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Cultural Factors in Complex Decision Making

Abstract

Complex decision-making is conceptualised as the process of problem solving in meaningful and important, but complex, dynamic and partially opaque situations. This process is open to a number of cultural influences, among them educational practices, environmental predictability, and power distance. Two empirical studies that explore into the cultural relativity of this type of decision making use interactive computer simulations of complex problems as research instruments. There are a number of behavioural differences between participants from India and Germany which can be explained within a culture-theoretical framework and give reason for the plea to include cultural factors in theories on human decision making.

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INTRODUCTION

Small Decisions and Big Decisions

Making decisions is a universal process. Human beings in all ages and cultures constantly find themselves in a position where they have a choice between two or more alternatives. Whether you try to attack the mammoth from the left or the right side, whether you order pizza or pasta at a restaurant, or whether you continue to read this chapter or not means making a decision. Cognitive psychology has developed quite complicated models to describe human decision making. Although these models do differ in many respects, they are often variations of the "expectation-times-value - principle". This means that humans usually select the one alternative that has both a high subjective value and a high likelihood of success. For instance, you are only supposed to continue reading this chapter if you value the topic and if you expect a fair chance that you understand the text. If one of both conditions is not met, you should by now be thinking of doing something else.

However, different observers have remarked that many of the more important decisions in real do not fit such simple models. For instance, there might be no common "yardstick" against which to measure different alternatives (there is, for instance, no common value involved in spending the same amount of time with a textbook or in a movie). Furthermore, real life decision making is usually more like a series of decisions than a single "one-shot-decision". If you, for instance, decide to make your room more comfortable, you usually do not develop three or four alternatives and then decide among these according to some rational criterion. Rather, you may start by deciding to move your desk from one wall to another. Looking around, you feel that the cupboard also needs a new place, then the bed and so on until you room looks in a way that is well beyond what you imagined when you moved the desk. And finally, the likelihood of success is often not known to the decision maker. If one, for instance, is wondering whether to enroll in Psychology or Medicine, the estimate of one's own liking of and success in these subjects is at best vague. Moreover, other important aspects like job prospects may also be quite unclear.

Therefore, making decisions on issues of importance and with far-reaching consequences is much more difficult than doing simple multiplications of values and likelihood of outcomes. This probably is one of the reasons why many of the "big decisions" are regulated by cultural norms. In many cultures decisions on how to view the world, which gods to believe in, which profession to learn, where to live and whom to marry are, in fact, more influenced by the social and cultural context than by individual decisions. Certainly, this limits individual freedom. On the other side, this also alleviates the burden of constantly making decisions whose consequences can barely be overseen.

Within cognitive psychology, the last two decades have witnessed an increasing interest in studying these "big" decisions. This has to do with the enormous consequences of many technological, ecological and economic decisions. It is generally felt that never before in the history of mankind were decisions made by individuals so potentially harmful (or beneficial) to so many other individuals (the reader may think of, for instance, nuclear

power, carbo-monoxide emissions, international trade regulations, or bio-technology). It is quite natural that there is an increasing interest in the nature of these decisions, the psychological mechanisms that regulate them and typical errors that are committed in making them (see Frensch & Funke, 1995; Klein, 1997).

This reading, then, attempts to introduce more formally the concept of "complex decision making", to look at cultural factors that might be important in influencing this form of decisions, and to discuss the results of some empirical studies that have investigated this topic cross-culturally. This is done in the context of observing participants from India and Germany.

A Primer on Complex Decision Making (CDD)

Most "big" decisions share some features that distinguish them from other, more easily tractable problems. These features include:

- a) *Complexity*. In our context, "complexity" means (a) that the decision making situation consists of a large number of variables (or factors) that need to be taken into account and (b) that these variables are highly interrelated. The factors influence each other, they cannot be dealt with independently but form a tight network.
- b) *Multiple goals*. The decision maker(s) usually has (have) not one, well-defined goal. Often there exists only a vague dissatisfaction with the present situation. Sometimes the degree of improvement is open, sometimes possible goals contradict each other.
- c) *Dynamics*. The decision making situation does not remain constant, it does not "wait" for the decision maker to finally come up with something. Rather, it develops independently of the actions of the decision maker. The different variables that make up the situation are subject to trends which, unfortunately, tend to deteriorate rather than improve.
- d) *Opacity*. The decision making situation is not obvious. Some of the important variables may be not known, mutual influences may be unclear or hidden, and the current situation of some of these variables may be difficult to assert.

Of course, these features of complex decision making situations have psychological consequences for the decision maker. He or she will usually experience a fair degree of time pressure and there are multiple uncertainties. Knowledge is insufficient and it can be quite unclear what to do at all. Well known solutions may not work and decisions do not only have the intended main effect but also (often detrimental) long-term- and side-effects. The following example may help to further clarify this notion of complex decision making:

In many countries colleges and universities have student bodies that participate (to a larger or smaller extent) in organizing and managing the university. Imagine that at your university the group of people that represents the student population is highly ineffective and even acts against clearly voiced student interests. You, being a politically aware person, are extremely dissatisfied with the situation. You feel that the student

representatives only promote their own interests and that important issues get procrastinated or torpedoed.

For you, this situation has all the features of a complex decision-making problem. There are numerous "variables" involved, the variables here being the foul student representatives, the other students, the faculty, the administration. All these "players" are not independent from each other. Any action on the side of one group of players influences the position of other players; there may be factions, temporary coalitions, and animosities. Then, you are dissatisfied with the present situation, but what is your goal? Do you want to influence the present representative's political position? Do you want to "straighten" them? Do you yourself want to become a representative? Are you interested in improving campus policies or do you aim at personal power or do you want to impress parents or friends or do you actually want to compensate for poor academic achievements? While reflecting on this question of multiple goals, you probably do not have too much time. There might be other, equally dissatisfied students that could leave you sidelined. The present representatives might get hunches that you plan something and could take some quick action against you. But the situation not only develops dynamically, it will also be, in some important aspects, opaque to you. You may have a rough idea of who the important players are. But you will not know in sufficient detail what their individual goals are, what their relationships look like and how they really think about issues that are important to you.

As has been mentioned before, making decisions in such complex and dynamic situations requires a mixture of different cognitive and behavioral activities such as:

- Clarification of goals, setting priorities, resolving conflicts between incompatible sub-goals;
- Collection of information and acquisition of knowledge about the variables involved, their interrelations and current status;
- Analysis of developmental trends of critical variables;
- Deciding on a general strategy or "game plan";
- Development of possible measures to influence the situation, analysis of their probable main-, long-term-, and side-effects;
- Planning and actually implementing a sequence of steps;
- Effect control, monitoring of results of one's actions;
- If necessary, revision of one's goals and general strategy, acquisition of additional knowledge, and improving on further plans.

And, what is more, these different processes need to be organized in a way that fits the features of the situation at hand.

If we now change the perspective and look at CDD from a more descriptive angle, we find that humans appear not to be very well equipped to meet all these demands. Case studies as well as laboratory experiments have repeatedly pointed to several typical error tendencies (see Dörner, 1996; Reason, 1990; for more details). To mention just a few: CDD requires strategic flexibility, that is, the constant adaptation of the organization of

thought. Humans often lack this flexibility, they, instead, resort to "methodism". They tend to establish methods quickly for arriving at decisions and transport these to new situations without checking their applicability. This error tendency is related to another potential error, lack of exploration. Exploration means gaining a broad overview over the variables involved. Instead, decision makers tend towards what has been called "central reduction" - the tendency to pick just one factor, use it as basis for decision making and forget about the rest of them.

"Central reduction", of course, implies ignoring the long-term consequences and side-effects of decisions, which is probably one of the major reasons for so many faulty decisions in the area of ecology, politics, and economy. In general, when planning for a sequence of decisions, humans are usually preoccupied with the dominant motive. They make decisions with the aim of removing the most prominent shortcomings, regardless of whether the prominent ones are also the important ones, or not. On the strategic level, this often causes an insufficient adaptation of decisions to changing circumstances and it also gives rise to a typical feedback-orientation: Decision makers react to what the situation appears to demand from them and do not, by themselves, attempt to change the situation in a direction that satisfies their intentions.

Complex Decision Making in the Cultural Context

It is now about time to turn to the question of cultural influences on CDD. In what way would cultural factors influence the process of complex decision making? Would it be possible to distinguish different ways of CDD that are related to cultural differences? Would it even be possible to extend the cross-cultural research program others have successfully completed for the notion of "cognitive styles" (Berry, 1976) to something like "styles of complex decision making"? - As usual, ongoing research is far away from being able to answer these questions conclusively. There are, however, some culture-theoretical as well as some empirical results available that allow for some preliminary insights. On the culture-theoretical side three factors need to be discussed (see also Badke-Schaub & Strohschneider, 1998; Strohschneider & Güss, 1999):

1. *Predictability and "planability" of the environment.* It is well known that cultures differ in the extent to which public life, economic affairs, and the private and social life of people are predictable. This predictability of different spheres of the environment should influence the development of problem solving styles: If an environment is completely predictable, there is not much complex decision making required because there will be routinized solutions available for all kinds of choices. Only when there is development (and therefore limited predictability), CDD becomes necessary. However, the dynamics of change should influence the strategies used. Slow rates of change may allow for knowledge based, analytic and long term oriented strategies to develop whereas an environment in a constant state of flux (like in situations of social unrest or rapid economical change) requires ad hoc and short term oriented strategies.

2. *Exposure*, that is, the degree to which a culture requires and promotes experiences in different areas of problem solving. Exposure may be related to the accountability of the environment but it may also be a function of dominant value systems or the availability of resources necessary to promote exposure. For instance, highly individualist cultures promote independence and self-reliance. Therefore, children, juveniles and adolescents will be likely to be confronted with different kinds of decision problems, they will be expected to make these decisions on their own and have to bear the consequences. In growing up they will collect experiences with different types of decisions, different strategic approaches and with the consequences of poor decisions. They are likely to develop at least some kind of expertise in this area of decision making. In highly collectivist cultures, on the other hand, the value system promotes obedience and conformity to the norms of the in-group. In situations of choice, individuals will be given advice on what to do or there will be role models to follow. Therefore, exposure to and individual experience with this type of decision making will be limited.
 - a) Differences in individualism and collectivism are likely to also influence the style of decision making. It has often been described how individualistic cultures reinforce risk taking and confrontational approaches aimed at increasing personal benefits even at the cost of others (e.g., Ohbuchi, Fukushima, & Tedeschi, 1999). In collectivist cultures personal benefits are less valued if other members of the group suffer or if group oriented values (like harmony) are endangered. Therefore, in collectivist cultures decision makers should proceed more carefully and should pay greater attention to the social implications of decisions.
 - b) With respect to exposure, the amount of schooling could also be an important factor. However, the ways of teaching are critical. If learning at school is equated to digestion and repetition of prefabricated solutions there will be only limited development of problem solving expertise (see Rogoff, 1981; Gauvain, 2000).
3. *Power distance and social hierarchy*. These well known cultural dimensions could also be influential in shaping the ways of decision making. Attempts to solve a problem only make sense when one is given sufficient leeway not only to make a series of decisions but also to bring them to work. The notion of "control span" captures this idea. High power distance cultures are more likely to limit the control span of individuals not on top of the hierarchy and thus hamper individual decision making rather than promoting it. This is not to mean that high power distance necessarily results in poor decision making, however, the strategies will be different. Decision makers will pay greater attention to possibly adverse social implications of decisions and will therefore be rather conservative, or risk avoidant (see Sinha, 1997). Under conditions of low power distance assertive and control-oriented strategies are more likely to be functional.

It is not the purpose of this discussion to develop a fully evolved model of cultural influences on complex decision making. It attempts to argue that decision making, being universally required, is nevertheless likely to vary cross-culturally. Psychological theories

on decision making should acknowledge this possibility and pay attention to cultural influences on and cultural variation in decision making. The next section briefly reviews the main results of empirical studies that have attempted to do so.

Some Empirical Results

How does one research CDD empirically? Given the features of complex decision situations, this is a difficult question. Using questionnaires appears to be highly inappropriate to tap the interesting behaviors, and observational studies in the field also face considerable problems, although they are done occasionally. Interactive and dynamic computer simulations appear to be a way out of this dilemma (Brehmer & Dörner, 1993). Here, complex problems are simulated on a computer and participants are asked to interact with the simulated problem. Usually, participants are given a written introduction that describes the problem and the scenario and they then are asked to achieve some more or less precisely predefined goal. In doing so, they can inquire necessary information from the computer and they can make decisions as they wish. Of course, these decisions influence the further development of the problem and decision makers therefore find themselves in the realistic situation of having to cope with setbacks and failures - or being able to enjoy the pride over a plan, working well.

In order to minimize the role of computer experience, the simulation programs themselves are usually operated by a facilitator. Participants have as much freedom as possible. They have the choice as to the when and what of decision making, there are no mandatory decisions prescribed by the program, and all the available information (which is always plentiful) is only given on demand. Since these simulations can be played by individuals as well as groups, the whole setup comes as close to "real life" decision making as is possible within the constraints of laboratory research. If the simulations are carefully designed they are thought to be interesting research tools in the cross-cultural context.

A study using the computer simulation MORO sheds some light on the role of "exposure" in CDD (Strohschneider & Güss, 1999; Strohschneider, 1999). Participants were university students from India and Germany, about 22 years of age. The general life situation of these two groups of students differed greatly. In Germany, university students of this age group are completely independent. They usually live in a private apartment in the university city of their choice, often far from home. They have complete freedom with respect to their private as well as academic life (this is a special feature of the German university system) and they are responsible for all the numerous decisions this way of life requires. Indian students of this age group often study in a city close to their homes and they usually either stay with their parents or live in a (strictly regimented) student dorm and almost all responsibilities for their private and academic affairs are taken care of. Therefore, it is safe to assume that exposure to complex decision making situations differs greatly between these two groups.

The MORO-game simulates a small tribe of semi-nomads, living at the southern rim of the Sahara-desert in Africa. The living conditions of this tribe are poor. They grow a little

millet and they breed some cattle, but the general conditions are adverse. The heat is intense, water is always short in supply and the cattle stock is constantly threatened by a lethal disease, transmitted through a fly. There is neither schooling nor are there any medical facilities. Participants take the role of a developmental administrator, assigned to this tribe, and are given the task to improve the living conditions of this tribe (whatever that means).

Overall, participants were quite successful in alleviating the tribe's problems. 53 out of 68 participants at least managed to complete 20 simulation years without causing a famine. However, a comparison of some of the behaviors related to CDD yields interesting cross-cultural differences. Table 1 presents a selection of results in an overview, a brief discussion follows.

Table 1.

CDD in the MORO-game. Comparison of Indian and German University student's problem solving behavior.

Dependent variable	Indian Participants		German Participants	
	Mean	SD	Mean	SD
Number of decisions, total	41.68	17.00	59.88	16.01
Number of questions, total	54.79	38.05	102.00	45.79
Incomplete exploration	1.65	1.74	0.24	0.50
Years with feedback-strategy	3.15	3.91	0.79	1.68
Insufficient adaptation of decisions	6.26	5.72	1.45	1.97
Decisions without information	7.21	6.86	2.24	3.42
Lack of effect-control	1.88	1.09	1.21	1.09

The first two rows of Table 1 show data about the general level of activity. German participants were clearly more active. Overall, they made more single decisions and they asked much more questions. This indicates that they needed more information on which to base the decisions.

The lower five rows in Table 1 show the frequency of some typical errors that are made in CDD. Clearly, Indian participants committed more of these. Specifically, 1) they

more often failed to explore the scenario fully (ignoring, for instance, the problems related to cattle), 2) they more often stayed with a reactive feedback-strategy (this means that decisions only are reactions to crisis-signals like "poor rains", coming from the system and not proactive attempts to improve the situation), 3) they frequently "forgot" to adapt their decisions to changing circumstances (for instance, not decreasing millet sales in times of hunger), 4) they made decisions without having the necessary information available (for instance, deciding to sink bore-wells without knowing the price), and 5) they more often missed to control the effects of their decisions (for instance, setting up a field hospital but not checking the effects on population growth).

Since there were no indications that the two groups differed with respect to basic cognitive capabilities, or that there were decisive differences in background knowledge, these results basically point to the fact that "exposure" in the sense defined above is indeed critical. The German students apparently knew better what to do in such a situation and avoided many of the pitfalls inherent in CDD. The Indian students were less acquainted with the demands of this problem, their decision making appeared to be reluctant and error-prone.

The results of a second study can be interpreted more in terms of "predictability of the environment" and "power distance" (Ramnarayan & Strohschneider, 1997). The simulation used is called MANUTEX, the scenario is that of a small garment factory located in Kuala Lumpur, Malaysia. The MANUTEX has 37 employees that produce different garments for the local markets. However, due to the untimely death of the founder the unit is currently only limping along. Participants have the task to take responsibility as a General Manager and make all the decisions necessary to make it profitable again with the additional goal of increasing the number of employees, if possible.

This time, participants were managers from German and Indian companies. The Indian managers came from two different types of organizations. One was labelled "traditional Indian", old organizations from traditional industries that had not experienced much change over the last decades and were having strictly hierarchical internal structures. The other type of organization was called "modern Indian", young units in new industries with constant changes in technologies, operations, and markets and very flexible human resource management practices. The German managers came from organizations similar to the "modern Indian" ones.

This design promises interesting insights into the role of environmental factors ("predictability") as well as internal factors ("power distance") on the development of decision making styles. Managers from both types of Indian organizations were working in a (compared to the German situation) unpredictable economic and infrastructural environment but differed with respect to internal flexibility and power distance.

The results indeed yielded concise differences between these three groups. Table 2 shows the development of the company's cash balance over the first four quarters of operations.

Table 2.

CDD in the MANUTEX-game: Development of cash-balance over four quarters (mean values, standard deviations in parentheses).

Sample Group	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
Traditional Indian	786 (182)	492 (474)	283 (728)	179 (829)
Modern Indian	817 (108)	721 (308)	781 (438)	729 (404)
German	854 (113)	790 (239)	925 (333)	847 (403)

The participants from the traditional Indian group had to suffer constant losses, where as participants from the other two groups managed to roughly maintain the initial cash level. With respect to decision making behaviour, we counted pieces of information collected and decisions made. Table 3 shows these data, split up for different areas of decision making within this company (mean number of questions asked: "Q" and number of interventions made: "I").

Table 3

CDD in the MANUTEX-game: Distribution of questions and decisions.

Sample Group	Raw Materials		Manu- facturing		Marketing		Personnel		Acc.	Total	
	Q	I	Q	I	Q	I	Q	I	Q	Q	I
Trad. Indian	16	38	40	113	37	33	5	10	40	138	195
Modern Indian	23	45	51	119	49	26	13	12	49	186	203
German	16	24	45	59	50	25	17	8	43	173	117

Notes. Q: questions; I: information.

In Table 3 there are several interesting differences, for instance with respect to the comparative neglect of the personnel sector by the traditional Indian managers. Most prominent, however, is the pattern of results in *total number* of questions and decisions. Both, "modern Indian" and German participants collect more information than the "traditional Indian" ones, whereas both the Indian groups make much more decisions than the German participants. Overall, the "traditional Indian" managers seemed to be overtaxed by the problems of the Manutex. Although they made many decisions, these were poorly founded, not very integrated, and often missed the crucial points.

Since we already know that the "traditional Indian" managers fared worse with this decision-making task than the other groups, we can concentrate on the differences between "modern Indian" and German participants, who did about equally well. Why did the "modern Indian" participants make so many more decisions? An inspection of other

data reveals that there is a difference in decision making style. The German managers achieve their results with comparatively few but "strong" decisions. The "modern Indian" managers achieve their results with many small steps. Both, the "massive" German and the "incremental" Indian approach appear to be functional in the respective economic environments. When your environment is highly unpredictable it makes sense to start with some small steps, closely monitor the effects and then gradually increase decision making in those avenues that have proven reliable. In a predictable environment probable outcomes of decisions can be anticipated and there is less risk involved in making strong decisions.

Conclusions

From the data presented it appears as if the ways of complex decision making are indeed influenced by cultural factors. For one, it has been demonstrated that the specific combination of cognitive and behavioral activities that is required by complex decision making tasks does not come quasi naturally. It requires a specific expertise that has to be developed through exposure to different kinds of decisions from different domains. Culture plays a significant role in creating this exposure through, probably, value systems, familial socialization practices, and patterns of schooling.

Secondly, there are reasons to assume that there are culture-specific decision making styles that are developed according to the functional requirements of the environment. Differences in predictability (e.g., in economic accountability) should lead to differences in the decisiveness or "strength" of decisions. In some cultures - the Indian culture would be an example - we know that there are differences in predictability between various domains of life (between, for instance, public life and social life). It is a question open to further research to find out whether decision making differs between these domains, whether styles are indeed styles in the sense that they are trans-situationally constant, and which domain is, in the end, more influential. Cultural differences in power distance should work in a similar manner in shaping decision making styles. Large power distance could be related to cautious and defensive decision making whereas small power distance should work in the direction of risk-taking and assertiveness.

Some of this theorizing has to remain speculative for the time being. However, it is already clear that a purely cognitive perspective on decision making is incomplete. The processes at work in realistic and complex settings are culturally relative. It remains a task for future research to incorporate cultural factors into otherwise universal theories. Here, interactive computer simulations of complex and dynamic decision problems are a promising method. Although the instruments are complicated to handle and the protocols are sometimes difficult and tedious to evaluate, the results are worth the effort. Participants can be observed while dealing with a concrete and meaningful task. In almost all instances participants in the process quickly forget that they are working "only on a simulation", they get involved and show "real" behaviour, "real" decisions, and, often, "real" emotions and thus, in a way, allow a glimpse on culture "at work".

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Questions for Discussion

1. Is the distinction between small "one-shot-decisions" and big and complex decision making processes theoretically valid?
2. Would you be able to identify everyday examples for complex decision making situations?
3. To what extent is complex decision making a cognitive process, to what extent is it modulated by emotions and motivations (using a concrete example)?
4. How would you react to the statement "Culture is basically a super-individual decision making mechanism"?
5. Why are there cultural differences in exposure?
6. What are the advantages and disadvantages of computer simulations in cross-cultural research on decision making?
7. How could cultural factors be included in a theory on decision making that is based on the expectation - times - value - principle?