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ORGANIZATIONAL INTELLIGENCE:  
ITS CONCEPTUAL AND EMPIRICAL UTILITY

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ABSTRACT

Wilensky recently introduced the concept of organizational intelligence. Though conceptually insightful, it has been in need of empirical documentation. This paper documents the intelligence concept via studies of organizational change in 29 community organizations (police and fire departments). Intelligence boundary personnel are identified and their influence in the development of planned organizational change shown. Finally, several organizational structural and environmental variables are introduced to further elaborate the concept via multiple regression analysis. These variables include organization size, wealth, complexity, centralization, professionalization, comparative reference, and environmental threat.

Organizational Intelligence:  
Its Conceptual and Empirical Utility

There has been a growing interest in the sociological literature with identifying analytical properties of organizations (e.g., Burns, 1967; Haydebrand, 1967; Wilensky, 1967; Udy, 1965). At the same time there has been growing practical concern with developing more effective mechanisms for organizational action. The problem, then, is to identify and measure analytical dimensions which address fundamental aspects of organizational action which are both theoretically interesting and instrumentally useful (Hall, 1972).

One such possibility is the concept of organizational intelligence introduced by Wilensky (1967). Here we attempt to empirically apply the concept and to develop hypotheses about its relationship to change in organizations. Wilensky suggested that intelligence represents the gathering, processing, and communicating of technical and political information used in decision making. Thus intelligence was seen as an element of organizational technology (Perrow, 1967). Wilensky developed the concept from an interest in the relationship between experts, intellectuals, and policy makers (Wilensky, 1956; 1967). In his own work, he was concerned with the determinants of the use of intelligence, the structural and

doctrinal roots of intelligence failures, and the conditions which facilitate the flow of high quality intelligence.<sup>1</sup>

Of particular interest here is Wilensky's suggestion that as costs and uncertainty increase, and as the need for change becomes increasingly significant, the more intense will be the effort to generate intelligence (Thompson, 1967). With the generation of intelligence, organizational decision making may move out of the usual normative arrangements to take into account these new intelligence sources wherever they might be located within the organizational structure. Thus, under conditions of uncertainty, within a particular organization, intelligence could supercede authority position as a primary influence in decision making.

If intelligence is an important property of organizational change, one would expect that individuals who played intelligence boundary roles, i.e., those who mediated intelligence resources, should exert a greater influence on organizational changes than those within the organization not playing such roles. In fact, such influence should override individuals within the organization with positions of more authority in the traditional division of labor. More specifically here, the research questions became the following: To what extent were intelligence boundary personnel influential in the development of organizational change? What were the authority positions of the intelligence boundary personnel? What other organizational dimensions affect the utilization of organizational intelligence?

### The Research Context

To explore the role of organizational intelligence, specific types of organizations which were experiencing uncertainty had to be observed. The organizations selected here were police and fire departments and the context of environmental uncertainty was the threat of civil disturbances which characterized cities in the U.S. in the later part of the 1960s. Both of these organizations had domain considerations which were seriously affected by the presence or threat of civil disturbances. The threat had to be evaluated and decisions had to be made as to the appropriate types of response in the development of new strategies and techniques. Coping with this uncertainty became an important problem for many of these organizations and this required a higher level of intelligence within their organizational technology. Change was initiated in a number of areas -- planning, equipment, training, and community relations and such changes required the development of new types of expertise within these organizations.

The threat of civil disturbances also generated a proliferation of information within a developing "national safety" network.<sup>2</sup> This information emanated and was diffused from various sources such as site visits, journals, associations, conferences and seminars, government agencies,

and various organizations who were developing their own programs. The urgency felt resulted in rather intense efforts nationally to expand a civil disturbance-related technology.

### Sample

Fourteen police departments and fifteen fire departments were studied. These departments were located in 17 cities, which averaged 588,000 population.<sup>3</sup> While the cities were skewed toward moderately large midwestern cities, one was far western, three were southwestern, one eastern, and two southern. Thus, the cities had a fairly broad regional and size representation and also had some variability in terms of civil disturbance history and potential.<sup>4</sup> Within these 29 organizations, changes in policy, planning, training, operations, and community relations were examined for the time period of 1965 to 1969. Those organizational incumbents who were knowledgeable in the various change areas were interviewed and treated as informants. A mean of 4.5 interviews was obtained in each of the organizations.

For the purposes here, there were four primary measurement requirements. The first was to identify as comprehensively as possible various sources of intelligence. The second was to determine who played intelligence boundary roles. The third was to determine the authority position of those

playing intelligence boundary roles. The fourth was to determine those incumbents who were influential in the development of organizational change.

1. Sources of Intelligence. Intelligence was defined as essentially technical and political information used in the development of organizational changes. In each of the change areas, a series of questions were developed to elicit measures for the following dimensions of organizational intelligence as they related to the area of civil disturbance: after-action reports from their own civil disturbance experience; site visits made to other departments to obtain information about emergency operations or specifically change-related programs; civil disturbance or community relations-related conferences and training seminars attended; emergency plans examined; relevant publications employed; after-action reports developed; and other informational sources utilized. These were considered to reasonably exhaust possible intelligence resources in the civil disturbance area from either a response or prevention standpoint. The assumption was that increased amounts of these types of information represented greater degrees of intelligence existent within the organization.

2. Intelligence Boundary Roles. When an intelligence resource was identified, it was then determined who played the intelligence boundary role. Thus questions were raised as to who specifically made site visits; who attended any conference or seminar; who examined civil disturbance

plans, journals, after-action reports, and other informational resources. It was felt that in this manner a fairly broad range of intelligence mediation could be assessed.

3. Authority Position of Intelligence Boundary Personnel. When intelligence boundary personnel were identified, their specific organizational rank was then determined. The result was a list of intelligence boundary personnel by position for each organization.

4. Organizational Incumbents Influential in the Development of Organizational Changes. In each of the change areas, the informants were asked to name specifically those individuals who were influential in the development of organizational changes, how their influence was enacted, and their organizational rank. This produced a list of influential organizational incumbents and their ranks for each organization.

We also measured several organizational and environmental variables so that their impact upon intelligence boundary and influence could be determined. These variables included the following:

Environmental Threat: Number of days of civil disturbance experience between 1965-69. (We applied criteria and data from Senate subcommittee reports and The Lemberg Center for the Study of Violence.)

Comparative Reference Linkage: (Evan, 1965) Number of specific contacts with other police or fire departments to exchange information relative to police or fire department operations.

Organization Size: Number of uniformed personnel.

Organization Wealth: Base line salary of policemen and firemen.

Professionalization: Number of officers having college training for police departments and number of hours of inservice training/month for fire departments.

Administrative Complexity: Proportion clerical/uniformed personnel in police departments and number of stations in fire departments.

Centralization: Proportion ranked/total personnel.

Many of the above concepts are complex and the measures admittedly crude. A few comments are in order about these indicators. Organization size is a relatively straight-forward variable, has a direct empirical link, and requires few assumptions in measurement. Environmental threat was operationalized as an objective historical dimension. There were a number of potential measures such as injuries, deaths, sniping, property damage as well as number of events and total number of days of civil disturbance. We decided that the latter two measures were the best. Arrests, deaths, and injuries were already incorporated in criteria used previously for determining civil disturbance events.<sup>5</sup> Number of events and number of days of civil disturbance correlated quite well for these cities ( $r = .93$ ); thus number of days was selected as the final measure because it allowed for somewhat finer discrimination.

With regard to comparative reference, informants were asked in each type of organization to name other departments they were in contact with from time to time to discuss problems, exchange information and obtain advice about new programs, techniques, etc., as they related to general police or fire operations. The number of contacts was then aggregated for each organization.

The measure of organization wealth assumes that as base line salary increases, there are greater potential resources for intelligence generation and use, under both normal and stress conditions. Professionalization was measured somewhat narrowly. Hall's (1968) work points out the difficulty in measurement of this concept and it is recognized that there are limits to our use of the term. However, in police departments in particular, professional pressures for increased college training have become noteworthy. With regard to administrative complexity, we defined this dimension as an element of organizational administration, but we realize there are important technical dimensions as well. It was impossible to use the same measure in fire departments because clerical work is incorporated into standard ranks. The number of fire stations was chosen because it was felt to most readily represent administrative complexity in this type of organization. In both cases the ambiguity of the concept is recognized and the need for more systematic empirical examination in

all organizations is understood (Haydebrand, 1967). Finally, the use here of the centralization measure assumed that a lower ratio represented a lower proportion of incumbents having some decision-making function, thus higher centralization. We were hesitant here. Though the measure is common to both types of organizations, we had more confidence with the separate analyses using this variable principally because of the complexities of decision making and potential qualitative differences across police and fire departments.

#### Findings

Table 1 forms the initial basis of data analysis. Table 1 lists the total number of identified influentials and is followed by the percent of influentials who were intelligence boundary personnel. The table also lists the total number of identified intelligence boundary personnel and is followed by the proportion of intelligence boundary personnel who were influential. A similar array is presented for those below the top three levels of command. For our purposes the data can be organized to address the following four dimensions:

1. The percentage of influentials who were intelligence boundary personnel.
2. The percentage of intelligence boundary personnel who were influential.

3. The percentage of influentials below the top three command levels; and the percentage of these who were intelligence boundary personnel.
4. The percentage of intelligence boundary personnel below the top three command levels; and the percentage of these who were influential.

Dimension 1 essentially addresses the role of the "expert" in the development of organizational change. If intelligence is an important analytical dimension, then the proportion should be relatively high among influentials. As can be seen from Table 1, 65 percent of identified influentials who were intelligence boundary personnel. Simple Pearson correlation of the number of intelligence boundary personnel with the number of influentials who were intelligence boundary personnel gave further evidence of this relationship ( $r = .904$ ).<sup>6</sup> This data indicate that "men of knowledge" played a significant role in the development of organizational change (Wilensky, 1967; Hickson et al, 1971).

Dimension 2 looks at the question of intelligence uses. The loss of intelligence represents an "intelligence pathology" (Wilensky, 1967); in other words, to what extent was usable technical and political information wasted in organizational activities. As can be seen from Table 1, 72 percent of intelligence boundary personnel were also influentials. This finding indicates again that intelligence is an important factor for change, but there clearly were potential intelligence losses. Of course, possible

distortion of this data is recognized. Information gained by intelligence boundary personnel may have been used even though these specific individuals were not involved. For example, detailed reports were sometimes made by officers making site visits and subsequently used by others to make changes. This mitigates loss but the data do not reflect this factor.

Dimensions 3 and 4 look at the centralization of influence and intelligence in the 29 organizations. With regard to dimension 3, 36 of the influentials were below the top three command levels. Of these 61 percent were intelligence boundary personnel. Summarizing the results from dimension 4, 31 of intelligence boundary personnel were below the top three command levels and of this figure, 71 percent were influentials. Thus intelligence and influence tended to be centralized. Authority position was prerequisite for intelligence boundary roles and top command people developed organizational changes. However, where lower echelon personnel were involved in the change process, an intelligence boundary role of some kind appears to increase the possibility of their involvement in change.

Specifying the extent of centralization of influence and intelligence by type of organization presented some interesting findings. Influence and intelligence were almost completely centralized in fire departments. Only 3 of 89 influentials and 2 of 59 intelligence boundary personnel were below the top three command levels. The situation in police departments was somewhat different. A total of 33 of 110 influentials (30 percent)

and 29 of 122 intelligence boundary personnel were below the top three command levels. What accounts for the much greater centralization in fire departments, particularly since both have traditional hierarchical systems? Our interpretation is that compared to police departments the range of tasks and complexity of functioning in fire departments appears to be lower, as have been pressures for professionalization (particularly in the late 1960s). A somewhat more rigid structure of decision making may be the result. With regard to the specific case of civil disturbance, the range of crisis-relevant demands (though not necessarily the magnitude) from both response and prevention standpoints are smaller for fire departments. Thus pressures for restructuring as a result of emergencies of this nature are less pronounced. It might be concluded that the change process was primarily a logical extension of a normally centralized decision-making structure.

The Effects of Organizational and Environmental Variables  
on Influentials and Intelligence Boundary Personnel

Having documented the relevance of intelligence for influence in organizational change, we next sought to determine antecedents for both intelligence boundary and influence. For example, was the frequency of influentials and intelligence boundary personnel a function of aggregate organizational variables such as size, wealth, professionalization, administrative complexity, centralization, etc.? In addition to these organizational

variables, there were other factors, subsumed here under environmental variables, which had the potential for affecting the frequency of influentials and intelligence boundary personnel. For example, we might also logically expect that increased civil disturbance experience would be reflected in an expansion of intelligence boundary and influence. Another competing explanation relates to what might be called the social network of police departments and fire departments in the United States (Turk, 1970). Recalling from Evan (1965), comparative reference linkages refers to relations between similar organizations, i.e., organizations having similar charters and perhaps similar structures and processes. In the context of this particular study, comparative reference relations were other police or fire departments with which the focal departments had been in contact. It could be hypothesized that as the number of such contacts increased, there would be a concomitant increase in organization intelligence. The reasoning is that since these comparative reference organizations have similar environmental contingencies and problems, they require similar kinds of technological skills. Therefore, those organizations having many such relationships have available intelligence resources which can be obtained and employed in organizational activities.

(Tables 2, 3, and 4 about here)

Correlation and regression analysis was employed to assess the effects of these organizational and environmental variables.<sup>7</sup> The analysis was

divided into two parts. Because of both conceptual and measurement commonality, we first regressed intelligence boundary and influence with comparative reference, organization size, environmental threat, organization wealth, and centralization for all 29 organizations. We then ran separate analyses of police and fire departments with the additional variables of administrative complexity and professionalization. Tables 2, 3, and 4 summarize the results from these analyses. Column one lists the original zero order  $r$ 's; column two gives the standardized Beta coefficient (beta's expressed in standard deviation units) for each independent variable; and Multiple  $R$ 's and variance explained with each set of independent variables appear at the bottom of each sub-table. For purposes of summary of findings and discussion, we will treat each independent variable sequentially, pointing out both total population and sub-sample findings. Taken as a totality, the various regression analyses show considerable variance explained, most notably in police departments.

Organization Size. We were frankly surprised by the findings along this variable. We had expected that size represents an intelligence resource and would result in an expanded pool of potential intelligence boundary personnel and influentials. The concern was merely to determine the extent to which the dependent variables were a function of the mechanics of size. The zero order correlations with size were in the expected direction

but somewhat low, ranging from approximately  $r = .15$  to  $r = .46$ . However, size clearly exhibited a moderate negative effect for the total sample under controlled conditions and sub-samples of police and fire departments point to interesting differences. Size has a low to moderate positive effect in police departments, but a substantial negative effect in fire departments. Thus the total sample regressions appears to be a function of size's dominant influence in fire departments. The explanatory power of size was expected in fire departments but not its direction. These findings, though interesting, must be interpreted with caution since our sample was small. Obviously further study with a larger sample is needed. Independent case analyses revealed some interesting patterns. There were several cases in which organizations of relatively low size had substantial intelligence boundary personnel and influentials. In small samples, the effects of a few cases will be substantial statistically.

A theoretical explanation appears to lie in the characteristics of police and fire departments as organizations. Police and fire departments are para-military structures with rigid hierarchies in the classic bureaucratic sense. Thus decision making involvement would be rather constricted, regardless of size. It would not then necessarily follow that as size increases the number of intelligence boundary personnel and influentials would increase in a simple fashion. On the other hand, we would certainly not expect a negative relationship, particularly since the

dependent variables were stated as simple aggregates rather than as proportions of total size. These findings are intriguing and warrant further research.

It must also be remembered that other important variables are operating here; of some interest to us were comparative reference and police professionalization. The tables indicate that these variables display a moderate to strong positive impact upon the dependent variables. These and the other organizational variables analyzed as independent variables can also be seen as dependent variables with size as antecedent. It is interesting, for example, that size correlates with professionalization ( $r = .899$ ), administrative complexity ( $r = .793$ ), and wealth ( $r = .470$ ) in police departments; and with comparative reference ( $r = .580$ ), administrative complexity ( $r = .975$ ), and wealth ( $r = .529$ ) in fire departments. Thus in discussing these organizational variables, the cumulative impact of size upon them must also be kept in mind.<sup>8</sup> It is clear that size can have both direct and indirect effects.

Comparative Reference. It is evident from Table 2 that comparative reference is a powerful predictive variable overall and in the expected direction. Both zero order  $r$ 's and standardized regression coefficients are consistently high. Separate police and fire analyses (with new independent variables) yields additional support. Comparative reference continues to show moderate to strong impact upon the dependent variables in fire

departments; its effects are somewhat enervated in police departments, but still moderate and positive. We expected comparative reference to be more prominent in police departments because of recent public concern with law enforcement, augmented by federal support. In general, however, a strong case can be made for further treatment of this variable.

The relevance of organization-environment relationships has been given recent prominence in the organizational literature (Evan, 1965; Guetzkow, 1965; Terreberry, 1968). This research suggests that attention is justified. In a complex society social network linkages are increasingly important, both as explanatory variables (Turk, 1970) and as instruments for more effective organizational action (Thompson, 1967). As defined from our research as well as others (Waller, 1974), that social network appears to be crecscive in the law enforcement area. Since late 1968, new federal, state, and regional bureaucracies have been created, a plethora of joint programs enacted, and a growingly complex set of formal and informal social arrangements developed among police agencies. Our research context covers only the initial stages of this increased activity and we suspect that linkages have intensified in the last three to four years. We also think that fire departments are exhibiting these same tendencies, but the future role of the federal government will be very important. Certainly complexity of urban problems represents a relevant factor as well. This suggests that the continuing task of organizational theory will be to elaborate

the nature and complexity of these new and generative social arrangements increasingly characteristic of modern society.

Professionalization. Because of different measurement requirements, we ran professionalization only with separate analyses of police and fire departments. Although measures of professionalization have not been empirically standardized in either of these organizations, we had more confidence in the police measure. Recent pressures for professionalization in police departments have been felt in part in the area of college training, thus our measure seems quite appropriate. We cannot make a similar claim in fire departments. Professionalization is a powerful predictive variable in our sample of police departments. It operates in a positive direction, from moderate in the case of intelligence boundary to substantial for influentials and intelligence boundary influentials. The effects of our measure in fire departments are certainly less, but in the same positive direction. Overall, these results are encouraging.

Many police departments in the United States are taking a more "professional" as opposed to quasi-military orientation to police work and organization. The implicit hypothesis was that the more professionalized the police department the more expansive the technological resources and decision-making structure; in this case as enumerated by the number of intelligence boundary personnel and influentials. Our findings support

this. Individual case analyses indicated a breadth of intelligence and influence in some police departments in our sample. All of these organizations appeared to be much more oriented toward a "professional" model of law enforcement.

We have yet to develop analytical closure with the concept of police professionalization. At the same time we do not think the concept has crystallized instrumentally as yet within the social network of law enforcement. Quite simply, the nature of law enforcement is changing. There is constant discussion, debate, and conflict (both within and outside these organizations) about how much change and in what direction the profession should move, but there is no doubt that these organizations are experiencing a dynamic period of adjustment. Police professionalization can only be understood fully by examining organizational and contextual inputs to that change process (Kreps and Weller, 1973). We suggest that a greater range of behavioral and attitudinal data will have to be generated so that this concept can be more completely elaborated. Substantive areas such as police community relations are particularly relevant for study because they involve potentially fundamental changes in law enforcement premises.

The potential effects of size upon professionalization need to be restated. Size correlated quite well with number having college training at the zero order level ( $r = .899$ ). It appears to be a viable argument from our data that as professionalization in police departments increases,

its impact upon the decision making structure will be pronounced. Thus in this case the influence of size appears to operate in an indirect fashion, via the professionalization variable. Indeed, in experimenting with partial correlation analyses using only size and professionalization with the dependent variables, size operated more substantially through professionalization than it did directly. The theoretical implications are intriguing. If we assume that the number of influentials and intelligence boundary personnel reflect the complexity of decision making, then size is a necessary but not sufficient condition for complexity of the process of change. What is important is not size per se, but the pressures for professionalization that size generates.

However, we would also argue that size is a necessary but not sufficient cause for professionalization. In other words, other variables must also be considered in assessing the development of police professionalization. In this regard, it is our contention that particular attention should be addressed to the expanding social network of law enforcement; particularly since 1969 where massive federal expenditure and involvement began and has continued. As stated earlier, our measure of comparative reference reflects largely a period prior to that time, thus it is inadequate for these purposes. We hypothesize that as the magnitude of the linkage of a given department to this social network increases, so will its level of professionalization. Given certain temporal assumptions

built into data analysis, size and social network linkages could be evaluated as competing explanations for increased professionalization. The preceding discussion should make clear the need for more elaborate data analysis. For example, a comprehensive study of the law enforcement network entails, at the very least, a complex interorganizational design; one in which network boundary roles are fully enumerated and the magnitude as well as range of linkage are empirically documented with behavioral data. We have thus far only touched the surface of this complex variable.

Environmental Threat. Environmental threat represents a contextual variable. The logical hypothesis here was that as civil disturbance experience increased, so would the number of intelligence boundary personnel and influentials. Given assumptions of organizational rationality, these could be seen as adjustments to environmental uncertainty. The zero order correlations were in the low to moderate positive range; in fact much lower than anticipated. Under controlled conditions, this variable did not exceed Beta = .189 overall but the direction was as expected. Sub-sample analyses shows considerable inconsistency. In police departments the effects are moderate positive in the areas of intelligence boundary and intelligence boundary influentials, but low and negative with influentials. The picture is also mixed in fire departments as there is a moderate negative effect upon intelligence boundary, a clearly positive effect upon influentials, and a low negative effect upon intelligence boundary influentials.

Therefore environmental threat generates intelligence boundary in police departments, and in fire departments involvement in the development of change is generated but without an intelligence requisite.

In sum, environmental threat is a less powerful variable than were others on the positive generation of intelligence boundary and influence, most notably, comparative reference, professionalization in police departments, and organizational wealth in fire departments. These findings imply that it is not merely the objective experience of civil disturbance that is important, but rather complex definitional and interpretive responses generated by other conditions. The case for comparative reference and professionalization appears to be quite important in this regard.

We have suggested that comparative reference reflects linkage to the broader social network of these organizations. It is logical to argue that through ties of informational and ideational exchanges the full import of what was, in part an uncrystallized environmental contingency became clarified. Professionalization reflects an expanded human resource, but also provides an impetus or normative orientation for intelligence search. Thus under conditions of environmental uncertainty there will be greater efforts to reduce ambiguity by highly professionalized organizations via boundary spanning organizational personnel. In sum, it is not merely the existence of environmental uncertainty, but the translation of uncertainty through other organizational processes.

Organization Wealth. We thought that wealth also was an organizational resource bearing upon the amount of intelligence existent within an organization, in this case by providing a material resource for intelligence gathering and allocation. We assumed that base-line salary reflected requisite material resources for intelligence, and also a posture of quality of organizational personnel. Given our broad definition of intelligence as a key technological dimension of decision making, the inclusion of this variable seemed warranted. Wealth had low positive effect overall, moderate to strong impact in fire departments, and a moderate negative impact in police departments. Our hypothesis was thus supported in fire departments but rejected in police departments.

This rather substantial difference is interesting and we have no ready interpretation. Clearly conceptual development of this variable was much too simplistic. Increased base-line salaries may be a product of a number of conditions such as collective bargaining, community socioeconomic condition, the level of saliance given to law enforcement or fire fighting, etc. Wealth, in this sense, may have little to do with the predilection of an organization for intelligence generation. Wealth may serve indirectly as an antecedent for professionalization ( $r = .45$  in police departments and  $r = .005$  in fire departments), but the causal process of professionalization is more complex than the simple inducement of increased salaries. The impact of this variable in fire departments,

at the very least, gives impetus to further empirical treatment. We suggest again a search for the structural antecedents of professionalization. That kind of study would require a more thorough elaboration of the professionalization concept than we have accomplished and a more complete empirical assessment of what we consider to be the chief competing explanation with size, wealth, and other structural variables, that of the social network of these public bureaucracies.

Administrative Complexity. Administrative complexity was measured as the proportion clerical/total uniformed personnel in police departments and as the number of stations in fire departments. Administrative complexity was positively correlated with size at the 0-order level ( $r = .793$  in police departments and  $r = .975$  in fire departments). Our implicit hypothesis was that organizational complexity breeds a more complex orientation to organizational problems and that this would result in increased intelligence boundary personnel and influentials. This hypothesis was supported in fire departments as evidenced by the moderate to substantial zero order  $r$ 's and Beta's. It is interesting, given the high zero order correlation between size and administrative complexity, that the variables would operate in such different directions in fire departments; but the measurement of complexity used allows for more complete separation from size under controlled conditions. However, by employing a proportional measure in police departments rather

than a simple aggregate, the effects are reversed. The zero order  $r$ 's are low positive but the Beta's are solidly negative.

Our hypothesis was simply not supported in police departments; as administrative complexity increased, the number of intelligence boundary personnel, influentials, and intelligence boundary influentials decreased. We first thought there were errors in data collection and analysis but these were checked and found to be correct. Statistically, the proportion standardizes clerical personnel by organization size, thus both variables should be considered in assessing the impact of administrative complexity as defined. Size operated somewhat strangely in this study. We have already noted its substantial negative Beta's in fire departments, and in police departments there is a somewhat inconsistent picture of low negative to moderate positive. We experimented with stepwise regression, building in administrative complexity prior to size, and the effect of the introduction of size moderately decreases the negative Beta's of administrative complexity and the dependent variables. Thus given a regression model with these independent variables, the importance of interaction effects in measurement must be considered. We are not prepared to offer a theoretical explanation for these findings in police departments. We are frankly puzzled.

Centralization. Centralization was also measured as a proportion with size, in this case ranked/total uniformed personnel. The higher

the proportion the more decentralized the organization was assumed to be. We could have employed simply the number or ranked personnel and argued that as this figure increased the organization would be more decentralized. That measure seemed unwarranted given the nature of bureaucratic organizations. As stated before these organizations are para-military structures with rigid hierarchies, thus it could be argued that decision making authority would be concentrated to a relatively few positions, regardless of size. At the same time we felt that this measure would reflect patterns of decentralization where extant. As reflected in the original data of this study, virtually all intelligence boundary personnel and influentials were concentrated in the top three ranks in fire departments, but police departments were somewhat more decentralized.

The pattern of centralization-decentralization in the statistical analysis presents the same inconsistency. The effects are low under controlled conditions in police departments but in the expected positive direction, i.e., the more decentralized the organization, the higher the dependent variables. However, in fire departments the more centralized the organization the higher the score on the dependent variables. Centralization-decentralization exhibits low negative effects for the total sample. This variable is not as powerful as several others, but the police-fire differences are interesting. We would suggest that the data reflects some movement away from traditional bureaucratic patterns in police departments but their persistence in fire departments.

Given a rigid bureaucratic structure, as size increases the proportion ranked/total personnel might have the tendency to decrease, thus exhibiting greater centralization with size. In other words, the more bureaucratized the organization, the greater the inverse relationship with the proportion. Our simple correlation findings support that contention ( $r = -.25$  overall;  $r = -.078$  in police departments;  $r = -.492$  in fire departments). The tendency is only slight in police departments but more substantial in fire departments. We can logically argue, therefore, that police departments will exhibit more decentralized patterns of decision making but these effects will not be large. The data analysis supports that view. We are of course left to explain these differences. We suggest again that future research be directed to assessing the level of professionalization in police and fire departments, but particularly in the former. We argue that there are substantial differences in police and fire departments in this regard and that these differences are reflected in the decision-making structure of these organizations.

#### Summary of Findings

The following should be reiterated in summarizing the findings. Size was an important variable but operated in an inconsistent fashion. The variable effects of administrative complexity and centralization can be interpreted, in part, from their measurement relationship with size. These findings are interesting and some run counter to the organizational

literature, but since there has been little empirical analysis of structural variables in police and fire organizations, any inference should be tempered by the need for further research. Environmental uncertainty is a moderate precipitant of organizational adjustment but appears to be mediated through a complex of organizational and extra-organizational processes. Professionalization is a strong predictive variable in police departments and we suggest this finding is consistent with the changing orientation of police work and organization. Finally, comparative reference shows substantial promise as a social network variable, linking organization with the broader social structure. These findings provide a basis on which to build.

#### Discussion

One of the most telling critiques of sociology has been its inability to unravel complex social processes, particularly relating to change (e.g., Coleman, 1969). Recent gains notwithstanding, the organizational literature is conceptually underdeveloped and social statics rather than dynamics predominates. Organizational intelligence is a processual concept. In its elaboration it conveys the dynamics of technology and decision making. From Wilensky we have suggested that intelligence represents the gathering, processing, and communicating the technical and political information and/or

knowledge used in decision making. In this case, change became defined as an intelligence processing organizational activity.

The movement from concept to empirical measurement is always difficult, particularly when the effort is to spell out the complexity of organizational process. Our attempt, though incomplete, is a step in that direction. In this empirical instance we have identified intelligence resources and located intelligence boundary roles. We have further documented the importance of these roles in the process of change development. Finally, we have begun to "specify" the relationship between intelligence and change development through the introduction of additional variables. The effort should therefore be seen as an exercise in concept building and testing.

It is evident that organizational activities require certain types of information and knowledge (Dill, 1962). In this case, for example, what should a civil disturbance plan include? What are basic equipment needs? What policies should be established? What training techniques are required? How do you develop a community relations program and what problems should it address? Questions such as these represent distinct technological needs, some of which are fulfilled internally (e.g., knowledge, experience) and some which must be mediated through the environment (e.g., a facilitating social network). Although purposive or planned change was at issue in this study, it is clear that these types of technological needs are basic to virtually all organizational action.

It is legitimate to ask why we employed the concept of organizational intelligence in the design of this research. Why not simply refer to information or knowledge processing technologies? We develop concepts so that we can articulate the complexity of phenomena with which we deal. Whatever their level of complexity, concept formation is necessary. However, the ultimate utility of these nominal definitions rests upon our ability to discover empirical indicators for them. As Dubin (1969) has suggested, the worth of nominal concepts is simply whether they give us something new or different to look for in the empirical world, whether we can be more precise in our observations and measurements, and how well we can generalize from one case or event to the next.

Wilensky suggested theoretically that intelligence, as both process and product, was a fundamental analytical element of all organizations. Broad in complexity, the concept appears to subsume a range of organizational activities, most particularly in the technological and decision-making realms. Intelligence reflects both usable human attributes and material resources. It entails both internal organization affairs and environmental linkages. It is an analytical property of organizations as well as individuals. Finally, the concept was useful for us in synthesizing two rather large sets of literature, i.e., the diffusion of innovation and decision making, both of which we were examining in the design of this study of organizational change under uncertainty conditions.

Wilensky elaborated the concept but did not attempt to operationalize or document it in systematic empirical fashion. Our effort was to empirically isolate intelligence resources and boundary roles, working toward delineating their relevance for organizational change. Of course, there is much to be done. We have not fully conveyed in one study the analytical complexity of the concept. For example, we have specified the link between intelligence and influence but have not conveyed its dynamics through detailed case analyses. We have also linked the concept to key structural variables but need to broaden the sample and the range of variables employed. We have shown the concepts relevance to the organizational change and decision making under uncertainty conditions. However, future research can generalize the concept to other crisis-relevant organizations, other types of organizations, and other environmental and/or organizational conditions. A focus upon change in this future research would appear to be wise because it is under these conditions that intelligence needs, processes, and pathologies are perhaps most manifest and therefore amenable to research.

In the final analysis, if intelligence is an important analytical concept, it must be shown what difference its presence or absence makes to the functioning of an organization. We have largely treated intelligence as a dependent variable in this paper, endeavoring to locate antecedents. But we have also shown clearly that an "intelligence boundary role" was highly related to influence in the development of organizational changes,

changes in planning, training, community relations, etc. Thus intelligence was in fact relevant to ongoing organizational process.<sup>9</sup>

In conclusion, we agree with Wilensky that intelligence is a fundamental property of organizations, one that is both theoretically interesting and instrumentally useful. It is abstract enough to capture the complexity of important elements of organizational technology and decision making, yet has properties which can be empirically demonstrated. Such concepts are essential for the model building necessary in the organizational literature.

### Footnotes

1. Essentially two areas of the literature are germane to the concept of intelligence processing. These can be referred to as decision making under uncertainty conditions (Simon, 1947; Bross, 1953; Shubik, 1958; Edwards, 1963; Taylor, 1965) and studies of diffusion and adoption of innovations (Katz, 1961; Rogers, 1965). Informational search and use behavior is central in both cases. Whether the topic is organization learning (Congolese and Dill, 1965; Hirschman and Lindbloom, 1962), or purposive change (Lawrence, 1958; March and Simon 1958; Burns and Stalker, 1961; Aiken and Hage, 1970), the development of knowledge technologies is defined as relevant to uncertainty reduction
2. As adoptors of innovations, social units often have those ideas or practices defined and evaluated in some measure through information and influence sources in the social system. (e.g., Coleman, 1966; Evan, 1966)
3. Since 1968, the Disaster Research Center has been monitoring these cities in terms of their natural disaster and civil disturbance history and the types of adjustments made by various community organizations.
4. For example, the average size of cities in this study was 588,000. Although most of the sample were of this moderately sized metropolitan category, one city was less than 100,000 and two were over 1,000,000. In addition, although all cities had some civil disturbance history and potential, the variability was considerable.

5. The following criteria were utilized for all reported incidents: If a community reported a riot-related death, it was automatically included as an event. Otherwise, two or more of the following conditions had to be met: (1) two or more injuries, (2) sniping, (3) looting, (4) twenty or more fires, (5) fifty or more arrests. These criteria and data were taken directly from "Riots, Civil and Criminal Disorders," Part 13, pp. 2762-2777. Data was also taken from Riot Data Review (1968, 1969).
6. Further specifying the relationship by type of organization, in police departments, the relationship was  $r = .876$  overall and  $r = .973$  below the top three command levels. In fire departments, the relationship was  $r = .954$  overall. The relationship below the top three command levels was meaningless in fire departments due to the almost complete concentration at the top of both intelligence boundary personnel and influentials.
7. It must be carefully noted at the outset that small sample size combined with a large number of independent variables creates potential distortion problems in the interpretation of the Beta coefficients; this problem is being further aggravated by multicollinearity among independent variables. It is therefore best to consider the following regression analyses as exploratory.
8. For example, size regresses, Beta = .645 with comparative reference in regression analyses employing wealth, environmental threat, and centralization. We have experimented with professionalization and found the same

general pattern. We have not concluded this kind of analysis here because it is beyond the scope of the present paper. One of the authors is presently engaged in collecting structural data on a large sample of police and fire departments in the United States. The attempt of this research is to more fully elaborate in particular the concepts of comparative reference and professionalization, then applying regression analysis with other structural variables whose causal antecedents can be explicitly argued or logically assumed.

9. Another question which is beyond the scope of the present paper deals with the relationship between magnitude of intelligence and magnitude of change. The chief measurement problem is to develop an aggregate measure of change of police and fire departments. In this study we developed multi-item change checklists for each type of organization. These items ranged from the development of civil disturbance plans and policies, to recruit and inservice training techniques, to interorganizational and community relationships at the local level, to community relations units and programs. These checklists provided us with overall change configurations for each organization and a medium through which influentials in various change areas could be identified. However, we have yet to develop an empirically precise interval measure of change. For exploratory purposes, we have experimented with the number of items

marked on the change checklist as a dependent variable and found substantial relationships with intelligence as well as other independent variables used in this paper (Kreps, 1974). But the diversity and complexity of items renders the validity of that kind of analysis unacceptable for other than illustrative purposes. We are presently involved in the development of organization change scales.

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Table 1 Influentials and Intelligence Boundary Personnel  
in 29 Police and Fire Organizations

|                                    | N   | Intelligence<br>Boundary Personnel | Influentials |
|------------------------------------|-----|------------------------------------|--------------|
| Influentials                       | 199 | 130 (65%)                          | -----        |
| Below Top Three<br>Command Levels  | 36  | 22 (61%)                           |              |
| Intelligence Boundary<br>Personnel | 181 | -----                              | 130 (72%)    |
| Below Top Three<br>Command Levels  | 31  |                                    | 22 (71%)     |

Table 2 Standardized Regression Analysis for Total Sample (n = .29); by Intelligence Boundary, Influentials, and Intelligence-Boundary Influentials

| <u>Intelligence Boundary</u>              |                 |                          |
|-------------------------------------------|-----------------|--------------------------|
| <u>Variables</u>                          | <u>Simple r</u> | <u>Standardized Beta</u> |
| Comparative Reference                     | .715            | .936                     |
| Organization Size                         | .161            | -.546                    |
| Environmental Threat                      | .342            | .189                     |
| Centralization                            | -.023           | -.189                    |
| Organization Wealth                       | .124            | .114                     |
| R = .798    Variance = .637               |                 |                          |
| <u>Influentials</u>                       |                 |                          |
| Comparative Reference                     | .589            | .723                     |
| Organization Size                         | .199            | -.355                    |
| Environmental Threat                      | .314            | .153                     |
| Centralization                            | -.034           | -.142                    |
| Organization Wealth                       | -.052           | .098                     |
| R = .635    Variance = .403               |                 |                          |
| <u>Intelligence Boundary Influentials</u> |                 |                          |
| Comparative Reference                     | .687            | .880                     |
| Organization Size                         | .152            | -.430                    |
| Organization Wealth                       | -.110           | .112                     |
| Environmental Threat                      | .314            | .153                     |
| Centralization                            | .104            | -.043                    |
| R = .740    Variance = .548               |                 |                          |

Table 3 Standardized Regression Analysis for Police  
Departments (n = 14) by Intelligence Boundary,  
Influentials, and Intelligence-Boundary  
Influentials

| <u>Intelligence Boundary Personnel</u>    |                 |                          |
|-------------------------------------------|-----------------|--------------------------|
| <u>Variables</u>                          | <u>Simple r</u> | <u>Standardized Beta</u> |
| Administrative Complexity                 | .135            | -.566                    |
| Comparative Reference                     | .779            | .491                     |
| Environmental Threat                      | .790            | .442                     |
| Organization Wealth                       | -.184           | -.354                    |
| Professionalization                       | .292            | .319                     |
| Organization Size                         | .339            | .313                     |
| Centralization                            | -.068           | .019                     |
| R = .958    Variance = .918               |                 |                          |
| <u>Influentials</u>                       |                 |                          |
| Professionalization                       | .404            | 1.273                    |
| Administrative Complexity                 | .195            | -1.033                   |
| Organization Wealth                       | -.164           | -.552                    |
| Comparative Reference                     | .587            | .394                     |
| Organization Size                         | .216            | .205                     |
| Environmental Threat                      | .310            | -.166                    |
| Centralization                            | -.032           | .146                     |
| R = .789    Variance = .622               |                 |                          |
| <u>Intelligence Boundary Influentials</u> |                 |                          |
| Professionalization                       | .312            | 1.189                    |
| Administrative Complexity                 | .097            | -.930                    |
| Organization Wealth                       | -.187           | -.574                    |
| Centralization                            | .133            | .376                     |
| Comparative Reference                     | .709            | .308                     |
| Environmental Threat                      | .542            | .278                     |
| Organization Size                         | .173            | -.019                    |
| R = .897    Variance = .804               |                 |                          |

Table 4 Standardized Regression Analysis for Fire Departments (n = 15) by Intelligence Boundary, Influentials, and Intelligence-Boundary Influentials

| <u>Intelligence Boundary Personnel</u>    |                 |                          |
|-------------------------------------------|-----------------|--------------------------|
| <u>Variables</u>                          | <u>Simple r</u> | <u>Standardized Beta</u> |
| Organization Size                         | .371            | -1.522                   |
| Administrative Complexity                 | .377            | .931                     |
| Comparative Reference                     | .521            | .882                     |
| Organization Wealth                       | .489            | .515                     |
| Environmental Threat                      | .002            | -.265                    |
| Professionalization                       | .156            | .235                     |
| Centralization                            | -.395           | -.189                    |
| R = .756    Variance = .572               |                 |                          |
| <u>Influentials</u>                       |                 |                          |
| Organization Size                         | .414            | -2.240                   |
| Comparative Reference                     | .549            | 1.103                    |
| Administrative Complexity                 | .384            | .799                     |
| Environmental Threat                      | .477            | .620                     |
| Organization Wealth                       | .562            | .615                     |
| Centralization                            | -.328           | -.293                    |
| Professionalization                       | .148            | .271                     |
| R = .873    Variance = .763               |                 |                          |
| <u>Intelligence Boundary Influentials</u> |                 |                          |
| Organization Size                         | .462            | -1.939                   |
| Administrative Complexity                 | .452            | 1.416                    |
| Comparative Reference                     | .575            | .791                     |
| Organization Wealth                       | .468            | .455                     |
| Professionalization                       | .302            | .410                     |
| Centralization                            | -.385           | -.308                    |
| Environmental Threat                      | .126            | -.151                    |
| R = .797    Variance = .636               |                 |                          |