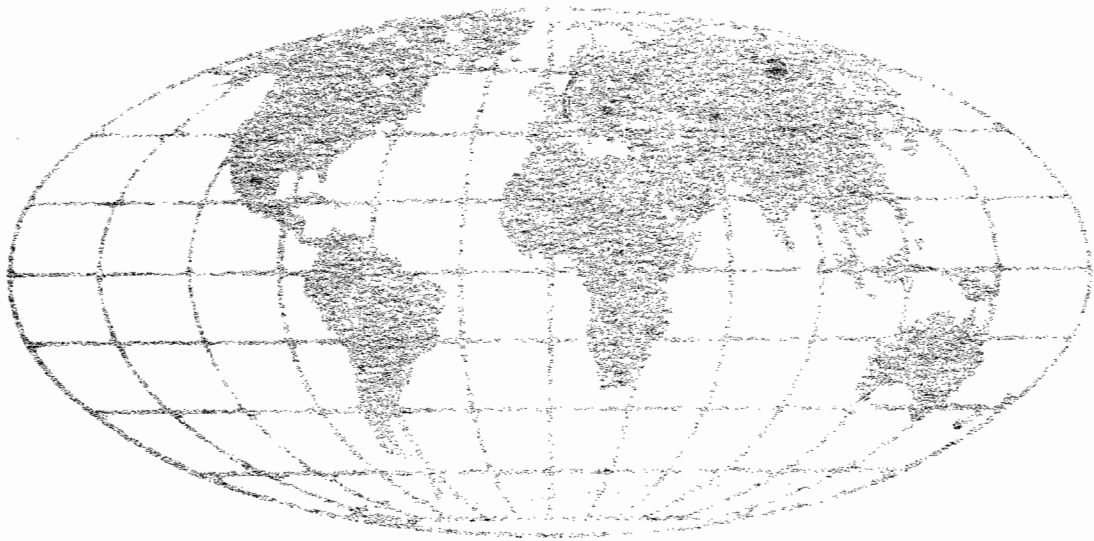


PROBLEM SOLVING

with Critical and Creative Thinking



Edited by Thomas M. Haines

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PHILOSOPHICAL ASPECTS RELATING TO EDUCATION USING THE CASE-METHOD

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Abstract

What contribution can philosophy make to the conference theme "Problem Solving with Cases?" Apart from a number of other subjects, it can raise the question about the perception we have of the interrelationships that we wish to influence. The purpose of this paper is to explore the effectiveness of the Harvard-Case-Method with reference to the concept that Dewing formulated in 1954 as follows: "The Harvard-Case-Method asks not how a man may be trained to know, but how a man may be trained to act" [McNair, 1954]. The results of this exposé shall be an attempt to explain the crux of the Harvard-Case-Method in such a way that it will enable one to approach management decisions using correct questions. Every teacher follows teaching goals. The goal common to all professors could be that they seek to transform the student's present level of knowledge to the required [desired] state. How can the Harvard-Case-Method help in this endeavor.

THE PROBLEM

RATIONAL, HUMAN BEHAVIOR

Directed human action can be described using a matrix. I will develop a matrix and relate the points I will raise to this matrix. Refer to Figure 1. The present state is the recognition of a condition or of a special situation. The desired state is the point we want to reach. This point often is not more the desire for change. The solution path represents the action. As is apparent, a path to a solution cannot be found in isolation. It must correspond to the desired goal. Therefore, the parts [components] of a decision are made up by the path from the present state to the anticipated desired state and the solution path.

Aristotle recognized Anaxagora as being the first sane person among the rabid man, because he was the first to provide absolute explanations for natural events based on the observance of nature, in contrast to the Ancient Ionian philosophers of nature.

DEFINITION OF THE PROBLEM

We will now modify the matrix. The modification is prompted by the fact that the effectiveness of the concept of goal accomplishment is only valid as long as the time span between the present state and the desired state is short and as long as we have a reliable understanding of the interrelationships between the two states and the solution path. It is only when the concept is misleading that mistakes are made in the selection of a solution path. That can result in failure to reach the goal. Spaemann [1985] is quoted as saying:

"A monkey with the wrong concept of what branches onto which he wants to jump, is as good as a dead monkey."

It is usually at this stage of decision-making that problems develop. They can be characterized by the following factors:

- The discovery of a situation that requires change.
- A certain, if vague, idea of the desired outcome.
- A search for appropriate solution paths.

PROBLEM SOLVING USING THE "WHY-QUESTION"

There are several possible answers to the simple question "How does one solve a problem?" This process begins by searching for explanations for the present undesirable situation. Although I might not be able to reach a coconut growing on a palm tree, I might ask why this is so. What do we want to find out when we ask the "Why-question?" For example, children raise this question when a routine activity is interrupted. The aim could, therefore, be the desire to classify the unknown in the framework of the known.

As long as the activity appears normal, we have no need to raise the why-question. It is, at the same time, a question relating to the aspect of novelty in its own right and will always be raised by a curious person. We should, however, appreciate that the why-question only makes sense if it is asked from a position where knowledge is already available. In a completely unfamiliar situation, every answer to a why-question will generate an entire chain of new why-questions. Furthermore, it can be surmised that normally the why-question will not be raised, as long as the familiarity to which we are accustomed to is not disturbed.

Which conditions or events in the environment of a manager can generate a why question? An unexpected development for the company such as the market entry of competitors might be an example. If the manager's education and training would prompt him to attempt to understanding the situation and he has developed skills to analyze current positions, he will be increasingly certain of obtaining answers to the why-question. But, and that is important, what kind of answers do we get to why-questions?

REESTABLISHMENT OF TRUST THROUGH UNDERSTANDING

If one employee leaves work daily at the same time, whereas another leaves at very irregular times, asking the why-question might explain these behavioral differences. The answer in the case of the employee who leaves at the same time could be that his train leaves 10 minutes after work, while in the case of the second employee, the answer might be that his or her train leaves an hour after work [Spaeman, 1985]. Understanding, therefore, is also a form of "no further questioning," because the familiar status has been recreated [Spaeman, 1985]. Remember, as long as the procedure appears normal, we have no need to raise the why-question. This kind of answer to a why-question is the reestablishment of trust through understanding.

REESTABLISHMENT OF TRUST THROUGH EXPLANATION

"Let us assume a bridge has collapsed. What do we want to know when we ask why the bridge collapsed? The first category of answers could be that it was sabotage (action), or due to failure to carry out the necessary tests. The second category could be that it was due to material damage or to overloading. Both sabotage as well as material damage are antecedent conditions, which, because of the laws of nature, are intimately associated with every event requiring clarification. The difference between the two is only, that in the first case the action is characterized by intent to produce the event, whereas in the second case the event is not deliberate... Here, too, the event, that differs from the norm is

explained by appealing to a superordinate state or normality. This time the state are the natural laws" [Spaemann, 1985].

Even in this case we reach a point where further questioning ceases, "...as we do not really want to know the exact answer, but this point is arbitrarily set by ourselves and is independent of the subject. That is why, in reality, it is not familiarity or understanding that is reestablished, but rather security." Spaemann calls this kind of answer to a why-question the reestablishment of trust through explanation. "Instead of a sense of trust in the comprehensibility of nature, a sense of trust of controllability appears, or the security of our ability to intervene in events" [Spaemann, 1985].

THE IDEAL OF THE UNIVERSAL FORMULA

If posing further why-questions is not arbitrarily stopped, but pursued further, until there are no questions left unanswered, we would arrive at the ideal state of the so-called universal formula, in the sense of the La Placean universal spirit, which would explain everything, thereby answering every individual why-question. It would then be possible to dispense with the answer to reestablish trust through understanding anybody's intention. The power of reestablishment of trust through explanation is sufficient to [answer] any why-question.

THE POWER OF THE WHY-QUESTION IN MANAGEMENT DECISION-MAKING

Let us now return to the quote from Dewing referred to earlier: "The Harvard-Case-Method asks not how a man may be trained to know, but how a man may be trained to act" McNair, 1954]. (Refer to Figure 3. - present state). What is a management student capable of achieving with his skills in analyzing interrelationships and searching for explanations? He realizes that understanding or being ready to explain the interaction of various influences generates control (refer to Figure 3. - solution path). Goal achievement is a result of understanding of the interrelationships and of properly arranging facts (refer to Figure 3. -desired state).

There are certain conclusions which describe the manager and his choice of solution path:

- there are several solution paths until the clarity of the interrelationships is not precise.
- a desirable solution path can be found through appropriate optimization methods such as explanations, statistics or inquiries.
- the chosen solution path is sound with regards to its efficiency in goal achievement.
- if difficulties are encountered in reaching the goal, one must provide additional the resources.

It cannot be overlooked that: Although this way of decision-making is fascinating, it stems from a concept of absolute mastery of the world. The only constraint is that one needs to know enough about the subject matter.

PROBLEM SOLVING USING THE "WHAT-FOR-QUESTION"

ARISTOTELIAN TELEOLOGY

The ideas discussed so far are based on the concept that perfect understanding of interrelationships makes it possible to reach goals. However, during the earlier discussion we have not really defined the meaning of goals. We will now make an excursion through Aristotelian teleology to point out how it is relevant to the judgement of management decisions.

The idea of movement

Physics defines movement as "Movement is the reality of the possibility as the possibility" [Aristoteles]. If we can say that an object in position A, has the possibility of being in position B, then, according to Aristotle, this is one of the essential possibilities of the object. The movement of the object to B, can also be seen as the anticipation of point B. C.F. Weizäcker described this as "Movement is the present of the future" [Spaemann, 1985]. The central question is, how can a goal (in greek: telos) be the cause of a movement. The psychological concept of motive is also based on this fact. Managers frequently experience the attraction of a goal within a motive as being so strong, that the motive can be readily accepted as the cause for the actions of employees or customers. How does this apply to subjects and objects (which we would not credit with having intentions) such as percentage market share, a bank balance or machines on the shop floor? In other words, this raises the question of material teleology. Spaemann describes this subject as follows: "The orientation towards our everyday form of speech led Aristotle to his theory of the four causes:

1. causa materialist - material cause
2. causa efficiens - operative cause
3. causa formalis - shape cause
4. causa finalis - purpose cause

Let us consider a piano that is located in a house on the Côte d'Azur. It is out of tune. Why? One answer may be that because it is made of wood. The stating of a material cause is accepted by Aristotle as a valid answer, in contrast to Plato, because the specific material, in this case wood, possesses concrete form, and one of its properties is that it can easily warp. Another answer could be that it is out of tune, as a result of the moist sea wind that blows through the house all day. This would be a statement of the operative cause. We could also point out a shape cause. One of the qualities of musical instruments is that it can be possible for them to be out of tune. The state of being out of tune only manifests itself in the case of an instrument made of wood and is not a consequence of the general warping of wood. One could take the shape cause a step further and say that it is well known that this make of piano, built by the Hulesh & Quenzel company, tends to be out of tune easily. The last answer is, however, of yet another type. Being out of tune is a negative expression. One can only appreciate the concept of being out of tune if one understands the predetermined purpose of a piano, namely to make music. A piano that is out of tune cannot perform this function very well. Something can only appear bad if it can also be good. The missing of the telos [goals] naturally proposes the presence of the telos. In order to understand what is meant by a piano out of tune, I have to know what a piano is. It is not enough to be told the name, what it is made of, who made it, or what its shape is. I also have to know its purpose.

The knowledge concerning "what-for" is cited by Aristotle as the prime cause of all, as illustrated by the fact, that the desire to sit precedes the concept of all chairs. If we did not want to sit, we would not make chairs. There would be no chair makers or chair designers, and one would not cut down trees for chairs. If the substance's goal disappears, then the substance itself disappears after a certain time, as illustrated by Plato in his example of the craft of shipbuilding" [Spaemann, 1985].

DISTINCTION BETWEEN THE "WHY-" AND THE "WHAT-FOR-QUESTION"

A manager who has been educated to direct his attention towards goals, is interested in "what-for-questions." At first sight it may not appear that there is much difference between the "what-for-" and the "why-question." The question why a company has a certain sum of money in its account is easy to answer by looking back to the past. One of the reasons may be that a customer has paid, but the company has not yet spent the funds. The "what-for-question" directs attention to the future. The reason for frugal action can only be explained through the anticipation of future events. "Save for a rainy day." Under this aspect the question "why are you saving?" could be better formulated as "What are you saving for?" If we were to question

a crying child, we would receive very different answers to the question "Why are you crying?" than "What are you crying for?" This is, where the quality of the "what-for-question" becomes apparent. Saving, for example, is a way of reaching a desired goal, but merely one of the possible ways. Generally, we are immediately in a position to propose other, different ways of reaching the goal, which is defined by the answer to the "what-for-question." Let us note the difference: The "why-question," which explores causal relationships, directs attention to the past and looks for explanations of events and connections with the current event. The "what-for-question," directs attention to the future and looks for a goal of the current event, permitting an attempt at evaluation of the feasibility of the solution path with reference to the goal. And - very important - with increased goal precision: the number of alternatives (found) leading to the goal rises.

THE POWER OF THE "WHAT-FOR-QUESTION" IN MANAGEMENT DECISION-MAKING

What can a management-student, educated in goal formulation and attainment, achieving? Refer to Figure 4. He is aware that there exists many solution paths and this number increases with the further precision of goal clarification. Goal achievement is the result of a proven solution path which was not recognized as the best path at the outset. The route chosen was one of the possible routes. There are certain conclusions which describe the manager and his choice of solution paths:

- there are a number of solution paths, and the number increases with goal clarification.
- a desirable solution path can not always be found, he has to make a decision between competing paths.
- the chosen solution path is, despite all analyses, a risk, which he has to observe and evaluate during the application.
- if difficulties arise, there is a good chance to compare the actual solution path with other possible solution paths and to reject the non-proven path.

It cannot be overlooked that the manager needs courage to select among the possible choices which can be predicted only to a limit extent. He finds reassurance through the availability of additional alternatives. These are only at his disposal if the initial choice does not permit reaching the goal with the resources allocated.

EFFECTS OF DIFFERENT APPROACHES ON REACHING THE SOLUTION PATH

If we now assume that each method of problem solving - the method using the "why-question" and the method using the "whatfor-question" - is assigned to different managers, then we examine the relationship to their solution paths (refer to Figure 5). We will call the using-why-question-method the knowledge collection approach, and the using-what-for-question-method the alternatives collection approach. Both managers would undertake an intensive search for possible explanations and interrelated factors relating to events in their companies. Over time they would acquire a wealth of knowledge in their specialty area. But how does this relate to the solution path?

- a. The knowledge collection approach. The person that believes that his knowledge is a true depiction of reality, in other words his knowledge is knowledge about the truth, will believe in mastery of the interrelationships. Therefore, a certain choice of solution path - in his point of view - is possible and this chosen solution path could be forced by resource back-up if the company is in difficulties.
- b. The alternatives collection approach. The manager who finds new alternatives, as knowledge in his area of responsibility grows, is not sure of the best choice. He realizes that there exists an infinite number of solution paths which increases with the precision of goal clarification. Therefore, he never makes an optimum choice. The alternative selected is nothing more than a trial, but a trial based on a well analyzed

starting preposition. He believes that his choice could be an error. If his company is has fallen on hard times, he would consider it to be imprudent to allocate additional resources and he, therefore, rejects the non-proven alternative.

ACHIEVEMENT OF THE HARVARD-CASE-METHOD

ECONOMY OF EXPLANATION

According to Konrad Lorenz, "Life is a process of gaining cognition" [Weiss, 1971] and Noah Chomsky explains that "Man is equipped with certain natural convictions, which are true, because a certain uniformity exists in the entire universe and the rational person is himself a product of the universe" [Chomsky, 1970]. If the Harvard-Case-Method is an educational method which brings cognition, what is this cognition related to? Dewing wrote "... where thinking occurs there is an element of newness involved and without this element of newness there is no thinking" [McNair, 1954]. The cases which are presented to the students each class present new ideas continuously and thus keep the analysis and questions concerning explanations at a high action level. If, however, students pursue this analysis with a passion to get the roots of an issue, then they may adopt an approach similar to the educational methods at universities - being aware of the why-question.

In the course of this lecture we lack the time to ponder the quality of our cognition of our surrounding. However, there is doubt of the content of absolute truth. Karl Popper [1974] remarked "Most mortals do not have anything in their misleading understanding, which has not entered their minds through their misleading senses." The Harvard-Case-Method draws a clear line to a range of analyses. Stuhler [1975] described the use of 1,200 different case studies with students over a two year period. This worked out to approximately three new cases a day. The goal here is to teach economy of analysis and explanation, otherwise it would be impossible for the student to analyze all cases. This economy is highly recommendable for graduates of a business school.

ECONOMY OF RESOURCES

Stuhler [1975] also described the transition from conventional teaching methods to the Harvard-Case-Method at the Munich Technical University

"Special difficulties in the transition from the lecture to the Case-Method arose in that older teachers were rather hesitant to adopt this method of instruction, because chairing a class discussion requires distinctly more preparation than a lecture. Nevertheless it may reoccur that the case leader arrives at a situation, where he must humbly admit his state of being unprepared, faced with a partial problem that crops up for the first time, which had not been touched upon in previous discussions."

This state of being unprepared should, however, not affect the professor's authority. Rather it causes the student to pose the question as to how he - the professor - could get so far in his career without always having the answer to every question, or even having not realized some points (perhaps even a majority) in a concrete assignment. Thus, the student experiences precisely the opposite from the conviction that he will ever be able to fully grasp a matter in such a way, that all the factors which are necessary to control a situation, are gained. His blind courage gives way to thoughtful reticence. He will increasingly ask for the valid concept of his decisions and realizes that this can only be partially attained by means of analysis and explanations.

OPTIMIZATION OF THE NUMBER OF ALTERNATIVE SOLUTIONS

Gragg stated "But it is so discouraging to prepare a case as well as I can and then listen

for an hour in class to other students bringing out all sorts of interpretations and arguments that I had never thought of" [McNair, 1954]. It is precisely this discouraging moment that is decisive for success in learning. Stuhler described three objective development stages a student experiences in the Harvard-Case Method

- To begin with what is discovered is that one is incapable of thinking of everything that one's co-students bring up in the course of case analysis.
- In the second development stage the students regard it as natural and a matter of course that they will not succeed without cooperative assistance. At the same time, competition grows to achieve a high rational standard of argumentation, however, the give and take of assistance is no longer a matter of silent suffering.
- In the third stage the student discovers that the teacher is not always able to give the best answer. Once this stage of development has been reached, he will start to work independently as a responsible member of the study group" [Stuhler, 1975].

This does not only confirm what I explained earlier, it is also an excellent explanation of how the initial discouragement is the part of what turns the "absolute analyzer" into the "what-for-questioner." Any alternative that has not been discovered by the student himself is checked for its effectiveness in reaching the goal. After 1,200 cases he has undoubtedly developed the state of consciousness that an individual person will never find all the alternatives that are possible - and that it is also not necessary to find them. It is a question of method how to increase the number of alternatives and how to keep them in reserve, especially when a chosen alternative is being subject to proof. Furthermore, it is a question of certainty that other managers could decide differently in the same situation without necessarily being less successful. This will increase the readiness to reject an alternative already pursued, if it no longer appears to be practicable. The collection of possible alternatives relating to the desired goal softens the errors caused by the manager's ability to make accurate forecasts.

BALANCE BETWEEN EXPLANATION AND GOAL CLARIFICATION

Aristotle said in Nicomachian Ethics "We will best be able to recognize our inclinations by the objects, in which we experience pleasure or displeasure. We must, therefore, free ourselves from the things that attract us and turn in the opposite direction; for if we distance ourselves from the side of such a transgression, we will reach the middle path.... However, we must always guard ourselves from pleasures and their appeal, because we are not capable of impartial judgement... If we do behave like this, then, in brief, we shall be most likely capable of reaching the middle path." The Harvard-Case-Method permits both, the "why-question" as well as the "what-for question." That may be one of the reasons for its effectiveness.

CHANGE MANAGEMENT

Learning is primarily a question of motivation and, thus, a question aimed at asking "what-for?" The Harvard-Case-Method can assist in developing the following skills:

- Economy in the search for explanations. - Economy in the clarification of goals.
- Holding of alternatives in reserve for difficult company situations.
- Awareness that predictions are mainly speculative.
- Awareness that the knowledge about interrelationships can be deceptive.
- Maintaining the proven alternatives. - Rejection of the non-proven alternatives.

The student will undoubtedly appreciate the practicability of this procedure very soon and will drop the desire to obtain infallible knowledge. He is motivated to learn how to live with change.

ANTICIPATION AND EDUCATION

It is the ability to anticipate, which allows man to experience the consequences of his behaviour in a logical manner without wasting his resources in the process. Even established paths can be regularly subjected to an examination of their efficiency with regard to attaining goals. Without wasting more resources we can anticipate the results of an initialized solution path, now from a point that is closer to the goal. During every state of the process we can decide whether to continue or to change the solution path. This behaviour is to be practiced if one wants to follow the concept of Dewing: "The Harvard-Case-Method asks not how a man may be trained to know, but how a man may be trained to act."

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Usual path of parts of decision

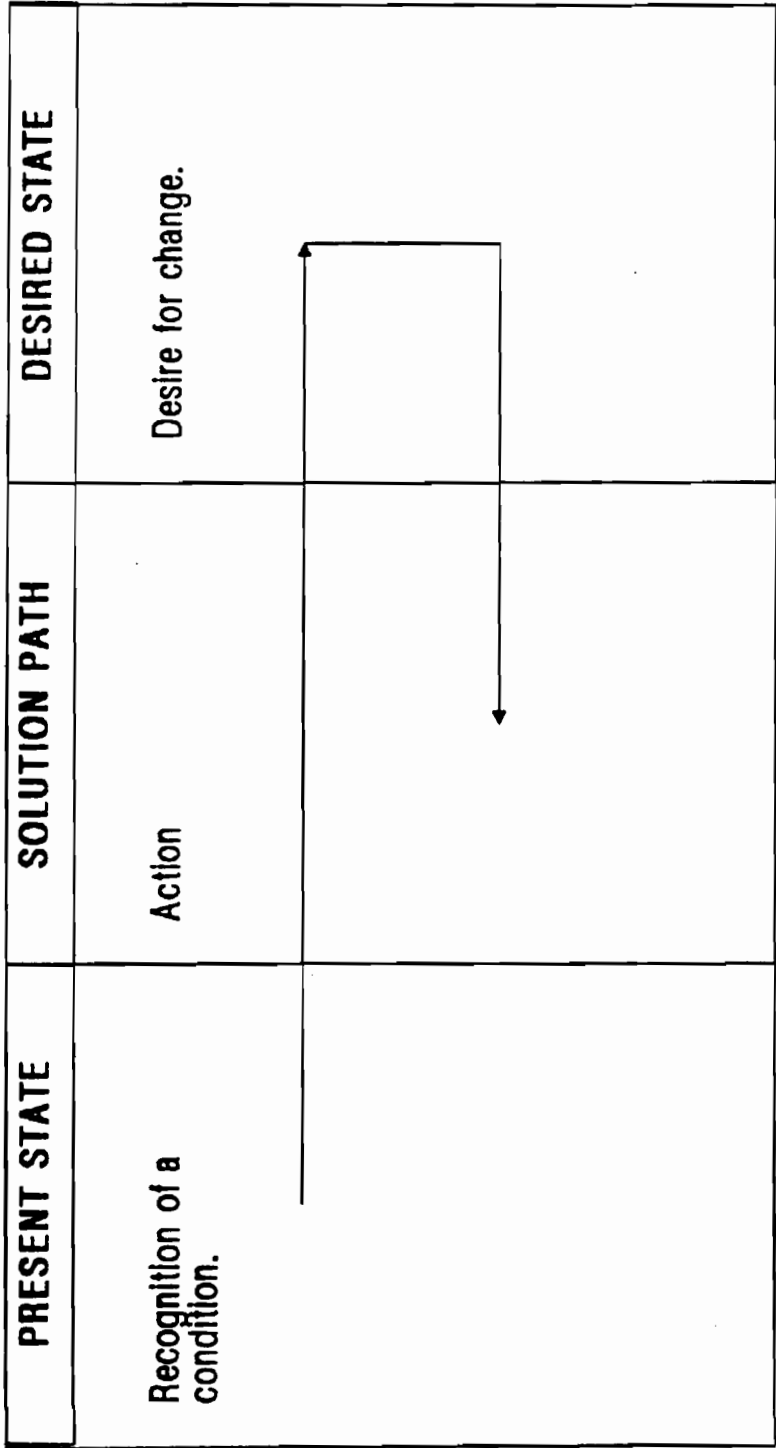
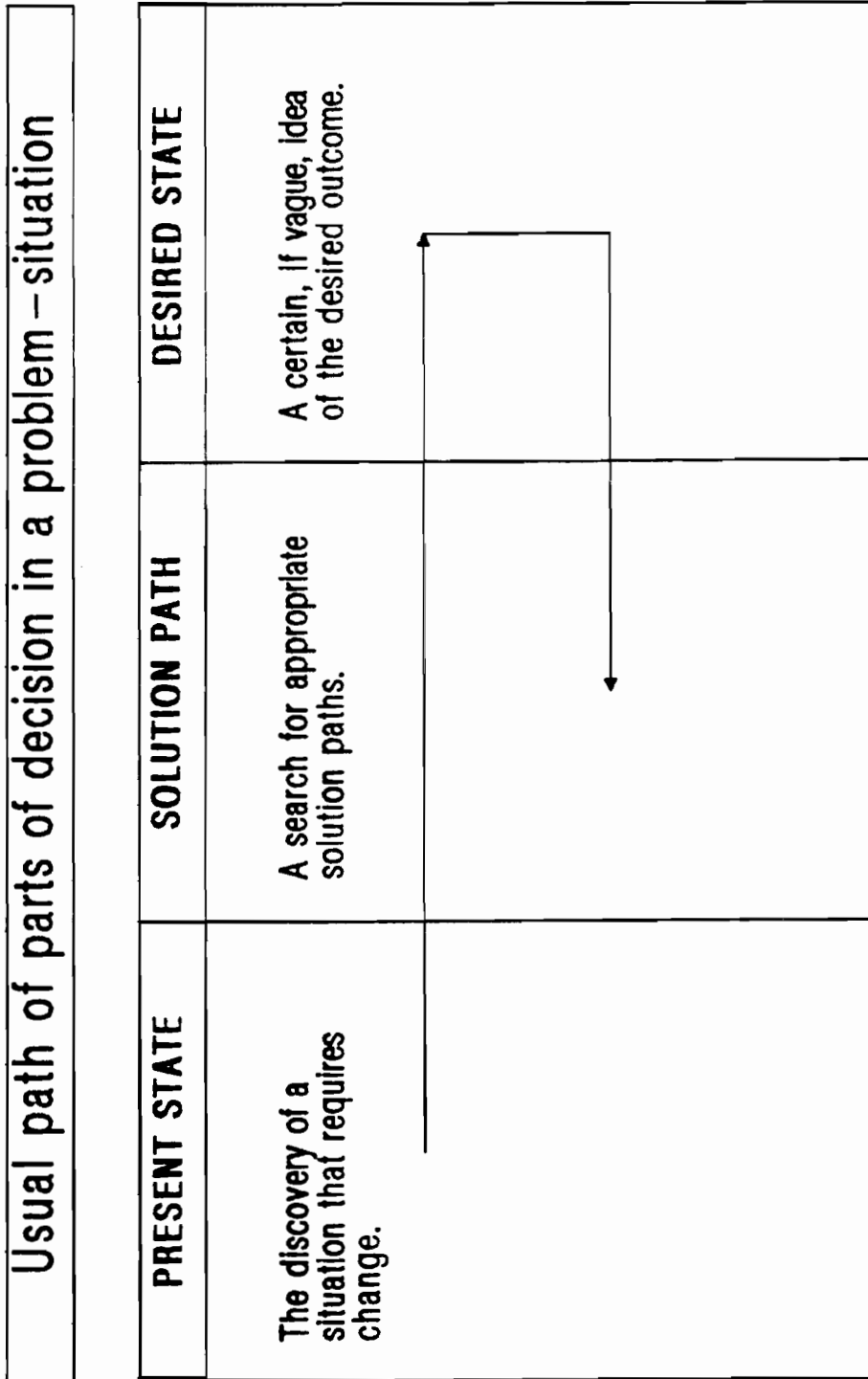


Figure 1.

Figure 2.

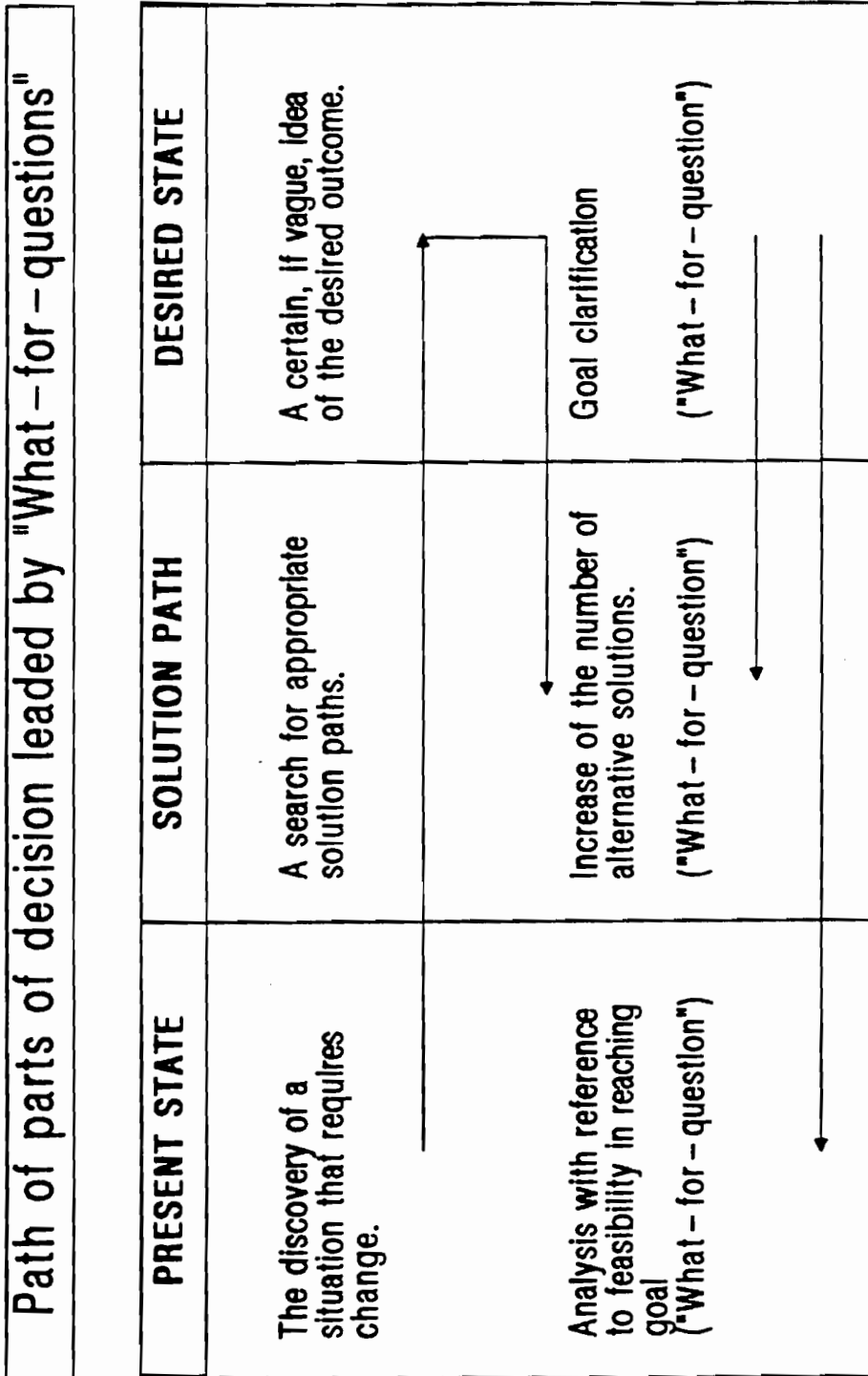


Path of parts of decision led by "Why - questions"

PRESENT STATE	SOLUTION PATH	DESIRED STATE
<p>The discovery of a situation that requires change.</p>	<p>A search for appropriate solution paths.</p>	<p>A certain, if vague, idea of the desired outcome.</p>
<p>Qualification of the analysis Explanation search ("Why - question")</p>	<p>Belief in mastery of the interrelationships ("Why - question")</p>	<p>Goal achievement as a result of understanding of the relationships</p>

Figure 3.

Figure 4.



Effects of different approaches on reaching the solution

PRESENT STATE	SOLUTION PATH	DESIRED STATE
Knowledge collection approach:		
Qualification of the analysis Explanation search ("Why - question")	Belief in mastery of the interrelationships ("Why - question") Certain choice Resource back - up if in difficulties	Goal achievement as a result of understanding of the relationships
Alternatives collection approach:		
Analysis with reference to feasibility in reaching goal ("What - for - question")	Increase of the number of alternative solutions. ("What - for - question") Non - optimum choice Rejection of the non - proven alternative if in difficulties	Goal clarification ("What - for - question") Goal achievement as a result of proven alternative

Figure 5.