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ABSTRACT

Decisionmaking is the process of choosing among alternatives, or turning inputs into outputs. In a situation of information overload, inputs exceed the decisionmaker's capacity to assimilate and act on the information as well as his ability to evaluate every alternative. Decisionmakers have a variety of responses to information overload, some of which are analyzed in this paper. Among such information selection procedures are random selection, delegation, delay, withdrawal, choice by source, and selective or random sequencing. Further research into the consequences of information overload is needed to improve the decisionmaking process. (RA)

DECISION-MAKING UNDER CONDITIONS OF INFORMATION OVERLOAD: ALTERNATIVE RESPONSE MODES AND THEIR CONSEQUENCES

by

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INTRODUCTION

"What we've got here is a failure to communicate!" mocked the ill-fated Luke.* Long before Luke's untimely (and final) remark, "communication failures" have been an omnibus symptom of the problems evident in every societal institution from the dyadic relationship of the new family to the nearly infinite relationships involving the transfer of information within and among political, economic, military and educational institutions. But to say that The Problem is a failure to communicate is not unlike explaining an airplane crash by maintaining that "What we had here was a gravitation problem." Like gravity, the flow of information with which we communicate is omnipresent and to say that somehow, somewhere in the huge and dynamic labyrinth of information flow lies our problem is inadequate because such a statement cannot be wrong and thus, it explains nothing.

Decision-Points

Somewhere in this labyrinth are decision points critical to the flow and utility of the information. An initial delimitation of this discussion will focus on the relationships between information and decision-making. Decision-making is seen as the choice among alternatives made by individuals or units occupying decision-making roles. Decision-making problems will be discussed as they might occur in any organizational setting including education, and as they result from, and contribute to, conditions of information overload.

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*1969 Movie: "Cool -Hand Luke"

Gereric problems of decision-making in education can be supported, if through no other means, by inferential analyogy alone. For example, volumes have been written depicting the problems and complexities of the decision-making process in the economic and military spheres of society--settings in which, relative to education, the objectives are clear, the decision units known, the authoritative and regulatory arrangements rigid, and the resources determined.* In these sectors, the decision criteria are known; if not evident before or during the decision process, they become very clear after it. Changes in profit margins and losses of battles are indeed meaningful types of feedback. Thus, if these institutions are beset with problems of decision-making, consider in contrast the conditions under which decisions must be made in education. The problems can only multiply.

THE PROBLEM

Decision-making in Education

Yet little has been done in regard to exploring the information-decision-making relationship in education. A recent statement by Stufflebeam et al.(1970: 35) maintains that, "...knowledge of the decision-making process and of the methodologies for relating evaluation to decision-making are woefully inadequate." A similar statement by Guba (1969:) states that, "At present, no adequate knowledge about the relevant decision processes and associate information requirements relative to education programs exists." One could probably prepare a statement in support of these contentions which would be far

*See for example: Braybrooke, 1963; Bross, 1953; Drucker, 1954; Luce, 1967; Machol, 1962; Messick, 1964; Miller, 1967; Quade, 1967; Rapoport, 1966.

more cogent and convincing than to take the counter-position that knowledge exists and has only to be adopted and applied. Yet as Stufflebeam (1970: 532) says in concluding a comprehensive examination of the past, present and future of educational evaluation and decision-making, "We must get off the dime." So despite the pessimistic (albeit factual) tone of the comments attesting to our collective ignorance in education concerning decision-making, the position to be taken here is that one must begin, however erroneously or arrogantly, with the belief that decision-making problems in education are not insurmountable and that investigation and discussion focusing on components of the problem will yield insights and eventually viable solutions.

So what do we now know about decision-making that might serve as a basis for exploring the relationships between the input of information and the decision-making process? Most of the literature on decision-making is drawn from or applicable to economic or military decisions. Although a variety of conditions and exceptions are evident, generally these decisions are those made on the basis of probability and payoffs attached to the consequences of decision alternatives. For the most part, the debate and discourse centers around the proper mathematical quantification techniques, the correct decision rules (minimax, maximin, minimin, etc.) and the philosophical-mathematical notions of probability (the objectivist-subjectivist polemic). The nature of the information (input) on which decisions are made is discussed in terms of the settings (under conditions of certainty, risk, or uncertainty) and to some extent in terms of its availability and relevance but little can be found concerning the decision makers responses to the source(s), intensity and quantity of the information.

Premises from general system theory

Turning to the area of General Systems Theory, one finds statements that, while not focused specifically on the information--decision-making relationship, should provide a basis for examining this relationship--particularly under conditions of "information overload." Consider, for example the following statements offered by four different "General Systems Theorists":

1. (Von Bertalanffy, 1956: 8) "A unitary conception of the world may be based, not upon the possibly futile and certainly farfetched hope finally to reduce all levels of reality to the level of physics, but rather on the isomorphy of laws in different fields."
2. (Maccia, 1962: 6) "The output variables of a system are always less than input variables." "The action of a system is effected by the amount of its input. If input is high, some of the input will be omitted."
3. (Ashby, 1958: 6) "If, as is usually the case, the system's capacity for information if finite, information about what has happened to it as the remoter past tends to be swamped and destroyed by what has happened recently."
4. (Hall, 1956: 23) "It is a well known fact that the nature, polarity and degree of feedback in a system have a decisive effect on the stability or instability of the system."

A transformation of these four statements results in these operational premises on which the discussion here will be based:

1. Generalizations (laws) which govern decision-making processes will, if they can be generated, apply to any field in which decision-making occurs and is of concern. For example if: a) information overload results in filtering of the input and b) if the input, process, output sequence of the Systems approach can be equated to (isomorphic with) the information input, decision-making process, consequences of decision-making action (or non-action) sequence, then c) this principle (filtering) will transcend the organizational or institutional settings in which decision-making occurs.
2. That a system's action is effected by the amount of input is the subsuming principle to be paraphrased from Maccia. A delineation of this principle is the bulk and purpose of the discussion here.
3. It is assumed that the system's (decision-maker's) capacity for information is finite--at least in terms of the ability to assimilate and meaningfully respond to information input.
4. The importance of feedback is central to the discussion here because the concern is with not only the alternative responses to, but also the consequences of information overload. For these consequences to become manifest, the system must contain feedback loops through which the results of the decision-makers action or non-action can become known by the information "inputers."

A simple systems model

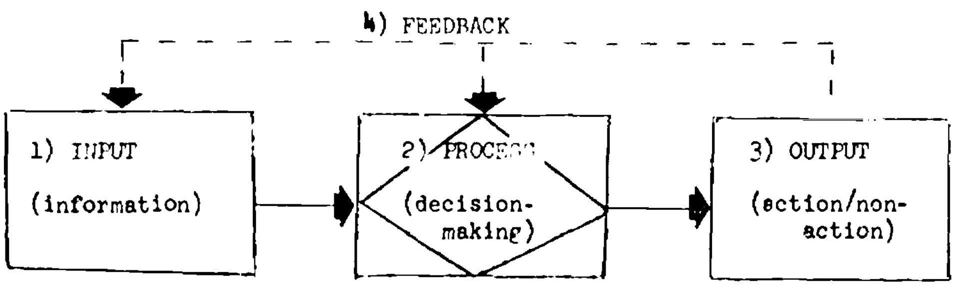
Finally then, the problem to be explored here is to examine the relationship between information overload and decision-making using a systems approach in which:

1. The information becomes the systems input.
2. The decision-making process is the process component of the system.
3. The output component is the action or non-action of the decision-maker.
4. The feedback component includes the formal or informal routes through which the original information providers become aware of the output.

Following conceptions of this process offered by Yovits (1968:   ) and Miller (1967: 18), figure one presents a simplified overview of the system which will guide the discussion to follow.

Figure 1

INPUT, PROCESS, OUTPUT AND FEEDBACK COMPONENTS OF A DECISION MAKING SYSTEM



INFORMATION OVERLOAD: RESPONSES AND CONSEQUENCES

Information overload can be defined only in relation to a decision-making capacity to assimilate and act on the information input. This capacity is not an objective, transcending quantity, rather it is an individualized quantity which is a function of the unique characteristics at a given point in time of the decision-maker and of the particular relationship between the decision-maker and the sources of information input. These conditions vary over time with the same decision-makers and information sources and of course they vary among different decision-makers. Thus, the decision-maker's capacity to assimilate and act on information input is a perceptual, particularistic variable, and information overload is a meaningful concept only when expressed in the form of a ratio to the decision-maker's capacity to assimilate input.

It may be helpful to symbolically* express some of these points as follows:

Let: dm === Decision-Maker

IO === Information-Overload

T_1, - T_2, --- T_n === Time 1, Time 2, --- Time n

C === Capacity for Information

These statements, then recap the discussion thus far:

1) $IO = F\ (Cdm)$
2) $Cdm_1 \neq Cdm_2$
3) $CdmT_1 \neq CdmT_2$
4) $IO = I > Cdm$ or $I:Cdm > 1$

Having defined information overload in this manner, the question concerning its empirical nature remains. If it is only and always a particularistic and

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* These expressions and notations are intentionally and necessarily esoteric for purposes of this discussion.

situational function of a decision-maker's capacity, then what pragmatic utility can the concept hold for the real-world information providers or decision-makers? Much of the remainder of this discussion will address itself to this question. The question, rephrased is "How then, does one know if the decision-maker is operating under conditions of IO?" The answer for now is "By interpreting the feedback which results from the DM's output." For example, assume that n units of information input consistantly result in output A and that output A, as fedback to the information source, is interpreted as a consistent and reasonable transformation of the input. Now assume that an input of n + 1 units results in an alien outcome, say $\tilde{A}$, then an hypothesis for the information source is that $Cdm < n + 1$ units.

The hypothesis might be "tested" in a manner similar to the protocol which Ashby (1958:) advocates as a means for inferentially determining the behavior of the "black box". Although, it is unlikely that we (especially in education) have the concepts and tools to experimentally manipulate all inputs and observe outputs (or to empirically quantify either input or output), the approach seems reasonable and should at least be attempted under experimentally controlled simulations.

What then might be the differential responses to and consequences of information overload? The taxonomy which follows (Figure 2) presents some of the possible alternative responses to IO. Each response will be discussed in terms of its relationship to different input models; its implications for alternative input models; possible examples in the real-world; and its consequences for the stability of the total system.

FIGURE 2

A TAXONOMY OF THE ALTERNATIVE INFORMATION INPUTS, DM PROCESSES AND OUTPUTS UNDER CONDITIONS OF IO

SOURCE	INFO OVERLOAD: INPUT	DECISION-MAKING PROCESS #	SYM.	RESPONSE TO IO	OUTPUT-FEED BACK
	$I/Q_1 > I/Q_2 >$	1	BK	BLOCKING	NIL
		2	WD	WITHDRAWAL	
	$I/Q_3 > I/Q_4 >$	3	DY	DELAY	
Si		4	RF	RANDOM FILTERING	A_4, A_2, A_7
	$I/Q_5 > I/Q_6 >$	5	SF	SELECTIVE FILTERING	A_1, A_2, A_3
	I/Q_7	6	CS	CONSENSUS	A_4
Si	I/Q_i to DM_i	7	DG	DELEGATION	A_i From DM_j
Si	$I/Q_1, I/Q_7$ (T_1) $I/Q_2, I/Q_6$ (T_2)	8	CT	CATEGORIZATION	A_3 (T_1) A_3 (T_2)
S_1 S_2 S_3 S_4 S_5 S_6 S_7	I/Q_1 I/Q_2 I/Q_3 I/Q_4 I/Q_5 I/Q_6 I/Q_7	9 10	SS RS	SELECTIVE SEQUENCING RANDOM SEQUENCING	A_1, A_2, A_3 A_4, A_2, A_7

WHERE:

I/Q_i = INFORMATION SUPPORTING AND IMPLYING A RESPONSE TO QUESTION$_i$

A_i = AN ACTION OR ANSWER IN RESPONSE TO I/Q_i

$I/Q_i > I/Q_j$ = I/Q_i IS MORE IMPORTANT THAN I/Q_j

S_i = SOURCE OF INFORMATION INPUT

$S_i > S_j$ = S_i IS SUPERODINATE TO S_j

IO = INFORMATION OVERLOAD = I>CDM

DM_i = DECISION-MAKER$_i$

T_1, T_2 = TIME$_1$, TIME 2

Blocking

Quite possibly the most common and predictable of the alternative response modes to IO is that of blocking. Maccia (1962: 6) maintains that "If input is excessive, the system will ignore input entirely or employ means for cutting off input." The manifestation of this response mode can vary greatly. It can be apparent at the time of attempted input and might take any of the following forms:

- Intermediary rejecting input: From secretary to executive assistance, the delays, excuses and rejections offered by intermediaries are familiar symptoms of the decision-maker blocking additional input.
- Conspicuous display of IO: Another means of cutting off input is that of providing conspicuous evidence of information overload. This approach is an appeal to the reason (and/or compassion) of the source of input. Displays can take the form of cluttered desks, full calanders or appointment books, busy waiting rooms, stacks of reports, etc.

These and many other techniques are used to block input; more common perhaps is the acceptance of the information followed by non-action. It is important to realize that under these circumstances the absense of action results in feedback to the information source. The non-action results in accumulated feedback over successive, but unsuccessful, input trials. For example, the feedback to students from campus administrators unwilling or unable to respond to student input accumulates and, in such cases, reinforces and intensifies the input. The bursting of regular input channels, evidenced by mobs in front of administration buildings (simply an alternative input mode) is at least predictable if not inevitable.

The alternatives for the information sources under conditions of blockage are multiple. The input may increase in frequency and intensity; in fact, this alternative may be a direct consequence of the absense of action ("NIL" output). The input may lessen or cease depending on the relative need for the information to be responded to and depending on the existance of alternative input channels to different DM processes.

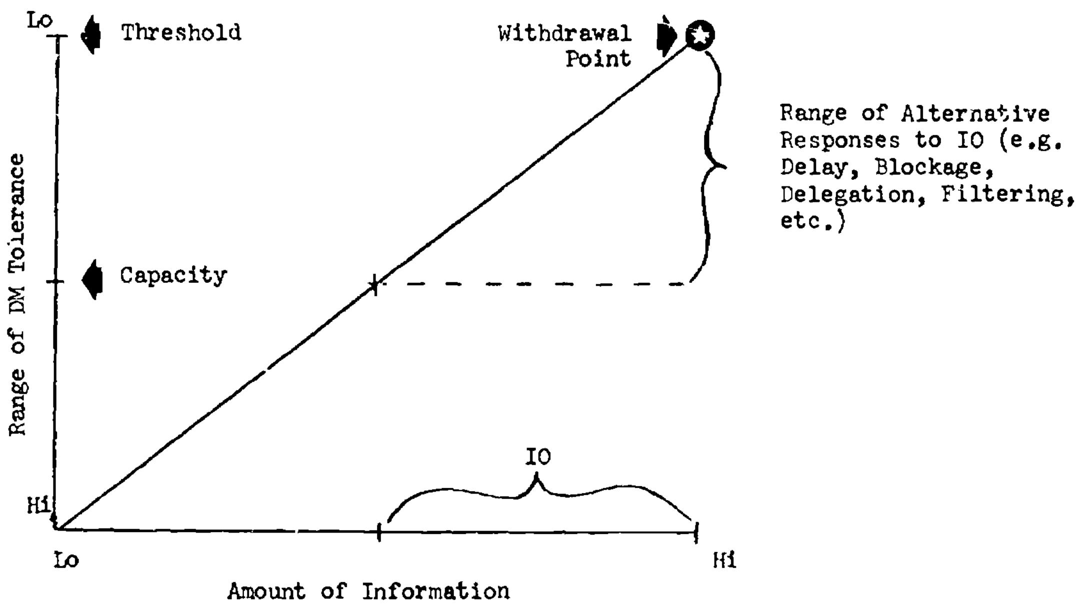
Withdrawal

A severe and likely final response to IO is the withdrawal of the Decision-maker. One might see this manifest in cases such as resignations of college presidents, deans, superintendents, teachers, etc. IO may have been a partial contributor to the recent rash of firings, resignations and reassignments in the USOE. Clearly, in the case of withdrawal as a response to IO, the entire system is affected because the information which must be re-routed causes an additional strain on other decision points within the system. It is probably not coincidental that high-level resignations within an organization appear to be contagious. Management exodus may well be a function of the increased stress placed on alternative decision-points resulting from withdrawals elsewhere in an organization.

Withdrawal is likely to be a final response to IO after unsuccessful attempts at blockage, filtering, sequencing, delegation, etc. The relationship between the tolerance of the decision-maker and the amount of information input may resemble the function and points depicted in Figure 3.

Figure 3

HYPOTHETICAL RELATIONSHIP: RANGE OF DECISION-MAKERS' TOLERANCE AND AMOUNT OF INFORMATION INPUT



<u>Delay</u>

The symptoms of (feedback from) the delay response are initially similar to those of blockage or withdrawal. The information source in all cases receives feedback of "no action." To avoid the consequences that might result from a blockage response, the prudent decision-maker (if his delay is, or can be convincingly argued to be, reasonable and unavoidable) should feedback this information to the original source of input. Delay may well be a dysfunctional tactic under conditions of continuing and increasing input. In such cases it may simply be the forerunner to blockage and finally, withdrawal. In other cases where input fluctuates systematically, a delay response may enhance the system's stability. Maccia (1963:6) states that "If input fluctuates in intensity, the system will delay output during peak loads and catch up during lulls." It would seem that the key to a decision to delay would depend on the predictability of the timing and intensity of fluctuating input.

Random Filtering

In each of the three response modes discussed so far (blockage, withdrawal, delay), the decision-maker has not reacted to any of the information input. More likely responses are those in which some of the information is acted upon; what has been labeled here as "Random Filtering" is one such case. Filtering as a response to IO occurs when the decision-maker can " . . . react only to certain categories of input." (Maccia, 1962:6). It is maintained here that filtering can be either discriminatory (selective) or random. Random filtering is responding to n amount of N information where each "unit" of information has an equal chance of being reacted to. It is most likely to occur when the decision-maker: 1) perceives the input as greater than his capacity to assimulate and act on it and 2) is unaware of (or unconcerned with) any hierarchial ordering among the categories of information input. To him, it is homogeneous and to act on any given unit has the same utility as any other unit. A simple and common example of random filtering is the decision-maker who responds to a stack of "input" one unit at a time. The only natural ordering may be one of sequence of the input with the more recent first and vice versa.

The feedback to the information source is (as indicated in Figure 2) a set of answers or actions inconsistent with the ordering of the input. Even then, the inferences that the information source can make are that 1) the decision-maker was unaware of the input's priority ordering or 2) the decision-maker was not in agreement with the ordering and chose to re-arrange it in the order indicated by his answers or actions. The alternatives for the information source in subsequent inputs are to 1) clearly indicate the priority ordering of the input or 2) submit only the top priority inputs consistent with the decision-maker's capacity to assimilate and act. The decision-maker on the other hand should be aware of the possibility of ordered input and, if necessary to filter, filter on the basis of what he determines to be meaningful priority criteria and/or on the basis of the priority order attached to the input from its source.

Consistent patterns of Random Filtering as a response to IO may contribute to what Bertalanfly (1956: 5) & others consider positive entropy because he states that " . . . negative entropy [system stability] can be considered a measure of decisions, taken out of equally probable ones, a measure of improbability or information." Thus, if decisions are consistently made in a <u>random</u> fashion, the system will tend to decay.

<u>Selective Filtering</u>

With selective filtering, the decision-maker continues to respond to only some of the information, but he does so according to a priority that he imposes on the information and/or that is pre-determined by the information source. Selective Filtering results in an improbable (in the technical sense of negative entropy) ordering of a new state of affairs (outcomes) which result from the decision. The system may tend toward negative entropy and thus increasing stability, under response conditions of selective filtering. The information provider can learn much of the decision-maker's value structure by observing the patterns of the response orderings resulting from selective filtering. The decision-maker should take care to be selective on dimensions that are indeed of highest priority; he should also be aware that the information he has "selected out" will be fed back to the information source in a manner and with consequences similar to the blockage, withdrawal or delay response modes.

Selective filtering, as with all other DM response modes to IO, is dealt with as an ideal type which occurs under certain conditions as a discrete and "pure" response. It is realized that the response modes are not discrete and that the utility of presenting them as such is simply to facilitate discussion. This caveat is particularly important for selective filtering because of the inevitability of selectivity in observing, assimilating and reacting to any set of stimuli. That an individual selectively perceives and retains information of any kind is observable in all facets of human behavior. The decision-maker should be aware of his inevitable selectivity and should occasionally "step back" and question the bases for being selective and examine these bases <u>vis a vis</u> the goals, policies, and objectives of the organizational setting in which he makes decisions.

Consensus

Consensus is simply a decision rule which in some circumstances can be a reasonable and rational means of arriving at a decision; in other circumstances it is means for the decision-maker to absolve himself of his responsibility. It is suspected that this response mode is particularly prevalent under conditions of IO. It takes the form of "sending it to committee"; "brainstorming"; "Let's get their views on this"; etc. It becomes a dysfunctional response mode if the most important or frequent decision rule is consensus. The frequency with which consensual decision-making occurs in educational settings would seem to be related to: 1) the plurality of goals, objectives, and directions under which educational sub-systems operate 2) the resulting plurality of audiences and constituents to whom educational decision-makers are (or are thought to be) accountable and 3) the "democratic ethos" which seems to permeate educational decision-making. While neither discrete nor exhaustive these factors may help explain the reasons for the prevalence of consensual decision-making in educational settings. From the information sources' point of view, detecting consensual decision-making is difficult and unreliable. Also difficult are the alternative input modes open to the information provider who must obtain decisions from a specified decision-maker. The consensual decision may often be a "central tendency" decision whereby the "voters" perceive a range of normally distributed alternatives from a range of normally distributed perceptions and a levelling phenomenon may occur. The consequences for the system may be similar to those of random filtering (i.e., positive entropy and system decay). Consensus as a consistent response mode will place additional strain on the system because of the energy that the system must expend to act on a given input. Suppose that decision-maker X can alone act on information input Y by expanding Z units of energy; if the same decision-maker must assemble a committee, where each member must react to information input Y, then the energy expended by the system approaches Z•N where N is the size of the committees.

Delegation

Like consensus, delegation is often an appropriate and necessary decision-making response to IO. However, it too can become dysfunctional if used frequently. Frequent use of delegation implies that 1) the information sources are inputing through the wrong channels; 2) the dm is not being responsible (in the sense discussed under "consensus") or; 3) the original decision-point is unnecessary to the system. Under conditions of IO, the DM must strike a difficult balance between 1) re-routing information to other decision points in order to reduce overload and 2) retaining the information that only he can or should act upon. Perhaps for reasons of fear, mistrust, inflated sense of self-importance, or ignorance of appropriate delegates, the tendency seems to be for decision-makers to error on the side of retention.

The information source becomes aware of the delegation response mode if the feedback is from different DM units than those receiving the original input. If delegation becomes a consistent response, the input will tend to by-pass the original DM unit. This would seem to be particularly true under conditions of "step-up" delegation where the information is re-routed for action to a superordinate DM.

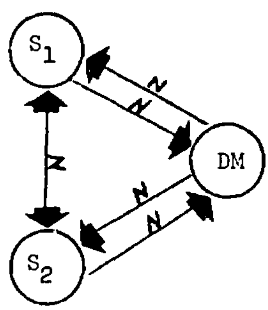
Categorization

Categorization refers to a DM response founded not on the information but on the source of the information. It is a particularly prevalent response under conditions of IO. It occurs when the DM has learned (i.e., has come to believe, correctly or incorrectly) that source X expects and/or desires response Y regardless of the information being inputed. The response of the decision-maker may not be the same as that desired by the source, but it will be consistent and it will be independent of the information. For example, suppose that a decision-maker has repeatedly received input from source Y and that he (the decision-maker) has learned that Y is perpetually in search of money and that any correspondence between them will ultimately result in such a request. His pat (categorized) response then, becomes "out of funds." Other examples occur in cases where a decision-maker learned through interaction with information source Y that all that is desired or needed by Y is positive reassurance that he is doing his job well, and if he in fact has confidence in Y, he need only scribble a "looks good", "go-ahead", etc. on any input from Y. The converse of of this situation is also apparent; here the DM sends feedback of the nature "What are your objectives?" "This is not internally consistent," etc., to the information source. In either case, categorization is a response to IO which minimizes the energy which the decision-maker must devote to transforming the input. Categorization may also apply to some of the response modes previously discussed (esp. blockage, delay, consensus). If the "decisions" become simply a ritualistic rubber-stamping of information, then whatever energy is expended in routing information through ritualistic decision-points is wasted. Decision-makers who respond to all input by this response mode would seem to be unnecessary to the workings of the system.

Selective Sequencing

Sequencing of any type occurs under conditions of IO from multiple sources. Simultaneous input from two or more sources requires that the decision-making sequence the process of assimilating and acting on the information. Sequence is often a function of the valence held by the DM toward the information source. Whatever the basis for the valence held for the information source by the decision-maker, it becomes the criterion on which the sequence decision is made. The consequences of selective sequencing for the excluded (lower valence) source are similar to those of blockage or delay but with the confounding element of altering that source's relationship between the DM and/or the higher valence source. For example, if Source 1 (S_1) had thought his relationship with the decision-maker to be a certain level of reciprocal valence but he receives feedback that S_2's input is of higher priority, dissonance theorists would tell us that he must then re-arrange his set of valences. Figure 4 presents a simplified scheme of valence modification resulting from selective sequencing.

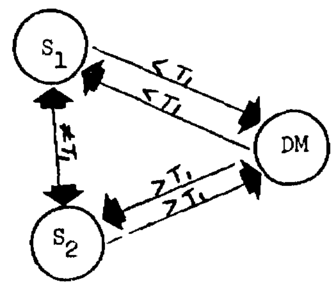
Figure 4
HYPOTHETICAL VALENCES AMONG INFORMATION SOURCES
AND DECISION-MAKER BEFORE AND AFTER 'SELECTIVE SEQUENCING'
(FROM PERSPECTIVE OF S_1)



T_1

Decision To Avoid IO: 'Selective Sequencing'

(S_2, then if at all, S_1)



T_2

WHERE: Si = Source i
N = Valence of N Quantity
DM = Decision-Maker
$\neq$ = Not Equal to

T_1, T_2 = $Time_1$, $Time_2$
$>$ = Greater Than
$<$ = Less Than

The discussion and portrayal of valence arrangements is intended only as an illustration of the combination of multiple inter-personal relationships which might result from selective sequencing.

Random Sequencing

Random sequencing occurs when no differential valence is attached to the source of information. The decision-maker, under conditions of IO, (where S_1 input <u>and</u> S_2 input are beyond his capacity) must sequence the order in which he reacts to the information. Unless the fact that the sequencing was random is fed back to all sources, the same type of "valence rearrangement" consequences accrue from random sequencing as they do with sequential sequencing. The consequences of random sequencing may be temporarily similar to other response modes. For example, it may be blocked, delayed, delegated or categorized. Consequences for system stability are similar to those resulting from random filtering.

CONCLUSIONS AND IMPLICATIONS

The ten response modes to IO which have been discussed should be clearly understood as being:

- <u>hypothetical</u>, presently having no empirical basis.
- <u>arbitrary</u>, in terms of label, discreteness, and exhaustiveness
- <u>esoteric</u>, serving only the immediate purpose of facilitating the discussion here

At the same time, it is hoped that these general points have emerged:

- Information overload, as applied to the relationship between a decision-making unit and the source(s) of information input is a particularistic function of X decision-maker's (perceived) capacity to assimilate and act on Y information from Z source(s). The decision-maker's capacity and thus the quantity determining information overload will change with every combination of X, Y, and Z.
- A decision-maker must select a response mode under conditions of IO; the responses will vary according to his perception of the information and its source(s).
- Strain is placed on the system under all conditions of continuing IO.
- Consequences accrue from the non-responses of decision-makers as well as responses (i. e., a non-action <u>is</u> a response).
- The action of a system is effected by the intensity and quantity of input and by the decision-maker's response to input.

It should be clear that two major, related dimensions have been omitted from this discussion. First, the essentially dyadic relationship implied in this discussion does not represent the intricacies of the real world, nor is it truly a full systems model. To be fully understood, this simple relationship must be placed in the perspective of the larger system in which it operates. Second, little attention has been given to the trends over time which result from and contribute to information overload. It is likely that the capacity of the decision-maker and the amount of information input over time represent a contrasting series of cyclical relationships.

Probably the foremost implication from this discussion is that the relationship between information overload and decision-making responses needs to be investigated much more thoroughly. We need to know much more about real-word decision-making processes in general. Discussions such as this become much more fruitful when the concepts can be operationalized and then empirically validated by observing and classifying actual (or carefully simulated) decision-making processes under conditions of information overload. If explanation will provide reasonably accurate predition of decision-making behavior, then finally the real utility of any investigation may be possible--namely to change and improve the information--decision-making relationship.

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