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Cultural variation in Africa: Role of mechanisms of transmission and adaptation

(cultural transmission/demic diffusion/environmental adaptation/cultural diffusion)

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ABSTRACT **Cultural inheritance can be considered as a mechanism of adaptation made possible by communication, which has reached its greatest development in humans and can allow long-term conservation or rapid change of culturally transmissible traits depending on circumstances and needs. Conservativeness/flexibility is largely modulated by mechanisms of sociocultural transmission. An analysis was carried out by testing the fit of three models to 47 cultural traits (classified in six groups) in 277 African societies. Model A (demic diffusion) is conservation over generations, as shown by correlations of cultural traits with language, used as a measure of historical connection. Model B (environmental adaptation) is measured by correlation to the natural environment. Model C (cultural diffusion) is the spread to neighbors by social contact in an epidemic-like fashion and was tested by measuring the tightness of geographic clustering of the traits. Most traits examined, in particular those affecting family structure and kinship, showed great conservation over generations, as shown by the fit of model A. They are most probably transmitted by family members. This is in agreement with the theoretical demonstration that cultural transmission in the family (vertical) is the most conservative one. Some traits show environmental effects, indicating the importance of adaptation to physical environment. Only a few of the 47 traits showed tight geographic clustering indicating that their spread to nearest neighbors follows model C, as is usually the case for transmission among unrelated people (called horizontal transmission).**

It is known that cultural behaviors, practices, and beliefs (cultural traits) in human societies are variable in space and time. We are interested in the forces involved in cultural conservation and change. A theoretical treatment of the dynamics of conservation and change was given by Cavalli-Sforza and Feldman (1). Conservation is the result of transmission over generations. Change involves (*i*) the occurrence of an innovation—usually an event sparked by an individual—often in response to a challenge caused by a new situation in the social or physical environment that is spontaneous or is due to migration and resettlement in other regions or other events; (*ii*) transmission of the innovation to other individuals of the social group, first through communication and then through acceptance, which usually is conditioned by its function (its perceived or real adaptive value) and other factors [prestige, imposition (2), etc.]; and (*iii*) possible transmission of the new behavioral trait over future generations. This is the least studied part of the process, which is essential for understanding long-term conservation. Major mechanisms of cultural transmission summarized in Table 1 have a profound influence on the rate of cultural change and resulting spatial variation within and between groups (1, 3, 4).

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Table 1. Major mechanisms of sociocultural transmission and theoretical expectation of their dynamics in ref. 1

Type of mechanism	Description	Culture change	Comments
Vertical	Parent-to-child or through family	Unlikely and slow	Conservative
Group pressure	Concerted effort of many (older) people on each person	Very slow	Highly conservative
Horizontal	Person-to-person (unrelated)	Can be rapid	Frequent route of innovation
One-to-many	Teacher or leader to group	Most rapid	Prevalent route of innovation

Mathematical treatment (1) has shown that cultural traits are highly conserved when parents transmit culture to children. Actions of parents and extended family members on children take place when they are young and more easily influenced. Even more conservative is the action of a homogeneous social group (also social, political, and religious groups) exercising pressure on all (usually younger) individuals one by one (e.g., during initiation). Since under these conditions innovations have little chance of acceptance, we call these mechanisms of transmission "conservative." Innovations may affect an entire group through contact with unrelated individuals, which we called "horizontal" transmission. They often originate from outside social groups. Their spread through teachers, powerful authority, or high-prestige individuals has been called "one-to-many" or "teacher/leader-directed" mechanisms [including that called "imposition" by Durham (2)].

Is It Possible to Dissect, on the Basis of Synchronic Spatial Variation of Cultural Traits, the Action of the Above Different Forces Affecting Cultural Evolution?

Appropriate data would be necessary for a satisfactory analysis of cultural variation in space and time. But while detailed diachronic data on culture seldom exist, cultural variation in space is documented by several collections of data, among which those of Murdock's early *Ethnographic Atlas* (5), although imperfect, have been chosen for the present preliminary analysis. Three models of spatial cultural variation are first defined (Fig. 1) and then tested with a collection of statistical approaches to interpret the geographic distribution of cultural diversity in sub-Saharan Africa. This approach is different from, but in a sense is complementary to, that suggested by Mace and Pagel (9). It does not try to reconstruct the history of the origins of innovations in the tree of descent; this is sometimes a difficult proposition, given that the spread of a group in a new area rarely can be represented by a tree branching without reciprocal connections. Methods to test the above models are described briefly below.

Cultural Trait Analysis, Classification, and Correlation

We consider the nature and sources of variation of 47 cultural traits (given in ref. 5), which are ordered in six groups (see

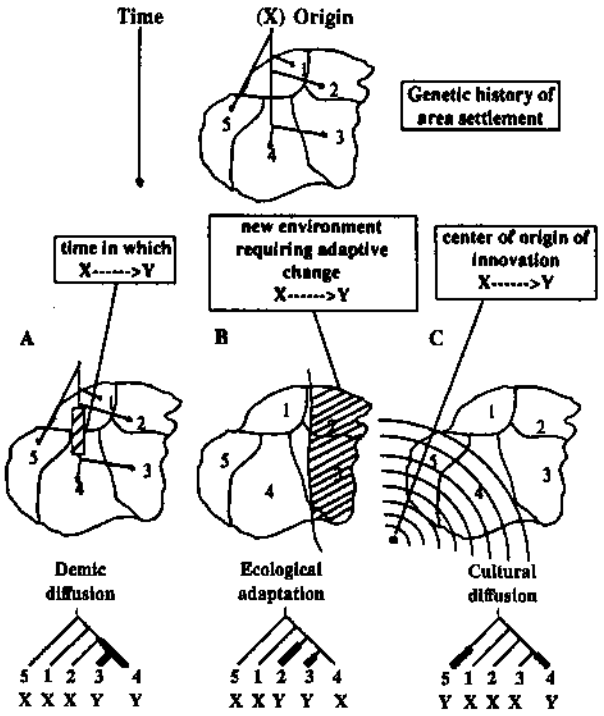

FIG. 1. Models of evolutions of a cultural trait (X) undergoing change X → Y. (Model A) Radiation of people and the accompanying spread of their cultural practices and beliefs. This model is called "demic diffusion" and is usually the result of repeated expansion due to population growth and migration after local saturation (6, 7). Similarities in cultural traits may exist even though the cultures may live at great distances from one another because the two groups share a common history. In this case cultural similarities may be maintained by the two highly conservative sociocultural transmission mechanisms described in Table 1. Genetic data (8) are insufficient in this case to reconstruct history, but linguistic data that under certain circumstances closely parallel them are informative and more readily available. Consequently, we use linguistic affiliation as an indirect measure of demic diffusion. (Model B) Natural ecologies place constraints on populations. This model of "environmental adaptation" may be only partially independent of linguistic affiliation: in fact, migrations and expansions of linguistically related populations are likely to occupy areas that are ecologically similar to those from which they migrated. (Model C) Individuals in a culture adopt some of the traits of neighboring cultures. This model, called "cultural diffusion," is often associated with the "horizontal" type of cultural transmission described in Table 1.

Table 3) based on *a priori* considerations: (*i*) family and kinship (12 traits); (*ii*) economy (8); (*iii*) social stratification (6); (*iv*) labor division by sex (10); (*v*) house (5); and (*vi*) various others (6). The traits regard 277 sub-Saharan societies. Murdock's symbols (qualitative "classes"), 2–13 per trait, were used (e.g., the trait "mode of marriage" includes the classes "B" for bride wealth, "S" for bride service, etc.). We constructed maps (10) of the geographic distribution of each class. Summary (Table 2) and data (Table 3) for correlations among traits within and between the six groups are given. We tested the significance of correlations in contingency tables of all possible pairs of traits by means of G^2 (11). We also calculated the distribution of G^2 from 100 contingency tables, each obtained from resampling with replacement of the original data (bootstrap analysis) (12). Significance levels in the right upper part of Table 3 are based on the standard deviation of the distribution of bootstrapped G^2 values. Since this procedure generated a lower number of significant values than the normal procedure using the χ^2 distribution, further analyses are referred to these more conservative results. Table 2 summarizes the correlations significant at the 5% level from Table 3. The traits within four groups—Family and Kinship, Economy, Social Stratification, and House—are correlated to each other in 67%, 79%, 67%, and 60% of trait pairs, respectively. This high correlation is expected (13). The two other trait groups (labor division by sex and various others) are less compact (24% and 7% of association within the groups, respectively). Thus, a sexual division of labor in one task is almost uncorrelated with that in another task. The "various others" group of traits shows no correlation between members of the group and with traits from other groups. This is expected, as this group is a collection of miscellaneous traits remaining after forming the first five groups and has no *a priori* internal coherence. Fewer associations (30% on average) occur between traits of different groups than within groups. Even though this occurrence is more frequent than expected (5%), it is clear that the grouping made is confirmed to be useful by this correlational analysis.

Demic Diffusion and Environmental Adaptation: Correlation of Cultural Traits with Language and Ecology

To try to determine which cultural traits in Africa were consequences of demic diffusion (see legend to Fig. 1) and which were a result of environmental adaptation, contingency tables were constructed to examine the associations of cultural traits with language (as a measure of historical connection) and with the ecological setting. Linguistic affiliation is based upon Murdock's language classification, which although somewhat outdated, is essentially consistent for the part relevant here with that of Greenberg (14). Ecological setting of each society is based on categories of an African vegetation map (15). Correlations of cultural traits with linguistic affiliation and environment are calculated in two ways—by a "detailed" (**a**) and a "condensed" (**b**) classification. Table 4 lists the results of both classifications. Only the results with the highest level of significance ($P < 0.001$, or code 3) will be discussed. Table 4 shows that linguistic affiliation is correlated to more cultural traits than is the environment, regardless of the subdivision used to group languages or ecologies. It also indicates that family and kinship traits consistently have more significant associations with linguistic affiliation (history) than with ecology. The groups called "various others" and "labor division by sex" consistently had fewer correlations with both language and ecology.

Table 2. Number and proportion of significant associations at $P = 5\%$ between and within groups

Group	1	2	3	4	5	6
Family and kinship	44/66 (0.67)	28/96 (0.29)	32/72 (0.44)	24/120 (0.20)	20/60 (0.33)	13/72 (0.18)
Economy		22/28 (0.79)	23/48 (0.48)	34/80 (0.42)	23/40 (0.58)	7/48 (0.15)
Social stratification			10/15 (0.67)	26/60 (0.43)	10/30 (0.33)	5/36 (0.14)
Labor division by sex				11/45 (0.24)	17/50 (0.34)	6/60 (0.10)
House					6/10 (0.60)	2/30 (0.07)
Various others						1/15 (0.07)

Overall 108 of 179 (60%) pairs of traits within groups (diagonal values) are found to be significant at the 5% level, but only 9 of 179 are expected to be significant by chance.

Table 3. Correlation of 47 cultural traits in six groups according to the G^2 significance level

	111 123456789012	11111112 34567890	222222 123456	2223333333 7890123456	33344 78901	444444 234567	*TRAITS*	*GROUPS*
1	01021022202	00030001	000300	0000000000	00000	000000	Mode of Marriage	
2	0 0210000021	00000000	230001	1000000003	20121	000000	Family Organization	
3	30 333223333	01020202	001000	0000101000	11000	000030	Marital Residence	
4	033 20200000	00002010	330002	1011000000	00200	010020	Community Organization	
5	3333 3212333	00010001	210000	0000000000	33000	000010	Patrilineal Kin Groups and Exogamy	**FAMILY**
6	21303 033333	00010200	010002	0000000100	10110	000000	Matrilineal Kin Groups and Exogamy	**AND**
7	013331 00000	00000001	101000	0000000000	00001	000010	Cognatic Kin Groups	**KINSHIP**
8	2030230 3333	02010000	000113	3001002001	00000	000100	Cousin Marriage	
9	21303303 333	00000000	030001	0000000001	00000	000110	Kinship Terminology for Cousins	
10	203033033 33	00020022	010200	0000000002	00310	000000	Succession to the Off. of Loc. Headman	
11	1330330333 3	00032331	220121	0100101202	00330	000012	Inheritance of Real Property	
12	22303303333	01030321	122222	0100011103	20320	000112	Inheritance of Movable Property	
13	100000100000	0211010	002001	1001102020	00220	000000	Subsistence Economy: Gathering	
14	002010010011	0 032313	000020	0000000022	22003	100001	Subsistence Economy: Hunting	
15	000000000000	10 33231	001001	0010300300	30331	000100	Subsistence Economy: Fishing	
16	302022021333	133 3333	030131	0020000332	30330	000000	Subsistence Economy: Animal Husban.	**ECONOMY**
17	000200000030	2333 033	111002	1101300030	00330	000020	Subsistence Economy: Agriculture	
18	002013100033	03330 03	000030	0000001302	30130	000100	Type and Intensity of Agriculture	
19	001201001232	223331 3	311303	2003300210	30330	000110	Settlement Pattern	
20	213120200222	2323333	110210	1021100231	30230	000000	Type of Animal Husbandry	
21	021330100021	11012031	33310	1210000102	00300	000003	Mean Size of Local Community	
22	030321203222	10031002 2	0000	2200000002	30332	000020	Hierarchy within local Community	**SOCIAL**
23	011100110002	20101010	30 323	3300301000	00000	000000	Hierarchy above local Community	**STRATIF.**
24	200000020212	10020132	303 12	1101100003	00000	000002	Class Stratification	
25	000000020023	02130302	2022 2	0220000013	02221	000200	Caste Stratification	
26	010303032023	10123030	11332	1300200101	00010	000300	Slavery	
27	020110110000	31002033	333202	303200000	00210	000000	Metal Working	
28	000000001021	00001000	223223	3 02000002	00100	010100	Weaving	
29	000100000000	00320103	200030	00 0000201	10010	000000	Leather Working	
30	000100000000	30002032	000101	330 300010	00010	000002	Pottery	
31	001000010010	10313133	003203	2003 00300	00010	000000	Boat Building	**LABOR**
32	000000000000	00000010	000000	00000 0000	00100	000000	House Construction	**DIVISION**
33	001100021011	20010100	001000	000000 100	00000	001000	Gathering	**BY SEX**
34	000002010021	00330333	100011	0020302 00	11020	000200	Fishing	
35	010010100010	33133033	110020	20020000 0	00010	000200	Animal Husbandry	
36	030000022333	03030302	330232	023011000	31333	000000	Agriculture	
37	031022000003	02330333	130001	0020100103	0333	000100	Ground Plan of Dwelling	
38	000010000000	00100000	000000	0000000100	0 000	000000	Floor Level	
39	010302000333	12333133	330030	3100010003	30 33	000000	Wall Material	**HOUSE**
40	031001000133	31333333	130032	2012100233	303 3	000200	Shape of Roof	
41	020000010012	11000000	020020	0000000003	3033	000000	Roofing Material	
42	000000000000	02000001	000000	0000000000	00000	00000	High Gods	
43	000100000000	00000000	000000	0200000000	00000	0 0000	Type of Games	
44	000000001000	00000100	000000	0000001000	00000	10 000	Post-Partum Sex Taboos	**VARIOUS**
45	010000011002	00100220	100123	0200000220	30120	010 10	Male Genital Mutilations	
46	003221101011	00012020	030000	0000000001	00000	0101 0	Segregation of Adolescent Boys	
47	000000100022	02000000	301200	0002000000	00000	10100	Norms of Premarital Sex Behaviour	

The lower triangular matrix is based on standard contingency table analysis of the original data, and the upper triangular matrix is based on the bootstrap procedure. 0, Not significant correlation; 1, significant at $P = 0.05$; 2, significant at $P = 0.01$; 3, significant at $P = 0.001$; Stratif., stratification; Off., office; Loc., local.

Table 4. Association of cultural traits with language and ecology and clustering analysis

Cultural trait correlation									Clustering index	
Linguistic affilitation (LA)*			Type of environment (E)*			LA & E				
a	b	Code 3, no. in a–b	a	b	Code 3, no. in a–b	code 3,† no. in a–b	Traits	Groups	Mean ± SD over classes	Mean ± SE SD of group
2	3		1	0			Mode of marriage		0.25 ± 0.07 (5)	
3	1		1	0			Family organization		0.17 ± 0.14 (8)	
3	3		3	0			Marital residence		0.31 ± 0.29 (6)	
2	0		0	0			Community organization		0.19 ± 0.13 (4)	
3	1		1	0			Patril. kin groups and exog.	Family	0.42 ± 0.13 (5)	
3	3		0	0			Matril. kin groups and exog.	and	0.33 ± 0.37 (4)	
0	0		0	0			Cognate kin groups	kinship	0.22 ± 0.14 (4)	
3	3		3	3			Cousin marriage		0.27 ± 0.19 (7)	
3	3		3	2			Kinship termin. for cousins		0.35 ± 0.21 (7)	
3	3		0	0			Succ. to the office of local head.		0.36 ± 0.18 (10)	
3	3		3	0			Inher. of real property		0.24 ± 0.18 (7)	
3	3	9–8 of 12 (75–67%)	3	2	5–1 of 12 (48–8%)	5–1	Inher. of movable property		0.28 ± 0.17 (7)	0.28 ± 0.02 SD = 0.07
0	0		0	0			Subsist. economy: gathering		−0.06 ± 0.17 (3)‡	
2	3		1	0			Subsist. economy: hunting		0.12 ± 0.11 (4)‡	
3	3		3	0			Subsist. economy: fishing		0.05 ± 0.20 (5)‡	
3	3		3	3			Subsist. economy: anim. hus.	Economy	0.18 ± 0.09 (8)‡	
1	2		1	1			Subsist. economy: agriculture		0.14 ± 0.22 (10)‡	
3	3		3	0			Type and inten. of agriculture		0.30 ± 0.24 (5)	
3	3		3	3			Settlement pattern		0.30 ± 0.13 (8)	
3	3	5–6 of 8 (63–75%)	3	1	5–2 of 8 (63–25%)	5–2	Type of anim. hus.		0.44 ± 0.14 (4)	0.35 ± 0.05 SD = 0.08
2	0		0	0			Mean size of local commun.		0.30 ± 0.12 (7)	
3	3		3	1			Hierar. within local commun.		0.39 ± 0.32 (3)	
3	2		1	0			Hierar. above local commun.	Social	0.18 ± 0.02 (4)	
2	1		3	1			Class stratif.	stratif.	0.31 ± 0.06 (5)	
3	3		3	0			Caste stratif.		0.50 ± 0.16 (3)	
3	3	4–3 of 6 (67–50%)	1	0	3–0 of 6 (50–0%)	2–0	Slavery		0.32 ± 0.25 (4)	0.33 ± 0.04 SD = 0.11
1	2		1	0			Metal working		0.62 ± 0.27 (2)	
3	1		1	0			Weaving		0.50 ± 0.14 (5)	
2	2		2	0			Leather working		0.55 ± 0.08 (4)	
0	0		0	0			Pottery	Labor	0.32 ± 0.30 (5)	
1	3		1	0			Boat building	division	0.47 ± 0.19 (3)	
0	0		2	0			House construction	by sex	0.53 ± 0.24 (4)	
1	0		2	1			Gathering		0.23 ± 0.23 (6)	
3	3		3	0			Fishing		0.24 ± 0.18 (7)	
0	0		0	0			Anim. hus.		0.36 ± 0.11 (6)	
3	3	3–3 of 10 (30–30%)	3	3	2–1 of 10 (20–10%)	2–1	Agriculture		0.41 ± 0.23 (7)	0.42 ± 0.04 SD = 0.13
3	3		3	2			Ground plan of dwelling		0.53 ± 0.16 (4)	
0	0		0	0			Floor level		0.53 ± 0.31 (3)	
3	2		3	2			Wall material	House	0.36 ± 0.20 (7)	
3	3		3	2			Shape of roof		0.44 ± 0.26 (7)	
2	3	3–3 of 5 (60–60%)	0	0	3–0 of 5 (60–00%)	2–0	Roofing material		0.43 ± 0.45 (4)	0.46 ± 0.03 SD = 0.07
0	2		0	0			High gods		0.39 ± 0.14 (4)	
1	0		0	0			Type of games		0.55 ± 0.32 (3)	
0	0		0	0			Postpartum sex taboos	Various	0.40 ± 0.29 (5)	
3	2		3	0			Male genital mutilations	others	0.39 ± 0.24 (9)	
3	2		0	0			Segregation of adol. boys		0.36 ± 0.09 (4)	
2	3	2–1 of 6 (33–17%)	2	0	1–0 of 5 (17–00%)	1–0	Norms of premar. sex behav.		0.37 ± 0.19 (5)	0.41 ± 0.03 SD = 0.07
Total§		26–24 of 47 (55–51%)			19–4 of 47 (40–9%)					

*Correlations are calculated in two ways: detailed (in columns **a**) and condensed (in columns **b**) classifications. Numbers 0, 1, 2, and 3 are as in Table 2. LA calculation in column **a** was based on nine linguistic groups—Cushitic, Central-Sudanic, Nilotic, West-Atlantic, Bantoid, Adamawa-Eastern, Voltaic, Kwa, and Mande. E calculation in column **a** was based on six categories; 1, tropical forest with evergreen trees; 2, tropical forest with evergreen and deciduous trees; 3, tropical forest with deciduous trees; 4, savanna also with evergreen trees; 5, savanna with only deciduous trees; and 6, semidesert. LA calculation in column **b** was based on three major linguistic groups: Hamito-Semitic, Macro-Sudanic, and Niger-Congo. Ecology calculation in column **b** was based on three categories: tropical forest, savanna, and semidesert. In the clustering index, analysis of variance shows that the differences between groups are significant: $F_{(5,37)} = 109.1$. The number of classes considered is in parentheses. SD, standard deviation; SE, standard error; Patril., patrilineal; Matril., matrilineal; exog. exogamy; Inher., inheritance; Subsist., subsistence; anim. hus., animal husbandry; Hierar., hierarchy; commun., community; inten., intensity; termin., terminology; stratif., stratification; adol., adolescent; premar., premarital; behav., behavior.

†No. of traits highly correlated (code 3) with both LA and E in **a–b**. Their total number is 17–4 of 19–4—i.e., 90%–100%.

‡Subsistence traits (the first five) are excluded from the analysis of variance and from the mean group value because they are coded in percentage classes, while the clustering index is fit for qualitative data.

§Total no. of traits significant at $P = 0.001$ (code 3) and corresponding percentage.

Table 5. Evolutionary model plausible or likely to be prevalent for each group of cultural traits

Group	Group correlation		Degree of clustering	Evolutionary model (Fig. 1)
	Language	Ecology		
Family and kinship	High	Low	Low	A
Economy	High	High	Medium	A, B, and C
Social stratification	Medium	Medium	Medium	A, B, and C
Lab. div. by sex	Low	Low	High	C
House	Medium	Medium	High	A, B, and C
Various others	Low	Low	High	C

A, demic diffusion; B, environmental adaptation; C, cultural diffusion; Lab. div., labor division.

Geographic Clustering of Cultural Traits

The geographic distribution of the cultural traits investigated was found to be in almost all cases far from random in space. To quantify the degree of clustering, we developed an index (10) that is based on ratios of distances from nearest neighbors: $r = d/dS$, where dS is the distance from the nearest neighbor sharing the same class of a trait and d is the distance from the nearest neighbor of each society. Such ratios are calculated for each society and for each class of a trait; an index of clustering is calculated from the average over the societies and the classes for each trait (Table 4). This index of clustering expresses how geographically close are neighbors who share a certain trait. Traits spread by horizontal cultural diffusion (model C in Fig. 1) should tend to be shared predominantly by closest neighbors and therefore have the highest values of clustering index but should not have, or should not necessarily have, a high correlation with history—i.e., language (model A) or environment (model B). Table 5 shows this is true of the groups "Labor division by sex" and "Various others" and especially "House," where ecological considerations (for use of materials, floor level, etc.) and fashions (ground plan) are also important. The groups "Economy" and "Social stratification" are intermediate, probably because some of the traits are also affected by models B and C.

Final Remarks and Discussion of Major Results

The finding (Table 5) that family and kinship traits follow primarily the geographic pattern of language (history) rather than that of natural environment or similarity with neighbors is not surprising, since these traits are generally transmitted vertically (by parents) or through group pressure (e.g., extended family, kin group–clan, moiety) and are therefore highly conserved (see Table 1). Hallpike (16) suggests that "core principles" responsible for cultural evolution are based upon linguistic and cultural heritage rather than on ecology. It seems simpler to assume that these patterns are due not to language *per se* but to the properties of vertical and group pressure mechanisms of transmission. Two groups of traits (labor division by sex and various others) with low associations with language and ecology and a relatively higher degree of geographic clustering fit the cultural diffusion model best. This is the model of diffusion (model C in Fig. 1) that anthropologists are most familiar with to explain the distribution of cultural traits. The environmental adaptation model, unlike the demic and cultural diffusion models, is not strongly associated with any of the groups of traits in and by itself; this model occurs with one or both of the other two models. In fact almost all [17 of 19 (90%) or 4 of 4 (100%) by the condensed method] of the cultural traits that were highly correlated with ecology were also highly correlated with linguistic affiliation—i.e., 90% of the time in which there is a significant relationship with ecology, there is also a significant relationship with language. The reverse is not true (see Table 4). This is not unexpected, since frequently in human migration people choose environments similar to those they left. Economic traits fit this pattern especially well, whereas social stratification traits are not associated as frequently with language and ecology. House traits appear to be influenced by all three models in Fig. 1, but ecology seems to predominate somewhat, especially if the detailed classification is used (Table 4). House shape and construction are clearly influenced by availability of materials in the natural environment, but traditional preferences and tastes as well as ideas from neighboring populations also appear to be factors.

These conclusions are only suggestive. There are also serious limitations with Murdock's data, but we consider this a preliminary analysis in which we utilized the conservative bootstrap method and considered only very high correlations. The significance tests may not have full validity, because of Galton's (17) problem, also called "spatial autocorrelation," which has been partially avoided by the bootstrapping and by making a comparative use of correlation values (over the same set of societies). In conclusion, cultural transmission mechanisms with their different degrees of conservativeness, determine the stability of cultural traits. Family and kinship traits are more highly conserved because they are learned in the family [*per se* a conservative mechanism (1)] and also at a younger age when plasticity is highest. Naturally, there are always many influences acting jointly in the determination of cultural traits, and we can only hope to indicate some of the prevalent processes. This investigation indicates that the conservation of many cultural practices and beliefs in traditional societies is the result of vertical transmission and family group pressure. Little attention has been paid so far to these mechanisms, although a fundamental feature of "culture" is that it is transmitted from generation to generation.

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