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64-5

COGNITIVE CONSEQUENCES OF A PERSON'S POSITION  
IN A FORMAL ORGANIZATION<sup>1</sup>

by

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Technical Report No. 24

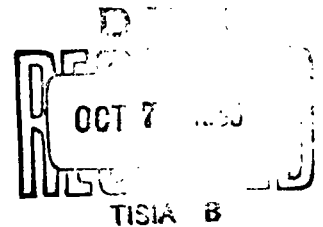
June, 1963

Prepared under Contract NONR-1224(34)  
(NR 170-309)

for

OFFICE OF NAVAL RESEARCH

RESEARCH CENTER FOR GROUP DYNAMICS  
INSTITUTE FOR SOCIAL RESEARCH  
THE UNIVERSITY OF MICHIGAN  
Ann Arbor, Michigan



A person's position in an organization may be said to "filter" the information he has commerce with. The flow of information in a formal organization distributes it unequally among the organizational positions both with respect to amount as well as to kind. Some positions receive, transmit, and relay a large amount of information, others a small amount. Some positions deal with information of very specialized nature, while others have access to a broad variety of informational content.

It was shown in previous studies (Zajonc, 1954; 1960) that individuals expecting to deal with information "tune in" cognitive structures which constitute the basis of their commerce with the information. The nature and morphology of these cognitive structures were found to depend on the expected communication and on the individual's role in the communication process. Persons whose role in the communication process was primarily to transmit information were found to tune in morphologically different structures than persons whose primary role was to receive information. Because organizational positions consistently supply their occupants with differential opportunities for reception, processing, and transmission of information, the cognitive structures tuned in by them in coping with this information will reflect the communication demands and opportunities of the positions. It is the purpose of this study to examine these cognitive consequences of a person's position in a communication network which derives from his position in a formal organization. The former studies utilized laboratory

procedures to analyze these effects. The present one was designed to study them under field conditions. A sample of employees of an industrial company employing approximately 1000 men was examined for their participation in the communication process and for the cognitive consequences of their positions in the company. The main concern was with the way the employees view the company itself. Cognitions about the company were examined among employees responsible for line as well as for staff functions. Within each function the sample included three hierarchical levels.

#### METHOD

Subjects. Forty-two employees of an industrial company were used as Ss. Eight Ss held vice-presidential positions, each of which was responsible for the operation of a particular department. Fifteen Ss were first-level supervisors, and 19 were employees who had no supervisory responsibilities whatsoever. Of the eight department heads, four held responsibility for staff functions (personnel, accounting, etc.) and four for line functions, i.e., various production departments. On the supervisory level five held staff and ten line functions. On the lowest level nine Ss were identified with staff functions (typists, secretaries, clerks) and ten with line functions (production workers). The two lower levels were distributed fairly equally among the various departments of the company.

The Ss do not represent a random stratified sample of the company, as only those willing and available at the time of the research participated in the study. It must be noted that the higher hierarchical levels represent greater proportion of the sampling universe than the lower levels. For instance, the department heads represent 80% of the department-head population in the company, supervisors approximately 20% of all the supervisors, and the employee group approximately 4% of the employees.

The educational level of the Ss in terms of years of school attended is shown in Table 1. While there are

Table 1

Average number of years of school attended  
by the subjects

Hierarchical level	Staff	Line	Both
Heads	12.75 (4)*	11.10 (4)	11.92 (8)
Supervisors	12.90 (5)	10.30 (10)	11.17 (15)
Workers	12.67 (9)	9.75 (10)	11.13 (19)
All levels	12.70 (18)	10.20 (24)	11.29 (42)

\* Figures in brackets indicate N.

differences in educational level associated with hierarchical level as well as with function, only those associated with the latter variable reached an acceptable level of significance.

The measurement of the properties of cognitive structures.

Ss were examined in small groups of five to ten persons. Each S was issued a booklet to which was attached a stack of 52 blank cards marked from A to ZZ. The Ss' task was outlined on the first page of the booklet. They were asked to imagine themselves in a position requiring them to describe the company they worked for to someone who has absolutely no information about things on earth, for instance, a Martian. They were warned that they cannot assume any previous knowledge on the part of the Martian, and that their descriptions of the company must enable him to obtain a complete and meaningful impression. The description was to be accomplished by listing on the blank cards the characteristics which describe the company.

Four measures of cognitive structures were obtained; differentiation, complexity, organization, and segmentation. All of them are described in detail in the previous publications (Zajonc, 1954; 1960). Differentiation of the cognitive structure represents the amount of information which the structure subsumes. To measure it the Ss were instructed as follows:

On each card separately write one thing which describes the company. While doing this you must assume that the Martian has extremely meager information about things on Earth. If you were to describe the company to an inhabitant of Earth you could omit certain obvious facts which are of general knowledge. You cannot do so in this particular instance because we do not know what is obvious to Martians. Of course, there is no need to go into extreme details. You may restrict yourself to the important aspects.

Now about the things you should put down in describing the company. This is really up to you. Keep in mind that from the things you put down the Martians will construct for himself a picture of the company you work for. Remember, however, that the Martians can understand you best if there is only one thing or aspect describing the company on any one card. This can be either a word or an entire sentence.

You may have too many or too few cards, but this shouldn't bother you. Put down as many things as you feel are necessary to describe the company you work for adequately. There is no fixed number of such things that can be considered as either "correct" or "incorrect."

The number of characteristics listed by the S constituted the degree of differentiation.

Complexity reflects the variety and elaboration of the information dealt with. The more different categories of information are represented in the cognitive structure, and the more the information is elaborated into sub-classes and sub-categories, the more complex is the cognitive structure. The definition of complexity weights each attribute by its level of inclusion in the system of classification. Characteristics included in the lowest level are weighted by a factor of 1, in the second-lowest by a factor of 2, and so on. The complexity score is represented by the sum of the weighted values. To obtain it the Ss were instructed as follows:

Lay out in front of you all the cards you used for listing the characteristics of the company. Look over them carefully and notice whether they fall into some broad natural groupings. If they do, arrange them into such groups.

After arranging the cards into groupings the Ss were issued the following instructions:



Now, look at your groups one by one and see whether these can't be broken down into sub-groups. If they can, separate the cards accordingly. It is also possible that these subgroups can be broken down further, and so on.

When you have arranged all your cards into groups and subgroups, list your groupings on the sheet below as if they were points and subpoints of an outline. First, give names or titles to your groups and subgroups. Then, in the right hand column list all the characteristics that belong in the respective groups and subgroups.

The groupings and sub-groupings were used to determine the levels of inclusion of the cognitive elements, which constituted the basis for computing complexity scores.

Organization is defined in terms of the unity of the cognitive structure. Unity is the degree to which the elements of the cognitive structure depend on one another, or, in other words, the extent to which the cognitive structure represents a tightly knit whole. Organization, on the other hand, reflects the extent to which the integration of the structure is accomplished around a single focus or around many foci. If there is one guiding principle which organizes the components of the cognitive structure then the structure is said to be highly organized; if there are many such principles the organization is of lesser degree. In order to measure the degree of organization the following instructions were issued to the Ss:

It is possible that some characteristics are related to one another. They may depend on one another in such a way that if one changes the other ones would change, too. Suppose the desk in front of you were bigger than it is now. Then it would also become heavier. This means that the weight of the desk depends on its size. The relationship between the

characteristics you put down may not be so obvious and so simple, but try to decide for each pair whether such relationship exists. To do this lay out the cards in front of you in alphabetical order and follow the procedure below:

List all the characteristics which would change if CHARACTERISTIC A were changed, absent, or untrue of the company. List all the characteristics which would change if CHARACTERISTIC B were changed, absent, or untrue of the company, and so on.

On the basis of these responses, dependency matrices were constructed using a score of 1 when a given characteristic was seen by the S as depending upon another, and 0 when it was not. The total sum of dependencies divided by the maximum possible sum of dependencies for the given matrix constituted the measure of unity. From the matrix the characteristic upon which the greatest number of other characteristics depended could be found. The number of characteristics which depended upon this strongest one divided by unity gave the measure of organization of the cognitive structure.

Segmentation represents the degree to which the groupings within the cognitive structure are independent of one another. Its reciprocal thus reflects integration. The groupings which served to score complexity and the dependency matrices which served to compute unity of the cognitive structure were both used in assessing the degree of segmentation of the cognitive structures. For each grouping the number of characteristics of which it was independent was determined. This number was then divided by the maximum possible number of characteristics of which the given grouping could be

independent. These quotients were summed over all the groupings of the given cognitive structure, and to normalize the score, the sum of the quotients was divided by the degree of differentiation. The final result represented the segmentation score.

Measurement of Communication. Organizational members derive information about the company largely through communication with others. The wider one's contacts with people in other departments and divisions, the greater his access to diverse kinds of information. Each position in the organization is linked through formal communication channels with a variety of other positions, i.e., each member communicates regularly with several others in order to accomplish his assigned responsibilities. Typically, each member also has a number of informal contacts in the organization with whom he communicates about things which are not necessarily related to the job.

Four indices of communication were computed. First, each S was presented with a list of the 39 departments and divisions in the company and was instructed as follows:

Below is a list of all departments in your company. There are also three columns. One is entitled "Department Heads"; the second is entitled "Supervisors"; and the third is entitled "Employees." Indicate how many Department Heads, Supervisors, and Employees in each department you see regularly as a part of your job.

The index of formal communication consists of the total number of persons the S mentions in response to these instructions. He is then given a second copy of the list of departments and is asked to:

Indicate how many Department Heads, Supervisors, and Employees in each department you see informally (not in connection with your job).

The total number mentioned here constitutes the index of informal communication. The measure of total communication consists of the sum of the formal and informal communication indices.

Because people at higher levels in the authority hierarchy tend to generate more information about the company contacts with them are more important vis-a-vis cognitive inputs than are contacts with others at lower levels in the hierarchy. Therefore, a weighted formal communication index was constructed by weighting the number of contacts by the hierarchical level of the contacts.

## RESULTS

Communication. It was assumed that individuals occupying different positions in the company are given different communicational opportunities and demands. The validity of this assumption is examined by analyzing the various communication indices. Table 2 shows these results. We note that on the whole there is more communication among the higher hierarchical levels, and in general, somewhat more among staff than line employees. This is particularly true for formal communication and for weighted formal communication. Both of

Table 2

## Communication patterns

Index		Heads	Supervisors	Workers	All levels
Total communication	Line	327.8	271.3	214.0	256.8
	Staff	338.8	390.8	204.22	285.9
	Both	333.3	311.1	209.4	
Formal communication	Line	193.3	159.9	95.9	138.8
	Staff	239.8	191.4	134.4	173.7
	Both	216.5	170.4	114.2	
Informal communication	Line	134.5	111.4	118.1	118.0
	Staff	99.0	199.4	69.8	112.3
	Both	116.8	140.7	95.2	
Weighted formal communication	Line	43.2	29.0	19.9	27.5
	Staff	44.3	36.6	31.3	35.7
	Both	43.6	31.5	25.3	

these indices showed significant or nearly significant F-ratios for hierarchical level (2.72 and 3.53,  $p < .10$  and  $p < .05$  respectively, both for 2 and 36 df).<sup>2</sup> The effect of function was significant for the weighted communication but just failed to reach acceptable level of significance for formal communication. We note that with

respect to informal communication, it is the staff supervisors who exhibit the greatest frequency. Among line employees it is the department heads who have the greatest amount of informal communication, although the differences in the amount of informal communication among the hierarchical levels of the line employees are rather slight. The interaction between function and hierarchical level was not significant.

The amount of communication an individual engages in does not unequivocally reflect the amount of information with which he has contact. For some cases the communication may involve a good deal of redundant information, for others it may constitute a genuine gain in information. Thus, for instance, an employee reporting a given frequency of communication may be referring to the number of times his supervisors issue orders to him, or check with him on the time at which his assignment will be accomplished. Such communication has little value in gaining information about the company as a whole. On the other hand, a typist in the president's office, even when communicating little with others, has easy access to information about the company policies, intended changes in the policies, production, sales, expansion plans, problem areas, etc. On the whole, however, there is probably a significant relationship between the amount of communication reported and the amount of information received, transmitted, or processed, and we shall take the above results as supporting the intuitively plausible assumption that staff has more commerce with

information about the company than line, and that higher hierarchical levels have more commerce with this information than lower levels.

Communication and cognitive structure. The second assumption made in the present study was that the cognitive structure is influenced by the individual's access to information. The amount and kind of information with which the individual must repeatedly deal influences the organization of cognitive structures tuned in by him in coping with it. Although this point is not too well documented, it is probably true that habitual ways of dealing with information about a particular subject matter lead to habitual styles of cognitive structures processing this information. There are probably momentary variations arising as a consequence of momentary situational requirements, but on the whole, individuals who have different histories of communicational involvement and therefore different histories of information received, processed, and transmitted, will in general have different cognitive structures. Since we take the components of the cognitive structure to represent traces and effects of information processed in the past, we should expect that individuals having restricted communicational history will cognitively differ from those having a rich communicational history.

Table 3 shows means of the four properties of cognitive structure broken down in terms of weighted formal communication and, for purposes of comparison, also in terms of informal communication.

Differentiation was said to reflect the sheer amount of information which the individual receives, processes, and transmits. We note that informal communication does not have an effect upon the degree of cognitive differentiation

Table 3

Measures of cognitive structures as a function of weighted formal and informal communication

Measure	Informal Communication		t	Weighted Formal Communication		
	High	Low		High	Low	t
Differentiation	13.19	12.81	.16	16.09	9.60	3.08***
Complexity	34.05	31.91	.34	40.73	24.45	2.84***
Segmentation	.241	.213	.56	.187	.270	1.69*
Organization	60.83	31.71	1.59	68.67	23.87	2.10**

\*\*\*  $p < .01$

\*\*  $p < .05$

\*  $p < .10$

while formal communication does. We are dealing here with the company as the cognitive object. While informal communication among employees may foster cognitive effects with respect to certain cognitive objects, their cognitions about the company itself apparently do not seem to be affected by the extent of their informal communication. Formal communication, however,



contributes significantly to cognitive differentiation. Individuals who report a greater degree of formal communication show a higher degree of differentiation.

Complexity represents the variety of informational categories subsumed by the cognitive structure. The results here are of the same character as with cognitive differentiation. Informal communication does not have an effect on complexity, while formal communication does.

Segmentation represents inversely the degree to which the various categories within the cognitive structure are integrated into a unified whole. Apparently extensive formal communication helps the individual to integrate the information he receives, while informal communication has no such effect. If anything, individuals with high opportunities for informal communication show a tendency toward greater segmentation (i.e., lesser integration).

Organization was said to reflect the degree to which the integration of the cognitive components is accomplished around a single focus. To the extent that there is one rather than many guiding principles which integrate the components, to that extent the cognitive structure is organized. Again informal communication does not help the individuals to organize their cognitions about the company, while formal communication does. The contrast here, however, is fairly weak. The difference in the degree of organization as a function of informal organization almost reaches acceptable level of significance as well.

In general, therefore, we note that frequent formal communication among employees contributes significantly to the development of highly differentiated, complex, integrated, and organized cognitions about the company. Informal communication does not seem to produce these effects.

Hierarchical level, function, and cognitive structure.

It was shown that hierarchical levels differ with respect to the amount of formal communication and that staff and line functions differ in similar ways. It was also shown that cognitions about the company vary significantly with weighted formal communication. Since we assume that cognitive structures are influenced by communicational history, and since the organizational positions examined were shown to differ in these histories, we naturally expect that they will also differ in their cognitions about the company.

Table 4 shows the means of the various cognitive properties broken down in terms of hierarchical level and in terms of function of the employees. Differentiation was found to differ significantly both with respect to hierarchical level and with respect to function ( $F=15.58$  for 2 and 36 df. and  $F=4.82$  for 1 and 36 df. with  $p < .001$  and  $< .05$  respectively). Complexity showed similar trends ( $F=13.71$  and  $F=8.29$  with  $p < .001$  and  $.01$  respectively). We note that the line department heads show a somewhat higher complexity than staff department heads, and that this trend is reversed for the remaining hierarchical levels. The interaction between hierarchical

Table 4

Properties of cognitive structures of three  
hierarchical levels of staff  
and line employees

Property	Function	Hierarchical Level			All
		Heads	Supervisors	Workers	
Differentiation	Line	22.0	10.9	7.7	11.4
	Staff	23.5	16.6	10.7	15.2
	Both	22.8	12.8	9.1	
Complexity	Line	59.0	23.5	18.2	27.2
	Staff	54.8	51.4	28.9	40.9
	Both	56.9	32.8	23.3	
Segmentation	Line	.120	.245	.358	.321
	Staff	.144	.146	.189	.167
	Both	.132	.212	.278	
Organization	Line	42.53	29.58	15.76	25.98
	Staff	223.59	49.28	19.89	73.32
	Both	133.06	36.14	17.72	

level and function showed an  $F$ -ratio of 2.91 for 2 and 36  $df$ , significant at the .10 level. It is also clear that there isn't a great difference in complexity between staff heads and staff supervisors. Apparently staff supervisors deal with as wide

a variety of informational content as staff heads.

Segmentation shows more or less uniform values among hierarchical levels of staff employees and increasing values for line employees. There is both a significant effect of function ( $F=3.40$ ,  $p < .05$ ), as well as a significant interaction effect ( $F=2.59$ ,  $p < .10$ ). It would appear that the sort of information which the staff employees have access to allows them more readily to integrate it than information which is available to line employees. For line employees this integration may be accomplished only if their level is fairly high in the hierarchy.

The results with respect to cognitive organization are rather interesting. Here we note that there is little difference between staff and line for lower hierarchical levels, but that this difference increases in favor of the staff function as we go up the hierarchical ladder. The degree of organization of the cognitive structure, we said, measures the extent to which the cognitions are integrated around a single guiding principle. Since staff provides more or less a service function to the line, and in many instances has the responsibility for the integration of data coming from various line activities, it requires a fairly stable frame of reference. A personnel officer or the vice-president in charge of finance and administration must view the activities of the company constantly in terms of some single implication--for instance, budget, expansion, labor relations, work standards, or the

like. Thus, the high staff positions apparently deal with information in terms of specific goals of their responsibilities and with a fairly stable and specific frame of reference. We note therefore an extremely high level of cognitive organization on the part of staff heads.

In general then, staff employees show cognitive structures of higher differentiation, higher complexity, lesser segmentation, and greater degree of organization than line employees. Higher hierarchical positions, too, have more differentiated, complex, integrated, and organized cognitions about the company than lower hierarchical positions.

Hierarchical level, function, and cognitive content. An attempt was also made to examine the differences in cognitive content between the hierarchical levels and between the two types of functions. Because the company wished to remain anonymous only two such content categories are reported: the extent to which the cognitions about the company reflect the employees' identification with it, and the extent to which they represent their value judgments about the company. With respect to the latter type of content the interest was not whether the employees spontaneously expressed positive or negative attitudes in describing the company, but whether they tended to consider the company in evaluative rather than in objective terms. Identification was scored simply by counting the proportion of time the descriptions included the pronoun "we" when the employee referred to the company. The measure

of value judgments is based on the proportion of time the employee referred to an aspect of the company in evaluative terms, for instance, saying that the company had a "fair retirement system," that the "working conditions are bad," that "there isn't sufficient opportunity for advancement," or the like. The reliability between two judges scoring for value judgments was .93, measured in terms of percent agreement.

Percent of identification statements and value judgments are listed in Table 5. We see that the staff workers exhibit the greatest degree of identification, while the line heads

Table 5

Percent identification and value judgments  
for three hierarchical levels of  
staff and line employees

Measure	Function	Hierarchical Level			
		Heads	Supervisors	Workers	All
Identification	Line	3.41	7.34	2.63	4.73
	Staff	7.44	7.23	13.54	9.52
	Both	5.49	7.29	8.72	
Value judgments	Line	18.18	40.37	43.32	34.07
	Staff	5.32	21.69	25.00	17.32
	Both	11.54	32.29	33.14	

the lowest. On the whole the staff identifies with the company more than line, and among Ss with staff functions the lower the hierarchical level the greater is the degree of identification. Both the effect of hierarchical level and function were significant at the .05 level. Also the interaction term reached that level of significance. The workers of the company investigated did not seem to take special pride in it. Rather they perceived it in terms of providing them with an opportunity to earn a living. The company had a history of some fairly difficult labor relations problems, leading to some animosity between the workers and the management. If "company" is identified by the workers primarily with "management," and if the workers perceive management as essentially hostile to them, we would in fact expect little identification on the part of the workers. The high degree of identification on the part of staff employees of the lowest hierarchical level is probably due to the great number of social activities these employees engage in. They have a bowling club, frequent dances, outings, and other recreational activities in common.

The data on value judgments are also quite consistent. Both the differences associated with hierarchical level and with function were significant at the .01 level. Here we note that the proportion of value judgments increases with decreasing hierarchical level, and that it is lower for staff than for the line function. One may conjecture that those

employees who regard themselves as part of the company and do not think of their employment as a temporary engagement but something quite permanent, have stopped evaluating it. Individuals who view their employment as a more or less transitory affair are prone to judge the particular merits and shortcomings of their position and of their employers. We would think that the least permanence is for production workers, and they, in fact, exhibit the greatest proportion of value judgments. Almost one half of their cognitive components include a value judgment of one sort or another. Also, in general, the higher the hierarchical level the higher is the expected permanence of the employment. We note that as the hierarchical level increases the proportion of value judgments decreases significantly.

#### SUMMARY AND CONCLUSIONS

Communication contacts of a sample of employees of an industrial company were examined in terms of their effects upon the employees' cognitions about the company. The following findings were obtained:

- (1) Staff employees have wider formal communication contacts than line employees;
- (2) Within each function high hierarchical levels have wider formal communication contacts than low hierarchical levels.
- (3) Informal communication does not vary systematically with function or hierarchical level. On the whole there are



no differences in informal communication between staff and line functions. However, supervisors with staff functions report the greatest amount of informal communication, while the lowest level of staff employees report the least amount. No differences in informal communication were found as a function of hierarchical level for line employees.

(4) Cognitive structures about the company do not differ as a consequence of reported informal communication.

(5) Systematic differences were found in cognitive structures as a function of formal communication. Employees who have wide formal communication contacts showed more differentiated, more complex, less segmented, and more highly organized cognitive structures than employees with narrow formal communication contacts.

(6) Cognitive differences were also found to be associated with the employee's position in the company. Staff showed more differentiated, more complex, less segmented, and more highly organized structures than line employees. Differentiation, complexity, and organization were all found to vary positively with hierarchical level, while segmentation was found to vary negatively with it.

(7) Staff employees seem to identify with the company more than line employees. On the whole identification increases with decreasing hierarchical level, although the trend does not seem to be entirely systematic. Among line employees it is the supervisors who show the greatest amount

of identification. Among staff employees the lowest hierarchical level manifests highest identification.

(8) Line employees show cognitions involving a significant affective component by including many value judgments. There are also systematic differences in the proportion of value judgments found for the different hierarchical levels. The higher the employee's position in the hierarchy the less he tends to regard the company in terms of evaluative cognitions, and more in terms of its objective characteristics.

The above results were interpreted primarily in terms of the effect of the individual's consistent commerce with information upon his cognitive structure. It was assumed that different opportunities for information processing will result in a different organization of the cognitive content represented by the cognitive structure. While differences in cognitive structures were found to vary with the position of the individual in the company, which was taken as highly correlated with his access to information about the company, the effect must be interpreted with some caution. In addition to differences in communicational opportunities and demands existing as a function of the individual's position in the company, differences in educational background of the employees were also found to vary in the same way. Staff employees had significantly higher educational background than line employees, and there was also a tendency for educational background to vary positively with hierarchical level, although this latter relationship was not significant.

It is therefore possible that the differences in the organization of cognitive structures found for the various categories of employees are not entirely due to their position in the company, but reflect differential intelligence or education, or both.

That the differences in cognitive structures are not entirely due to educational level is suggested by various aspects of the data. For instance, staff employees showed no differences in educational background as a function of hierarchical level, yet strong differences in the degree of differentiation, complexity, and organization were found. On these cognitive dimensions staff department heads consistently showed the highest scores, while the highest educational level was found not for staff heads but for staff supervisors. Staff heads showed a higher educational background than line heads, but there was no difference between them in the level of differentiation, complexity, or segmentation. Moreover, the significant variations in segmentation and organization of the cognitive structure which were obtained for the different positions cannot easily be explained in terms of educational background. Other things being equal, intelligence or educational background need not produce a high (or low) cognitive integration, for this property depends not so much on how well the individual can handle the information but on what the circumstances require him to do with it.

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## FOOTNOTES

1. This research was supported by the Office of Naval Research, Contract NONR-1224(34)NR 170-309.
2. All analyses were corrected for unequal N.