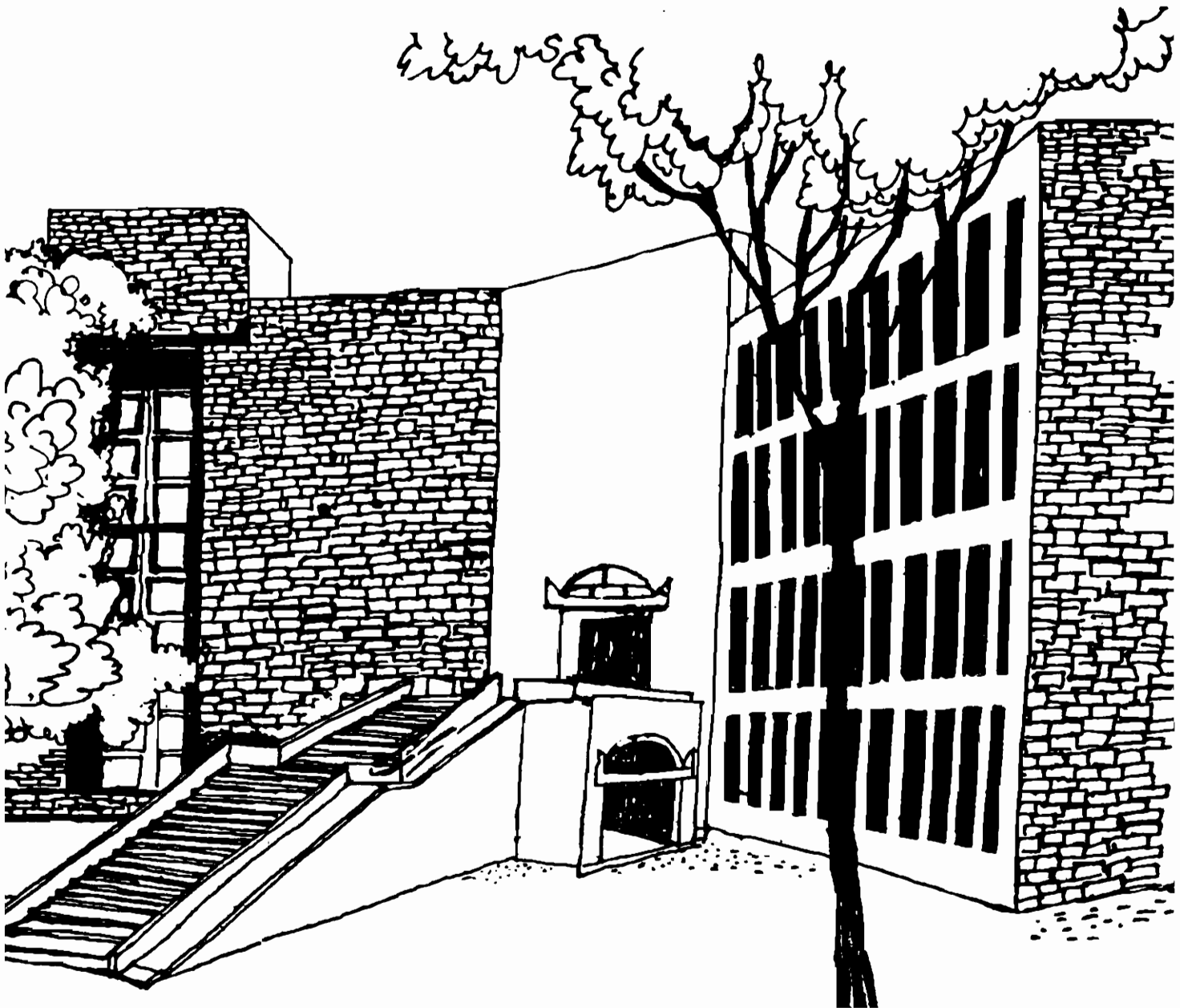




Working Paper



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INTEGRATED PROBLEM SOLVING AND DECISION
MAKING: MATCHING ABILITY AND TRAINING
WITH MANAGEMENT REALITY

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INTEGRATED PROBLEM SOLVING AND DECISION MAKING:
MATCHING ABILITY AND TRAINING WITH MANAGEMENT REALITY¹

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Abstract

To solve problems parsimoniously and make decisions well, to-be-managers must possess the requisite ability [intelligence] and acquire the needed professional skills through education and training. According to the authors, the prevalent bases of selection [e.g. GMAT score] and teaching methods [e.g. lecture method] do not adequately meet the requirements of managerial work that are often nonroutine, loosely structured, and nondeliberative. The authors present an alternative view of "intelligence" advanced by Das [1988] that goes beyond IQ. They also describe Dörner's work [1981,1989] that highlights barriers to human problem solving. From these two lines of work, implications for student selection [input] and design of teaching-learning programmes [throughput] are drawn. In the latter context, the usefulness of problem-solving-oriented teaching material [e.g. cases] and the case method are suggested.

The role of the manager / administrator is vital to our social and economic institutions be they in the developing or the developed nations. Perceptions differ in regard to the nature of managerial work and even in regard to what the manager's role should be. There is however, consensus among observers of managerial work and researchers in this area that top level executive functions include goal setting, planning, decision making,

monitoring the implementation of a number of decisions, influencing co-workers, problem solving, and even problem sensing.

To solve problems effectively and make decisions well, managers must be "intelligent" and possess sound knowledge of the industry, informed awareness of the socio-economic environment, and the legal framework in which they work. Management educators in the institutions of higher learning make the fateful assumption that given a "higher than average" level of intelligence, the prospective managers/administrators can be equipped with the necessary knowledge base and professional skills to solve problems parsimoniously and make good judgments and decisions in the real world of management and public administration. It is further assumed that this objective is best served through assimilation of disciplinary and informational learning materials such as, reading books and listening to lectures delivered by professors and subject specialists.

Based mainly on these two assumptions most of the management schools and universities around the world persist in their emphasis on teaching theories and concepts rooted in various academic disciplines [e.g. economics, mathematics, psychology, etc.] and analytical tools and techniques [e.g. operations research, management science, expert systems, etc.] to the managers-to-be.

RATIONAL ANALYSIS - INTUITION ISSUE

Teaching, learning, and research in the rational-analytic mode have had their greatest impact on executive problem solving and decision making that are routine, deliberative, and well structured. However, in real life problems are multifaceted and complex; decision demanding situations that have high managerial content are often non routine and loosely structured.

Such problems and situations call for "qualitative judgment", "intuition", and "creativity" on the part of problem solvers and decision makers. It is further recognised that no human behaviour [of which managerial behaviour is a subset] is without its emotional content. "All important decisions take a chunk out of our hearts, make us intensely involved in making the decision and either cause ecstasy, agony or resignation at the stage of accepting what we have decided to do" [Das, 1987: Personal communication]. The natural compounding of emotion and thought continues to be largely ignored in the so called analytic orientation to training and education for to-be-decision-makers. This compounding of emotion and thought in human behaviour coupled with the lack of structure in decision demanding situations has provided management thinkers a strong ground for challenging reason.

In recent years, a few [but vocal and articulate] management thinkers and educationists have been disillusioned with the orientation to management and other classes of higher education that virtually worship logical-analytic thinking. Educational programmes based on such orientation, they believe, are geared towards reliance on formal ex cathedra instruction and extensive specialised knowledge. In these programmes students are rewarded for their passive assimilation of theoretical knowledge. The viewpoints of these thinkers are also echoed by several top level executives and reflect a kind of movement toward intuitive, holistic, and seemingly nonrational thinking.

The overarching concerns pertaining to analysis-intuition issue in the reality of management and their implications for management education are contained in Janis and Mann [1977], Leavitt [1975] and Mintzberg [1990]. Leavitt for instance, advocates that some amount of "organized anarchy" ought to be encouraged in managerial goal setting activity and further,

undue emphasis on rational rules should be abandoned. Mintzberg [1990] in retrospective commentary to his highly publicised article The Manager's Job: Folklore and Fact describes intuition as "the insightful face in contrast to the long dominant professional or the cerebral face [of management]. One stresses commitment, the other calculation; one sees the world with integrated perspective, the other figures it as the components of a portfolio. The cerebral face operates with the words and numbers of rationality; the insightful face is rooted in the images and feel of a manager's integrity" [p. 170].

But intuitions and judgments are not always accessible to conscious thinking. Do we know how judgmental and intuitive processes work in poorly structured and unprogrammed decision making situations? Do some to-be-managers, especially the ones with higher IQs than others, possess masterminds? If we know how they work for students in our higher educational institutions, we may have some clue to how they can be made to work better. We may then be able to get on with a constructive alternative to management education which continues to pursue the informational-analytic mode ever more vigorously.

In this paper, we address our concerns about conventional management education in the universities around the world. We will focus on two important aspects of education, alluded to earlier. These are: [1] intellectual competencies of managers / administrators-to-be and [2] the processes that impede their ability to evaluate prevailing conditions, find parsimonious solutions to problems, and make good decisions. In doing so, we will first present an alternative perspective of intelligent functioning of humans [alternative to IQ] developed by the Canadian psychologist Das [Das, Kirby, & Jarman, 1979; Das, 1983; Das, 1984; Das, 1988]. This perspective, we believe, has far reaching implications for the kind of

students we get into higher education in general and management education in particular. Second, we will present some research evidence of the prominent German psychologist Dörner [1981, 1989] whose systematic research into problem solving behaviour of human subjects under conditions of high complexity and poor structure has revealed some important barriers to effective and parsimonious problem solving. Dörner's work, we believe, provides some insights into the consequences of overly structured, programmed and heavily analytical learning in higher educational systems.

COGNITIVE INTEGRATION AND INTELLIGENT FUNCTIONING: IMPLICATIONS
OF AN ALTERNATIVE VIEW OF COGNITIVE COMPETENCE [DAS]

What makes an outstanding manager stand apart from others, we believe, is his ability to find parsimonious solutions to problems and make "good" decisions. Is he / she intelligent? The answer could be "no" if you go entirely by his / her score on standard IQ tests such as that of Binet's. Most intelligence tests, following the legacy of Sir Francis Galton, continue to place everyone on a single scale of merit. Recent research and debate on the nature of human intelligence indicate that "intellectual abilities cannot be reduced to a unitary metric; a Mozart is not an Einstein" [Das, 1988]. The single scale of merit purported to measure an individual's ability to grasp complex and abstract relationships fails to distinguish between different intellectual abilities. Moreover, not only there is no universally acceptable notion of what is abstract or what is to be regarded as complex, but also these abilities are influenced by previously acquired knowledge and opportunities for acquiring that knowledge.

Growing out of the criticisms of and dissatisfaction with IQ tests, two decades of research by Das and his colleagues has led to the conclusion that "the ability which is predominantly measured by standard intelligence tests is the ability to code information, to store it and to retrieve. These abilities are necessary of course, but outside the scholastic environment of classrooms, what counts more is a person's aptitude for making evaluations, judgments and decision. The essence of human intelligence, according to Das, is broadly called "planning which includes all of those activities that lie beyond the gathering and storing of information" [Das, 1983, p.2]. This view of intelligence, Das argues, has to do with how we process information, not so much what information we have. How we think [cognize] when we have obtained information is the basic concern of human intelligence. In fact, according to Das, cognitive activities can be simply divided into two types: Coding of information and planning. Of course, without their knowledge-base, plans are empty. Similarly, without plans the mere gathering of knowledge may be blind. We need not go into the scientific basis of Das' information processing theory of human cognitive functions. Suffice it to say, the theory has evolved out of the studies of functions [workings] of the brain by the Soviet psychologist Alexander Luria [1973].¹

INPUT

The implication of this view of intelligent functioning for students who come into educational programmes in management [input in systems terms] is clear. We know that there is a scramble for getting admitted to top rated management schools all over the world. For a few seats, the pool of applicants is immense.¹ Selectors to the programme place great emphasis on the applicant's GMAT [Graduate Management Admission Test] or similar other test scores and hard numbers of grade points. We know of no evidence that the selection tests are positively related to the management roles we are concerned with -- solving loosely structured problems parsimoniously and making decisions that are nondeliberative and judgmental. Higher performance on such tests will of course be positively correlated with performance [requiring comprehensive memorising and reproduction] in educational systems which rigorously pursue analytical orientation to training loaded with cognitive-informational learning material and lectures. With such selection tests and learning systems, educators may have done an excellent job of selecting the right students for their so-called management education programmes but they have not selected outstanding managers of the future.

What is the alternative? In looking for it we must get ourselves out of the mental set of viewing intelligence / aptitude as a unitary psychometric concept. Measurement of different ways in which individuals organize their thinking and are able to solve multi-step problems should be made. Alongside aptitude tests we should develop appropriate multidimensional cognitive assessment systems in order to fully represent the "intelligence" of aspiring managers. Das [1988] has developed such systems for children with learning difficulties and used them for

remediation of these difficulties.

Without making overzealous pronouncements and delivering pious homilies on fostering "creativity", and encouraging "holistic thinking" through appropriate learning / teaching materials and methods, we now turn to simply describing the difficulties our "intelligent" students encounter when they are confronted with complex and poorly structured problems. We draw upon the imaginative work of Dörner and his colleagues [1981] in this area.

PROBLEM SOLVING PROCESS IN POORLY STRUCTURED MANAGEMENT CONTEXT

Dörner conducted a series of simulation studies. In one such study, the participants in the role of the Mayor were required to govern a small European city [imaginary name: Lohausen] with medium- to high-level socio-economic environment and infrastructure. Dörner found that whereas some people could successfully handle complex, ambiguous problems of the city and the community without any formal disciplinary training [e.g. economics, sociology, law, etc.], others could not grasp and master the problems satisfactorily. The latter had high levels of training in various educational disciplines.

Many in the latter group could only deal with highly localised problems [e.g. repair services in the city] in the system. They found it difficult to sense and evaluate major economic variables [e.g. oil consumption]. They tended to think in causal series instead of causal nets; they did not consider sufficiently the side effects of certain measures. Some other typical mistakes of poor problem solvers were: a low assessment of their own ability to act linked with fear of failure or loss of control.

Consequently, they engaged themselves in "Thematic Vagabonding" -- meaning often changing the topic of the problem and dealing with the topic only superficially and escaping to the next only to do the same. Some participants treated certain relatively unimportant and easy details of a problem very carefully while neglecting the important ones [Encystment]. In addition, there were increased tendencies to postpone decision making and delegate responsibilities. Dörner also observed that when subjects lost control of their simulated situation, there was a reduction in self-analyses, in the number of plans generated, in their awareness that they were repeating their thought patterns, and in checks on the realisation of their plans. In emergencies, poor problem solvers reduced the number of conditions relevant to decision-making process, turned more risky by way of violating rules and regulations, and frequently escaped from responsibility. Since complex situations always contain incomplete information, problem formulation becomes increasingly broader; and goals become less complete.

One last question for the purpose of this paper: What can and should be done to train those who come to our universities and management schools by way of sharpening their ability to deal with poorly structured and ambiguous problems? But first, what is the nature of such problems?

The more clearly the goals are recognised and the more transparent the means to be utilised are, the less the extent of the impediments that the problem solver will encounter. Take the case, for example, where the means are all adequately known, but the goal is quite inadequately defined. Here a dialectic procedure must be attempted in the sense of flushing out and then disposing of contradictions until, bit by bit, a more precise vision of the goal is attained. Synthesis impediments can arise when goals are clear but means poorly understood. What targets should be

selected for the purpose of teaching and learning poorly structured and ambiguous problems? In systems terms we are concerned with throughput.

THROUGHPUT

Teaching targets: For instance, upon completion of a course in ecology-oriented economics and business administration the learner knows available basic facts and concepts in this field. He is sufficiently aware both of his personal functioning as a learning, information-processing system and of the possibilities and dangers inherent in the handling of weakly structured or unstructured problems of complex economic systems. He is in a position to avoid the principal deficiencies in working with complex systems which include taking due care not only of the short-term but also of the long-term stability of the system in the sense of conserving gliding equilibria and avoiding destructive instability. Furthermore, in the course of solving larger problems they can be helped to develop heuristics for treating problem subsets; risk decisions by venturing into uncharted territories despite the information gap; to be receptive to unanticipated questions in the overriding ethical contexts and one's own value systems. Last but not the least, the student should be able and willing to make appropriate use of various management techniques mentioned earlier.

A teaching target is generally looked upon as a statement of what the learner is to be like when he has successfully completed a learning experience' [Mager, 1962]. What constitutes appropriate teaching material can be deduced from well-specified teaching targets. The above suggested teaching targets comprise both a content and a behavioural component. The

behavioural component prescribes what the students are expected to do with the content component. The teaching material incorporates the set of tasks, which are also aimed at developing certain qualities of personality in the students. The teaching target has been reached when the students have mastered the teaching material. Taking the above stated targets [these can be divided into content and process components], we require teaching materials which present management or related problems that have multiple steps for solution. Teachers in guiding the students to solve such problems and make decisions if needed, should evaluate the 'different' not 'one or two' ways in which students organize their thinking, sustain their attention, and solve the multi-step problems. In this sense, the case study method can be a productive and useful device for professional training.

Let us illustrate the use of a problem [case] in an academic course of study in the field of Agricultural Policy at the Technical University of Munich. The case involved, to a considerable extent, analytical and heuristic problem solving processes on the part of the students. Stuhler [1990] required the students to study, analyse, formulate a plan of action and decide upon a case entitled "Economic and Social Committee of the EEC" [Stuhler and Franck, 1976]. The content of the case related to potato marketing arrangements proposed by the high level Commission of the European Community. This proposal was passed on to a consultative body that represented the producer, consumer, and other interest groups of the member nations for comments. This consultative body is called the Economic and Social Committee [ESC]. The Commission's proposal in the main, contained four alternatives [Titles]. Title I proposed common quality standards for potatoes; Title II envisaged a central marketing role for producer groups; Title III outlined support and stabilisation measures; and Title IV provided for trade arrangements with non-EEC member countries.

Each student was required to analyse the problem. He was requested to assume the role of the leader of the expert study-group for the concerned subject. It was hinted that the students take into account the segments of the potato market and different national and group interests vis-a-vis the potato market within the EEC. Furthermore, each student was expected to formulate the ESC's response to the Commission's proposal. The case facts included the structure of the European potato market, the regulatory role of the EEC, the legal framework in which that institution operates, its functions and the operating procedures it follows. The case also described the decision making process in the ESC and the role of the expert group.

Evaluation of the case analyses by Stuhler revealed that there was little evidence, if any, that the students had adequately realised the roles to be played by the decision makers with whose actions they were concerned. There was little understanding of the nature and scope of the potato market problem, partly because analysis of the system's objectives was inadequate or non-existent, and partly because the structure and scope of the problem was not outlined. Moreover, there was no or at best an inadequate attempt to segment the market, and the relationship between instruments and given targets or alternative targets was not sufficiently explored.

The reader can compare these weaknesses underlying the students' approach to problem-solving with that of the findings of Dörner described earlier. We observe a rough parallel between the results of Dörner's systematic study and Stuhler's exploratory analysis in the teaching-learning context. In this regard, it is our untested assumption that the use of good diagnostic cases can promote not only conceptual skills but also professional skills among managers and administrators-to-be. Management educators in designing course contents and developing appropriate teaching

FOOTNOTES

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Please note that Das' model of intelligent functioning bears little relationship with the left brain / right brain mythology that in recent years, has led to enthusiastic but misguided preaching of the use of 'right brain' thinking for managers [Mintzberg, 1976, Agor, 1983].

The number of applicants to the institute's MBA programme, where one of the authors is a professor, is nearly 10.000 every year. The number admitted is only about 200.

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