)	.58 (.10)	.59 (.09)	.10
28	.26	.40 (.14)	.31 (.05)	.23 (.03)	.29 (.03)	.10 (.16)	.34 (.08)	.08
29	.32	.26 (.06)	.44 (.12)	.54 (.22)	.42 (.10)	.30 (.02)	.19 (.13)	.11
30	.06	.26 (.20)	.25 (.19)	.20 (.14)	.23 (.17)	.19 (.13)	.25 (.19)	.17
31	.18	.19 (.01)	.25 (.07)	.33 (.15)	.16 (.02)	.34 (.16)	.15 (.03)	.07
32	.27	.29 (.02)	.34 (.07)	.34 (.07)	.35 (.08)	.47 (.20)	.22 (.05)	.08
33	.30	.38 (.08)	.50 (.20)	.33 (.03)	.31 (.01)	.38 (.08)	.17 (.13)	.09
34	.27	.25 (.02)	.28 (.01)	.40 (.13)	.22 (.05)	.46 (.19)	.39 (.12)	.09
35	.19	.34 (.15)	.46 (.27)	.44 (.25)	.20 (.01)	.38 (.19)	.22 (.03)	.15
36	.38	.26 (.12)	.42 (.04)	.54 (.16)	.27 (.11)	.31 (.07)	.21 (.17)	.11
37	.23	.25 (.02)	.40 (.17)	.26 (.03)	.12 (.11)	.15 (.08)	.32 (.09)	.08
38	.59	.70 (.11)	.47 (.12)	.63 (.04)	.58 (.01)	.43 (.16)	.67 (.08)	.09
39	.23	.15 (.08)	.36 (.13)	.47 (.24)	.41 (.18)	.42 (.19)	.70 (.47)	.22
40	.29	.26 (.03)	.16 (.13)	.17 (.12)	.15 (.14)	.21 (.08)	.39 (.10)	.12
41	.38	.27 (.11)	.56 (.18)	.59 (.21)	.46 (.08)	.04 (.34)	.37 (.01)	.16
42	.11	.20 (.09)	.23 (.12)	.15 (.04)	.23 (.12)	.07 (.04)	.50 (.39)	.13
43	.10	.26 (.16)	.40 (.30)	.27 (.17)	.15 (.05)	.30 (.20)	.32 (.22)	.18
44	.62	.70 (.08)	.70 (.08)	.66 (.04)	.56 (.06)	.55 (.07)	.72 (.10)	.07
45	.18	.20 (.02)	.35 (.17)	.17 (.01)	.43 (.25)	.39 (.21)	.42 (.24)	.15
Avg.	.27	.34	.37	.39	.31	.33	.35	
Average Difference		.09	.13	.13	.10	.11	.13	.12

across the six areas. The largest fluctuation occurs for the association between subsistence economy (variable 7) and class stratification (variable 9), which varies from 0.53 in East Eurasia to a low of 0.04 in North America. Although a rather large range of difference exists for this association, four of the six areas express a relationship of magnitude equal to the one found in the worldwide relationship. Thus, ecological and historical circumstances have apparently tended to allow a greater geographical spread of the functional relationship in East Eurasia, whereas in North America different ecological and historical circumstances have tended to disturb this association and to favor the spread of other associations. An examination of the contingency tables reveals that a majority of societies in the North American sample lack class stratification and have a hunting, gathering, or fishing economy. And the relative ratios of societies possessing the three levels of class stratification are more or less equal between the societies possessing agriculture and those lacking agriculture. In North America many of the societies with a fishing or hunting economy have some form of stratification, and the majority of the societies with some form of agriculture lack stratification as coded and scaled in the present analysis. These two associations are in conflict with the worldwide association. Among the East Eurasian societies the majority of societies possess some form of agriculture and some form of stratification, and most of the few societies that have either a hunting, gathering, or fishing economy are also classless.

STANDARD ERROR OF AREAL DIFFERENCES

In order to compare the regional samples in a more concise manner, the coefficients of contingency were transformed to Z values, and the difference between the Z values in each regional sample and the worldwide sample of 412 culture cluster societies were then compared with the standard error of their differences. Table 11 presents the Z value for each of the 45 intercorrelations in each of the six regional samples. The number in brackets to the right of each Z value is the difference between that Z value and the Z value for the same intercorrelation in the worldwide sample. Table 12 gives the standard error of their difference. Table 13 compares the Z value differences (Table 11) with the standard error of their difference. A zero (0) means that the Z value of a regional sample differs less than one standard error from the Z value of the worldwide association. A Z-value difference of less than one standard error of their difference is assumed not to be significant. The numbers 1, 2, and 3 refer to the number of standard errors of their difference that a Z value in a regional sample differs from the Z value for the same association in the worldwide sample.

TABLE 12. STANDARD ERRORS OF THEIR DIFFERENCE FOR REGIONAL SAMPLES

Samples	*Standard errors*		
	1 $p<.32$	*2* $p<.05$	*3* $p<.003$
Insular Pacific	.13	.26	.39
South America	.14	.28	.42
Circum-Mediterranean	.15	.30	.45
Africa	.12	.24	.36
North America	.13	.26	.39
East Eurasia	.14	.28	.42

Since each of the six regional samples is part of the worldwide sample, each regional sample intercorrelated separately should yield the same results as the worldwide sample if some other factor does not interfere. The present hypothesis is that there is an interfering factor; that is, different historical and ecological circumstances in the various regions influence the type of relationship encountered. The proposed null-hypothesis is that there is no difference in the correla-

TABLE 13. LEVELS OF SIGNIFICANCE FOR AREAL DIFFERENCES SCALED

	Correlation World-Wide	*Regional samples*					
		Insular Pacific	*South America*	*Circum-Mediter-ranean*	*Africa*	*North America*	*East Eurasia*
1	.87	0	0	0	0	0	0
20	.22	0	0	0	0	0	0
21	.16	0	0	0	0	0	0
44	.62	0	0	0	0	0	0
27	.68	0	0	0	0	0	1
29	.32	0	0	0	0	0	1
12	.52	0	0	0	0	1	0
32	.27	0	0	0	0	1	0
34	.27	0	0	0	0	1	0
38	.59	0	0	0	0	1	0
7	.23	0	0	0	1	0	0
22	.64	0	0	0	1	0	0
15	.16	0	0	1	0	0	0
26	.32	0	0	1	0	0	0
33	.30	0	0	1	0	0	0
37	.23	0	0	1	0	0	0
42	.11	0	2	0	0	0	0
40	.29	1	0	0	0	0	0
23	.17	0	0	0	0	1	1
31	.18	0	0	0	0	1	1
28	.26	0	0	0	1	1	0
17	.13	0	0	1	0	0	1
14	.14	0	1	0	0	0	1
10	.16	0	1	0	1	0	0
2	.19	0	2	0	1	0	0
4	.54	1	0	0	0	1	0
19	.29	1	0	1	0	0	0
41	.38	0	0	1	0	2	1
36	.38	0	1	0	1	0	1
18	.14	0	2	0	1	1	0
13	.14	1	0	1	0	0	1
9	.16	1	1	0	0	0	1
35	.19	0	0	1	1	1	1
24	.42	0	1	1	2	1	0
6	.13	1	0	0	2	1	3
25	.23	2	0	0	1	1	1
11	.16	1	0	1	0	1	1
3	.11	1	0	1	1	0	1
16	.11	1	1	0	0	1	1
39	.23	1	3	0	0	1	1
5	.18	1	1	0	1	0	2
45	.18	1	1	1	0	1	0
43	.10	0	1	2	1	1	1
8	.12	1	1	1	1	1	1
30	.06	1	1	1	1	1	1

tional results between the worldwide sample and each of the regional samples. Thus, there is no interfering factor in each region. Since in the present analysis the influence of the interfering factor (historical-ecological circumstances) is proposed to be one of degree, the null-hypothesis is examined in terms of different levels of significance.

At the top of Table 13 we find four intercorrelations that do not fluctuate even one standard error of their difference. Thus, these associations are not being influenced by different types of historical-ecological circumstances in the various regions. Immediately below these are fourteen intercorrelations that fluctuate more than one standard error of their difference in one of the regions. The probability for this is less than 0.32; that is, this much fluctuation would be expected to occur in each separate case about one time in three. We infer that specific historical-ecological circumstances in the regions are not influencing these associations to any large degree. Below these are nine associations that are fluctuating more than one standard error of their difference in two geographical regions. Since the probability of the combination of independent events is equal to the product of their separate probabilities, the probability here is less than 0.10; that is, this much fluctuation for two intercorrelations of the same two variables would be expected in only about one time in ten if there were no interfering factor. We infer from this that historical-ecological circumstances in the regions are affecting the relationships. Next in the list we encounter eighteen associations that fluctuate more than one standard error of their difference in at least three of the regions. Here, $p < .03$. Thus, we infer that all these associations are being highly influenced by different historical-ecological circumstances in each of the six geographical regions. In summary, the majority of the associations are able to be influenced to some degree by different historical-ecological circumstances. However, it is to be emphasized that different areas affect different combinations of variables.[4]

Although there is a tendency for the more highly associated variables of the worldwide sample (Z value $>.40$) to hold up across regions, this is not always the case. For example, intercorrelation number 24 between marital residence and succession of local headman has a worldwide, base sample correlation of 0.42 and holds up in all six of the previously examined worldwide samples (see Table 5). From this one might assume that the relationship is constant in all six major geographical regions of the world. However, Table 11 shows that the association between marital residence and succession of the local headman is constant in the East Eurasian and Insular Pacific areas, even more closely associated in Africa and North America, and little associated in the Circum-Mediterranean and South American areas. Thus, even the more closely associated variables from a worldwide point of view can be influenced by regional circumstances. It follows that association among anthropological data is a matter of different degrees of invariant relationship and contingency.

The association between marital residence and succession of local headman also indicates that the sample of 412 culture clusters (as Murdock is fully aware) is controlling only for the most recent contact between cultures. The pervasive influence of different historical-ecological circumstances in the six major geographical regions affects nearly all associations of variables, both the so-called functional and the nonfunctional.

Of special interest is that not just the highly associated variables hold up across regions (see Tables 11 and 13). For example, among the four associations that do not fluctuate even one standard error of their difference, two barely deviate from nonpredictability. Thus, historical-ecological differences in the major geographical regions need not affect all the weakly associated variables.

As Table 11 shows, the average Z value for each of the six geographical samples is higher than the average Z value in the worldwide sample. As was stressed before,

the coefficient of contingency, upon which the Z value is based, is sensitive to any systematic departure from total nonpredictability or independence. An examination of the three-by-three tables, upon which the coefficients are based, reveals that in nearly all the cases where there is a large range of difference in the coefficients for the six regions, at least one of the areas yields a somewhat different type of relationship (not just a lack of association) than that found in the worldwide sample. In other words, regional circumstances often favor different associations of two variables. It cannot be overemphasized that the "exceptions" for the majority of the intercorrelations are *not* randomly distributed among the six geographical regions of the world. Rather, there are clusterings of exceptions for the different intercorrelations in the different geographical regions (for a somewhat different view of "exceptions" see Köbben 1967).

In summary, the present analysis indicates that neither a single continent-wide study (without a careful analysis à la Driver [1966] of continuously distributed traits) nor a single worldwide study is able to give an understanding of the degree of invariant relationship and contingency between sociocultural phenomena. Valid comments on the nature of the association can be derived only (if at all) by an analysis of a representative worldwide sample with regional breakdowns. It is in a comparison of how variables go together in relatively separated areas that the effect of historical-ecological circumstances on associations of different degrees of invariant relationship and contingency is understood. The associations between all variables can be influenced by regional, historical-ecological circumstances. Even the closely associated variables that hold up in all the regions fluctuate somewhat from region to region. Among the less associated variables there is often a much larger regional fluctuation because multiple combinations are possible. Naroll (1961) has also stressed that the occurrences of the majority of sociocultural phenomena are determined by both history and function (c.f. Lowie [1916] 1960; Driver 1956, 1966). But whereas Naroll conceived of his method as one of "distinguishing between associations which reflect a 'functional' relationship and associations which reflect mere historical accident," the stress here is that the associations of sociocultural phenomena express different degrees of invariant relationship and contingency.[5]

As a final comment to this section of the paper, I wish to emphasize that there "are inherent limitations on cross-sectional investigations which take observations on many units each at only one point in time" (Coleman 1964:102). As Driver and Schuessler have said, "It cannot be overemphasized that diachronic correlations should be determined from all available evidence, including archaeological, and not from the limited evidence of this or any other synchronic correlational study" (1967:351). Speculation on the necessary and sufficient conditions of sociocultural development based on observations of various aspects of culture, each at only one point in time, will never replace the more careful analyses of evolutionary change, such as those by Steward (1963) in which he utilized archaeological data in his development of ethnological theory. Or, as Chang has put it,

> Ethnologists can construct quasi-static systems without regard to difference in time; they can also conjecture about what might have happened in the past, on the basis of their understanding of the mechanisms and patterns of cultural and social change. But they can never empirically verify a historical hypothesis without archeological recourse [1967:233].

To a large extent, cross-cultural researchers are constructing theories of anthropological statics; that is, given specific characteristics of the state of a system at a given time, they are able to predict other characteristics of that system at the same time. However, cross-cultural studies can and do hold in check some of the circular, functional interpretations of one-culture-at-a-time analy-

ses and some of the impressionistic generalizations on universal associations of sociocultural phenomena.

DISCUSSION

Terms and ideas, such as, "historical-diffusional," "functional and/or causal," "realms of order" and "different degrees of invariant relationship and contingency " are concepts by postulation as used in the present analysis. These concepts are linked to statistical correlation (which always relates items in the same world of discourse) by epistemic correlations that relate a postulated factor to an inspectable datum (cf. Northrop 1959:119–121). In the present analysis, the statistical correlations and their consistency and inconsistency in the various worldwide samples and regional samples are the inspectable data. If these postulated concepts do in fact exist, one would expect (1) some associations of variables to hold up in all worldwide samples and in all the major geographical regions; (2) some associations of variables to fluctuate from one major geographical region to the next; and (3) the influence of regional differences on the associations to be one of degree. The present analysis has demonstrated that all these postulates are true.

In general, the associations that fluctuate most from one major geographical region to the next are best conceived of as being more contingent upon specific historical and ecological circumstances in the various regions, whereas the associations that tend to hold up in all geographical regions are best conceived of as being more invariant; that is, they tend to remain constant amid variation.

For many behavioral scientists in the past it was somewhat unthinkable that an association between variables should be at once describable both in terms of functional factors and of historical factors—not merely unimaginable, but notationally impossible. The present analysis indicates that the disjunction "an association is functional or historical" (but never both at once) reaps only confusion. This disjunction is side-stepped if one thinks in terms of different degrees of invariant relationship and contingency. The terms "historical factors," "diffusion," "culture heritage—migration," "independent invention," "parallel inventions," etc. refer more to the origin and spread of sociocultural phenomena, whereas the terms "functional," "nonfunctional," "causal," "noncausal," "necessary and sufficient condition," etc., refer more to the nature of the relationship between sociocultural phenomena. Since the origin and spread of sociocultural phenomena are related to the nature of the relationship between them, any statement on the nature of sociocultural integration in both time and space must make use of both types of ideas and terms in any discussion.

Although every new speculation in anthropology can hardly be viewed as if it were a clear alternative to older views, the "weight of evidence" of the present analysis indicates that an interpretation of sociocultural phenomena in terms of realms of order and different degrees of invariant relationship and contingency works better than an interpretation in terms of the disjunction functional-causal factors versus historical-diffusional factors. However, the method of representation of sociocultural phenomena discussed here is presented only as being more appropriate at the present state of analysis (cf. Watson [1938] 1967:226–244).

Implications for a Philosophy of Culture

Much of the discussion of the nature of sociocultural integration has been in terms of a disjunction: determinism versus indeterminism. The present analysis, based on a study of ten structural variables, stresses that it is much more fruitful to think in terms of different degrees of invariant relationship and contingency. Although all configurations of two or more aspects of culture can be influenced by historical and ecological circumstances in a specific geographical region, some configurations can be influenced more than others. Variables that are more invariantly associated (i.e., fewer

workable combinations) tend to hold up in all the worldwide samples examined and in all six major geographical regions. But the degree of association can still fluctuate from one continent to the next as a result of differing historical and ecological circumstances. Configurations of variables that are less invariantly associated (i.e., numerous workable combinations) can vary even more in their worldwide distribution. However, the amount of variance is a matter of degree; some configurations fluctuate much more than others, and different configurations react differently in the different geographical regions. Also, the nature of the geographical spread of configurations of two or more sociocultural variables (both "functional" and "nonfunctional"), viewed at one time, is influenced by the nature of the relationship. Within each of the six main geographical regions of the world one encounters the geographical spread of both the same and different configurations.

Anthropologists need to abandon the conception of a continuous universe. Cultural relationships can not be interpreted in terms of the relationships that are encountered among physical phenomena. As Bidney has emphasized:

> One source of confusion in modern ethnological thought is the failure to distinguish between natural and cultural history. As has been noted, the classical cultural evolutionist, following eighteenth- and nineteenth-century conceptions of natural history, confused natural history and cultural history by assuming that there were natural laws of historical development and evolution comparable to those of physics [1953:282].

The need for an explicit recognition of the disparity between culture history and natural history becomes obvious if one reads some of the current statements made by anthropologists. Thus, we find Kaplan stating that:

> Recent developments in microphysics, or more precisely philosophical interpretations of these developments, have cast doubt on the heuristic value of the doctrine of determinism. It is proclaimed that causality has been dethroned and indeterminism once again reinstated in Nature. Physicists seem to be sharply divided on this issue. But from the vast literature on the subject one thing is clear, namely, that the dispute is about the theoretical interpretation of the data and not about the data themselves. What the dissenters from the orthodox interpretation, such as Einstein, de Broglie, and Schrödinger, seem to object to, are the ontological conclusions which have been drawn from what they regard as conceptual and theoretical difficulties in formulating strictly causal laws at the quantum-mechanical level. Moreover, as a number of writers have pointed out, the theoretical foundations of microphysics are not as acausal as they have often been made out to be (for excellent discussions of this whole problem see Nagel 1951; Bradley 1962). *In any case, these developments are not very relevant to the phenomena dealt with by anthropologists, since they are macro-events and physicists agree that the interpretation of macro-events are just as deterministic as they ever were* [1965:974, italics mine].

Thus, Kaplan distinguishes between microevents and macroevents but assumes that the macroevents of sociocultural phenomena plug into each other in the same way as do the macroevents of physical phenomena.[6] This is a completely unwarranted assumption. As Morris Cohen ([1931] 1964:356) pointed out over thirty years ago, the paucity of statements that can be called laws in sociocultural phenomena suggests the impossibility of formulating the same kind of laws for sociocultural phenomena that are encountered in physical phenomena.[7] Although all philosophers of culture should be familiar with developments in philosophy of science, one is not able to transfer the theoretical thinking on physics directly to theoretical discussions of the nature of culture.

The disjunction—determinism versus indeterminism—in discussions of sociocultural phenomena has led to an amazing amount of confusion on ontological issues of sociocultural phenomena.[8] The existence of realms of order in sociocultural phenomena and different types of sociocultural data (artifacts, sociofacts, mentifacts, etc.) has led to a kind of unpredictability in which any one formula for explaining all culture in the

same terms is precluded. In the present analysis, sociocultural phenomena are viewed as a series of interrelated variables rather than as a monolithic entity.

Kroeber was "the first to formulate a theory of emergent evolution of cultural phenomena and a deterministic philosophy of culture history" (Bidney 1953:52).[9] The view expressed here is one of emergent evolution; that is, cultural phenomena are viewed as something different from physical and biological phenomena. However, unlike Kroeber's earlier view (1917), the present analysis does not view historical, sociocultural phenomena as developing and evolving independently of psychobiological, organic evolution. It cannot be overemphasized that, in the present view, not only the content is thought to be different, but also the nature of the relationships between sociocultural phenomena is conceived to be fundamentally different. This is a conceptual difference, not merely a verbal one. Thus, rather than the disjunction determinism-indeterminism, the present analysis suggests that sociocultural phenomena are better viewed in terms of realms of order and different degrees of invariant relationship and contingency. Unfortunately, much of the discussion of the possibility of invariant relationship in sociocultural phenomena has led many to believe that the existence of invariant relationship would preclude a humanistic conception of man. However, to postulate a degree of invariant relationship between some aspects of sociocultural phenomena, for example, among some of the cumulative aspects of culture in the politicoeconomic realm, is independent of the question of whether man is *able to be* the efficient cause of culture change. The abstract structural relationships of increasing complexity say nothing of the specific content or philosophical premises of the relationship. Much of the confusion in anthropological discussions by "humanists" and "positivists" has resulted from not separating different levels of analysis and not separating different kinds of sociocultural facts.

Further, if the relationship between sociocultural phenomena is conceived as one of different degrees of invariant relationship and contingency, it is apparent that in anthropological studies of sociocultural integration and developmental sequence a scientific approach must study the "ideographic" aspects as well as the "nomothetic" aspects. The more contingent aspects are as intrinsic a part of sociocultural phenomena as are the more invariant aspects.

It may be that *man assigns more of the meaning to things than is generally acknowledged.* As Bidney (1953:19) has pointed out in a different context, "From a historical humanistic perspective it may be shown that man's ideologies and cosmologies testify to his range of vision and to his inventiveness as an architect and fashioner of worlds." If this be the case, it is apparent that the behavioral scientist must speak about problems of value in addition to problems of fact.

> As contrasted with the old positivistic thesis that an empirical, comparative study of "social facts" will reveal moral laws comparable to the laws of physics, a normative anthropology would concern itself not only with what is the case actually and historically but also with what may be and ought to be, with possible alternative ideals suggested by the facts of cultural experience and natural science, but not given actually in any cultural system [Bidney 1953:417; cf. Northrop 1959].

Further, the logical implication of the concept of realms of order and different degrees of invariant relationship and contingency is that there is no sharp break between problems of value and problems of fact. Rather, a problem of value is inherent in the so-called factual data of sociocultural phenomena. It cannot be over emphasized that sociocultural phenomena are cognitively mediated.

In the past, the behavioral scientist has tended to be merely a commentator and analyst of the flow of events. It is now becoming painfully obvious that man can and must (a condition, not a commandment) himself determine the course of his own sociocultural life.[10] One needs only to reflect a mo-

ment on the contemporary cultural crises that engulf us.

EPILOGUE

Sociocultural phenomena, the process of: a *potentially* creative imagination expanding against different degrees of psychosociocultural invariant relationship and historical-ecological contingency.[11]

> Man has, as it were, discovered a new method of adapting himself to his environment. Between the receptor system and the effector system, which are to be found in all animal species, we find in man a third link which we may describe as the symbolic system [Cassirer 1944:24].
>
> Man's possession of symbolic language is one of the most important, if not the most important, trait differentiating him from animals [Dobzhansky 1962:71].
>
> The hypothesis of the psychic unity of mankind is justified to the extent that all members of the species *Homo sapiens* free of overt pathology are capable of learning a symbolic language and a variety of cultural forms. This only means that the capacity has become established as a species characteristic, like erect posture, ability to subsist on diverse diets, absence of a breeding season, a brain size exceeding that of the other living primates, and much else besides (see Chapter 10) [Dobzhansky 1962:20–21].
>
> Human culture taken as a whole may be described as the process of man's progressive self-liberation [Cassirer 1944:228].
>
> It may very well be that the truly constructive ideas of modern philosophy are not cosmological ideas at all, but such ethico-social concepts as "progress," "control," and the like. These form a fascinating key to the interpretation of modern thought and give it a quite different contour from that which it assumes when we follow up its metaphysical notions [Burtt 1932:16].

NOTES

[1] We wish to express our appreciation to the Centro Nacional de Cálculo, Instituto Politécnico Nacional, México, D. F., for allowing us full use of their computing facilities. And also to Herbert Barry III, University of Pittsburgh, for generously providing the punch cards. The programs were written by Ruiz Revilla, computer consultant at the Centro Nacional de Cálculo. The paper was conceived and written by Chaney as an additional project while on a field-trip (1966–1968) in San Miguel Allende, Guanajuato, Mexico, sponsored by the National Science Foundation. At that time he was a Ph.D. candidate in anthropology at Indiana University. Harold E. Driver, Joseph G. Jorgensen, LeRoy Johnson, and Miss Dale Hahn generously read the manuscript and provided valuable comments.

[2] Robert C. Suggs (Köbben 1967:26–27) has argued that Murdock's work "shows a deep misunderstanding of statistical methods which is quite common in anthropology." Although Suggs is quite correct in calling anthropologists to task for their lack of sophistication on statistical matters, his consideration of Murdock is wholly unwarranted. Murdock has repeatedly emphasized the many shortcomings of using his samples. As indicated in the present cursory review, Murdock has continually attempted to refine his methods and to arrive at closer approximations between his samples and the known universe of societies. This is not to invoke sacredness for either his methods or results, but rather to acknowledge freely his pioneering attempts to go beyond the impressionistic statements and the hop-skip-and-jump illustrations from world ethnography that one usually encounters in anthropological discussions.

[3] Pearson's C was calculated with and without the Yates correction for X^2 for all the intercorrelations of the smaller samples. Since the results were not significantly different in terms of the present analysis, the uncorrected coefficients were used in all the comparisons.

[4] Different rates of diffusion are generally assumed to exist not only in different times and places, but also among differing aspects of culture in the same or adjacent sections of time and space. Where documentary and accurately dated archaeological materials are lacking, rates are difficult to determine. Barnett (1964) suggests that material objects are generally most diffusible, social organization least diffusible, with organized religions taking an intermediate position. Although this generalization is arrived at by citing authoritative opinions rather than by assembling a large sample of datable diffusions, it may well be correct [Driver and Chaney in press].

Since the ten variables used in the present study are structural, the influence of regional historical-ecological circumstances on the associations of other variables may be even more prominent. It should be kept in mind that Bar-

nett, Driver and Chaney, and the present analysis are talking more about the nature of diffusion in the preindustrialized societies of anthropological literature. In contrast Pitirim Sorokin has examined the "great civilizations" and "cultural supersystems" and concluded that

> As a rule the ideological form of cultural phenomenon diffuses faster and more easily over a vaster multitude of persons and groups, areas and cultures than its behavioral and material forms. Communism or Buddhism as ideologies are spread in the human universe to an incomparably greater degree than are their behavioral practice and material forms [1963:300].

To a large extent, these two opposing views of diffusion are the result of analyses of two different "kinds" of data. Thus, it follows that many problems facing modern industrialized society cannot be examined with the typical anthropological data that possesses a strong bias toward the so-called primitive societies. The advent of rapid communication, weakening of kinship ties, etc., have made the modern society in many respects a different structural and functional problem from the "typical society" of anthropological literature.

[5] Stressing the importance of areal differences on worldwide correlations also brings into focus some problems concerning the various solutions to the Tylor-Galton problem. All the solutions (Naroll 1961, 1964a; Naroll and D'Andrade 1963) proposed so far measure the extent of "patches" or "runs" of specific variables within the major geographical areas, even when they are part of a worldwide study. Driver and Chaney (in press) have examined the relationship between mother-in-law/son-in-law avoidance and bifurcation in kinship terminology in either ego's generation or in the first ascending generation with the matched-pair technique of D'Andrade (Naroll and D'Andrade 1963). The two above variables correlate 0.40 for 277 nearly continuously distributed ethnic units of North America. Each of these 277 ethnic units was paired with an adjacent ethnic unit (also the same culture area and the same language family) and with a nonadjacent ethnic unit (also different culture area, different language family, and selected at random). As expected, historical factors won by a wide margin over functional-evolutionary ones for the adjacently paired ethnic units. Surprisingly, however, historical factors even won by a small but definite margin for the nonadjacent (extraculture area and extralanguage family), randomly paired ethnic units. In order to correct the above deficiency in the D'Andrade method, Driver (Driver and Chaney in press) developed a technique to evaluate the observed frequencies in terms of the expected frequencies. Using this modification, the historical-diffusional outcomes were fewer than expected for nonadjacent, randomly paired ethnic units, while the functional-evolutionary outcomes were more numerous than expected. From that point of view of the present paper, the Naroll and D'Andrade techniques are being swamped by the pervasive influence of specific regional, hostorical-ecological circumstances on many associations of sociocultural phenomena.

[6] For a rational analysis of "An essential unpredictability in human behavior" at the level of the individual, see Michael Scriven 1965:411–425.

[7] As Paul Kurtz has pointed out,

> The trouble with most scientific determinists is their dogmatic faith that in the future we shall discover all the "causes" at work, even though they may be presently unknown. They have generalized about the whole universe in a way that puts the most speculative metaphysician to shame. But here we reach an empirical question: Is there sufficient evidence for determinism in any of the above senses? We must in philosophy tell not only how much we know, but how much we do not know. . . . All that we can mean when we say that *X* is "determined"—is that *X* is *explainable* and *predictable*. But, one may ask, are all events in the universe and in human life explainable and predictable? Unfortunately, many otherwise cautious empiricists seem to assume that they are. But how do we know? The Greeks thought the universe thoroughly intelligible. But is it? The only answer that I can give is: we do not know. We do know that *some* (perhaps even most) events are explainable and predictable; and we can find no logical or epistemological reason (although there may be good, practical ones) why we should not be able to explain and predict events not now brought under scientific knowledge. But beyond this we cannot go. Our initial conclusion is that the most we can argue for at the present is a limited or weak determinism: some events are explainable and predictable, but we have no guarantee that all are. Thus, determinism is not merely a linguistic or logical problem; it is also an empirical problem (as it was, incidently, for Mill) [1968:93–94].

Or, as Bidney has said,

> The ethnological study of history, to be scientific, must be empirical and without any restraining preconceptions derived from posi-

tivistic philosophies of science as to the nature of the order and processes to be found therein. Cultural determinism is a fact of history and the historian must reckon with it in explaining human motivations and social movements. But culture history is also the expression of human freedom and human ideals. Culture history is neither a record of unique and incoherent events, without rhyme or reason, nor is it a rigidly determined sequence of forms. The degree of regularity and uniformity is something to be determined empirically [1953:284].

From the point of view of the present analysis, many philosophical puzzles and many problems in theoretical anthropology have, at least in part, empirical solutions. Any theoretical inquiry into problems such as "the nature of culture" should be closely allied with an examination of empirical data. The present analysis is attempting to integrate rational analysis with empirical data.

[8] This problem of "disjunctions" was initially brought to Chaney's attention in a paper by Norwood Russell Hanson (1960) on "The Copenhagen Interpretation of Quantum Theory."

[9] For a broader and different view of emergent evolution that postulates vast leaps of encompassing wholes—"life," "mind," "society," etc.—see Lloyd Morgan 1926. Other important articles on emergence are Lovejoy 1926; Pepper 1926; Russell, Morris, MacKenzie 1926; Henle 1942; and Meehl and Sellars 1956.

[10] Although many will no doubt view some of the ideas espoused here as somewhat heretical, these ideas should be conceived rather as a defense of action already in progress. A defense and an explanation.

I would like to make an additional comment about the relationship of the latter part of the paper (Discussion) to the former. Much of the theoretical (and practical) discussion of probability is based on the model of a basically deterministic universe derived from an analysis of the macroevents of physical phenomena. I wish to stress that I am *not* working with this type of deterministic model. Rather, the theory postulated here views sociocultural phenomena as fundamentally different from physical phenomena—both the content and the nature of the relationships. Thus, we need a complete reanalysis of the type of "statistical thinking" needed for sociocultural data. In the present analysis the coefficient of contingency is being used to summarize the data. The coefficient is not being employed to establish (or discover) functional or causal relationships. One misuses statistics such as χ^2 when one thinks that it can yield direct information relating to functional or causal explanation with sociocultural data. In the present study an explicit recognition of the difference between statistical correlation and epistemic correlation is made. Retroductive reasoning is employed (see Hanson 1965:85–92). In the long run, many of the ideas espoused under "Discussion" may be of more significance than the "major" part of the paper. However, this possible significance is *not* in terms of a final answer, but rather in terms of underscoring the *problem*. The tentative overall view (or paradigm) of sociocultural phenomena proposed here is fundamentally different from the view that is implicit and/or explicit in statements by behavioral scientists such as Spiro (1965, 1966:1473). As I see it, the truly profound problems are *conceptual organization* and *interpretation*. What I am trying basically to indicate (at one level) in the paper is that the theory that one works with has a bearing on one's method, results, and interpretation. All of these things are intimately intertwined.

To some (undetermined) extent, all of us are suffering from what Malthus called "the insensible bias of situation and interest."

[11] Although there are many modes of cultural integration, the view expressed here is that from a temporal perspective the unity of *a* culture consists to a large extent in its continuity. Habituation and conditioning are essential characteristics of *a* culture. The *meaning* is assigned by man. Further, this view appreciates the possible integrative functions of cultural ideals.

REFERENCES CITED

BACON, MARGARET K., IRVIN L. CHILD, AND HERBERT BARRY III
1963 A cross-cultural study of correlates of crime. Journal of Abnormal and Social Psychology 66:291–300.

BARNETT, HOMER G.
1964 Diffusion rates. *In* Process and pattern in culture. Robert A. Manners, ed. Chicago: Aldine. pp. 351–363.

BARRY, HERBERT III
MS Cultural variations in development of mental illness.

BARRY, HERBERT III, MARGARET K. BACON, AND IRVIN L. CHILD
1957 A cross-cultural survey of some sex differences in socialization. Journal of Abnormal and Social Psychology 55:327–332.

BARRY, HERBERT III, IRVIN L. CHILD, AND MARGARET K. BACON
1959 Relation of child training to subsistence economy. American Anthropologist 61:51–63.

BIDNEY, DAVID
1953 Theoretical anthropology. New York: Columbia University Press.
BRADLEY, R. D.
1962 Determinism or indeterminism in microphysics. The British Journal for the Philosophy of Science 13:193–215.
BROWN, JULIA S.
n.d. A comparative study of deviations from sexual mores. Ms.
BURTT, E. A.
1932 The metaphysical foundations of modern physical science. Garden City: Doubleday & Co.
CASSIRER, ERNST
1944 An essay on man. New Haven: Yale University Press.
CHANEY, RICHARD P.
1966a Typology and patterning: Spiro's sample re-examined. American Anthropologist 68:1456–1470.
1966b A reply to Spiro, or on the misplaced banderillas. American Anthropologist 68:1474–1476.
CHANG, K. C.
1967 Major aspects of the interrelationship of archaeology and ethnology. Current Anthropology 8:227–243.
CHILD, IRVIN L., THOMAS STORM, AND JOSEPH VEROFF
1958 Achievement themes in folk tales related to socialization practice. *In* Motives in fantasy, action, and society. J. W. Atkinson, ed. Princeton: Van Nostrand.
COHEN, MORRIS R.
1964 Reason and nature. Glencoe: The Free Press.
COLEMAN, JAMES S.
1964 Introduction to mathematical sociology. Glencoe: The Free Press.
COULT, ALLAN D., AND ROBERT A. HABENSTEIN
1965 Cross tabulations of Murdock's World Ethnographic Sample. Columbia: University of Missouri Press.
DOBZHANSKY, THEODOSIUS
1962 Mankind evolving. New Haven: Yale University Press.
DRIVER, HAROLD E.
1956 An integration of functional, evolutionary and historical theory by means of correlations. Indiana University Publications in Anthropology and Linguistics, Memoir 12.
1961a Indians of North America. Chicago: University of Chicago Press.
1961b Introduction to statistics for comparative research. *In* Readings in cross-cultural methodology. Frank W. Moore, ed. New Haven: Human Relations Area Files.
1965 Survey of numerical classification in anthropology. *In* The use of computers in anthropology. Dell Hymes, ed. The Hague: Mouton and Company.
1966 Geographical-historical versus psycho-functional explanations of kin avoidances. Current Anthropology 7:131–182.
DRIVER, HAROLD E., AND RICHARD P. CHANEY
in press Cross-cultural sampling and Galton's problem. *In* A handbook of method in cultural anthropology. Raoul Naroll and Ronald Cohen, eds. New York: Natural History Press.
DRIVER, HAROLD E., AND KARL F. SCHUESSLER
1967 Correlational analysis of Murdock's 1957 ethnographic sample. American Anthropologist 69:332–352.
HANSON, NORWOOD RUSSELL
1960 The Copenhagen interpretation of quantum theory. *In* Philosophy of science. Arthur Danto and Sidney Morgenbesser, eds. Cleveland & New York: The World Publishing Company.
1965 Patterns of discovery. Cambridge: Cambridge University Press.
HENLE, PAUL
1942 The status of emergence. Journal of Philosophy 39:486–493.
HYMES, DELL, ed.
1965 The use of computers in anthropology. The Hague: Mouton.
JORGENSEN, JOSEPH G.
1966 Geographical clusterings and functional explanations of in-law avoidances: an analysis of comparative method. Current Anthropology 7:161–169.
KAPLAN, DAVID
1965 The superorganic: science or metaphysics? American Anthropologist 67:958–976.
KÖBBEN, A. J. F.
1952 New ways of presenting an old idea: the statistical method in social anthropology. Journal of the Royal Anthropological Institute 82:129–146.
1967 Why exceptions? The logic of cross-cultural analysis. Current Anthropology 8:3–34
KROEBER, A. L.
1917 The superorganic. American Anthropologist 19:162–213.
KURTZ, PAUL
1968 Decision and the condition of man. New York: Dell Publishing Company, Inc.
LOVEJOY, ARTHUR O.
1926 The meaning of emergence and its modes. Proceedings of the Sixth International Congress of Philosophy. pp. 20–33.
LOWIE, ROBERT H.
1960 Historical and sociological interpretations of kinship terminologies. *In* Robert H. Lowie: Selected papers in anthropol-

ogy. Cora DuBois, ed. Berkeley: University of California Press. pp. 65–74.

MALINOWSKI, BRONISLAW
1944 A scientific theory of culture. Chapel Hill: University of North Carolina Press.

MCEWEN, W. T.
1963 Forms and problems of validation in social anthropology. Current Anthropology 4:155–169.

MCNEMAR, QUINN
1955 Psychological statistics. New York: John Wiley and Sons.

MEEHL, P. E., AND WILFRED SELLARS
1956 The concept of emergence. *In* The foundations of science and the concepts of psychology and psychoanalysis. H. Feigl and W. Sellars, eds. Minnesota Studies in the Philosophy of Science, 1. Minneapolis: University of Minnesota Press. pp. 239–252.

MORGAN, LLOYD
1926 Emergent evolution. New York: Henry Holt and Company.

MORONEY, M. J.
1967 Facts from figures. Baltimore: Penguin Books.

MURDOCK, GEORGE PETER
1940 The cross-cultural survey. American Sociological Review 5:361–370.
1949 Social Structure. New York: Macmillan Company.
1957 World Ethnographic Sample. American Anthropologist 59:664–687.
1961 World Ethnographic Sample. *In* Readings in cross-cultural methodology. Frank W. Moore, ed. New Haven: Human Relations Area Files.
1966 Cross-cultural sampling. Ethnology 5:97–114.
1967 Ethnographic atlas: a summary. Ethnology 4:109–236.

MURDOCK, GEORGE PETER, ET AL.
1962 Ethnographic atlas. Ethnology 1:533–545.
1963a Ethnographic atlas. Ethnology 2:109–133.
1963b Ethnographic atlas. Ethnology 2:249–268.

NAGEL, ERNEST
1951 Reflections on the causal character of modern physical theory. *In* Freedom and reason. Salo W. Baron, Ernest Nagel, and Koppel S. Pinson, eds. Glencoe: The Free Press.

NAROLL, RAOUL
1961 Two solutions to Galton's problem. Philosophy of Science 28:16–39.
1962 Data quality control. Glencoe: The Free Press.
1964a A fifth solution to Galton's problem. American Anthropologist 66:863–867.
1964b On ethnic unit classification. Current Anthropology 5:283–312.

NAROLL, RAOUL, AND ROY G. D'ANDRADE
1963 Two further solutions to Galton's problem. American Anthropologist 65:1053–1067.

NORTHROP, F. S. C.
1959 The logic of the sciences and the humanities. Cleveland & New York: The World Publishing Co.

PEATMAN, JOHN GRAY
1947 Descriptive and sampling statistics. New York: Harper and Brothers.

PEPPER, STEPHEN C.
1926 Emergence. Journal of Philosophy 26:241–245.

RUSSELL, E. S., C. R. MORRIS, AND W. L. MACKENSIE
1926 The notion of emergence: a symposium. Aristotelian Society Supplement, 6.

SAWYER, JACK, AND ROBERT A. LEVINE
1966 Cultural dimensions: a factor analysis of the world ethnographic sample. American Anthropologist 68:708–731.

SCHAPERA, I.
1953 Some comments on comparative method in social anthropology. American Anthropologist 55:353–366.

SCRIVEN, MICHAEL
1965 An essential unpredictability in human behavior. *In* Scientific psychology. Benjamin B. Wolman and Ernest Nagel, eds. New York: Basic Books.

SIEGEL, SIDNEY
1956 Nonparametric statistics for the behavior sciences. New York: McGraw-Hill Book Company.

SOROKIN, PITIRIM
1963 Modern historical and social philosophies. New York: Dover Publications.

SPIRO, MELFORD E.
1965 A typology of social structure and the patterning of social institutions: a cross-cultural study. American Anthropologist 67:1097–1119.
1966 A reply to Chaney, or it all depends on whose ox is being gored. American Anthropologist 68:1471–1474.

STEWARD, JULIAN H.
1963 Theory of culture change. Urbana: University of Illinois Press.

TEXTOR, ROBERT B.
1967 A cross-cultural summary. New York: Taplinger.

TYLOR, EDWARD B.
1889 On a method of investigating the development of institutions applied to the laws of marriage and descent. Journal of the Royal Anthropological Institute 18:245–272.

WATSON, W. H.
1967 On methods of representation. *In* Philosophy of science. Arthur Danto and Sidney Morgenbesser, eds. Cleveland & New York: The World Publishing Co.

WHITING, JOHN W. M.
1961 The cross-cultural method. *In* Readings in cross-cultural methodology. Frank W. Moore, ed. New Haven: Human Relations Area Files.

WILSON, THURLOW R.
1952 Randomness of the distribution of social organization forms: a note on Murdock's *Social Structure.* American Anthropologist 54:134–138.

WITTFOGEL, KARL A.
1939 The society of prehistoric China. Studies in Philosophy and Social Science 8:138–186.