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ABSTRACT

The effectiveness of the Delphi Technique is evaluated in terms of immediate and delayed controlled information feedback (feedback within 5 seconds as compared with a 24-hour delay); and the relationships that exist among measures of integrative complexity, estimations about the time of occurrence of future events, and time delay between task completion and the reception of controlled feedback. Experimental procedures, hypotheses, and findings are discussed as they relate to these variables. Three major conclusions drawn from the results of the study include: (1) individual integrative complexity is strongly predictive of performance on the tasks of making time estimates of occurrence of remote future events, and changing those estimates in light of controlled information feedback; (2) individual integrative complexity is consistently predictive of convergence; and (3) differential time delay of information feedback has a significant effect on the performance of individuals involved in the Delphi process. The assumption that the phenomenon of convergence in the direction of a "correct solution" is a product of objectivity relatively free from the interference of certain psychological variables is considered unfounded. It is also contended that non-objective factors are as reflective of outcomes in a Delphi exercise as they are in direct confrontation group outcomes. The interrelatedness of time delay variables and performance in the Delphi process is considered. A bibliography is included. (AE)

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THE DELPHI PROCESS:
SOME ASSUMPTIONS AND
SOME REALITIES

A paper presented by:

JAMES S. WALDRON

A paper prepared for presentation at
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Education, as one of the most important institutions of our society, is caught up in this modern world of rapid change and uncertain future. Educational policy makers are being forced to make policy decisions which will have far-reaching impact on the future, and which may remove the freedom of choice from future individuals. These policy decisions are being made in the absence of knowledge of their impact and are, at best, most often based upon intuitive estimations of what the future will be like; at worst, these decisions are being made based upon practical experience which may have little relevance to tomorrow's needs. But no matter what method is used, these decisions are being made and they do and will have far-reaching implications for tomorrow's generations.

Educational policy makers must become aware of as many alternatives and their potential outcomes as is possible when making decisions. In most cases the policy maker cannot be an expert in all areas that might possibly relate to a particular question. Usually his decisions are based on the advice and alternatives generated by experts from all the areas that are directly and indirectly related. In other words, these policy decisions are based on human judgments and estimations of the future.

One of the procedures very frequently used for the collection of opinions is the Delphi technique.* The Delphi technique

> is a carefully designed program of sequential individual interrogations (usually best conducted by questionnaire) interspersed with information and opinion feedback (Helmer, 1967, p.7).

The assumed value of this technique lies in its provision of: (a) anonymity, (b) iteration with controlled feedback, and (c) statistical summarization of responses. Anonymity is achieved by using questionnaires where specific responses are not associated with individual members of the group. This is assumed to lessen the effects of dominant individuals and to reduce group pressure. Iteration with controlled feedback occurs in several stages; generally, at the beginning of each questionnaire round, the results of the previous round are statistically summarized and reported back to the participating individuals. And, finally, the statistical summarization of responses allows a consensus to be reached without asking the group to arrive at a common opinion. It is assumed that

*The Delphi technique was developed by Helmer (1966) to systematically collect opinions about future dates of occurrence of social and technological events.

> by using a statistical group opinion, group pressure toward conformity is further reduced, and probably more important the opinion of every member is reflected in the group response [Dalkey, 1968b, p.9].

Present Delphi procedures suggested by Dalkey (1969) involve using the computer, which would enable the time delay between completion of a Delphi round and reception of information and opinion feedback to be greatly decreased. However, time delay as a variable of environmental complexity, and therefore one which may affect human information processing levels, is untested. The effect of variations in time between completion of a task and reception of feedback has generally been studied in motor skill and problem-solving learning situations. This effect has been measured in terms of improvement of a motor skill or retention of information. There is a need for understanding how time delay may effect both individual estimations of the time of occurrence of events and also changes in these estimations between rounds in a predictive process that incorporates iteration. This may lead to a more complete understanding of the process of convergence (the phenomenon of individual estimations moving closer to the statistical summary of group responses on each succeeding round in a Delphi questionnaire) as displayed by many individuals. (Various explanations of convergence have been explored by Dalkey [1968a, 1968b, 1969] without any significant results.)

Similarly, investigations into the interaction of the situational factors and dispositional factors within the Delphi procedure has been limited. Campbell (1966) and Dalkey (1968a, 1968b, 1969) have conducted the most complete evaluation of the Delphi technique to date. These experiments, while suggesting some possible relationships between personality characteristics and individual forecasts, have not fully explained why some individuals converge (shift their estimations toward the information feedback) significantly more than others, nor how such shifts affect the final forecast. The behavior of the individual (rather than simply the behavior of the group as a whole) within the Delphi process, or any predictive process, must be better understood if realistic interpretations of the resulting opinions are to be made. Moreover, efforts to increase our capacity to think about the future must rest on an understanding of the process involved, which includes a complex interaction of "situational" and "dispositional" factors.

Questions to be Investigated

A. "WOULD A DELPHI PROCEDURE THAT INVOLVES IMMEDIATE (WITHIN 5 SECONDS) FEEDBACK ELICIT A DIFFERENT SET OF BEHAVIORS THAN A TRADITIONAL DELPHI PROCEDURE INVOLVING DELAYED FEEDBACK (24 HOURS LATER)?"

B. "IN A DELPHI PROCEDURE, WHAT ARE THE RELATIONSHIPS THAT EXIST AMONG MEASURES OF INTEGRATIVE COMPLEXITY, ESTIMATIONS ABOUT THE TIME OF OCCURRENCE OF FUTURE EVENTS, AND TIME DELAY BETWEEN THE COMPLETION OF A TASK AND THE RECEPTION OF CONTROLLED FEEDBACK?"

Definitions

1. Integrative Complexity: A range of scores from 2 to 14 derived from the sum of the top two rated responses (possible rating range, 1 to 7) on the Paragraph Completion Test (PCT) (Schroder et al., 1967). The sum of the top two scores will be an individual's integrative complexity rating.

2. High Integrative Complexity: A sum of the top two scores equal to or greater than 6 on the Paragraph Completion Test.

3. Low Integrative Complexity: A sum of the top two scores equal to or lower than 4 on the Paragraph Completion Test.

4. Controlled Feedback Round 2: Controlled feedback of expert estimates randomly adjusted by adding or subtracting 0 to 10 years.

5. Controlled Feedback Round 3: The final median estimate of the same group of experts concerning the date of occurrence for each event.

6. Immediate Feedback: Controlled feedback supplied to each subject 5 seconds after all subjects have indicated their estimations about the occurrence of an event.

7. Delayed Feedback: Controlled feedback supplied to each subject 24 hours after all subjects have completed a Delphi round.

8. Estimation Range: The number of years between the earliest and latest dates assigned by each subject for each event. Each subject will be assigned an estimation range score for each of the three rounds of the Delphi procedure. This score will be composed of the median of the estimation range for all events of that round.

9. Change in Estimation Range: The difference between each subject's estimation range score for a round and its preceding round.

10. Median Estimation Date: The midpoint of each estimation range for each event on all rounds.

11. Relative Tendency-to-Change Measure: A measure of an individual's propensity to change his estimations relative to controlled feedback II between round one and round two, for all events, in relationship to all other subjects in the same treatment group.

The Theoretical Model

The basic questions in this study were investigated in the context of conceptual systems theory as explicated by Harvey, Hunt, and Schroder (1961) and Schroder, Driver, and Streufert (1967). Conceptual systems theory is based on the belief that "a concept is a system of ordering that serves as the mediating linkage between the input side (stimuli) and the output side (response) [Harvey et al., 1961, p.1]." Within this theory, man is perceived as an organism that receives external stimuli, structures them, and responds to them according to an internalized system of interdependent concepts. (Individual conceptual systems are dependent on the concepts held and how they are interrelated. Differences in perception of concepts and the connotation attributed to them result in different information processing structures.) And in addition, this internal structure, or conceptual system, determines to a great degree what responses can and will occur (Harvey et al., 1961). An individual's information processing structure is viewed as having a twofold function: first, it selects and screens information from the environment, and second, it combines these inputs in specific ways. The first function is one of content selection; the second function is the "structural or information-processing variable."

The manner in which these two functions are carried out depends on the individual's concepts and his perception of those concepts. For example, some may perceive the concept "rules" as connoting rigidity, authority, inflexibility and exclusion of alternate meanings. To others, it may connote flexibility, general guidelines and principles relative to attending conditions. In some, but not in others, the concept "rule" may generate anxiety or hostility. Dependent upon his perception, the individual may react by seeking rapid closure and avoidance of ambiguity, or, on the other hand, he may project far beyond the immediate concept and draw together several related concepts.

The emphasis of conceptual systems theory is on how an individual processes information, not on what he thinks. This emphasis is helpful in exploring the use of structural variables in understanding individual behavior. Schroder et al. (1967) stated that

> When the experimental environment is sufficiently complex, persons process information in different ways under different situational conditions, and different persons use different ways of processing information under the same conditions [p.5].

They further stated that "Given the same amount of information, different people use different conceptual rules in thinking, deciding, and interrelating [p.3]." If individuals process the same information differently, then, regardless of the content of the outcome, different adaptive consequences follow.

Implications of the Model

People seem to differ in their degree of conceptual complexity, and these differences have been scaled along a continuum that goes from levels of concreteness to levels of abstractness. The degree of complexity or lack of it determines the way in which an individual selects stimuli, integrates them, and adapts to them. Schroder et al. (1967) labeled the degree of elaborateness of this system "integrative complexity." An individual's ability to generate new rules, or new ways of combining old ones, determines his level of complexity. Schroder et al. (1967) suggested that behavior indicating levels of elaborateness in internally structuring stimuli can be categorized by the integrative complexity scale. On this scale, the "simple" concrete person is assumed to be characterized by: (a) low tolerance for uncertainty and ambiguity, (b) limited perspective, (c) limited inclination to project beyond the immediacy of present concrete information, and (d) reliance on outside rules and guidelines, rather than on an internal structure for handling new information. Concrete integrative structures are synonymous with fixed rules; i.e., procedures for organizing alternate sets of rules are limited. Conversely, the scale has been used to define integrative complexity based on certain assumptions of flexibility; i.e., the more complex one's system is, the greater one's ability to generate his own rules and guidelines for handling new information, the greater one's tolerance for uncertainty and ambiguity, and the greater one's potential to generate alternate combinations of information. Complex integrative structures are synonymous with flexible rules, where many interconnections among rules exist and where the capability of generating new rules and combinations of rules is an integral part of the structure. The conceptual systems model suggests that the more complex one's information processing system is, the more varied and elaborate his responses will be; and the more concrete one's information processing system is, the more constrictive his responses will be. Measures of integrative complexity (IC) were used in this study as a description of individual information processing systems.

Further implications of conceptual systems theory also focus on the relationship between environmental complexity and conceptual level. As Schroder et al. (1967) stated, "We strongly support the view that level of information processing is an interactive consequence of dispositional and conditional factors [p.29]."

Simple or concrete environments, which are characterized by lack of diversity of input stimuli, do not stimulate complex information processing. For example, a task that involves estimating which of a series of parallel lines is the longest does not require or encourage complex information processing. At the other extreme, very complex environments, which can be characterized by extremely diverse and numerous input stimuli, also fail to stimulate complex information processing. For an individual there is an optimum level of environmental complexity that stimulates and maximizes his information-processing ability. This relationship between environmental complexity and level of information processing has been defined as the "U curve hypothesis" by Schroder et al. (1967).

Rationale for the Model

This model was used because it supports the assumption that the way in which one makes estimations about future events is related to the degree of complexity of his use of information, and to the level of complexity of the task environment.

This study proposed that given a task (making estimations about the time of occurrence of future events) whose situational factors were characterized by: (a) ambiguity and uncertainty,

(b) lack of external standards, and (c) lack of concrete information, individual performance in this task can be explained by a knowledge of the individual's integrative complexity rating, as well as a knowledge of the structure of the task environment.

This study also suggests that conceptual level is predictive of the performance of individuals who are required to think about the future when such a task includes: (a) various levels of structural complexity, (b) inputs of additional information in the form of a statistical summary of a group of experts' responses for an event, and (c) re-evaluation of individual estimates in view of the new inputs.

Procedures

One hundred and eighteen graduate and upperclass undergraduates in the College of Education, Syracuse University, were administered the Paragraph Completion Test (PCT). These tests were then rated and the resulting individual integrative complexity indices were ranked from high to low and dicnotomized into high integrative complexity (HIC) and low integrative complexity (LIC). Those subjects who fell into either category were contacted and asked to participate in a further experiment. All those subjects who fell into either of the two categories and who agreed to further participate were randomly assigned to treatment one (T_1) or treatment two (T_2).

Each treatment group was given a date on which to meet with the experimenter. T_1 met for one session in which they proceeded through the three Delphi rounds. Each subject in T_1 was requested to make earliest and latest estimations for an event in round one (R_1). Five seconds later, he received controlled feedback round II for that event and was asked to re-evaluate his estimations for the same event in round two (R_2). Controlled feedback round III was then given to the subject with a request to re-evaluate his R_2 estimations in round three (R_3).

T_2 met on three consecutive afternoons for fifteen minutes. R_1 was completed on the first afternoon, R_2 was completed on the second afternoon, and R_3 was completed on the third afternoon.

All subjects were required to complete a Delphi questionnaire that was composed of eight future events taken from the Gordon and Helmer (1966) Delphi experiment at Rand Corporation. Examples of these events are

Chemical control of the aging process, permitting extension of life span by fifty years.

Man-machine symbiosis, enabling man to extend his intelligence by direct electromechanical interaction between his brain and a computing machine.

The data collected met the basic criteria for non-parametric treatment (Siegal, 1956). The data were ordinal (i.e., the data could be ranked because scores represent strength of ranks drawn from a continuous distribution). The following non-parametric tests were used in this study: the Sign Test, the Median Test, and the Mann-Whitney U Test. An α = .05 level of confidence was used to decide whether differences between samples are significant.

Hypotheses and Findings

H1: LICs WILL PRODUCE HIGHER SCORES ON THE TWO DEPENDENT VARIABLES -- ESTIMATION RANGE, AND RELATIVE TENDENCY-TO-CHANGE -- THAN WILL HICs.

The expectation that the differential effects of rounds, regardless of time delay of information feedback, would cause low integratively complex persons (LICs) to produce significantly higher scores on the two dependent variables than high integratively complex persons (HICs) was completely supported by the data.

H2: A DELPHI PROCEDURE THAT INVOLVES IMMEDIATE INFORMATION FEEDBACK (5 SECONDS) WILL ELICIT A DIFFERENT SET OF ESTIMATION RANGE SCORES ON ROUND TWO AND ON ROUND THREE, AND RELATIVE TENDENCY-TO-CHANGE SCORES FROM HICs, THAN A DELPHI PROCEDURE THAT INVOLVES DELAYED INFORMATION FEEDBACK (24 HOURS).

The expectation that the differential effects of time delay of feedback on high integratively complex persons would cause significant differences in performance between treatment one (immediate information feedback) HICs and treatment two (delayed information feedback) HICs was supported on the basis of the first dependent variable. But this expectation was not supported on the basis of the third dependent variable data. T_1 HICs differed significantly from T_2 HICs on the basis of estimation range scores on rounds two and three. With delayed feedback T_2 HICs produced higher scores than T_1 HICs. T_1 HICs did not differ significantly from T_2 HICs in their propensity to move toward the controlled feedback as indicated by their relative tendency-to-change scores. Differential time delay of information feedback did not significantly affect high integratively complex subjects' propensity to change their estimations in the direction of the controlled feedback. One may conclude that an individual's propensity to change in the direction of information feedback is a personality characteristic that is relatively uneffected by differences in experimental structure.

H_{2a}: TREATMENT ONE HICs WILL NOT DIFFER SIGNIFICANTLY FROM TREATMENT TWO HICs ON ROUND ONE ESTIMATION RANGE SCORES.

The expectation that procedural differences between treatment one and treatment two*, other than differential time delay, would not significantly effect high integratively complex subjects' performance was supported. T_1 HICs did not differ significantly from T_2 HICs on round one estimation range scores.

H_3: A DELPHI PROCEDURE THAT INVOLVES IMMEDIATE INFORMATION FEEDBACK (5 SECONDS) WILL NOT ELICIT A DIFFERENT SET OF ESTIMATION RANGE SCORES ON ROUND TWO AND ON ROUND THREE, AND RELATIVE TENDENCY-TO-CHANGE SCORES FROM LICs, THAN A DELPHI PROCEDURE THAT INVOLVES DELAYED INFORMATION FEEDBACK (24 HOURS).

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*Subjects in T_1 were required to make earliest and latest estimates for an event on R_1; they then received controlled feedback and were required to go through R_2. T_1 subjects then went through R_3. At the completion of the three Delphi rounds for an event, T_1 subjects then went on to R_1 on the next event. This procedure was repeated until all eight events had been considered.

Subjects in T_2 went through R_1 for all eight events sequentially. Twenty-four hours later, they went through R_2 for all eight events. Twenty-four hours later, this procedure was repeated for R_3.

The expectation that differential time delay of information feedback would <u>not</u> significantly effect low integratively complex persons was supported. T_1 LICs did <u>not</u> differ from T2 LICs on the first and the second dependent variables. The estimation range scores on rounds two and three were similar for both T_1 and T_2 LICs. The propensity of LICs to change in the direction of the controlled feedback, as indicated by the relative tendency-to-change scores, was not significantly effected by the differences in time delay of information feedback. One may conclude that differences in experimental structure did not significantly effect LICs.

H_{3a}: T_1 LICs WILL NOT DIFFER FROM T_2 LICs ON ROUND ONE ESTIMATION RANGE SCORES.

The expectation of no significant differences due to procedural differences other than differential time delay was completely supported by the data..

H_4: LICs WILL PRODUCE DIFFERENT RELATIVE TENDENCY-TO-CHANGE SCORES (C_i) THAN HICs IN TREATMENT ONE.

H_5: LICs WILL PRODUCE DIFFERENT RELATIVE TENDENCY-TO-CHANGE SCORES (C_i) THAN HICs IN TREATMENT TWO.

It was expected that the findings of testing H_1 on the basis of relative tendency-to-change scores would hold true within treatment one and within treatment two. The propensity of low integratively complex subjects to change their estimations in the direction of the controlled feedback, as reflected in their relative tendency-to-change scores, was significantly greater than high integratively complex subjects' propensity to change their estimations in the direction of the controlled feedback, as reflected in their relative tendency-to-change scores in each of the treatments separately.

Conclusions

Three major conclusions may be drawn from the results of this study:

(a) In the Delphi process, integrative complexity is strongly predictive of performance on the tasks of making earliest and latest estimates about the time of occurrence of remote future events, and changing those estimates in light of information feedback.

(1) In a Delphi process involving remote future events, low integratively complex persons produce larger estimation ranges (the number of years between their earliest and latest estimation dates is greater) than do high integratively complex persons.

(2) Low integratively complex persons produce larger changes in estimation ranges than do high integratively complex persons in a Delphi process involving remote future events.

(b) In the Delphi process, integrative complexity is consistently predictive of convergence.

(1) Regardless of differential time delay effects, low integratively complex persons display a greater propensity to change their estimations towards external information feedback than do high integratively complex persons.

(c) Differential time delay of information feedback does have a significant effect on the performance of individuals involved in the Delphi process.

(1) Differential time delay of information feedback significantly effects the performance of high integratively complex persons in the Delphi process on the tasks of making earliest and latest estimates and on the task of changing those estimates.

(2) In the Delphi process, differential time delay of information feedback significantly effects the performance of low integratively complex persons on the task of changing their earliest and latest estimates.

Discussions of Conceptual Systems Theory as it Relates to Differential Time Delay in the Delphi Process

The results of this study clearly support the predictive value of conceptual systems theory. The ideal characterization of both the high integratively complex and the low integratively complex person by the conceptual systems model provided a sound rationale for statement of the hypotheses.

The major contribution of the model lies in its recognition of the interrelatedness of both the dispositional and situational factors as they bear on observable behavior. In this study, this relationship was clearly demonstrated.

The situational factor of differential time delay of feedback significantly effected both high integratively complex and low integratively complex persons' performances in the Delphi process. When immediate information feedback was employed, the difference between the performance of LICs and HICs was maximized. When delayed information feedback was used, the difference between LICs and HICs in performance was minimized. The experimental treatments (differential time delay) can be assumed to fall somewhere on a continuum from low to high environmental complexity (see Figure 8). Treatment one (T_1) (immediate information feedback) can be assumed to represent the optimal experimental environment for differentiating the performance of HICs and LICs. Treatment two (T_2) (delayed information feedback) can be assumed to represent the more simplified of the two experimental environments, because of its employment of delayed information feedback (24 hours between rounds). Treatment one involved immediate information feedback, which may be assumed to increase environmental complexity by placing added pressure on the subjects to function in short periods of time (5 seconds between rounds). One may conclude that HICs process complex information at a faster rate and more consistently than LICs.

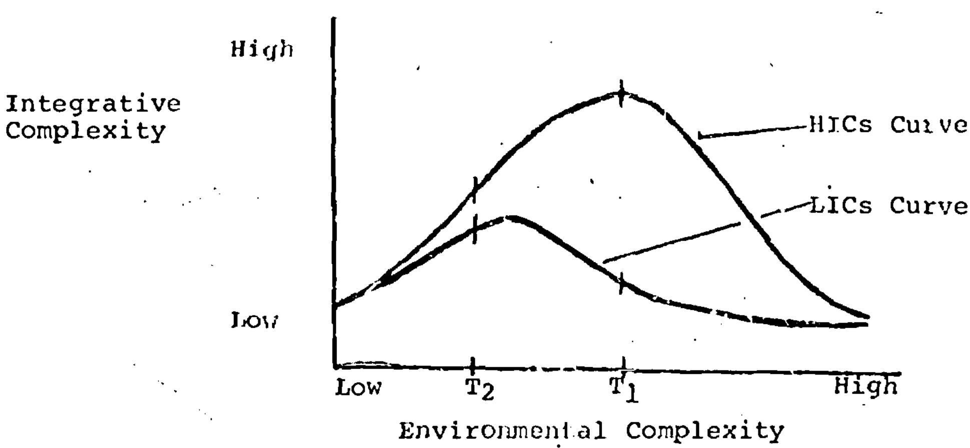

Figure 8.

Where HICs represents the theoretical relationship between high integratively complex persons and environmental complexity

LICs represents the theoretical relationship between low integratively complex persons and environmental complexity.

As Schroder et al. (1967) indicated, the more simplified the environment, the more simplified the information processing becomes. In other words, if the assumption that T_2 represents the more simplified of the two experimental environments is valid, and if it is overly simple in such a way that simple information processing structures are sufficient to cope with it, then one could expect that the differences in performance between HICs and LICs would be minimized. The data supports this explanation; no significant differences in performance were found between HICs and LICs in treatment two. If the assumption is valid that T_1 represents the more complex of the two experimental environments, and if it is complex enough to stimulate complex information processing structures, then one could expect that the differences in performance between HICs and LICs would be maximized. Again, the data supported this explanation. HICs differed significantly from LICs in treatment one.

Evaluating the Outcomes of the Delphi Process

The findings and conclusions of this study bring to bear information that is useful in interpreting the results of the Delphi process. They also help to explain the phenomenon of convergence, and thereby challenge some of the general assumptions underlying the Delphi process.

The major assumption of the Delphi procedure is that through its use of (a) anonymity, (b) controlled feedback, and (c) statistical group responses, it somehow reduces the effect of 'non-objective" variables found in direct confrontation group processes. Some of these non-objective variables are dominant personality influence, group pressure to conform, resistance to change a publicly stated position, and predisposition to depreciate stated opinions of others based on personality factors. Dalkey (1969), Dalkey and Helmer (1963), Campbell (1966), and many others tended to view the results of a Delphi exercise as being more acceptable than the consensus arrived at by interpersonal group processes. More specifically, the phenomenon of convergence in the direction of some "correct solution in the Delphi process is regarded as being a product of objectivity relatively free from interference of certain psychological variables. In view of the conclusions and findings of this study, that assumption is unfounded.

This study, within the stated limitations, concluded that performance in the Delphi process is predictable on the basis of knowledge of individuals' integrative complexity ratings. Conceptual systems theory indicates that low integratively complex persons may be characterized by: (a) low tolerance for uncertainty and ambiguity, (b) limited perspective, (c) limited inclination to project beyond the immediacy of present concrete information, and (d) reliance on external information and guidelines. From this description, one would assume that the low integratively complex person would, in the Delphi process, rely heavily on information feedback and be significantly influenced by it. The results of this study clearly supported the above expectation. Low integratively complex persons converged in the direction of the controlled information feedback significantly more than high integratively complex persons. In addition, the performance of individuals in the Delphi process on the tasks of (a) making earliest and latest estimations, and (b) changing those estimations in light of the controlled feedback, was found to be predictable on the basis of integrative complexity. Again, low integratively complex subjects produced significantly broader estimation ranges and significantly larger changes in estimations.

In summary, the implications of these findings are relevant to evaluating outcomes of the Delphi process. High integratively complex persons are more likely to base their estimates on something other than non-objective influences. Low integratively complex individuals consistently tend to change their estimates in the direction of the controlled feedback, and are more likely to be influenced by external inputs. In general, the outcomes of a Delphi exercise are as reflective of those non-objective factors as the outcomes of direct confrontation groups. As long as a process involves feedback, one may assume that some individuals will shift in the direction of that external input based on personality structure rather than on the basis of rational, objective evaluation.

Differential Time Delay and Delphi

In addition, the conclusion that differential time delay of information feedback has a significant effect on the performance of individuals in a Delphi process brings to light another area of potential concern. One of the major difficulties with the traditional Delphi procedure has been with the rather long delay between completion of a Delphi round, the reception of the controlled feedback, and the beginning of the following round. This time delay is usually caused by the need to receive the questionnaires, summarize the responses, and then return the questionnaires to the participants for the next round. The application of computer techniques to the Delphi process presents a very effective management technique for reducing the manipulative problems of the traditional process. The computerization of the Delphi process has been strongly urged by practitioners and is presently being implemented.

Before computerization of the Delphi process is implemented, extensive investigation of a large variety of different time delays should be carried out. In view of the fact that various time delays do have an effect, a more complete understanding of the parameters of this effect is required in order to more fully understand the related differences in individual performances. Without this understanding, evaluation of the outcomes of the process may be impossible.

In the present study, the use of immediate information feedback maximized the differences between high integratively complex and low integratively complex subjects. Conversely, when delayed information feedback was used, high integratively complex and low integratively complex subjects performed alike. It is impossible, from the findings of the present study, to assume that no other time delay increments than those used in this study will have significant effect. One can assume that many different combinations will have a variety of different effects on individuals' performances within the Delphi process. Failure to recognize the interrelatedness of time delay variables and performance in the Delphi process may culminate in a misinterpretation of the outcomes, whether they be a product of a computerized process or a more traditional questionnaire procedure.

The results of this study further imply that the Delphi process may have greater value when it is used as a pedagogical tool for providing a framework in which individuals are motivated to think about the future and to pull together as objectively as possible a large variety of information. This study clearly supports the value of the Delphi process as an analytical tool for the study of human behavior in highly complex and ambiguous situations.

It is fundamental that in order to improve forecasts, we have to improve our capacity to think about the future. To do this, we must know more about the process of thinking about the future. In this regard the Delphi process does two things. It requires people to think about the future, and it requires them to do it in complex ways.

The greatest danger lies in ascribing to the outcomes of the Delphi process some higher level of plausibility, that is, equating convergence with plausibility, than is warranted in view of the findings of not only the present study, but also the studies of Weaver (1969) and Campbell (1966).

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