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The Local-Cosmopolitan Scientist¹

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In contrast to previous discussions in the literature treating cosmopolitan and local as two distinct groups of scientists, this paperⁱ demonstrates the notion of cosmopolitan and local as a dual orientation of highly motivated scientists. This dual orientation is derived from institutional motivation, which is a determinant of both high quality basic research and accomplishment of non-research organizational activities. The dual orientation arises in a context of similarity of the institutional goal of science with the goal of the organization; the distinction between groups of locals and cosmopolitans derives from a conflict between two goals.

Several studies in the sociology of occupations and of organizations have concluded that some professionals in organizations tend to assume “cosmopolitan” orientation that manifests itself in their working professional goals and the approval of colleagues throughout their professional world, in focusing on a professional career, and in a concomitant lack of loyalty to and effort for the organization. Other professionals tend to assume a “local” orientation that manifests itself in their lesser commitment to the profession in more concern with the goals and approval of the organization and in focusing on an organizational career.ⁱⁱ With the growing movement of scientists into research organizations, there has been some interest by sociologists of science in studying the many problems and strains generated by the often conflicting professional and organizational demands and practices that, in turn, generate the adoptive cosmopolitan and local types of orientations.ⁱⁱⁱ A partial list of

¹ This paper was originally published in *The American Journal of Sociology*, Vol. LXIX, No. 3, November 1963

these problems might include varying incentive systems, differential emphasis on publication of research results, types of authority and supervision related to the professional need of autonomy, divergent and conflicting influences on work situations, assignments and research problem choices, budgets of time and money, kinds of compatible work groups, focus of performance, multiple career lines and commitments.

The major goals of many research organizations, particularly industrial research organizations,^{iv} are, of course, not consistent with the major institutional goal of science: advancing knowledge by basic research. They often emphasize goals of application, product development, and expert service. The scientist seeking a professional career (one based on pursuing an institutional goal) in an organization of this type becomes a “cosmopolitan”, by and large directing his efforts to professional goals, rewards and careers. Insofar as the cosmopolitan is always looking within the community of research organizations for better professional positions and conditions^v and has little “local” loyalty to inhibit his mobility, the result is a high organizational turnover. A professional career may be impeded by a too-long stay in the industrial context. Indeed, insofar as the industrial organization needs basic research, it becomes detrimental for it to try and induce the cosmopolitan to focus his efforts on the major organizational goals – product development, application and service – since that refocusing may reduce the quality of his basic research contributions.^{vi}

Whereas studies of industrial research organizations have usually found scientists who have either a primary local or cosmopolitan orientation, I shall try to demonstrate a local-cosmopolitan orientation among highly motivated scientists in an organization devoted to the institutional goal of science. The congruence of goals reduces in considerable measure, if not completely, the strains between organizational and professional requirements that tend to generate distinct local and cosmopolitan types. My principal criterion for ascertaining the general orientation of these investigators will be the direction of their work effort. First, I will investigate the general performance-reward process of science; then I investigate the efforts of those who do well in their scientific

performance to meet organizational demands. From these findings on their professional and organizational contributions, I infer that the orientation of these scientists is both local *and* cosmopolitan. I conclude with a discussion of the implications of this formulation for the developing theory about local and cosmopolitan orientations of professionals in organizations.

The data for the analysis consist of answers given to survey questionnaires in 1952 by the total resident research staff (332) of a large government medical research organization devoted to basic research.^{vii} In addition, some letters and documents give further information on the organization. My demonstration will be an effort to *explore* for plausible relations between variables, *not* to develop a strong case built on hard fact. While secondary analysis is well suited for exploratory work, to achieve the latter with old data is probably impossible. Accordingly, I shall use somewhat crude indexes and consider small differences that are consistent, highly suggestive, and that lead to an integrated picture of the local-cosmopolitan process. Since I am only suggesting, not testing, my language will not be riddled by the qualification rhetoric required in more rigorous demonstrations; my inferences will be designed to guide future research on local-cosmopolitan theory along (I believe) useful lines; and my primary effort will be to generalize as opposed to describing a real situation in detail.

The Performance-Reward Process

Motivation. In the institution of science perhaps the most important goal for the *typical* scientist is to advance the knowledge of his field by some form of basic research. A scientist, especially in training but throughout his career, is consistently reminded by colleagues that it is his job to advance knowledge by some increment, large or small. He internalizes the goal, and becomes, using Parson's term, "institutionally motivated" to achieve it.^{viii} Therefore, before we know anything about the distinctive personality of this or that scientist, we can hypothesize that to some degree he will be motivated to advance knowledge by virtue of his professional

training and that his research performance will tend to vary directly with the degree of his institutional motivation.

Insofar as the research scientist is motivated to advance knowledge, both his *research work* on problems, hypotheses, and methods as well as his *results* are centrally involved because he has the potential for advancing knowledge at either stage.^{ix} Irrespective of failures in results, he may have been quite original in his research work, and vice versa, he may have run rather a routine project into a contributing result.

As a measure of motivation to advance knowledge, I have selected the following two items that tap the (a) work and (b) result stages of the advancing knowledge process.^x

“How much do you want? How important is (it) to you?”

a.) Freedom to carry out my own ideas; chance for originality and initiative.

b.) Contributing to basic scientific knowledge.

Degree of importance: (1) utmost, (2) considerable, (3) some or little, (4) no opinion.

Over half the investigators felt both freedom and contributing were of the utmost importance. Each item was dichotomized between “utmost” and the remaining categories since this was where the direction of association consistently changed in cross-classification with criterion variables. The two items were fairly strongly related (coefficient of association = .70). Investigators were considered to have high motivation if they felt both freedom in work and contributing results were of the utmost importance. Fifty-six percent (186) of them were in this category. Among those of lower motivation, 27 percent (89) were high on one item and 17 percent were low on both items.

For further analysis I dichotomized the index into high and low, distinguishing those who were high on both items from all others. Three justifications for this are: (1) In many cross-classification checks the middle group proved to be more like those low on both items than those high on both items. Therefore, the index is reducible on statistical evidence.^{xi} (2) We only need a dichotomized variable to

establish general relations between variables. (3) The dichotomization is at the median, saving cases for necessary cross-tabulation.

Performance - The performance score (developed three months after the survey data were collected) consisted of the assessments by colleagues in the work situation of each investigator's current research.^{xii} Each assessment was based on five criteria: (1) Originality and Creativeness, (2) Wisdom and Judgement, (3) Rigor of thought and Precision of methods, (4) Persistence, Industriousness, and Efficiency, and (5) Contribution to the work of others. Three criteria (2, 3 and 4) focus directly on the research work, and two (1 and 5) focus mainly on research results. Thus, this index is based on the same aspects of advancing knowledge as the motivation index. Bearing out my hypothesis on the positive relation between motivation and performance, 19 per cent more of the highly motivated scientists (compared to those with less motivation) have been judged by their colleagues to have high quality performance.

Recognition – Concomitant with the development of institutional motivation is the expectation of reward for achievement of the institutional goal.^{xiii} The strong institutional emphasis of science on this achievement-reward pattern is noted by Merton: "originality can be said to be a major institutional goal of modern science, at times the paramount one, and recognition for originality a derived, but often heavily emphasized, goal."^{xiv}

The institutional emphasis on professional recognition holds for the research organization under study.^{xv} A memo to all personnel described the promotion process as follows:^{xvi} The immediate supervisor recommends the investigator to the institute director for promotion. If the latter agrees, he recommends the investigator's case to the promotion board. The board then thoroughly examines the investigator. A sample of his publications is read; prior and current supervisors are asked about him; and his qualifications are judged in terms of the following criteria: (1) Quality of work he has been engaged in, (2) Capacity to develop, (3) Capability in relation to other investigators, (4) Reputation in his field, (5)

Personal characteristics and ability to get along with others, and (6) Ability in the non-scientific work associated with his present and prospective position. If he passes this examination, he is recommended for promotion to the director of the organization, who follows the advice of the board in most cases.

The first four criteria clearly relate to the investigator's professional recognition by focusing on his past, present and potential ability to advance knowledge. I have shown elsewhere that professional recognition is also positively linked with getting along with others and with accomplishing non-scientific work.^{xvii} Given the emphasis on professional recognition for advancement, it seems reasonable to assume this reward (recognition) for achievement will maintain motivation for further achievement.

The promotion process clearly indicated the importance of two types of professional recognition: (1) The immediate supervisor's evaluation and (2) Publications. Therefore, if each type of recognition is measured and combined in an index, we can approximate completeness in measuring both the fundamental range of professional recognition required by the organization, and an important patterned form of professional recognition for research work and results. Thus all three indexes are based on the two broad stages of advancing knowledge.

The questionnaire did not include information on actual supervisors evaluation nor did it include information on actual publications (extent or quality). It did not include two items that measure *felt* recognition from supervisors and in publications. They are:

a.) "How do you feel about the way your chief makes *evaluations* about *the quality of work you are doing?*" (1) Accurate, (2) Partly Accurate, (3) No Attempt, (4) No Answer.

b.) "In scientific or other professional papers about work to which you have made some contribution, *is proper credit given to your own contribution* by means of authorship or acknowledgement?" (1) Always, (2) Usually, (3) Seldom, (4) No Opinion.

Over half the investigators feel they received adequate recognition from the supervisor (53 per cent say “Accurate”) and in publications, whether by authorship or acknowledgement (72 per cent say “Always”). To construct an index of felt professional recognition I have dichotomized each item between the highest category and all others. This dichotomization occurs as close to the median as possible, and at a statistical breaking point. In many cross-classifications of each item with other variables, the direction of association consistently changed between the highest category and the remaining categories. In combining these two variables into an index of felt recognition, 44 per cent of the investigators are high on both items; 37 per cent of the investigators are high on one item; and 19 per cent are low on both items. I have dichotomized the index between high and all others (low) for the identical statistical and substantive reasons earlier applied to the motivation index.

As suggested, professional recognition tends to maintain institutional motivation in this organizational context. Nineteen per cent more of those scientists who feel they have achieved high recognition (compared to those with low recognition) are highly motivated to advance knowledge.^{xviii}

Process – The next step is to show in one table the following process recognition for advancing knowledge (which indicates past performance) tends to maintain motivation (a time sequence based on common observation), which in turn tends to result in high quality research performance (measured three months later). This will give us the basic links of the circular, general performance-reward process in science: research performance leads to professional recognition, which maintains motivation to advance knowledge, which in turn leads to more performance.

In Table 1 the magnitude of association between recognition and performance is *diminished* when the intervening effect of motivation is removed. Therefore, high motivation tends to be a link between attaining recognition and accomplishing high quality research performance, this tentatively demonstrating the performance process.^{xix} As a social pattern, this circular process will continue if the

performance measured here results anew in recognition.

TABLE 1: RECOGNITION, MOTIVATION, PERFORMANCE

	RECOGNITION (PER CENT)		
	Average	Less	Difference
High Performance	56 (144)	44 (188)	+12
Proportion with high performance and: High Motivation	60 (96)	53 (90)	+7
Low Motivation	46 (48)	37 (98)	+9

At this point I wish to suggest that, besides research performance, it is also possible to predict behaviour associated with research on the basis of intensity of institutional motivation. This is borne out of by one indicator of research behaviour: the amount of time in a typical work week the scientist puts into “performing my own professional work (or work under the guidance of my chief) such as research, professional practice, professional writing, etc.” Fifteen percent more of the highly motivated investigators work 21 hours a week or longer on personal research. Furthermore, 11 percent more of those who work 21 or more hours a week on their own research have a high quality performance score.

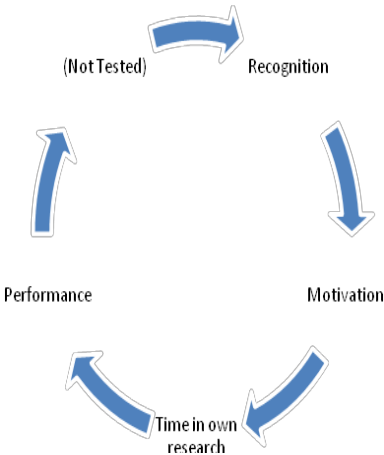
In combining motivation, personal research time, and performance, Table 2 demonstrates that the highly motivated investigators will tend to put more time into their own research work, and that this time, in turn, will tend to result in higher quality performance.^{xx} The magnitude of association between motivation and performance is *diminished* when the intervening effect of personal research time is removed.^{xxi} This finding adds a subsidiary link to the performance-reward process as diagrammed in Figure 1.

TABLE 2: MOTIVATION, RESEARCH TIME, PERFORMANCE

	MOTIVATION (PER CENT)		
	Average	Less	Difference
High Performance	57	38	+19

	(186)	(146)	
Proportion with high performance who put: Twenty-One or more hours per week into own research	60 (142)	43 (89)	+17
Less than twenty-one hours per week into own research	48 (44)	35 (57)	+13

FIGURE 1: The performance-reward process in science



Scientists as Organizational Men

As a link in the performance process, time in own research has direct relevance to the research organization. Insofar as this process supposedly results in the continual fulfillment of the institutional goal of advancing knowledge one might be tempted to say that this is favourable for the organization since this is why the research organization has been created. *But is the process favourable?* Scientists in any organization have other activities and duties, besides their own personal research, that must be accomplished as part of

their organizational commitment. This typical investigator cannot be his own scientist all week long, as is indicated by the fact that the median number of hours put into “own professional work” in a typical week is 29.8.

The question, therefore, arises as to whether investigators with high motivation sacrifice their other organizational commitments for their personal research because of strong desires to advance knowledge.^{xxii} If they do, and since this factor is a link in the performance process, then perhaps the above findings have unfavourable consequences for the organization. This process may require too much time for personal research, which may be disruptive for the organization as regards the scientists’ fulfilling their organizational commitments.

Table 3 provides one answer to this question. The extra time that the highly motivated scientists put into their research is carried forward, as their weekly time schedule accumulates, with no sacrifice to other professional and organizational activities or commitments. The longer hours put into their own research (15 percent difference) as maintained by highly motivated investigators as time is consecutively added on (1) for other professional productive work (14 percent difference), such as performing services for others and working with close colleagues; (2) for non-productive professional work (21 percent difference), such as attendance at meetings and seminars, reading and dealing with people other than close research associates; and (3) for a total work week (17 percent difference), which includes all other organizational activities beyond their professional ones.

TABLE 3: MOTIVATION AND WORK ACTIVITIES

	MOTIVATION (PER CENT)		
	High*	Low**	Difference
Own research: Twenty-one or more hours	76	61	+15
Plus other professional productive work: thirty-six or more house	63	49	+14

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Plus non-productive professional work: forty-one or more hours	69	48	+21
Plus other organizational activities for total work week: fifty-one or more hours	65	48	+17

* N = 186 ** N = 146

In fact, in response to the question, “How much time per week are you now spending on activities which could be shifted to other people or eliminated without impairing your present scientific or other professional work?” more highly motivated investigators suggested that less time be shifted to other people. Thus, in line with not sacrificing organizational work for their own research, the highly motivated investigators are less ready than those with low motivation to shift any additional work load of organizational life upon other men. Indeed, it would have been understandable if they had been more ready to shift activities not directly pertinent to their professional pursuits to other personnel, since they are motivated to advance knowledge, and any activity intruded into this effort might appear burdensome. *It would seem, then, that high institutional motivation tends to make these scientists both hard-working investigators and hard-working organizational men.*

The Distinction between Cosmopolitan and Local

This finding suggests that those scientists who are highly motivated to advance knowledge will be assets to the organization in two ways: (1) achieving the organizational goal, which is the same as the institutional goal of science and (2) meeting non-scientific organizational requirements that take time from research. Thus, the organizational will tend both to persist and to maintain its prestige (through accumulated individual successes) within the community of scientific organizations. The latter aim is very important for attracting and recruiting more capable, highly motivated scientists. Persistence and maintenance of prestige through

achievements of the institutionally designated goal need not always be related. There are numerous examples in the literature that show that attempts to meet requirements for persistence can subvert organizational goals.^{xxiii}

This finding – that both research and non-research activities seem important and compatible to highly motivated scientists – *indicates, by the criterion of direction of work efforts, that these scientists are both cosmopolitan and local oriented*. They are oriented to achievement of the institutional goal and honorary rewards, and hence toward professional colleagues everywhere and toward success as members of their profession. They are also oriented to their responsibilities within the organization that provides them with the facilities for advancing scientific knowledge and thus gaining recognition, and with a prestigious base for that cluster of organizational rewards called a promising career.

Further data support the presence of this dual orientation among highly motivated scientists. As hard-working cosmopolitans oriented to all professional colleagues they are more interested in contacts outside the organization as sources of information, in a move (if necessary) to a university environment (however, motivation does not account for more plans to move), and in belonging to an organization with prestige in the scientific world. Also, they feel a greater sense of belonging to and involvement with professionals within the organization. With respect to the professional or institutional goal, any suggestion of a change from basic research as the only organizational goal to its co-existence with applied research will be cause for concern.

As hard-working locals, the more highly motivated investigators desire an important job in the organization and association with persons who have high status and important responsibilities. In addition, more of them have a strong sense of belonging to the organization and are interested in higher level jobs that are more compatible with the institutional goal. That is, they tend to be interested in the supervision of subordinate scientists rather than in supervision of the organization.

In sum, this congruence of organizational and

institutional goals generates a local-cosmopolitan scientist when the scientist is highly motivated to advance basic knowledge. Devotion to both professional and organization is, in this case, not incompatible, as it tends to be for scientists in industry.

Local-Cosmopolitan Theory

This dual orientation of highly motivated scientists is especially important since, with few exceptions, the research literature characterizes *scientists* as either cosmopolitan or local. They are presented as two distinct types of scientists whose orientations and activities are, if not directly opposed to each other, not related. Shepard, in discussion dilemmas in industrial research, has said, "The research staff itself is likely to be divided into what Robert Merton calls the 'cosmopolitans' and 'locals'."^{xxiv} In his book on industrial scientists, Marcson reports that "it is possible to distinguish between two types of laboratory staff – professionally oriented and organizationally oriented."^{xxv} Peter reports of a seminar on problems of administering research organizations, "In the first two of the seminars, some time was spent discussing another bimodal distribution of scientists, those described as 'cosmopolitan' and those called 'locals'."^{xxvi}

I suggest that cosmopolitan and local can also be seen as two dimensions of orientation of the same scientist, each activated at the appropriate time and place as determined by the organizational structure within which he works. The question now arises as to whether or not there is a conflict between my findings of cosmopolitan-local orientation and the body of literature that treats the two orientations as distinct. Is one view more correct than the other? If we ask the question, "Under what conditions has each distinction emerged?" then we find that each of the views is accurate and applicable to the particular organizational situation under analysis.

The distinction between cosmopolitan and local scientists emerged during the study of research organizations in which the institutional goal of advancing knowledge is more or less in conflict with a major organizational goal of applying

knowledge. For example, in reviewing industrial research organization studies, Shepard states that the scientist's "motto" is "How much do we know about this?" whereas the businessman's motto is "What is the value of this to the company?"^{xxvii} This conflict results in a "problem person: in the cosmopolitan and in a "good employee" in the local.

Scientists take sides in the conflict according to their goal priority; hence the social scientist studying the organization uses this criterion to divide scientists into two groups. The cosmopolitan group makes trouble for management in primarily pursuing the institutional goal and career, and the local group creates little problem in primarily pursuing the company goal and career. In sum, this distinction is a device for understanding organizational problems such as communication of results, turnover, multiple career lines, differential incentive systems, needs for loyalty versus expertise, and so forth.^{xxviii}

Cosmopolitan and local as dual orientations of the same scientist emerged in our analysis of a research organization that emphasized the institutional goal. As there was little or no conflict between goals, there was no necessity to take a priority stand, or of being split into groups. Because of this congruence of goals, a local orientation helps to maintain the opportunity to pursue research and to have a career at a highly prestiged locale, both thoroughly consistent with the cosmopolitan orientation.^{xxix} In using the notion of dual orientation, we end up talking of organizational benefits, not problems.

Further, I have found this dual orientation among highly motivated scientists, whereas Shepard, as well as the other authors cited, talks of all scientists. Thus, the two conditions that generate the emergence of either groups of cosmopolitan and local scientists, or scientists with a cosmopolitan-local orientation, are (1) compatibility of the organizational with the institutional goal, and (2) highly motivated scientists versus all scientists.

TABLE 4: SCIENTISTS` ORIENTATION

Institutional and Organizational Goals	Professional Motivation		
	High	Medium	Low
Same	Basic research Local- Cosmopolitan	-	Local
Different	Cosmopolitan	Applied research Local- Cosmopolitan	Local

One of the exceptions to viewing local and cosmopolitan scientists as different groups in the literature on scientists is the “mixed type” offered by Kornhauser.^{xxx} The “mixed type” is oriented to both company and profession and is interested in “facilitating the utilization of technical results.” This applied orientation existed under the conditions of a conflict between the institutional goal and the company goal and is an accommodation seemingly in favour of the company. Thus to date we have two general types of local-cosmopolitan scientists arising under different sets of specific conditions: (1) the basic research local-cosmopolitan and (2) the applied research local-cosmopolitan.

Table 4 locates the various general orientations of scientists to organization and/or profession likely to be generated by the two cited conditions: (1) congruence of institutional and organizational goals and (2) degree of institutional (or professional) motivation.

Last, the concern among the scientists in this study over the potential organizational emphasis upon the applied research goal suggests a few hypotheses about possible changes. If the organization starts to emphasize applied research, those highly motivated to do basic research may give up the basic research cosmopolitan-local orientation and become a definite group of cosmopolitans. The professional motivation of some may drop a little and then they are likely to become applied research local-cosmopolitans. The potential

conflict between institutional and organizational goals may generate these changes, which then could result not only in the loss of benefits to the organization cited in this paper but also in the accumulation of problems cited by those writers who have developed the distinction between cosmopolitan and local as two types of scientists.^{xxxi}

ⁱ Revised version of a paper delivered at the 1962 meetings of the American Sociological Association. I am indebted to the encouragement of Alvin W. Gouldner and the editorial help of Anselm L. Strauss in preparation of this paper.

ⁱⁱ The Terms “cosmopolitan” and “local” were first used by Merton to describe different types of community leaders (Robert K. Merton, *Social Theory and Social Structure* [Glencoe, Ill.: Free Press, 1957], pp. 387-420). For a formulation of cosmopolitan and local as organizational types see Alvin W. Gouldner, “Cosmopolitans and Locals: Toward an Analysis of Latent Social Roles,” *Administrative Science Quarterly*, II (1957-58), 281-306, 444-80; see also Alvin W. Gouldner, “Organizational Analysis” in Robert Merton, Leonard Broom and Leonard Cottrel (eds.), *Sociology Today* (New York: Basic Books, 1959), pp.410-19. For particular studies see Peter M. Blau and W. Richard Scott, *Formal Organizations* (San Francisco: Chandler Publishing Co., 1962), pp. 64-74; Leonard Reissman, “A Study of Role Conceptions in Bureaucracy,” *Social Forces*, XXVII (1949), p. 308; Theodore Caplow and Reece J. McGee, *The Academic Marketplace* (New York: Basic Books, 1958) p.85 and *passim*; Harold Wilkensky, *Intellectuals in Labour Unions* (Glencoe, Ill.: Free Press, 1956), pp. 129-53; Warren G. Bennis *et al.*, “Reference Groups and Loyalties in the Out-Patient Department,” *Administrative Science Quarterly*, II (1958), pp. 481-500.

ⁱⁱⁱ William Kornhauser, *Scientists in Industry* (Berkeley: University of California Press, 1962), esp. chap. v; Simon Marcson, *The Scientist in American Industry* (New York: Harper & Bros., 1960); Donald C. Pelz, “Some Social Factors Related to Performance in a Research Organization,” in Bernard Barber and Walter Hirsch (eds.), *The Sociology of Science* (New York: Free Press of Gencoe, 1962), p. 357; Herbert A. Shepard, “Nine Dilemmas in Industrial Research,” *Administrative Science Quarterly*, I (1956), 346; Hollis W. Peter, “Human Factors in Research Administration,” in Rensis Likert and Samuel P. Hayes, Jr. (eds.), *Some Applications of Behavioural Research* (Paris: UNESCO, 1957), p.142; Clovis Shepard, “Orientations of Scientists and Engineers,” *Pacific Sociological Review*, Fall, 1961, p. 82. Robert Avery, “Enculturation in Industrial Research,” *IRE Transactions in Engineering Management*, March, 1960, pp. 20-41; Fred Reif, “The Competitive World of the Pure Scientist,” *Science*, CXXXIV (1961), 1959.

^{iv} Kornhauser, *op. Cit.*, p.133; Leo Meltzer, “Scientific Productivity in Organizational Settings,” *Journal of Social Issues*, No. 2 (1956), p. 38; Marcson, *op. Cit.*, pp.81-82, 104; Shepard, *op.cit.*, p.347.

^v Kornhauser, *op. cit.*, p.130.

^{vi} *Ibid.*; see also Shepard, *op. cit.*, and Pelz, *op. cit.*, p. 358.

^{vii} I am indebted to Donald C. Pelz of the Survey Research Center, University of Michigan, for providing me with these data.

^{viii} Institutional motivation has been dealt with extensively in: Talcott Parsons, *Essays in Sociological Theory* (Glencoe, Ill.: Free Press, 1954), chaps. ii, iii, Merton, *op. cit.*, pp. 214, 531, 555, 558-59; Robert K. Merton, "Priorities in Scientific Discovery," *American Sociological Review*, December, 1957, pp. 640-41. It should be noted that advancing knowledge as I deal with it here is institutional, a part of a normative pattern, not a mode of orientation that is simply natural to man. Thus, I make the distinction between institutional motivation (motivation based on internalized norms and goals) and typical human motives (assertive, friendly, ambitious, egotistic, etc.) as elements of concrete motivation.

^{ix} Advancing knowledge is a process that, for any one scientist, is composed of many events. This process has at least two broad stages: research work and research results. Bernard Barber, in talking of "inventions and discoveries," says "they have two aspects, that of process and that of products, and these aspects must be distinguished" (*Science and the Social Order* [Glencoe, Ill.: Free Press, 1952], p. 193).

^x I follow the procedure for index construction outlined and discussed by Paul F. Lazarsfeld, in Merton, Broom, and Cottrell (eds.), *op. cit.*, chap. ii, pp. 47-67; in "Evidence and Inference in Social Research," *Daedalus*, LXXXVII, No. 4 (1958), 100-09; and with Wagner Thielens, *The Academic Mind* (Glencoe, Ill.: Free Press, 1958), pp. 402-7.

^{xi} On reduction of property space see Alan Barton, "The Concept of Property Space in Social Research," in Paul F. Lazarsfeld and Morris Rosenberg (eds.), *The Language of Social Research* (Glencoe, Ill.: Free Press, 1955).

^{xii} This performance score cannot be construed as a measure of recognition, since, to be sure, the scientists were not made aware by the research team of colleagues' evaluations. The essence of recognition is that it is a *known* reward for one's work. For a complete discussion of the construction of this index of research performance see Donald C. Pelz *et al.*, *Human Relations in a Research Organization* (Vol. II, Ann Arbor: Institute for Social Research, University of Michigan, 1953), Appendix C; and *Interpersonal Factors in Research* (Ann Arbor: Institute for Social Research, University of Michigan, 1954), Part I, chap. i, Appendix A.

^{xiii} See Parsons, *op. cit.*, pp. 53-54, 143-44, 230-31, 239, for the formulation that the institutional norms reciprocally define relations between two classes of people or positions.

^{xiv} Merton, "Priorities ..., " *op. cit.*, p.645

^{xv} This is not the only government medical research organization that bases promotions on professional recognition. There would seem to be many others. Meltzer reports for his national sample of 3000 physiologists that publication productivity for those in government was the same as those in the university, and that publication was as strong a factor in promotions in both contexts (Meltzer, *op. cit.*).

^{xvi} Charles V. Kidd, "Resolving Promotion Problems in a Federal Research Institution," *Personnel Administration*, XV, No. 1 (1952), 16.

^{xvii} See my *Organizational Scientists: Their Professional Careers* (Indianapolis: Bobbs-Merrill, forthcoming), chaps vi and vii, and see below for the relation of performance process to accomplishing non-scientific work.

^{xviii} For other evidence that recognition supports motivation see Donald C. Pelz, "Motivation of the Engineering and Research Specialists" (*General Management Series*, No. 186 [New York: American Management Association], p. 30). He reports that for a national sample of 3000 physiologists, the number of publications and acknowledgements is positively related to intensity of motivation.

^{xix} Various sources exist for a full discussion of Lazarsfeld's elaboration analysis of which this is MI type. For the primary source see Paul F. Lazarsfeld, "interpretation of Statistical Relations as a Research Operation," in Lazarsfeld and Rosenberg (eds.), *op. cit.*: see also Lazarsfeld and Patricia L. Kendall, "Problems of Survey and Analysis," *Continuities in Social Research*, eds. Lazarsfeld and R. K. Merton (Glencoe, Ill.: Free Press, 1950), and Herbert Hyman, *Survey Design and Analysis* (Glencoe, Ill.: Free Press, 1955), chap. vii. One could say that the table also shows that motivation leaves to recognition, which in turn leads to performance (14 percent and 16 percent are less than 19 percent). But this is the same process I have described in the text. For motivation to result in recognition implies that there was some performance intervening; for recognition to lead to performance implies that there was some motivation intervening.

^{xx} I have based this finding on the one-time sequence. It is also possible that some investigators may have developed a high degree of motivation because of putting in more than 21 hours per week. Hard work could generate interest. Therefore, we may have another time sequence in the performance process of longer hours in research leading to high motivation which results in high performance. However, this is not so. In comparing proportions downward in Table 2 among those with high motivation, 12 percent more who work 21 or more hours a week on their own research have a high motivation score. The original relation between time in own research and performance is 11 percent. Therefore, high motivation, instead of being and intervening variable between time and performance, is a condition that creates a slightly stronger relation between the two. This is, of course, the time sequence I have originally assumed, which shows it is the sequence that prevails in the population under study.

^{xxi} I used the "21 or more hours per week" break in the distribution, since it is at this point that the consistent direction of association between time and motivation changes. This distribution ranges from 7 percent who work less than 15 hours per week on their own research and 7 percent who work over 46 hours a week.

^{xxii} That this is an important consideration for the organization is indicated by one of the six criteria used in evaluating the scientists for potential promotions: "writing or editorial ability, effectiveness on boards and committees, ability to organize his and others' work, administrative judgement and other traits relevant to his performance on his current job and the job for which he is being considered" (Kidd, *op. cit.*). This criterion indicates that the scientist's worth to the organization is based also on the non-scientific work he has been asked to do.

^{xxiii} The foremost example is Philip Selznick's *TV/A and the Grass Roots* (Berkeley: University of California Press, 1953).

^{xxiv} "Nine Dilemmas ...," *op. cit.*

^{xxv} *Ibid.*, p. 18

^{xxvi} *Ibid*

^{xxvii} Ibid. A conflict in goals is also the criterion for separating local and cosmopolitan scientists used by Marcson, *op. cit.*, Peters, *op. cit.*

^{xxviii} That the distinction between types of scientists has much potential use in the analysis of problems surrounding the research organization's need for both loyalty and expertise is forcefully brought out in Gouldner, "Cosmopolitans and Locals," *op. cit.*, pp. 465-67.

^{xxix} Blau and Scott, *op. cit.*, pp. 70-71, in comparing county agency caseworkers and Bennis' data in professional nurses, note that opportunities for a professional career in an organization coupled with restricted opportunities in competing organizational generate local orientations among professionals. Whether they still remain cosmopolitan or not was not discussed. Their analysis is, therefore, consistent with mine on the local dimension.

^{xxx} Kornhauser, *op. cit.*, p. 122. Another exception is Avery's (*op. cit.*), "The career question confronting the technical man is not, typically, whether to commit himself wholly to localism or cosmopolitanism. Rather he is likely to be constrained to try to extract advantage from both sources." Gouldner (*op. cit.*), and Blau and Scott (*op. cit.*), also have mixed types in their tables but do not discuss them in text. They focus on the distinct groups. Caplow and McGee also note a mixed orientation among professors in high-prestige university departments (*op. cit.*), p. 85 (see also Warren G. Bennis, *op. cit.*, pp. 481-500).

^{xxxi} For an analysis of the generation of cosmopolitan and local factions because of a change in goals see Paula Brown and Clovis Shepard, "Factionalism and Organizational Change in a Research Laboratory," *Social Problems*, April, 1956, pp. 235-43.

