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Indonesia
Borneo

Women and Men in Forest and Field:

Cognition in Kalimantan

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The importance of women's roles in production are beginning to be realized in the sphere of international agricultural development; but there remains a general uncertainty about how the topic might be studied, what aspects of the topic are of critical importance, and how the relevant and important information can be fed into ongoing and planned programs. The research results presented here are to illustrate one method that I have found useful in quantifying people's perceptions about women, men, and productive activity in agroforestry.

Between October 1979 and September 1980, I conducted ethnographic research in Long Segar, East Kalimantan (Indonesian Borneo). Long Segar is a Resettlement village, located two days and two nights upriver from the provincial capital, and populated by 1000 Christian, Uma' Jalan Kenyah Dayaks who moved there from the remote interior regions of Kalimantan between 1963 and 1972. The people practice shifting cultivation for their economic base, supplemented to a small degree by wage labor, gardening, collection of minor forest products, and commerce. Their village is situated along the Telen River, within primary forest which has been leased to an American timber company for timber extraction.

The research reported here was part of a project to document the "Interactions between People and Forests in East Kalimantan."* In an effort to

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generate research results that would be useful for the many, environmentally and developmentally critical policy decisions being made in the area, we adopted an unusual (but fruitful) research strategy (see Vayda, Colfer & Brotokusumo 1980, for more details). Rather than focusing on a particular community as the unit of study, we identified a problematic human action (in this case cutting down the forest) and investigated the factors that impinged on or affected that action. Participant observation was the basic research approach, with more focused and quantitative sub-studies being undertaken as deemed useful and necessary. The holistic, contextual, ethnographic investigation of interacting causes and effects could thereby be maintained, at the same time that relevance to important policy issues and a practical focus were assured.

To illustrate this approach by example, I did not delve deeply into questions of religion or ritual, once I determined that such domains had little impact on people's use of the forest. On the other hand, I devoted a good bit of attention to the activities and beliefs of personnel at the American timber company in whose timber concession the village was situated, as well as noting the changes in the price of lumber in the provincial capital and the price of logs on the international lumber market. Factors that influenced people's involvement in the cutting down of trees were traced outward and investigated far beyond the confines of the village; yet some areas which have traditionally been of interest to anthropologists were comparatively neglected in this study.

The cognitive study reported here (called a "Galileo") represents one of the more focused sub-studies deemed important in clarifying human involvement in activities that impinge on the forests. I wanted quantified corroboration of a number of my perceptions, which were based on participant observation--e.g., that men and women are seen as more alike than they are in the U.S., that women are seen as important actors in agricultural activity, and that women are per-

ceived to be more hardworking than men. I also wanted similar evidence regarding the spheres of activity that the Kenyah considered themselves to be closest to, or most involved in.

What is a "Galileo"?

Galileo is a research method/computer program designed for "cognitive mapping." It is also sometimes referred to as a multidimensional scaling technique. Although the computer program is based on sophisticated mathematical manipulations, the research procedure is fairly simple and straightforward.

A researcher isolates a domain of meaning. In this case, I was interested in the differences in people's perceptions of and attitudes toward the two sexes in interaction with their environment and their work. There is a detailed procedure one can go through to ensure the relevance of the concepts chosen (discussed by the originator, Woelfel 1977; and by Nehls-Frumkin 1978), including recorded, unstructured interviews, concept by concept content analysis of those interviews, and choice of the most frequently mentioned concepts.

Several factors, including my 10 month's residence in the community, Woelfel's lack of rigidity about the importance of adhering to those procedures, and some definite time constraints, resulted in my choosing the relevant concepts largely on the basis of my own judgment. I included concepts which 1) were commonly discussed in the community, 2) related to interactions between people and forests, and 3) had potential relevance to "development" or increased income for the people. In Long Segar, I utilized 11 concepts: forests, ricefield, garden, male, female, child, work, me, good, trade and handicrafts. A standard form is modified and used (see Figure A), simply pairing every concept with every other concept.

[Figure A goes about here]

Figure A

BALA 10 CEN PUTE' (cu' ale') (bek KUA', tai 0)

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		Koda' cu'	Nomor
2122	09-17	LES AU NGAN KETO'	_____
2324	18-26	LES AU NGAN UBA'	_____
2526	27-35	LES AU NGAN BA'I	_____

Duplicate 1-6
Card #01 7-8

		Koda' cu'	Nomor
0102	09-17	BA'I NGAN UMA	_____
0103	18-26	BA'I NGAN BANIT	_____
0104	27-35	BA'I NGAN LAKI	_____
0105	36-44	BA'I NGAN LETO'	_____
0106	45-53	BA'I NGAN ANAK	_____
0107	54-62	BA'I NGAN GAYENG	_____
0108	63-71	BA'I NGAN AKE'	_____
0109	72-80	BA'I NGAN PENIGA	_____

Duplicate 1-6
Card #02 7-8

		Koda' cu'	Nomor
0110	09-17	BA'I NGAN DAGENG	_____
0111	18-26	BA'I NGAN MAN INU	_____
0203	27-35	UMA NGAN BANIT	_____
0204	36-44	UMA NGAN LAKI	_____
0205	45-53	UMA NGAN LETO'	_____
0206	54-62	UMA NGAN ANAK	_____
0207	63-71	UMA NGAN GAYENG	_____
0208	72-80	UMA NGAN AKE'	_____

The next step involves the choice of a criterion pair. The criterion pair is the conceptual yardstick used by the respondents in measuring the distances between each of the pairs of concepts. In this study, I set "red" and "white" at 10 units apart.* Respondents were then asked, "if red and white are 10 units apart, how far apart are forest and ricefield?", "forest and garden?", "forest and male?", and so forth. If the respondents thought two concepts were twice as far apart as red and white, they indicated 20 units; or if they thought the two concepts were half as far apart as red and white, 5 units was the appropriate response.

There is some disagreement among users of this method regarding the advisability of using a "ruler" or a "yardstick" as a measuring device; or in other words, should we choose a criterion pair that represents a small conceptual distance or a large one? In this case, I chose a criterion pair that respondents considered to represent a very large distance. Indeed, none of the respondents considered any of the paired concepts to be as far apart as red and white. The possibility that they did not understand that they could specify a distance greater than 10 units cannot be ruled out; on the other hand, discussions during the interview process definitely corroborate the fact that the people generally considered red and white to be very far apart.

The sample of respondents can be chosen in a variety of ways, with a random sample being preferred methodologically. In Long Segar, again because of time constraints, I utilized naturally occurring groups (men working together on a village project, women working together on a church project, and teenagers assembled at the school) as well as individuals to whom I had ready access. I aimed for wide representation, in terms of age and sex. The adult group was

*One hundred units is also often used in studies of this kind. I chose the smaller figure because many of my respondents were illiterate, and I reasoned that 10 might be easier to manage than 100.

composed of 19 women and 30 men, ranging in approximate age from 19 to 67 years. The students were 19 boys, 19 girls, and 5 whose sex is unknown, ranging in age from 15 to 21.

In the school setting, the survey instrument was given to all the students at once, the procedure was explained, questions were answered, and the students filled in their own questionnaires. Among the adults, in most cases, the interviewer (my research assistant or myself) asked the distance between each pair, and filled in the questionnaire.

An interesting point should be raised here, as some have questioned the reasonableness of asking illiterates and people with minimal education to make judgments like this about their own perceptions. Certainly making such judgments requires thought and is something of a challenge for most people. But I found that the respondents in Long Segar seemed to understand the procedure just as easily and indeed complied with more equanimity to my request than did the well educated students and faculty members in the University of Hawaii's School of Public Health to whom I'd administered a similar instrument in the spring of 1979. Woelfel, the originator of the Galileo method, reports similar observations from other researchers (personal communication 1979).

Results

Obviously space limitations here preclude a thorough analysis of these data. But, because this method seems to provide a way to quantify some important, observable sociocultural features of relevance to women's roles and status, I will stress three of the most interesting findings: 1) the closeness of the concepts male and female, as contrasted to Galileo results from more sex-stereotyped social settings, 2) the integration of humans of both sexes with the environment and the world of work, and 3) possible indications of social changes

occurring in the people's perceptions of sex roles in relation to work.

Tables I and II provide the overall means matrices for adults and students, respectively. These are the core data, resulting from adding all the measurements for each pair and dividing by the number of respondents. The means matrix has been conceptualized by Woelfel as analogous to a distance matrix showing distances between major American cities, often found on road maps. But this means matrix provides distances in cognitive, rather than geographical, space.

[Tables I and II go about here]

Tables III and IV do not contain any new data; rather they highlight the concepts male, female, and me, in relation to all the other concepts. The distances in the male and female columns can be interpreted as cognitive or conceptual, whereas Galileo users often refer to the distances between me and other concepts as attitudinal.

[Tables III and IV go about here]

Figures B and C are "cognitive maps." They of course reflect only two of the 11 dimensions provided by the computer's manipulations of the means matrices. There is not space to provide amplification of the procedures performed by the computer (see Woelfel and Fink 1981) but suffice it to say that use of only two dimensions distorts the data somewhat.* For adults, 78.1% of the variance was explained by the first two dimensions; whereas for students, the first two dimensions accounted for only 56.5% of the variance. Because of this variation in the multidimensionality of the two data sets (adults and students), the adult

*Compare the plotted distances with the means, and the distortions should become clear. The maps are however useful for providing a sense of the distances among the various concepts.

TABLE I

GALILEC MEANS MATRIX

ADULTS

	<u>FOREST(1)</u>	<u>RICEFIELD(2)</u>	<u>GARDEN(3)</u>	<u>MALE(4)</u>	<u>FEMALE(5)</u>	<u>CHILD(6)</u>	<u>WORK(7)</u>	<u>ME(8)</u>	<u>GOOD(9)</u>	<u>TRADE(10)</u>	<u>HANDCRAFT(11)</u>
FOREST 1	0.0										
RICEFIELD 2	1.5	0.0									
GARDEN 3	1.7	2.2	0.0								
MALE 4	3.0	2.6	4.0	0.0							
FEMALE 5	3.7	2.0	1.7	2.0	0.0						
CHILD 6	6.4	6.1	6.0	3.2	1.2	0.0					
WORK 7	2.4	1.4	1.4	1.5	1.4	5.7	0.0				
ME 8	3.0	2.1	3.0	1.9	1.8	2.0	1.4	0.0			
GOOD 9	2.4	1.8	2.2	2.2	1.8	2.4	1.4	3.1	0.0		
TRADE 10	5.1	4.3	4.2	6.3	6.8	7.4	4.3	6.4	5.1	0.0	
HANDCRAFT 11	3.1	2.6	3.7	3.2	1.4	7.0	1.2	2.7	1.9	6.4	0.0

TABLE II

GALILEC MEANS MATRIX

STUDENTS

	<u>FOREST(1)</u>	<u>RICEFIELD(2)</u>	<u>GARDEN(3)</u>	<u>MALE(4)</u>	<u>FEMALE(5)</u>	<u>CHILD(6)</u>	<u>WORK(7)</u>	<u>ME(8)</u>	<u>GOOD(9)</u>	<u>TRADE(10)</u>	<u>HANDCRAFT(11)</u>
FOREST 1	0.0										
RICEFIELD 2	3.5	0.0									
GARDEN 3	4.0	3.5	0.0								
MALE 4	6.7	6.1	6.8	0.0							
FEMALE 5	7.8	6.3	5.4	6.3	0.0						
CHILD 6	7.7	7.1	6.4	5.7	4.2	0.0					
WORK 7	4.2	3.2	2.6	4.6	4.9	6.3	0.0				
ME 8	6.2	6.0	5.0	4.7	4.5	4.9	5.7	0.0			
GOOD 9	5.3	4.6	5.1	5.2	4.3	4.5	4.4	4.9	0.0		
TRADE 10	5.9	4.9	5.1	4.8	6.1	6.9	3.7	7.0	5.1	0.0	
HANDCRAFT 11	6.3	6.7	6.7	5.5	3.6	7.5	3.4	5.4	4.4	4.8	0.0

TABLE III

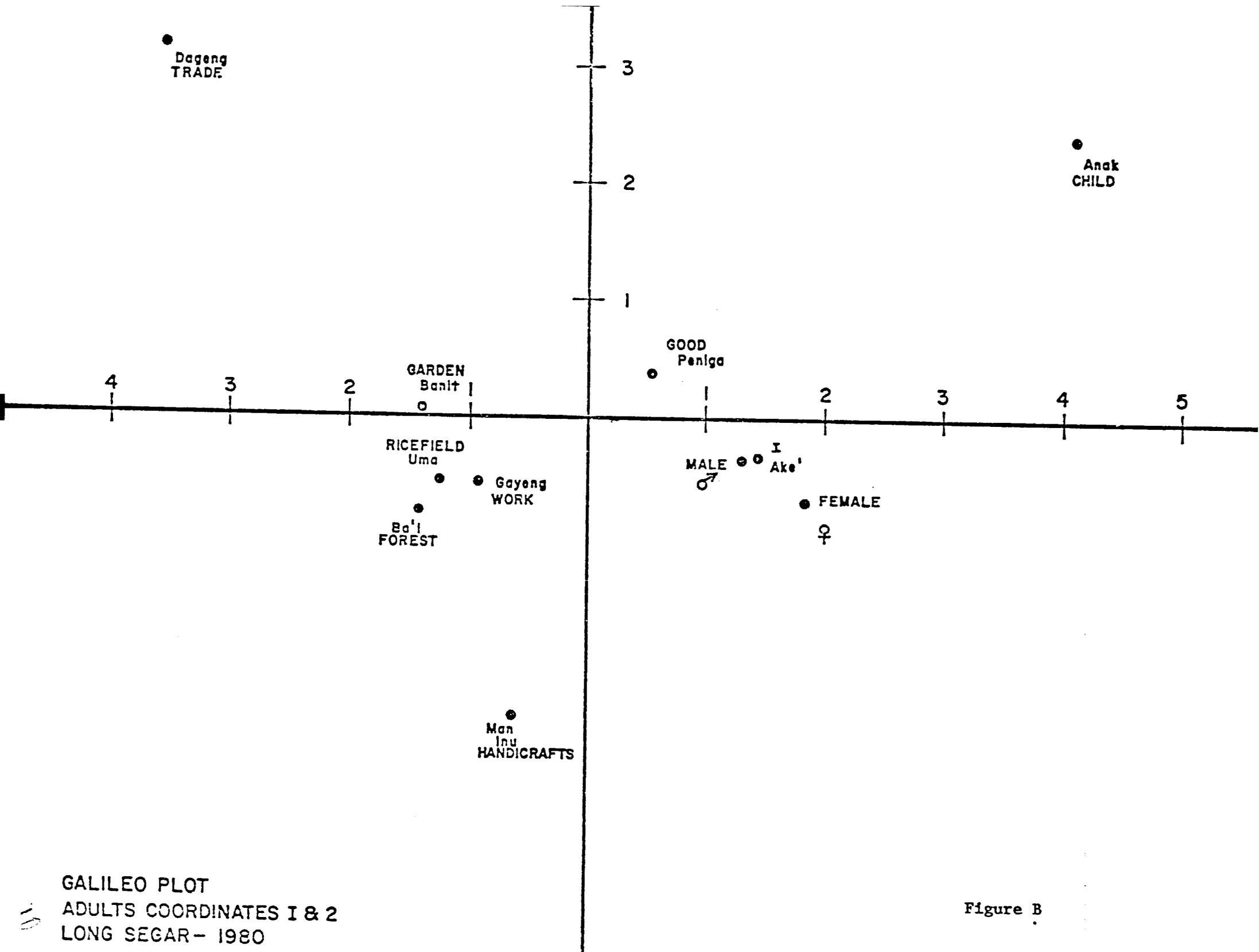
ADULTS IN LONG SEGAR - 1980

	FEMALE	MALE	ME
FOREST	3.7	3.0	3.0
RICEFIELD	2.0	2.6	2.1
GARDEN	1.7	4.0	3.0
MALE	2.0	-	1.9
FEMALE	-	2.0	1.8
CHILD	1.2	3.2	2.0
WORK	1.4	1.5	1.4
ME	1.8	1.9	-
GOOD	1.8	2.2	3.1
TRADE	6.8	6.3	6.4
HANDICRAFTS	1.4	3.2	2.7

TABLE IV

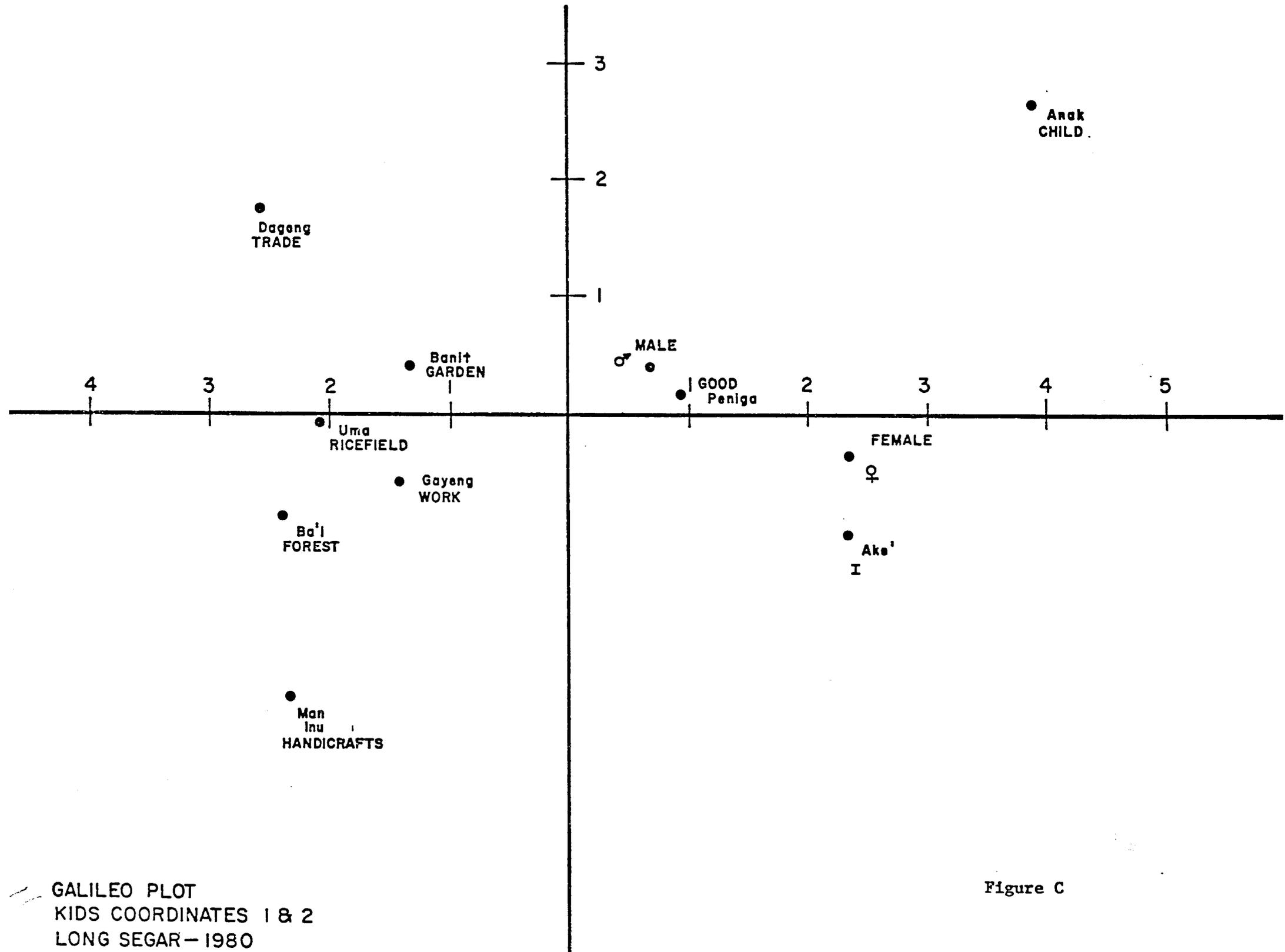
STUDENTS IN LONG SEGAR - 1980

	FEMALE	MALE	ME
FOREST	7.8	6.7	6.1
RICEFIELD	6.3	6.0	6.0
GARDEN	5.4	6.8	5.0
MALE	6.3	-	4.7
FEMALE	-	6.3	4.5
CHILD	4.2	5.7	4.9
WORK	4.9	4.6	5.7
ME	4.5	4.7	-
GOOD	4.3	5.2	4.9
TRADE	6.1	4.8	7.0
HANDICRAFTS	3.6	5.5	5.4



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 GALILEO PLOT
 ADULTS COORDINATES I & 2
 LONG SEGAR - 1980

Figure B



GALILEO PLOT
 KIDS COORDINATES 1 & 2
 LONG SEGAR-1980

Figure C

cognitive map is a more accurate portrayal of adult cognition than is the student cognitive map for the actual views of students. In other words, the students' cognitive systems, according to these data, were more multidimensional than were the adults' cognitive systems.

[Figures B and C go about here]

Discussion

Participant observation data from this community indicate that sex roles are extremely flexible. Both men and women at least occasionally perform virtually all tasks. Though males typically cut down large trees in forest clearing activities and women tend to spend more time in childcare and cooking activities, there is little sense that particular tasks are inappropriate for one sex or the other. In my own research experience, I have never encountered a group that more closely approximated equality between the sexes.

This traditional flexibility in sex roles is reflected in the small cognitive distance between males and females and between "me" and the two sexes, among adult respondents (Table III). This is particularly noteworthy when contrasted with the American pattern of response in which males and females tend to be nearly polar concepts, widely separated in comparison to other concepts within a domain (e.g., Newton 1977; see, for instance in Figure D, "actual man" and "actual woman").

[Figure D goes about here]

In the course of my fieldwork, people regularly reiterated that women are more hardworking than men; that women have a primary responsibility for rice cultivation and gardening; that men are the hunters; that men are less fearful of the forest than are women. Kenyah also portrayed themselves as essentially

University of Hawaii
Males & Females
Sex Roles Concepts

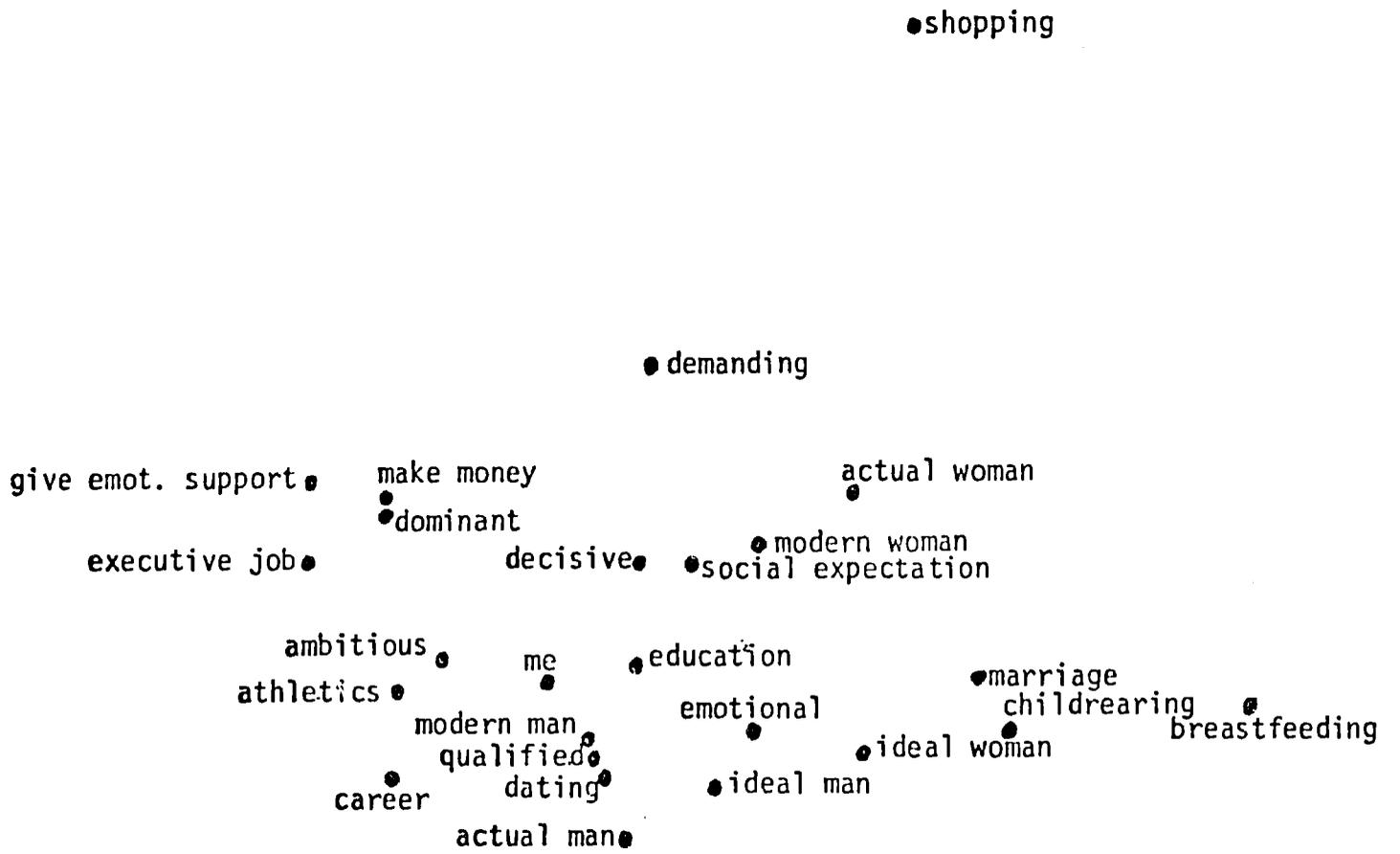


Figure D
(From Newton 1977)

rice cultivators and as disinclined to engage in commerce. These views are similarly reflected in the Galileo data for adults, providing substantiating quantitative evidence on Kenyah cognition. Observation of actual behavior (both participant observation and a formal time allocation study) similarly documented women's greater involvement in rice and vegetable production, and greater male involvement in forest-related activities (Colfer 1981a,1981b,1981c).

Indeed, none of the data provided by the Galileo method were contrary to my expectations based on much more intensive observation and a number of formal studies over an 11 month period of time. I am not suggesting that the Galileo method should replace the kind of data collection in which I was involved over that period of time. But I am suggesting that the method provides a relatively inexpensive, quick, reliable method for getting a handle on some important data related to women and their roles.

The last point I would like to delve into relates to the question of social change. Long Segar is undergoing rapid social change. It has been part of a Governmental Resettlement program which provided a number of kinds of assistance to and pressure on the community to change. Several important technological innovations have been adopted (notably the chainsaw, the outboard motor, and the rice huller), two of which have negatively influenced women's position relative to men (Colfer 1980). Most children are now in school. Marketing of one's surplus is now a possibility. Wage labor opportunities now exist in the area. And so on.

A number of factors seem to be operating to increase sex role stereotyping and to decrease women's status, in the community. Wage labor opportunities are disproportionately available to men, both because of the inappropriateness of the chainsaw for women (and the predominance of income earning opportunities

in logging) and because of the disadvantages of women's interacting with outsiders. Outsiders speak Indonesian which Kenyah women usually do not; outsiders have negative stereotypes of Kenyah women (related to alleged promiscuity). And the facts that outsiders have higher status, more power, and more rigid sex role stereotyping, encourages Kenyah to follow their lead, insofar as interaction occurs. Women's autonomy in the context of local production is even being undermined by the adoption of the outboard motor, another device that is too heavy for them to maneuver easily alone.

If we look at these kinds of changes going on in the community at large, the data presented in Table IV on teenager's perceptions, when compared with the adult perceptions provided in Table III, would seem to corroborate these changes. The distance between male and female is considerably greater (as are all the other distances). Female is farther from ricefield and from work than are males; both the reverse of adult perceptions. Trade had moved closer to both sexes, but far closer to males than to females.

Considering the Galileo as a reliable indicator of social change is seductive in this case; but an equally plausible interpretation of these differences is that they merely reflect differences in the life experiences of adults and teenagers---under conditions of comparative stability as well as under conditions of change. Testing of this alternative hypothesis by administering the same instrument to adults and teenagers in the remote, hinterland village (from which the inhabitants of Long Segar migrated) where the forces of social change are virtually non-existent is currently underway. But in any event, these differences between the adults and the teenagers are interesting and worthy of note, particularly since the differences are consistent with forces toward social change.

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In Conclusion

Information, collected and analyzed using the Galileo method, can provide much needed quantitative evidence about traditional and/or existing women's roles, in a reasonably short period of time. This kind of information is particularly important now that policymakers and "developers" are beginning to become aware of some of the adverse impacts of development on women when development programs are planned in the absence of such information (as has traditionally been the case).

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