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**9. ABSTRACT**

Fishermen in a western Puerto Rican fishing village were studied to ascertain characteristics which supported or resisted technological change in their fishing operations. Most factors were related to the community's modernization. In this transition, change could be either supported or resisted by family and friendship groups, by individual personality, by a person's identification with the area in which he lived and his relationship to it, and an individual's social and personal values. Economic motivation tended to support change. A person's evaluation of his activity, status, or situation as adequate evidenced resistance to change. Hostile, deterring responses to change derived from threat or deprivation. In addition, proneness toward technological changes in fishing operations was discerned as related to allocations of space and time use for fishing as well as to maintaining enough catch to achieve status expectations in a commercially oriented developing status system. Alteration of the work rhythm with "Large boats and adequate equipment" stood to have reorganizing effects on family and economic institutional structures of the fishermen in the community.

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SPACE-TIME USE AND TECHNOLOGY TRANSFER\*

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## SPACE-TIME USE AND TECHNOLOGY TRANSFER

### Abstract

Fishermen in a western Puerto Rican fishing village were studied to ascertain characteristics which supported or resisted technological change in their fishing operations. Most factors were related to the community's modernization. In this transition, change could be either supported or resisted by family and friendship groups, by individual personality, by a person's identification with the area in which he lived and his relationship to it, and an individual's social and personal values. Economic motivation tended to support change. A person's evaluation of his activity, status, or situation as adequate evidenced resistance to change. Hostile, deterring responses to change derived from threat or deprivation. In addition, proneness toward technological changes in fishing operations was discerned as related to allocations of space and time use for fishing as well as to maintaining enough catch to achieve status expectations in a commercially oriented developing status system. Alteration of the work rhythm with "Large boats and adequate equipment" stood to have reorganizing effects on family and economic institutional structures of the fishermen in the community.

## SPACE-TIME USE AND TECHNOLOGY TRANSFER

During 1973, the author worked as one of a multi-disciplinary team engaged in studying the potential for fisheries and mariculture development in the Commonwealth of Puerto Rico. Disciplines represented included anthropology, economics, engineering, marine biology, oceanography, and sociology. An aspect of the study focused on occupational roles of artisan\* fishermen and on technology used by them. Special attention was given to factors contributing to change, or lack of change, in role and technology.

In relation to these interests, a series of communities on the western coast of Puerto Rico was studied. Fishing villages by origin and tradition, these locality settlements were undergoing long-range disruption and reintegration under the impact of increasing commercialization. Lack of space limits comments on the transition. However, field workers' observations report, as pertinent to role and technology changes among fishermen, a combination of related characteristics, observed in some cases to support change and in other cases to resist change. They are relevant to the gradual breaking up of traditional community structure and reorganization of the community with a structure derived from commercialization of activities. In this context, role and technological

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\*These are defined as fishermen relying more on craft skills and animate power than on mechanization and inanimate power in their occupational activity. Living is regarded as being at or near subsistence levels.

changes could be either supported or resisted by family and friendship groups on which individuals relied as reference groups (support systems) during transitions, by an individual's motivation and ingenuity, by an individual's identification with the area in which he lived and his relationship to it, and an individual's personal and social values. Particular configurations of these characteristics appeared to vary with position in the traditional status system and with potential status in a developing commercially oriented status system.

Under these circumstances, a consequential factor supporting change was the economic motivation of individuals. To the extent that people were motivated to achieve status and the appurtenances of level of living and life style through commercialization of their activities, they were disposed to adopt changes which increased income, as long as this did not disrupt other valued aspects of their way of life. For many individuals, value is placed on having work as easy as possible and enjoyable; the setting in which they live has supported these values and does so decreasingly, now; yet, to earn money in that setting at the sacrifice of other valued aspects of living is not generally acceptable among the fishermen. Some individuals may become adequately motivated to endure the disruption of breaking out of this value orientation.

Consequential factors evidencing resistance to change are an individual's evaluation of his activity as adequate and evaluation of his current status and setting as adequate.

An additional relationship was observed as an impediment, if not as resistance, to change. This is a hostile response to change. Hostile responses were observed as contingent upon people's feelings of being threatened by on-going change or upon their feelings of being deprived in their relationship to on-going change.

Specific inquiry was made relative to factors influencing a phase of the work rhythm of the fishermen and to their observations about past and expected changes in fishing. Relative to their work rhythm is their use of space and time for going to sea and fishing. The data presented here are from 27 artisan fishermen, who have mechanized their operations to varying degrees during the past 15 years, in one village.

First, a word about the fishermen. They were users of fish traps, lines (fabric and wire), and nets; the boats which they used ranged in length from 14 feet to 38 feet, with an average length of 18.04 feet. Two boats of over 30 feet in length had sails and inboard motors of 46 to 80 horsepower. All boats under 30 feet in length, of which the longest was 20 feet, were powered with outboard motors having from 16 to 40 horsepower. The average horsepower for these was 26.5. Monthly cash household incomes ranged from \$US83.00 to \$US783.00, with an average of \$194.50. When only fishermen having boats under 30 feet in length are considered, the mean length of boat is 16.6 feet, the mean horsepower is 23.6, and the mean monthly household cash income is \$170.40.

To fish, most fishermen went offshore during daylight hours from 3 to 5 or 6 times a week.

A day fishing trip took fishermen offshore to distances which ranged from 2.5 miles to 17.5 miles and averaged 7.1 miles. Forty-eight per cent of the fishermen went between 6.5 miles and 9.0 miles offshore; those going less than 6.5 miles were 37.0 percent of the total, while those going more than 9.0 miles were 15.0 percent of the total. The trip ranged in time from 2.5 to 11.0 hours, with an average of 6.8 hours. Two-thirds of the fishermen were out between 6.0 and 7.6 hours; 15.0 percent were out less than 6.0 hours and 18.0 percent were out more than 7.5 hours.

A day fishing trip could begin as early as 3:30 a.m. and as late as 9:00 a.m. Fifty-two percent of the fishermen began their

trips between 5:00 a.m. and 6:30 a.m.; 29.0 percent began earlier than 5:00 a.m. and 19.0 percent began after 6:30 a.m. Times for returning ranged from 9:00 a.m. until 3:00 p.m. Forty-four percent of the fishermen returned between 11:00 a.m. and 1:00 p.m.; 19.0 percent returned earlier and 37.0 percent returned after 1:00 p.m.

The trip itself was usually into an area ranging from 2 to 17.5 miles off the southwest cape (Cabo Rojo) of Puerto Rico. The village of Cerro Pueblo\* and the Cabo Rojo lighthouse (Faro), about 2 miles apart, were used as landmarks delineating the landward "corners" of this area, which extended westward from the village and south from the lighthouse. However, about one-third of the fishermen went as far north as Mayaguez (approximately 18 miles) and about one-ninth went eastward as far as La Parguera (approximately 10 miles). Two fishermen, with appropriate boats, occasionally went as far west as Mona Island, slightly more than 40 miles away.

Of the reasons given by fishermen for fishing in that area, 50.0 percent pertained to the fact that fish existed there and could be caught there. As many as 28.6 percent indicated that their boats were too small or inadequately powered or inadequately equipt to go elsewhere. And 21.4 percent indicated that they liked it, knew the area, or regarded it as "the area" for Cerro Pueblo fishermen (with territorial implications).

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\*A fictitious name, used for the sake of anonymity.

Of the reasons given for not fishing in other places, 51.7 percent pertained to the smallness of boats and the inadequacy of equipment. Factors related to tension management--knowing the area, liking it, and regarding it as territory for Cerro Pueblo fishermen--accounted for 24.1 percent of the reasons for not fishing in other places. Environmental reasons--wind and rough water--along with increased costs, each accounted for 10.4 percent of the reasons. Only 3.4 percent of the reasons pertained to the availability of fish in the area.

In summary, the fishermen were essentially in low income levels; most of them used small boats with outboard motors (a practice introduced within the previous 15 years) and ranged from 2.5 to 17.5 miles at sea in an area which nurtured fish stock and could be reached with their small boats. Fishing was generally an early morning activity, for mid-day weather conditions and small boats precluded fishermen's comfort, safety, and preservation of their catch. For the most part, fishermen restricted their fishing in the described area by virtue of the availability of fish there, their familiarity with the area and satisfaction with it, and their inability to go elsewhere because of small boats and limited equipment. Fishing trips averaged 6.8 hours in duration and ranged off-shore through distances averaging 7.1 miles.

### Concepts

Perspective on use of space and time is taken with the following social system concept: human organisms mutually involved and syn-

chronized with each other and a given environmental context.

In looking at factors limiting use of space and time in fishing, use is made of the premise that any routine of activity, in order to be retained in a way of life, has to contribute simultaneously within a given interval to tension management for social system members as individuals and to a function essential to the operation of the system. Perspective on tension management is taken with H. S. Sullivan's concepts of situation integration-resolution (Sullivan, 1953:92-94). The perspective is enlarged to encompass management of euphoria and tension as physiological states of being and the coordinating processes of conceptualization relative to object involvement (Spaulding, 1970:4-6); the processes of conceptualization pertinent here are relevant to cognitive mapping, boundary maintenance, and territoriality as described by C. P. Loomis (Loomis and Loomis, 1961:5, Figure 1). Perspective on processes essential for the functioning of a social system is taken with the following itemization of functions which are collectively necessary for sustained functioning of social systems:

- 1) Securing new members and terminating memberships;
- 2) Training members to conform and handling deviants;
- 3) Handling illness and physical limitations of members;
- 4) Securing usable goods and disposing of wastes;
- 5) Stabilizing and altering members positions within the system;
- 6) Affirming the identity of members and of the system;

- 7) Accommodating to uncontrolled events;
- 8) Management of the system.

The catching of fish is regarded as embodied in item 4, securing usable goods.

### Simultaneous Functions

The following data suggest that the fishing activity of Puerto Rican artizan fishermen contributes both to tension management and securing collectively usable goods. Inquiry was made about ways in which fish were disposed of after being caught; 72 responses were secured, for most fishermen disposed of their catch in more than one way. However, 30.6 percent of the responses indicated that part of these fishermen's catch was used as food in their own homes; this contributed to managing the tension of hunger. The remaining 69.4 percent were indications of distributions through transfer procedures to other people; fish were given as gifts to friends and relatives and/or sold to any one or combination of the following: buyers, restaurants, tourists, friends, relatives, retail customers if the fisherman owned a store, and to stores. Of the total number of ways for disposition, 23.6 percent pertained to gift giving and 45.8 percent pertained to sale. Buyers to whom we talked sold, as "middlemen," to restaurants, primarily, and to stores, secondarily. The implication of this is that ultimately, after being involved in a series of transfers from person to person, the fish were utilized primarily as food, thus contributing to the management of hunger tensions both for the fishermen and for the

ultimate recipients of the fish in the transfer sequences. Hence, the fishing activity per se contributes during the interval of preserving edible fish both to tension management and to securing (extracting and distributing) usable goods.

#### Limits on Use of Space and Time

Fishermen were asked how they felt about going both longer and shorter distances offshore to fish, relative to distances they usually went. Answers could be classified as favorable, ambivalent, or unfavorable; in addition, an answer provided a rationale for the point of view taken by the informant, and these rationales were interpreted as indicating factors which limited use of space. Rationales were considered, conceptually, in the context of person-object involvements, in which use of space was oriented by the fishermen's involvement with the fish they wished to catch; hence, the rationales range in a conceptually consistent manner from those describing tension management (person) to those pertaining to quantity and quality of catch (object). The orientation draws on H. S. Sullivan's use of situation integration-resolution.

Similarly, the fishermen were asked how they felt about staying at sea for longer intervals than they usually did and for shorter ones. For analysis, answers were regarded as favorable, ambivalent, or unfavorable. The rationales were considered in the context of person-object involvements in which use of time was oriented by the fishermen's involvement with the fish they wished to catch.

In summary, the rationales show the following relationships:

Matrix A.

<u>Influencing Factors</u>	<u>Space Use</u>		<u>Time Use</u>		<u>Total</u>	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Tension management	14	24.6	12	20.3	26	22.4
Boat size and fishing equipment	13	22.8	13	22.0	26	22.4
Institutional activities and involvements	2	3.5	8	13.6	10	8.6
Environmental processes	-	-	8	13.6	8	6.9
Quantity and quality of catch	<u>28</u>	<u>49.1</u>	<u>18</u>	<u>30.5</u>	<u>46</u>	<u>39.7</u>
	57	100.0	59	100.0	116	100.0

$\chi^2 = 22.093054$ ;  $df = 5$ ;  $P < 0.001$ .

The data indicate that tension management (embodying like or dislike of being at sea and knowledge of fishing areas), boat size and fishing equipment, and the quantity and quality of the catch influenced space use and time use mutually and to a greater extent than other factors. For both space and time, the percentage of rationales pertaining to the catch was greater than the percentage for each other influence; this is interpreted as substantiating the premise that fishermen's use of space and time, in fishing is oriented by their involvement with the fish they wish to catch. The influence of catch is greater, here, on space use than on time use. Onshore activities related to institutions pertained only to use of space, while institutional involvements (buyers, families) and environmental processes (fish spoilage and the weather) were related

only to the use of time. The use of space is significantly different from the use of time, with respect to the influences on them; for the distributions above,  $\chi^2 = 22.093054$ . With 4 degrees of freedom,  $P < 0.001$ . Impingements on the use of time are more complex than impingements on the use of space.

Details pertinent to the above relationships are shown in Tables 1 and 2. Data in Table 1 show consistently a prevalent favorable feeling among the fishermen about going longer distances offshore to fish and a prevalent unfavorable feeling about going shorter distances than they usually go. In Table 2, data show that feelings about time intervals longer than usual ones are similar, in total, to those about time intervals shorter than usual ones. About 25.0 percent of all rationales show favorable feelings about each; about 20.0 percent show unfavorable feelings about each, and the remainder are ambivalent. There seems to be flexibility with respect to staying out longer or shorter intervals, and the flexibility is seemingly related to the relatively even distribution of influences among all the effective limitations.

(Tables 1 and 2 near here)

#### Extension of Space and Time

To seek evidence relevant to the question of whether influences on space and time use might vary from the relationships shown above, fishermen were asked how much farther out to sea, beyond the distances they usually went, they would be willing to go. They were also asked how much longer than they usually stay at sea they would

be willing to stay. In each case, they were asked why they would not go farther or stay out longer. Reported extensions of distance and duration were analyzed, and rationales were viewed with the person-object involvement orientation used above with prior rationales.

Distance extensions ranged from 0 miles to 25 miles for 15 informants who specified limited distances; 12 informants indicated that there was no limit to the distances they would go. The mean distance extension for those specifying limits was 6.3 miles. Duration extension, on the other hand, ranged from 0 hours to 6 hours for 22 informants who specified limited durations; 7 indicated that they would be willing to stay for unlimited lengths of time.

The rationales for not going farther or staying longer were regarded as identifying limiting influences in the context of person-object involvement. The relationships among them are as follows:

Matrix B.

<u>Influencing Factors</u>	<u>Space Use</u>		<u>Time Use</u>		<u>Total</u>	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Tension management	-	-	11	31.4	11	17.5
Boat size and fishing equipment	18	64.3	9	25.7	27	42.8
Institutional activities and involvements	1	3.6	2	5.7	3	4.8
Environmental processes	2	7.1	10	28.6	12	19.0
Availability of catch	<u>7</u>	<u>25.0</u>	<u>3</u>	<u>8.6</u>	<u>10</u>	<u>15.9</u>
	28	100.0	35	100.0	63	100.0

$$X^2 = 20.338263; df = 4; P < 0.001.$$

For going beyond usual distances, tension management was not a limitation; characteristics of boat size and equipment were the most prevalent limitations (64.3 percent of the rationales). Only 25.0 percent of the rationale indicated that lack of catch was a limitation; environmental processes and institutional involvements each accounted for fewer than 10.0 percent of the rationales. For extending time at sea, tension management was a consequential limiting influence, accounting for 31.4 percent of the rationales. Environmental processes accounted for 28.6 percent of them, while characteristics of boat size and equipment accounted for 25.7 percent of them. Availability of catch and institutional involvements each accounted for less than 10.0 percent of the rationales. The evidence indicates that under the "stress" of going beyond usual distances and extending time at sea beyond usual intervals, the limiting factors differ in their influence on fishermen's use of space and time from their degrees of influence on use of usual distances and intervals. Boat size and equipment become the primary influence limiting the use of space, while tension management and environmental processes become primary influences in limiting extension of time. In addition, the two distributions are significantly different from each other.  $\chi^2 = 20.338363$ ; with 4 degrees of freedom,  $P < 0.001$ . Impingements on the extension of time use are more complex than impingements on the extension of use of space; yet, when all rationales are considered in combination, boat size and equipment are shown to be more influential (42.8 percent of all rationales) than each other limiting influence. Details concerning the rationales are shown in Tables 3 and 4.

(Tables 3 and 4 near here)

Rationales and Space and Time Increases

Influences on the use of space and time differed significantly when classified according to time increased distances fishermen would go offshore and according to increased time intervals they would spend at sea. Extension of time intervals was more restricted than was extension of space intervals. Definite limits on extensions of space were associated with 57.1 percent of the influences on space extension; definite limits on extension of time were associated with 85.8 percent of the influences on time extension. The distributions are shown below; for them,  $\chi^2 = 6.375184$ ;  $df = 2$ ;  $P < 0.05$ .

Matrix C.

<u>Extended Distances and Intervals</u>	<u>Space</u>		<u>Time</u>		<u>Total</u>	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
None	7	25.0	12	34.2	19	30.2
Specific limitations	9	32.1	18	51.6	27	42.9
Unlimited extension	<u>12</u>	<u>42.9</u>	<u>5</u>	<u>14.2</u>	<u>17</u>	<u>26.9</u>
	28	100.0	35	100.0	63	100.0

$\chi^2 = 6.375184$ ;  $df = 2$ ;  $P < 0.05$

The rationales for not going farther offshore have a systematic relationship to the extensions of space and time. With respect to extended distances, no catch and inadequate boats and equipment were emphasized among fishermen who indicated they would go no farther than they usually do; these fishermen provided 25.0 percent

of the rationales. On the other hand, 42.9 percent of the rationales were provided by fishermen who indicated there was no limit to the distance offshore they would go, if they had a boat of adequate size with refrigeration and food handling facilities. Between these extremes, no catch and inadequate equipment (including the boat) are emphasized for extensions ranging from 1 to 10 miles; for extensions of 20 miles or more, inadequacy of the boat is emphasized. Details are in Table 5.

With respect to extended intervals of time, tension management and environmental processes were emphasized among the fishermen who indicated that they would not stay out longer than they usually do; they provided 34.2 percent of the rationales. Only 14.2 percent of the rationales were provided by fishermen who indicated there was no limit to the time they would spend at sea, if they had a boat of adequate size equipt with refrigeration and food handling facilities. Between the extremes, tension management and environmental processes are emphasized for extensions of 2 and 3 hours; for extensions of 4 to 6 hours, inadequacy of the boat and equipment is emphasized. Details are in Table 6.

(Tables 5 and 6 near here)

Relationships of Limits on Space and Time  
Use in Catching Fish to Past and Expected  
Changes in Fishing

Fishermen were asked what changes had taken place in fishing during the prior five years and what changes they expected in the future. Responses pertained to boats and equipment, environmental

processes, institutional involvements, and stock and catch. They are summarized in Table 7. Changes during the past five years pertained predominantly (60.4 percent) to reduction of the fish stock and catch. Secondly (33.3 percent), they pertained to economic institutional structures and relationships. Expected changes pertained predominantly (35.0 percent) to governmental and economic institutional structures and relationships and secondarily (32.5 percent) to boats and equipment. These past and expected changes have systematic relationship to factors limiting use of space and time in fishing.

(Table 7 near here)

The diminishing fish stock and catch tend to disrupt the stability of the spatial orientation fishermen use in catching fish; as shown in Matrix A, catch is more critical (39.7 percent) than other influences on usual use of space and time in fishing and is much more critical for use of space (49.1 percent) than for use of time (30.5 percent). Among other consequential influences on usual use of space and time are boats and equipment (22.4 percent) and tension management (22.4 percent); each is slightly more influential on use of space than on use of time, but the difference is meager for boats and equipment.

As shown in Matrix B, there is a difference between the influence of boats and equipment and of tension management which is made apparent in considering extension of space and time use. Boats and equipment are more critical (42.8 percent) than other influences

for the extension of space and time use. It is the greatest influence (64.3 percent) on limiting extension of space [(catch (25.0 percent) is less, even though consequential)], and it is more prevalent (64.3 percent) as a limit on extending space use than it is as a limit on extending time use (25.7 percent). Tension management, on the other hand, is regarded as being of no influence on limiting the extension of space use and the most influential factor (31.4 percent) on limiting extension of time use.

Thus, when compared to tension management, boats and equipment are shown to be more influential factors than tension management in use of and in limiting changes in use of space and time. (Matrices A and B). Totals for Matrices A and B combine in the following manner:

Tension management	37	20.7
Boat size and fishing equipment	53	29.6
Institutional activities and involvements	22	12.3
Environmental processes	11	6.1
Catch	<u>56</u>	<u>31.3</u>
	179	100.0

Overall catch, boat size and equipment, and tension management are the most influential factors in limiting use and extension of space and time.

Hence, under circumstances in which the existing spatial orientation of fish catching is being disrupted by the disappearance

of stock and decrease in catch, extensive changes (32.5 percent, Table 7) are anticipated in boats and equipment, which are the next most influential factors in limiting use and extension of space and time. The influences of boats and equipment on usual use of space and time in fishing are more nearly alike than the influences of other limitations on space and time use in fishing; there is compatibility in their space and time binding characteristics relative to the activity. This suggests that in technology transfer, or diffusion of artifacts, relative to a given function in society, changes which are made may tend to be those which contribute to compatible space-time binding characteristics, among other characteristics which enhance the probability of their occurrence (Rogers, 1971; Solo and Rogers, 1972).

#### Other Expected Changes

The above comments do not clarify the relationships which exist for institutional involvements as they pertain to use of space and time and to past and expected changes in fishing. With respect to use of space and time while at sea, the institutional involvements which are influential were economic and familial contacts and activities. Indicative of them are the following: "I miss my family." "My family would worry." "I've got to get the fish back here to the buyer." and "I could get back and mend nets." On the other hand, with respect to past and expected changes, the emphasis was not on personal contact with institutional structures but rather on new or changed relationships within existing institutional structures. Economic and governmental relationships pertain. With respect to the former, relationships

such as costs, prices, profits, quitting fishing, and the powers of buyers as "middlemen" were considered; with respect to the latter, government loans and other assistance with securing boats, equipment, piers, and other facilities were considered, along with increased government regulation of fishing, fish processing, and fish marketing. Clearly, the institutional characteristics brought to bear on use of space and time while fishing are different from those cited as entailing past and expected changes. The former (family and economic) are looked upon as having meager influences on use of space and time while fishing (8.6 percent, Matrix A) and on extension of space and time use (4.8 percent, Matrix B). The latter, however, (economic and governmental) account for 33.3 percent of the past changes and 35.0 percent of those expected; the ranking for these is 2nd for past changes and 1st for expected changes; 1st among past changes is diminishing fish stock and catch (Table 7).

The economic and governmental relationships embodied in past and expected changes pertain not to use of space and time while at sea fishing, but to reorganization of a way of living which these fishermen have been experiencing as their fishing has become increasingly commercialized. The transition has bearing on expected changes. Fishermen were interested in catching fish to sell--some were concerned primarily with meeting expenses and others were interested in catching and selling enough for profit. Achievement in these respects would be influential in establishing their position in a reorganized community with a commercially oriented status system. Under these circumstances, the emphasis on future use of

larger boats stands as a compromise between the traditional ways of fishing, enlarged to the point of reorienting space-time commitments to fishing activity, and the necessity for securing money in the milieu of developing commercialism. We received no indications that fishermen visualized or anticipated additional change in their way of life which might stem from the kind of space-time commitment to fishing activity they seemed prone to make. Specifically, under circumstances in which overnight or week-long fishing trips might take place with adequately equipped boats of 60 feet or more in length, the absence of a critical authority figure in the family structure can induce role accommodations; the operation of boats of this size would also stand to induce reorganization of work roles from the operation of the boats by family members and friends to use of paid crews or crews who are compensated with a share of the catch. These can be among the unanticipated consequences in this changing society of making a technological adaptation which stands to contribute simultaneously to tension management and system integration, to maintain compatible space-time orientations to the activity for which the new technology is used, to maintain an object relationship critical for identity ("We are fishermen."), and to contribute to status functions within a re-integrating social structure.

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Table 1. Feelings About Going Longer and Shorter Distances From Shore to Fish; 27 Artisan Fishermen, Cerro Pueblo, Puerto Rico; August, 1973

Rationale	Change of Distance and Feeling						Total	
	Longer			Shorter			No.	%
	Favorable	Unfavorable		Favorable	Unfavorable			
Tension Management	-	-	-	-	-	-	14	24.6
Knowledge of other fishing areas	Known or to be learned 3	Not Known 2		Known -	Not Known 1			
Feeling at sea	Like 4	Dislike -		Like 3	Dislike 1			
Boat size and Fishing Equipment	-	-	-	-	-	-	13	22.8
	With bigger boat 9	Boat too small 2		-	Not right equipment 2			
Institutional Involvements	-	-	-	-	-	-	2	3.5
Onshore activity	-	-		Fix equipment 1	Come ashore and drink beer 1			
Quantity and Quality of catch	-	-	-	-	-	-	28	49.1
	If, or will catch more 7	Won't catch more 2		If catch enough 3	Won't catch enough ( <del>7</del> ) -3 13			
Total Percent	23 40.3	6 10.5		7 12.3	3 5.3	18 31.6	57	100.0

**Table 2. Feelings about Staying at Sea Longer and Shorter Time Intervals to Fish; 27 Artisan Fishermen, Cerro Pueblo, Puerto Rico; August, 1973**

Rationale	Change of Time Interval and Feeling						No.	%
	Longer			Shorter				
	Favorable	Unfavorable		Favorable	Unfavorable			
<b>Tension Management</b>	-	-	-	-	-	-	12	20.3
Physical condition	-	Hungry	-	Sickness; fatigue	-	-		
	-	2		2	-			
Feeling at sea	Like 1	Dislike 1		Like 2	(/) 2	Dislike 2		
<b>Boat size and Fishing Equipment</b>	-	-	-	-	-	-	13	22.0
	If, bigger boat, and more equipment							
	9	Small boat; need refrigerator	2	Ok for using lines	2	-		
<b>Institutional Involvement</b>	-	-	-	-	-	-	8	13.6
Onshore groups	-	Buyer; family	2	-	-	-		
Exchange	If making money 2	-		If making money 2	Won't make money 2			
<b>Environmental processes</b>	-	-	-	-	-	-	8	13.6
Decay	-	Fish rot in heat at sea	2	-	-	-		
Weather	Good 1	(/) 1	Bad 1	Bad 3				
<b>Quantity and quality of catch</b>	-	-	-	-	-	-	18	30.5
	If enough 3	(/) 1	No increase in catch 2	If enough 4	Not enough 8			
<b>Total</b>	16	2	12	15	12		59	
<b>Percent</b>	27.1	3.4	20.3	25.5	20.3		100.0	

**Table 3. Limitations on Extending Distances From Shore; 27 Artisan Fishermen, Cerro Pueblo, Puerto Rico; August, 1973**

Limiting Factors and Rationales	No.	%
Tension Management (0) - - - - -	0	0.0
Boat size and Equipment- - - - -	18	64.3
Need bigger boat (16)		
Need longer lines ( 1)		
Need more traps ( 1)		
Environmental processes- - - - -	2	7.1
Fish would spoil (1)		
Water pressure too deep for diving (1)		
Institutional involvement- - - - -	1	3.6
Would miss being with family (1)		
Catch- - - - -	7	25.0
No fish, or unwanted fish, farther out (7)	—	—
Total	28	100.0

Table 4. Limitations on Extending Time at Sea; 27 Artisan Fishermen, Cerro Pueblo, Puerto Rico; August, 1973

Limiting Factors and Rationales	No.	%
Tension Management - - - - -	11	31.4
Fatigue (6)		
Too hot (3)		
Hungry (2)		
Boat Size and Equipment- - - - -	9	25.7
No cooking and refrigeration (3)		
No cooking; boat small (3)		
No cooking; too few traps (1)		
No refrigeration (1)		
Too few traps (1)		
Environmental Proceses - - - - -	10	28.6
Fish would spoil (6)		
Water gets rough (2)		
Darkness comes, making travel and work dangerous (2)		
Institutional Involvement- - - - -	2	5.7
Family would worry (1)		
Responsible for family (1)		
Catch- - - - -	3	8.6
Staying longer won't increase catch (1)		
Not necessary in order to catch what I need (1)		
As long as the fish bite, I'll stay (1)		
Total	35	100.0

Table 5. Limitations on Extending Distances from Shore, Classified by Extended Distances; 27 Artisan Fishermen, Cerro Pueblo, Puerto Rico; August, 1973

Extended Distance in Miles	Rationale For Not Going Farther	No.	%
0	----- <u>be*</u> Boat too small (1) <u>be</u> Need different equipment at greater depth (1) <u>ii</u> Would miss family (1) <u>c</u> No fish farther out (3) <u>c</u> Will go farther along shore, but not out (1)	7	25.0
1,2	----- <u>c</u> No fish farther out (1)	1	3.6
2,5	----- <u>c</u> Farther out, too deep for the kind of fish we are after (1)	1	3.6
5	----- <u>be</u> Farther out, water is too deep for our lines (1)	1	3.6
10	----- <u>be</u> Boat is inadequate (1) <u>ep</u> Too far to get fish back without spoiling (1) <u>c</u> Farther out, no fish (1)	3	10.6
20	----- <u>be</u> Boat is inadequate (1) <u>ep</u> Depth is too great for diving (1)	2	7.1
25	----- <u>be</u> Boat is not large enough (1)	1	3.6
No limit	-----	12	42.9
Total		28	100.0

\*tm - tension management  
be - boat, equipment  
ep - environmental processes  
ii - institutional involvements  
c - catch

Table 6. Limitation on Extending Time at Sea, Classified by Extended Time Intervals; 27 Artisan Fishermen, Cerro Pueblo, Puerto Rico; August, 1973

Extended Time In Hours	Rationale for Not Staying Longer	No.	%
0	-----	12	34.2
	<u>tm</u> * Fatigue (2)		
	<u>tm</u> Too hot (2)		
	<u>tm</u> Hungry (2)		
	<u>be</u> No cooking and refrigeration equipment (1)		
	<u>ep</u> Weather gets rough (1)		
	<u>ep</u> Sun spoils fish (2)		
	<u>ii</u> Concern for family (1)		
	<u>c</u> No more time needed to catch what I need (1)		
2	-----	3	8.6
	<u>tm</u> Fatigue (1)		
	<u>be</u> Not enough traps (1)		
	<u>ep</u> Sun spoils fish (1)		
2,3	-----	3	8.6
	<u>tm</u> Work gets rough (1)		
	<u>ep</u> Weather gets rough (1)		
	<u>c</u> Would not increase catch (1)		
3	-----	5	14.3
	<u>tm</u> Too much work (1)		
	<u>tm</u> Too hot (1)		
	<u>ep</u> Sun spoils fish (1)		
	<u>ep</u> Darkness and dangerous travel (1)		
	<u>ii</u> Worried family (1)		
4	-----	5	14.3
	<u>be</u> No food and refrigeration equipment; too few traps (1)		
	<u>be</u> No food and refrigeration equipment (1)		
	<u>ep</u> Sun spoils fish (2)		
	<u>ep</u> Darkness and dangerous work (1)		
4,5	-----	1	2.9
	<u>c</u> Fish stop biting (1)		
6	-----	1	2.9
	<u>tm</u> Fatigue (1)		
No limit	-----	5	14.2
	<u>be</u> No food and refrigeration equipment; boat small (3)		
	<u>be</u> No food and refrigeration equipment (1)		
	<u>be</u> No refrigeration (1)		
Total		35	100.0

\*tm - tension management      ii - institutional involvement  
be - boat, equipment            c - catch  
ep - environmental processes

Table 7. Changes in Fishing During Prior Five Years and Expected in the Future; 27 Artisan Fishermen, Cerro Pueblo, Puerto Rico; August, 1973

Changes	Intervals				Total	
	Past		Future			
	No.	%	No.	%	No.	%
Boats and equipment						
Boats	2		5		7	
Equipment	<u>1</u> <u>3</u>	6.3	<u>8</u> <u>13</u>	32.5	<u>9</u> <u>16</u>	19.2
Environmental processes	<u>0</u> <u>0</u>	0.0	<u>2</u> <u>2</u>	5.0	<u>2</u> <u>2</u>	2.3
Institutional involvements						
Economic: costs and prices	7		2		9	
profits	6		1		7	
fishermen/buyers	3		4		7	
Governmental: loans	-		5		5	
regulation	<u>-</u> <u>16</u>	33.3	<u>2</u> <u>14</u>	35.0	<u>2</u> <u>30</u>	34.1
Stock and catch						
Less stock or none	13		5		18	
Less catch	12		1		13	
Same catch	3		-		3	
More catch	1		3		4	
More stock	<u>-</u> <u>29</u>	<u>60.4</u>	<u>2</u> <u>11</u>	<u>27.5</u>	<u>2</u> <u>40</u>	<u>45.4</u>
Total	48	100.0	40	100.0	88	100.0

$\chi^2 = 15.877368$ ;  $df = 3$ ;  $P < 0.01$