

Two major contending models of university organization are the epistemological and the political: the former emphasizing the pursuit of truth and knowledge, the latter reflecting the presence of conflict and power struggles. A critical comparison of their respective strengths and weaknesses, together with an account of the rationale of model construction, reveals the underlying condition of their basic incompatibility and the futility of searching for a reconciling viewpoint.

COMPLEMENTARY MODELS OF UNIVERSITY ORGANIZATION

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What is the nature of college and university organization? How are the dynamics of higher education to be explained? How are the traditional departments and divisions to be understood and why does conflict between them arise? Are recent interdisciplinary ventures which cross traditional lines destined for success or failure? What is the significance of these questions for the practice of university administration? Answers to these perplexing questions about higher education are often given within the framework of a theoretical model which attempts to describe or explain the facts or phenomena with which the model is concerned. Besides providing a unique conceptual orientation, which in turn influences the selection of problems, the model may be useful in bringing to light some aspects of the situation which otherwise would remain hidden or obscure. When the same data are approached by different models, the question of choice arises: which is the more adequate? Thus, underlying the question of how best to represent a body of facts is the more fundamental one of the status of contending models and their compatibility or incompatibility. This question will be explored through a critical consideration of some alternative models of university and college organization.

James D. Thompson, Robert W. Hawker, and Robert W. Avery have proposed a model of university organization which, for the sake of comparison with other contending models, may be termed "epistemological".¹ Their main assumption is that many of the chief difficulties in university organization and administration are rooted in a pluralism of truth strategies which guide the thought and action of certain groups. These truth strategies, in turn, are

¹James D. Thompson, Robert W. Hawker, and Robert W. Avery, "Truth Strategies and University Organization", *Educational Administration Quarterly*, 5, Spring 1969, pp. 4-25.

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those collections of epistemological rules which guide the search for knowledge. For the purpose of analysis the authors employ the familiar but elementary distinction between experience and reasoning as the chief methods of achieving truth and knowledge. These two variables are further dichotomized according to whether individuals place a high or low reliance on experience and whether reasoning is codified or uncoded. Accordingly there are four truth strategies which scholars and researchers employ:

		TYPES OF REASONING			
		Codified		Uncodified	
RELIANCE ON EXPERIENCE	High	I	SCIENTIFIC	II	DIRECT
	Low	III	ANALYTIC	IV	INSPIRATIONAL

I. The scientific strategy, which employs a maximum reliance on experience and codified reasoning, involves continuous interaction between data collection and systematic theorizing. For this reason the scholar or researcher is regarded as physically distant from the phenomena under investigation.

II. The direct strategy, with its high reliance on experience but more unique and personal approach to the rules of reasoning and the evaluation of evidence, allows a greater intimacy between the researcher and his subject matter than does the scientific strategy.

III. The analytic strategy emphasizes codified reasoning at the expense of evidence and data collection and is characterized by logically closed systems often completely divorced from experience.

IV. The inspirational strategy has little if any reliance on experience or reasoning as ordinarily understood. Those alleged sources of inspirational knowledge, such as trances, dreams, and revelations, whose nature is little understood and often strongly debated, are not regarded as legitimate within the university.

In discussions on epistemology it is not only appropriate to identify and categorize the major techniques and methods for the acquisition of knowledge, but the complementary issue of the origin and detection of error also must be considered. Each of the truth strategies is scrutinized in turn from this point of view.

I. The scientific strategy, through its double-checking procedures, ensures that theory and evidence are consistent and in accord with one another. On the one hand, hasty generalizations and *ad hoc* deductions are avoided by a healthy respect for evidence; on the other hand, theories are revised or discarded in the light of new evidence. While this system of error detection is not foolproof, it minimizes the misinterpretation of a theory or its persistence in the face of contrary evidence.

II. The treatment of error in the direct strategy depends more heavily on the collection and comparison of evidence along with estimates of its relevance or “meaningfulness”. Debates as to the proper interpretation of experience often may serve to resolve disputes among scholars or researchers who employ this strategy, but not always.

III. In the analytic strategy error may exist in imputed relations between statements or in incomplete systems of statements. Accordingly, it may be diminished or eliminated by attention to matters of logical consistency and completeness as well as simplification of systems.

IV. Since the method of acquiring knowledge in the inspirational strategy is purely private and subject only to personal validation, there is clearly no method for resolving disagreement or eliminating error.

The epistemological model also yields a classification of traditional academic disciplines according to the various truth strategies, which may be summarized according to the following scheme:

STRATEGY	EXPERIENCE RELIANCE	REASONING CODIFICATION	ACADEMIC DISCIPLINES (*uncertain)
I Scientific	Maximum	Maximum	physics, chemistry, astronomy, physiology, zoology, *medicine, *engineering, *behavioural sciences, physical anthropology.
II Direct	Maximum	Minimum	humanities: literature, art, music, history; *social sciences: sociology, political economy, economics; *archeology, education, journalism, social work, public administration, business administration.
III Analytic	Minimum	Maximum	mathematics, statistics, logic, *medicine, *engineering, *behavioural sciences.
IV Inspirational	Minimum	Minimum	no institutionalized form.

Fluctuations in the states of development of some disciplines render their position in this classification uncertain. Cultural or social anthropology appears to be moving from descriptive techniques (direct strategy) to systematic theory (analytic strategy). Some of the social sciences, once connected with the humanities (direct strategy), also have moved in the direction of theory construction (analytic strategy). The position of the behavioural sciences is also ambiguous insofar as some of them emphasize

hypothesis-testing (scientific strategy), while others are concerned with mathematical models (analytic strategy).

Thompson and his associates raise a number of specific issues concerning university organization and administration, such as the relations between various divisions of the university and the outside community, the internal organization of the university according to schools and departments, and matters of staffing, salary, and promotion. In addition, topics of prestige and conflict are considered along with issues in curriculum development, like interdisciplinary studies programs. Some of the implications of the various strategies may be summarized as follows:

— Greater interchangeability between the university and the community in both knowledge and personnel is found in those disciplines which share the direct strategy. In analytic and scientific disciplines, on the other hand, the flow is largely from the university to the outside community.

— The standards of the era and culture are most strongly reflected in the direct strategy. The disciplines in this category are most susceptible to change on account of their preoccupation with problems of the times. The scientific strategy, more international in scope, has a greater freedom from temporal influences, while the analytic strategy, with its self-contained standards of truth, is rarely dependent on cultural restrictions.

— The activities and standards of some uncertain disciplines are determined by the context in which they are placed; for example, the social sciences adopt the direct strategy in a liberal college of arts, but their orientation within the graduate school of a larger university is more towards the analytic strategy.

— Recruitment of staff, salaries, and promotions are largely influenced by strategies adopted by departments or schools. Departments employing the scientific strategy, for example, often recruit from outside the academic community. Faculty salaries are thereby made competitive with those in government and industry. Promotion in rank and increases in salary are frequently rapid. Similarly, experience and age are unimportant in disciplines adopting the analytic strategy. The absence of non-university competition adversely affects the positions of faculties employing the direct strategy in these respects, however.

The prestige of various disciplines is closely tied to the truth strategies employed in them. At the present time it is understandable that the scientific strategy should rank highest with physics, as the idealized form, assigned first place by scientists themselves. The relatively smaller prestige of the biological sciences, however, is due to their lack of any highly generalized theories. Among disciplines employing the direct strategy, in particular the humanities, a hierarchy of prestige is unclear due to their specialized nature which renders comparison difficult.

Since conflict is so much a part of the life of a university it is not surprising that this feature should receive an explanation in terms of truth strategies. A major source of conflict arises from competition for funds and

space. Since both of these are in limited supply, the losers develop antagonisms either to the winners or to the administrators, or both. Occasionally administrators make decisions in favour of departments whose truth strategy they share as a result of early training. Within various schools or departments, splits frequently occur when proponents of different strategies challenge one another on ideological grounds and attempt to influence appointments, promotions, allocation of funds, and the like. In professional schools, for example, where the analytic and scientific strategies collide with the direct strategy, this form of conflict is noticeable. From the point of view of the administrator, the grouping of departments according to truth strategies is a crucial matter in the attempt to control conflict.

Finally, many of the difficulties experienced in attempts to establish interdisciplinary courses of study are located in fundamental differences of orientation which, in turn, reflect the pluralism of truth strategies. The essential conservatism here and in other areas is explained by the inherent tendency of individuals, departments, and divisions to resist challenges from truth strategies other than their own.

At first glance the truth strategy approach seems adequate and reflects recognized divisions between academic cultures. For example, C.P. Snow distinguishes between the literary and scientific academic camps which share little in common in intellectual, moral, and psychological matters.² In a very approximate way it is possible to relate the direct and inspirational strategies to Snow's literary culture, and the scientific and analytic strategies to Snow's scientific culture.

However, there are some difficulties in the construction of the model on a deeper conceptual level. The method of dichotomizing the variables of experience and types of reasoning yields four categories which are apparently discrete. While it is true that there are gradations *within* the four types, it should also be noticed that there are gradations *between* the four types. Although the uncertain state of some disciplines may account for the difficulty in classifying them under particular strategies, it is equally plausible to attribute the uncertainty to inadequacies in the scheme itself. However, the latter alternative is explicitly denied by the proponents of the epistemological model, presumably because the admission of gradations between categories would render many more of the various disciplines uncertain with regard to their position. The umbrella-term "education", for example, disguises a multiplicity of methods and strategies employed in achieving knowledge, so it would be a mistake to classify it under any one strategy in particular.

Some further questions concern the dimensions of experience and reasoning. Is high reliance on experience in the scientific strategy correlated with inductive modes of reasoning, and low reliance on experience in the analytic strategy characteristic of deductive reasoning? No satisfac-

²C.P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge: Cambridge University Press, 1959).

tory explanation is given for abandoning the traditional distinction between inductive and deductive methods. In addition, is there reason to believe that the terms "inductive" and "deductive" are interchangeable with the terms "uncodified" and "codified", respectively? In fact, to define "codified" simply as "explicit and arranged systematically" is extremely oversimplified. Moreover, the lack of adequate definitions of the central terms "experience" and "reasoning" renders their application uncertain. Because of this persistent vagueness in terminology the boundaries between the various strategies become blurred, increasing the chances of misinterpretation in applying them to specific cases.

There are some minor obscurities in the description of the various strategies which warrant correction. For example, it is curious to distinguish between the scientific and direct strategies on the basis of their respective distance or intimacy of the researcher with relation to the phenomena under study. Surely this is a metaphorical, not an actual claim. Although knowledge gained in transaction with the objects of scientific inquiry is often mediated by detecting and measuring instruments of various sorts, this neither alters the immediacy of the observer's experience nor requires that it should be regarded as essentially different from that which characterizes the direct strategy. This misleading distinction appears to have arisen through adopting uncritically the experience of the artist as a paradigm of the direct strategy. The distinction between the two strategies is better handled and clarified in the discussion of the respective techniques of error detection, but at the same time there is some doubt about the criteria of the "relevance" of evidence and the "meaningfulness" of experience in the direct strategy. In this context, "meaningful" for an artist might simply be "important", a matter of his psychological make-up, an expression of subjective values. For the scholar, however, the same term might refer to the likelihood of the ultimate verification and validation of an hypothesis or perhaps its fruitfulness in generating new truths. The confusion of artistic and scholarly activities contributes to the obscurity which plagues the account of the direct strategy in particular.

Research on creative thinking has yielded some distinctions which, when superimposed on the epistemological model, help to illuminate and correct its central claims. J.P. Guilford describes the sequence of operations in any problem-solving task as observation, memory, divergent thinking, convergent thinking, and evaluation.³ To think divergently is to be able to produce a variety of associations to some given idea, while to think convergently is to produce the one correct answer that fulfils the requirement of the problem. Roughly, then, the scientific and analytic strategies might be characterized by convergent thinking, perhaps as a matter of degree, and the direct and inspirational strategies would employ divergent thinking. This interpretation would qualify the unsatisfactory distinction between codified and

³J.P. Guilford, "Three Faces of Intellect", *The American Psychologist*, 14, 1959, pp. 469-479. See also *The Nature of Human Intelligence* (New York: McGraw-Hill, 1967).

uncodified types of reasoning used in the epistemological model. The work of L. Hudson which reports a connection between convergent thinkers and science-subject specialists, on the one hand, and divergent thinkers and non-science-subject specialists, on the other, provides some support for this interpretation.⁴

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We shall now turn from conceptual matters to some specific problems raised by the epistemological model and its relation to other work dealing with university organizations. Among the factors which characterize the internal organization of universities, prestige and conflict are particularly important. Thompson and his associates claim that prestige among disciplines adopting the scientific strategy is a reflection of the extent to which their methods conform to the idealized form of that strategy, physics. However, within the direct strategy, whose disciplines have little ground for compatibility, it is asserted that a hierarchy of prestige is difficult to determine. This account is particularly thin and neglects the question of the relative prestige of disciplines in different strategies. As a matter of fact, the dimensions of prestige and status in the university are intricate indeed. For example, the reciprocal prestige between departments and their individual members has a significant effect on hiring procedures, salary negotiations, and other personnel matters. Moreover, the assignment of prestige ratings to departments is subject to what Theodore Caplow and Reece J. McGee call the "aggrandizement effect", a characteristic of members of groups of universities and other similarly structured organizations to assign unrealistically high ratings to their own groups as compared with others.⁵

Since almost every member of a university lives by disciplinary prestige, it is inevitable that power relations should be affected accordingly. Due to the lack of fixed rules in many dimensions of university life, strong-willed deans, chairmen, or professors establish power structures by converting their prestige into authority, enlisting the support of others around them.⁶ Attempts to disentangle power structures are complicated by the fact that there is no direct connection between academic rank conferred by the institution and disciplinary prestige awarded by outsiders, the former definite and discrete and the latter a composite of subjective opinion, subject to distortion. Consequently, to account for prestige solely in terms of the

⁴L. Hudson, *Contrary Imaginations* (New York: Schocken, 1966), *Frames of Mind* (London: Methuen, 1968). This matter is far from clear-cut, however. Does the distinction between convergent and divergent thinkers describe a genuine difference between the scientist and non-scientist, or is it simply a reflection of the popular image of the scientist? It is plausible to argue that the activities of the scientist and artist alike depend on an initial phase of divergent thinking and later exhibit features of convergent thinking; both are types of problem-solving activity. Similarly, the epistemological model might be interpreted as an attempt to elaborate problem-solving techniques according to the different orientations of the various truth strategies.

⁵Theodore Caplow and Reece J. McGee, *The Academic Marketplace* (Garden City, N.J.: Anchor Books, 1965), pp. 37, 89.

⁶*Ibid.*, p. 178.

salient features of the knowledge-gaining techniques within the various truth strategies is doomed to failure. Prestige is not a matter of objective or scientific determination, but must be treated within the larger social and institutional setting.⁷

The belief that universities are safe havens for the gentlemanly pursuit of independent thought, free of all disruption and conflict, is a myth. The looseness of power arrangements referred to earlier easily permits the development of conflict within the organization. In fact, colleges and universities are not well designed to accommodate conflict. Consequently, typical mechanisms of adaption to stress are denial of its existence or avoidance through inaction.⁸ As expected, Thompson and his associates locate the source of conflict in the plurality of truth strategies. These antagonisms emerge in competitions for staff, money, equipment, space, and other academic amenities. Unfortunately, the epistemological model yields no apparent methods for the resolution of conflict. According to Louis C. Vaccaro, one type of conflict results from the introduction and growth of bureaucratic functions in the university and arises from the confrontation of administrative and professional (disciplinary or departmental) authority.⁹ The root cause of conflict is a matter of incompatible values: the professional scholar and teacher employs creative and imaginative approaches, while the non-professional administrator attempts to achieve an orderly, codified, and regularized mode of activity. Vaccaro comments on four areas of conflict identified by W. Richard Scott: the professional's resistance to bureaucratic rules, standards, supervision, and his conditional loyalty to the bureaucracy.¹⁰ He believes that the latter area, in particular, is one in which increasing conflict can be expected. The various professional societies have greatly increased the extent of their influence over the lives of their members in recent years. Consequently, the individual's orientation to his particular discipline, strengthened by membership and participation in the professional society, disorients him from the institution. He then becomes more autonomous and less subject to institutional controls.¹¹

To proceed from the recognition that compartmentalized systems exist within the university structure of departments and divisions to the wish that they can be eliminated is naive and unrealistic. R.C.C. Kim advocates a "philosophy of integration" to oppose the tendency of university organizations to become collections of independent units working at cross-purposes¹² but this a wholly over-simplified view of the situation. The stubborn

⁷*Ibid.*, p. 110.

⁸S.O. Ikenberry, "Restructuring the Governance of Higher Education", *AAUP Bulletin*, 56, 1970, p. 373.

⁹Louis C. Vaccaro, "The Conflict of Authority in the University", *College and University*, 44, 1969, p. 232.

¹⁰W. Richard Scott, "Professionals in Bureaucracies—Areas of Conflict", in *Professionalism*, edited by Howard M. Vollmer and Donald L. Mills (Englewood Cliffs, N.J.: Prentice-Hall, 1966), p. 273.

¹¹Caplow and McGee, *Op. cit.*, pp. 71, 183.

¹²R.C.C. Kim, "The Academic Division: Stumbling Block to Excellence", *Liberal Education*, 52, 1966, pp. 428-433.

fact of the existence of conflict between professional principalities cannot so easily be dismissed. The recognition of differing values and loyalties suggests that the complete elimination of conflict may never be possible, but reduction to a tolerable level is desirable. A certain amount of creative conflict may be beneficial, providing it can be controlled.¹³

Thompson and his associates suggest that some difficulties in establishing interdisciplinary programs can be traced to inherent differences in fundamental orientations related to various truth strategies, but they leave the implications of this observation undeveloped. Fortunately, this intriguing issue has been explored in an empirical study of faculty cultures by Jerry G. Gaff and Robert C. Wilson.¹⁴ They claim that there are fundamental differences between faculty members in various fields of specialization which extend beyond subject matter into areas such as educational values, teaching orientation, and life style. With regard to teaching orientation, their findings appear to support the truth strategy approach. For example, the most discursive teaching styles are in philosophy, religion, and history (direct strategy), while the least discursive methods are in mathematics and engineering. Student involvement is greater in least codified courses (direct strategy) and less in more highly codified fields (scientific, analytic strategies).¹⁵ In general, the conclusion is that interdisciplinary ventures have a greater likelihood of success when they attempt to merge humanities and social science subjects (direct, scientific strategies) than between subjects in the natural sciences, mathematics, and some professional areas, such as engineering (scientific, analytic strategies). At the same time, interdisciplinary ventures within each of the cultures (strategies) can be encouraged. Unless educators and administrators are aware of these differences between faculty cultures, plans to restructure education in the universities are not likely to succeed. Conscious and deliberate efforts must be made to accommodate the diversity of approaches in the service of common goals.

The realization that the epistemological model of university organization is incapable of dealing with conflict suggests that other models should be

¹³Vaccaro, *Op. cit.*, p. 239.

¹⁴Jerry G. Gaff and Robert C. Wilson, "Faculty Cultures and Interdisciplinary Studies", *Journal of Higher Education*, 42, 1971, pp. 186-210.

¹⁵Some features of faculty cultures may be related to psychological factors surrounding vocational choice. Why do individuals enter certain occupations or fields of study? Perhaps because their chosen areas are consonant with personality structures. An attempt to establish a correlation between personality types (realistic, intellectual, social, conventional, enterprising, artistic) and occupational choices is made by John L. Holland, *The Psychology of Vocational Choice* (Waltham, Mass.: Blaisdell, 1966). However, only the most tenuous connections can be made between his classification and the various professions. Nevertheless, if Holland's theory of attraction—the view that persons are attracted to a particular intellectual culture consonant with their predispositions in interests and values—is correct, it suggests that the differences, often destructive, that separate faculty cultures are basically unalterable, and conflict is inevitable. On the other hand, if a theory of socialization—the view that individuals acquire the characteristics of a faculty culture by being socialized within it—is preferable, then the possibility of reducing conflict is a real one. Which of the two theories is correct, however, is difficult to determine, according to Gaff and Wilson, *Op. cit.*, pp. 197-198.

considered. Julian F.S. Foster compares the economic model and the political model and concludes that the latter is more appropriate.¹⁶ In the economic model the various strata of universities are regarded as counterparts of corresponding elements of commercial organizations: the students are the consumers, the faculty are the salaried workers, the administration is the management, and the trustees are the board of directors. On this view, the university is a species of corporation or business enterprise insofar as it exhibits a hierarchical structure and stresses internal coherence, unification, and the common organizational goal of maximizing profits. Accordingly, the university is thought to be amenable to business management techniques. On the other hand, a more fruitful approach to the question of the nature of the university is supplied by the political model. From this point of view the university is regarded as a species of political state in which the often incompatible attitudes and interests of various individuals and groups exist in a condition of variance and competition. The political model, therefore, is pluralistic in nature and is characterized by internal conflict and lack of common goals. Like political systems, the goals of institutions of higher education are imponderable: they are obscure, conflicting, subject to constant change, and little agreement exists as to the best means of achieving these fluctuating ends.¹⁷ Universities, therefore, are unlike corporate enterprises and more resemble political realms.

A similar conclusion is reached by J. Victor Baldrige through a comparison of three academic models, the bureaucratic, the collegial, and the political.¹⁸ The chief inadequacies of the bureaucratic model, on the one hand, with its emphasis on the principle of legal-rationality in formal rules and regulations and hierarchical chains of command and communication, is that it fails to distinguish between formal, legitimate power and authority and that of the informal, illegitimate variety characteristic of a developing and changing organization like the university, particularly insofar as informal power relationships bear upon the dynamics of policy formation. The collegial model, on the other hand, describes the condition in which a community of scholars manages its own affairs by the technique of consensus, free of involvement with bureaucratic officials. However, this model of round-table democracy exists on a broad scale only at a few small colleges

¹⁶Julian F.S. Foster, "A Political Model for the University", *Educational Record*, 49, 1968, pp. 435-443.

¹⁷The question of the presence or absence of common goals in the university, in the light of its organizational structures, is debated by William E. Moran, "The Study of University Organizations", *Journal of Higher Education*, 39, 1968, pp. 144-151. He notes that universities, in common with commercial corporations, have certain bureaucratic features, such as regulations controlling member behaviour, hierarchical levels of authority, work specialization, etc., but they are not, on that account, bureaucracies. Rather, they *contain* bureaucracies. He doubts that the university has any goals apart from certifying student achievement and maintaining fiscal order and therefore is not a unitary organization. It is preferable to view it as a species of federal organization sheltering academic organizations, only some of which may have readily identifiable goals.

¹⁸J. Victor Baldrige, "Models of University Governance", Stanford Center for Research and Development in Teaching, School of Education, Stanford University, September 1971.

or on a restricted scale at very low levels in larger academic organizations. Essentially the collegial model is a utopian concept, more normative than descriptive in character.

According to Baldrige, the utility of the political model is indicated by the appropriateness of some principles and assumptions of political analysis, such as the inevitability of conflict as a feature of dynamic organizations, the existence of influential power blocs with diverse interests and values, the restrictions on formal authority by the relative bargaining power of conflicting interests, the necessity of compromise and negotiation among competing groups, and the recognition of the influence of other groups external to the academic organization and their effect on internal policy-making activity.¹⁹ The view of the university as a political entity is strengthened by the recognition that power in universities is distributed in ways which closely resembles domestic politics. The force of different types of personalities in the office of university president yields different styles of leadership describable in political terms: democratic, authoritarian, and theocratic.²⁰ The existence of academic freedom and rights for the professional staff and the preoccupation with constitutional forms of power among trustees illustrates the appropriateness of the political analogy. Increased participation of both faculty and students in policy-making allows the expression of diverse claims to power and, at the same time, reduces or controls conflict. If the essence of politics is conflict over goals, then the university does not simply adopt the superficial appearances of politics (elections, parliamentary procedures, etc.) but it *is* truly political.

At the same time, the overall rationality of the university's educational function is not accounted for in the political model. The primary activities of teaching and learning in the search for truth seem to have been lost sight of in the view of the university as an arena for rough-and-tumble politics. It does not seem helpful, at this point, to suggest that the search for knowledge is guided entirely by political principles, in an attempt to reconcile the claims of both the epistemological and political models. The discussion now appears to have reached an impasse. Each model of academic organization, from its unique viewpoint, has supplied fresh insights and has focused attention on hitherto neglected aspects of the academic situation. Each has provided a valuable alternative to other models in a largely neglected field.

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Which of the two models of university organization, the political or the epistemological, is the most adequate? In order to deal with this question it will be helpful to consider the topic of model construction and the issue of contending models in some detail. Of the various conditions for the uses

¹⁹*Ibid.*, p. 10.

²⁰For a similar account of the personality types of departmental chairmen, based on a political, feudal analogy, see the hilarious but insightful descriptions (The Robber Baron, The Lord of the Mountain Fief, etc.) devised by Caplow and McGee, *Op. cit.*, pp. 168-170.

of theoretical models, Max Black considers these the most important: the establishment of some facts and regularities in the original or primary field of investigation, the need for mastery of the original field by explanation of given regularities and by connecting it with other bodies of knowledge, the description of some entities, systems, or structures belonging to a more familiar secondary field, and the checking of inferences from assumptions made in the secondary field against known or predicted data in the primary field.²¹ As Black argues, the use of models is to be regarded neither as a prop for feeble minds nor as a substitute for some other type of procedure. Rather, they play a distinct and irreplaceable role in achieving insight through the transfer of implications from the secondary or metaphorical field of investigation to the primary or original field.

Theoretical models are somewhat similar to metaphors which establish comparisons and patterns of thought to enlarge our understanding. Models, like metaphors, accomplish their purpose chiefly by a transfer of vocabulary from the secondary to the primary field. But a fruitful model is distinguished from a purely metaphorical transfer of terms by its sustained and elaborate control of the concepts of the secondary field. Without this, the attempt to explain the relationships between the structures of one field in terms of another amounts to no more than the invention of an attractive picture or image having no further explanatory power. An adequate model, on the other hand, in virtue of its similarity of structure with that of the primary or original field of investigation, has sufficient implicative power to provide a basis for describing the phenomena in question from a new point of view but within the boundaries and controls of the secondary field, for understanding the structures of the primary field, for explaining the relations between them, and for predicting hitherto unnoticed consequences.

The primary reason for recourse to model construction is that the structure and properties of the model are generally better understood than those of the phenomena to which they are applied. The ultimate justification for the construction of theoretical models, then, is completely pragmatic: they provide better understanding, mastery, and control of the field on which they are superimposed. Any novel hypotheses which accompany such applications are then susceptible to the usual forms of empirical validation or invalidation, often in quantitative terms. As Black remarks, "Perhaps every science must start with metaphor and end with algebra; and perhaps without metaphor there would never have been any algebra".²² In addition, the use of models provides the only ground on which cross-connections between the broad divisions of knowledge — the natural sciences, the social sciences, and the humanities — and the various disciplines within these areas, can be established.

²¹Max Black, *Models and Metaphors* (Ithaca, N.Y.: Cornell University Press, 1962), p. 230.

²²*Ibid.*, p. 242.

Now, it is a commonplace to remark that a phenomenon may reveal somewhat different aspects depending on the conditions under which it is observed; no single observation can open up to us all the features of a situation. By reason of our presumptions, orientation, and outlook on a phenomenon or problem, some of its aspects are screened from view while others are brought into prominence. When a model of such a phenomenon, event, or process is devised, the purpose of such an activity is to reproduce in relatively accessible form certain selected features of the original situation which interest us. The desirability of accepting complementary models follows from the recognition that the universe of investigation is neither continuous nor unified, neither stable nor immutable. Rather than search for any single model which will do justice to all of the various facets of experience, we are obliged to contend with opposed truths. It has proven fruitful in physics to accept complementary truth statements in different domains as constituent of reality. The theory of complementarity, for example, requires the acceptance of two incomplete, irreducible accounts of the same phenomenon. The most familiar manifestation of complementarity is exhibited in the dual nature of light as wave and as particle. Neither of the models can be explained in terms of some more ultimate viewpoint but both must be accepted in their present complementary form. The acknowledgement of a similar orientation undoubtedly will prove equally necessary with regard to theories of educational organizations. Although this attitude may appear subjective and arbitrary, it is not. Physical assumptions and theoretical models are the result of a definite form of commitment to reality, one which imposes itself on the theorist under the guidance of experience and its associated articulated structures. Each model thus provides a unique way of threading together various dimensions of experience and thereby unifying them.

The perplexing thing about complementary models is that, while their respective statements and claims do not fit together and often contradict one another, each introduces a language or set of constructs which fits the facts of the phenomenon under investigation. The adoption of complementary models does not simply grant blanket permission to use either one according to whim or passing preference. Nor is it exact to say, of such competing conceptual structures, that both are true or that neither is true. It is more useful to regard them as alternate languages, either one of which is appropriate to some situations but inappropriate to others.²³ The ensuing freedom to adopt alternative viewpoints undoubtedly yields greater insights into the phenomenon under investigation.

Just as we have many different sorts of tools for doing a single job, there

²³The philosophical view of language as a multiplicity of games, governed by an almost endless diversity of rules, was first formulated by Ludwig Wittgenstein, *Philosophical Investigations* (New York: Macmillan, 1953), and has been adopted as a consistent approach to problems in the philosophy of science by Norbert R. Hanson, *Perception and Discovery* (San Francisco, Calif.: Freeman, Cooper, 1969), who discusses the theory of complementarity in physics from this point of view.

are various ways of regarding any single phenomenon. This fact should not be regarded as an intimidating one but as a welcome opportunity to organize the multiplicity of experience according to appropriate representational devices. The schemes that ultimately are adopted simply indicate what sorts of representations are possible; they do not require that any or all of them are necessary. At the very least, they define the various forms that the problem may take and they illuminate those particular aspects of the phenomenon which are amenable to representation through the construction of appropriate models.

The epistemological and political models of university organization, then, are irreducible and it would be misguided to insist that the situation should be otherwise. Each serves to direct perception to certain salient features of the phenomenon under investigation (description) and hopefully to account for them in causal terms (explanation), as well as to establish expectations with regard to future perceptions (prediction), but neither is completely adequate in all respects. The reason for this, it may be supposed, is that they draw attention to two fundamentally opposing dimensions of human activity, the rational and the irrational; the epistemological model, with its emphasis on truth and knowledge reflecting the former, and the political model, characterized by the presence of conflict and power struggles, reflecting the latter. If this view is correct, there is indeed a fundamental disparity between the two models. Consequently it is pointless to search for a reconciling viewpoint; each must be regarded as more or less adequate on its own terms.