

The Implementation of a Large System Dynamics Model of Human Behavior

Michel Karsky, Stéphane Copin, Sonia Pitarch
KBS, 287 rue St Jacques, 75005, Paris
France

Abstract : A large model describing the dynamics of human motivation is currently being implemented as a Learning Environment. This implementation and the corresponding use of the model by young managers or future managers generates interest but also problems. Some of the reactions to this novel approach are described in this papers.

I - Introduction

At the 1990 International System Dynamics Conference in Boston, we described a model, called MODERE (MOTivation - DESire - RESults) which applied the S.D. approach to analyze and understand some of the dynamics of human behavior (1).

Since then, our work in this area has developed in three directions :

1 - a development of the model to include most of the known and relevant psycho-sociological theories of human behavior. The model as it now stands will be briefly described in section 2 of this article.

2 - the realization of a "gaming" simplified version of MODERE, which is being used and sold during seminars, courses and workshops in France.

3 - the preparation of a multimedia version of the complete model, destined to be experimented and later used in the Ecole Militaire de St Cyr, the French equivalent of West Point. In section 3, we shall describe how the model was shown and used with young officers and analyze some reactions of the audience.

In the last section of this paper, we shall describe the projected development of our tool, geared towards future managers, in a fashion that could be both amusing for most in the short term, and rewarding to some in the long term.

II - The Model MODERE

This model develops no new theory of motivation or human behavior. Its unique feature is to combine most of the relevant psycho-sociological theories developed in the last 50 years. It happens that, as in most descriptions of human reality, all the known theories concerning motivation can be described by means of feedback loops, and it is the presence of these loops which renders human behavior so complex to understand, analyze and forecast.

Here are the main theories most often used to describe human motivation, and which have been included in MODERE.

II - 1 - Hersberg's and Maslow's theory of **Satisfaction of Needs** (2, 3) which states that human beings act to satisfy their various needs (a negative feedback loop).

II - 2 - Girard's theory of **Mimetic Desire** (4) which introduces two main feedback loops with two "error signals" : a positive loop which could be described as : "the more we have, the more we want", and a negative feedback which corresponds to the following sentence : "the greedier we are, the less we dare be even more greedy", both loops being intertwined via two error signals comparing desire with the level of satisfaction already obtained, and individual desire with societal desire.

II - 3 - Lawler and Porter's theory of **Anticipation** (5) and Vroom's **Learning** theory (6) which describe through the introduction of two feedback loops, the human being's adaptive reaction to the promise of reward, the error signal resulting from a comparison between promise (the carrot) and reality.

II - 4 - Laborit's theory of **Frustration and Inhibition** (7), a positive, potentially implosive loop.

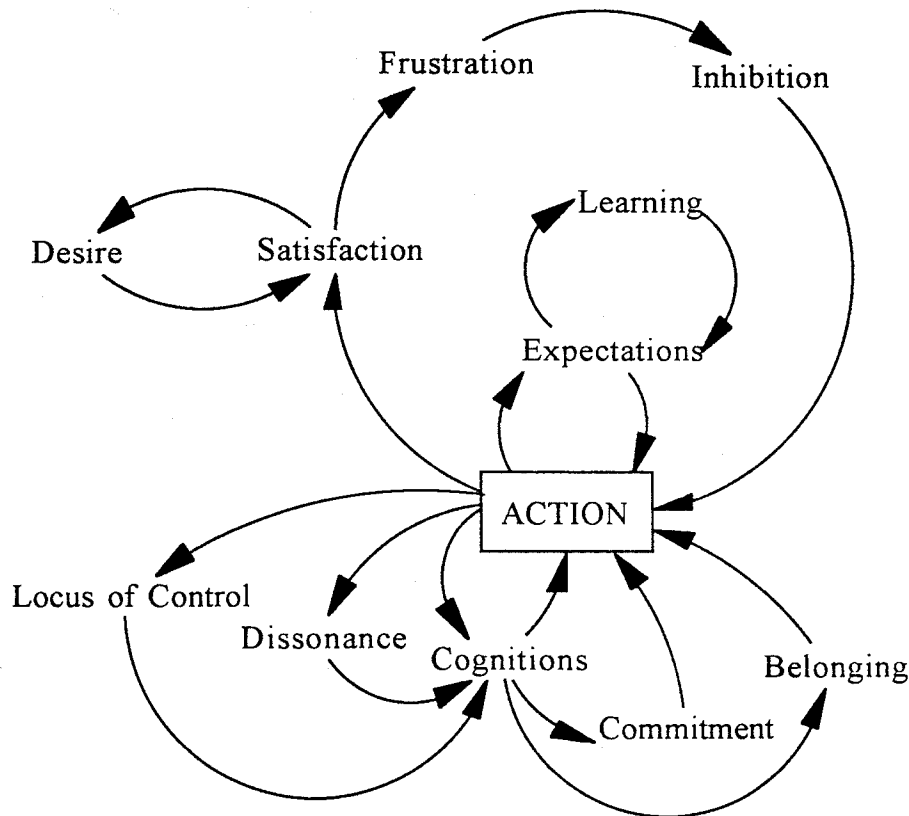
II - 5 - The **Commitment** theory (Beauvois and Joule, (8)) which explains, using the notion of opposition to undesired change, why more results can be obtained through progressive effort (commitment) than by a sudden step of high demand.

II - 6 - The theory of **Dissonance** (Beauvois and Joule, (8)), which introduces two main negative loops, one which tends to correct and modify one's understanding and acceptance of whatever action is being performed, the other which may lead us to oppose that same action (the two effects can occur more or less simultaneously, thus bringing us to oppose but also partially accept whatever action we are supposed to do or situation we find ourselves in).

II - 7 - The **Locus of Control** theory (Rotter,(9)) which describes the fact that success or failure can be ascribed either to oneself, thus either reinforcing one's own confidence and LOC (positive feedback loop) or allowing a better corrective action, or to totally external factors such as fate, God or gods, luck, etc..., thus opening the loop of "internality".

II - 10 - The theory of **Belonging** (Hirshman (10), Deonchy (11)) which describes, through numerous feedback loops, the feeling of belonging to a group (organization, company or firm, party, sect) which helps or hinders the acceptance of demands coming from that group or any other source.

A very general diagram of the model comes as follows :



III - The Use of MODERE within a Management Learning Context : The Army

MODERE is tentatively being introduced within St Cyr, the French officer's school (equivalent to West Point in the US) with several aims :

- Young officers are constantly confronted with problems linked with the management of people (soldiers). They do have courses in psychology and sociology, but professors realize that the corresponding knowledge remains static, hard to use and dry. Neither theory nor practice of the dynamics of motivation and management are taught.

- Young student officers are not very sensitive, *a priori*, to problems of motivation. The complexities of human behavior remain beyond their understanding and realm of interest. They could only be attracted to such complex problems needing complex analyses, through interactive games, amusing or exciting multimedia presentations, etc...

- On the other hand, young graduating officers are deeply worried by the situation they are soon to be confronted with, namely commanding experienced and much older sub-officers.

This makes them sensitive and much more amenable to the need to analyze the complexities of human motivation.

Hence we were asked to test reactions to our model and create a multimedia-type interface to MODERE, with numerous specific military examples which would help student-officers improve their understanding of the intricacies of human relations and develop their skills in dealing with complex management situations.

IV - The Experimentation

In order to develop the interface, we worked with a group of young officers who volunteered to experiment the use of the model and accepted the task of feeding back to us their remarks, criticisms and suggestions. To avoid the risk of an *a priori* rejection phenomenon, the testing population was chosen among officers having already two to four years of commanding experience, hence people who would be conscious of the complexities of human relations and readily listen to any attempt at helping to understand and explain these complexities.

A first phase consisted in describing the model, alternating theory and practical examples drawn from military life, showing and discussing with the audience what multimedia-type interface could be developed to help use the tool. At some point in the process, we passed along a questionnaire destined to evaluate the reactions to our analysis of the Dynamics of Motivation, independent of the amusing multimedia development and testing procedure. Here are the results, drawn from the answers given by the 39 participants.

QUESTIONS	Yes	No
1. Is our computer model (MODERE) easy to use ?	59 %	41 %
2. Do you feel you could use it alone ?	54 %	46 %
3. Do you generally use computers in your work ?	49 %	51 %
4. Do you have a computer at home ?	33 %	67 %
5. Do you think that analyzing a practical case by means of a simulator can be helpful for learning ?	59 %	41 %
6. Could this approach be useful to analyze the real case described ?	46 %	54 %
7. Is this approach sufficient to completely understand the daily problems of human management ?	13 %	87 %
8. Would the analyses of real cases always require the guidance and help of an officer knowledgeable in HR theories and practice ?	56 %	44 %
9. When facing a difficult management problem, would you try to use MODERE as a helping tool ?	18 %	82 %
10. Do you feel reluctant to use MODERE as a teaching tool ?	56 %	44 %
11. Do you think that such a tool could help to better understand the daily problems of management ?	33 %	67 %
12. Does the analysis of a real case, using MODERE, seem richer than a classical type of analysis ?	28 %	72 %

The officers seem to have understood the purpose of the model, but their reaction to its use within the officers school is not yet very positive. Computers and Human Relations do not mix well in people's head, the main cause of rejection being the worry about the machine replacing the human being, not only manually but also intellectually.

This corresponds to the fact, experimentally tested and recognized (12) that we tend to reject the idea that our attitudes and behaviors can be produced and represented through deterministic processes*.

* Note : The following experiment was performed : two groups are asked what is the role of the brain in producing and controlling every day actions and behaviors. To one group, a map of the brain is shown during the whole length of the test, while nothing is shown to the other group.

The role of the brain is considered more important by the group which was not faced with its biological description, thus idealizing its role and function with respect to human behavior.

In order to confirm the written reactions of the officers, we interviewed some of them. The two main ideas developed orally are as follows :

- a worry concerning the use of such a tool, but not a rejection of the tool itself.
- an apprehension as to the danger of oversimplification ("we (meaning I) are always more complex than can be described by a computer model"), the danger of loss of contact with reality (the monitor syndrome) and diminishing sense of criticism.

V - Future Developments

The interviews showed, on the other hand, that the majority of the officers who participated in the experiment, reacted positively to the proposed development of an easy-to-use software tool which would help them (and their future colleagues) understand the basic theories of motivation and their intricacies, and allow them to train themselves on real life cases drawn from every-day occurrences and experience. It was also felt that such training needed a tutor, an experienced member of the team (commanding officer) who could be a guide in the complex mesh of interacting theories, and help link theory and practice.

Let us insist on the fact that the proposed software, with its projected easy-to-use, multimedia-type gaming interface, is not so much aimed at playing scenarios as in facilitating the understanding of motivation mechanisms. Graphs, in any form, are not easy to grasp by people immersed in everyday petty management situations, and animation processes, films, visual help, etc...can enhance people's interest. On the other hand, it was felt by most participants that there is a danger of "playing scenarios for the sake of playing". Here again, the presence of a tutor, with the ever-present tutor-student relationship which involves fascination, power, fear, hope, frustration, is felt as very beneficiary and even indispensable to any learning process.

We are in the process of developing a Learning Environment which we hope will help develop the feeling and use of System Analysis in the particularly sensitive area of Human Relations, without distorting the understanding of its complex nature and numerous types of behavior.

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