

Mind as system of managing interests¹

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1. Introduction

Consciousness, or mind, looks like Janus a mythical person who has two faces. Computationally, it is a distributed system consisting of different "interests," which are interactive subsidiary goals, nevertheless being accompanied with a "self," the ego-centric subsystem of it, as such, being empowered, at least partly, to managing various cognitive activities and resources consumed by the activities.

The system occasionally needs to be coordinated especially when it is given a primal goal to seek. It may be compared to a political process of renegotiation and compromise among parties, for a bill to be cleared. For example, I am editing this article at this moment. I decided to write on the present theme, according to a rough, *ex ante*, plan of writing, and dealt with my manuscript. However, unexpectedly the work in progress gradually strays from my former plan, interrupts and affects me to revise it. I may either try to be temptation-proof and pre-commit my plan to pursue, or take changing more plastically and even abolish the previous goal.

The main problem can be summarized as follows: although those "interests" --- cognitive attentions with their emotional complements such as attractive goals, concerns to avoid, or other type of motivations--- are often distributed or even conflicting, the mind can itself governed as a unity under the meditative role of "interests"?

However, it derives several subsequent questions. What is a correct meaning of such self-referential system, with its computationally accurate realization, of the notion of "interest" in this context? If it can be defined, why they are scarce, and why they ought to be managed? How does a mind, via interests themselves, manage them coordinated as a whole effectively, though the rationality is limited, so as to keep the social life?

An economic-managerial metaphor used in the above statement can be applied to the internal architecture of a bounded rational agent. And it may be extended to the

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society-oriented one. In cognitive and decision sciences, and information management, such an approach is not quite new, I think, it nevertheless has not been explored formally, or appropriately up to now.

Herbert A. Simon a genuine precursor who suggested the mind in action is a system which manages scarce cognitive resources, “attention” (Simon, 1971).³ The recipients of information, who are, for example, managers in a business corporation, consume their relatively poor capacity of attention. Hence, efficient information resource management technologies, which filter irrelevant information, are needed in order to accomplish his or her mission.

Throughout this paper, the word attention assumed to be a synonym of interest, or interestingness, a cognitive-emotional factor. More precisely, a cognitive attention is paired with its emotional complement such as the attractive goal to achieve, the anxious concern to avoid, or the mixture of those motivations.

The aim of this paper is to provide answer to the above problem and the preceding questions about interests, by restricting our attention to a simplified model of decision maker with memory subsystem, and to introduce a cognitive modeling of bounded rationality to which the socio-economic metaphor applied.

2. Managing attention

At the time of the assertion was posed by Simon, it implied the managerial hierarchy, which is a human parallel computing network, as the relevance filter. However, thereafter such technologies mentioned above as RDB, DBMS, OLAP, and DWH, with communication network, have been developed and the modern business information (or intelligence) systems devised those as component technologies prevails thirty five years after that paper. These technologies use the stored structured business data to which the PC users submit query via groupware or other interfaces.

Since the later middle 1990's, in addition to the full-blown of corporate databases, the Internet and the Web have popularized, and vast unstructured information sources, mainly written in HTML, come to be accessible to every consumers as well as corporations. Today, people can not keep the Internet life today without the filters for e-mail and the search engine (such as Google, Yahoo) to allocate attention efficiently, as well as tools of security to protect against the threats. And the attention economy, so called by researchers inspired by the Simon's prophecy, has become a matter of the Web marketing.

³ After he pointed out, ordinary people, and even psychologists, have been mistakenly model a mind as an information consuming organ. See Miller (1983).

However, this paper will not argue further about such practical issues, because it strays from the main problem I stated in Section 1.

3. Bounded rationality

According to the bounded rationality hypothesis, any person who is faced a significant choice problem in real life, operating individually or organizationally, tends to fall short of ability to complete the task according to the prescription by the rational choice theory. In words, it is too much requirement to become a rational man as depicted in a textbook of economics.

Alternatively, under the bounded rationality modeling, behavior of the individual decision maker, or the organization, should be explained by *Satisficing* instead of *Maximization*, replacing the hypothesis of rationality, though it may be a somewhat deforming, in micro-economic analysis.

For the sake of clarity, I will simplify a problem of decision making, in order to clarify the notion of bounded rationality, as a 3-tuple (O, S, M), where O = (G, A, C), a constrained goal seeking regarding those components as follows: O, the objective of the decision maker, A, the set of possible alternatives, C, the constraints on the feasible solutions, S, the subjective (or satisficing) criteria which determine when the deliberation, which is a cognitive process of decision making and problem solving, terminates and outputs a final decision, and M, the memory (or mental space) which constrains operation of the cognitive process in decision making.

It may be said that the rational choice theory assumes rather simpler one where O is a given goal to seek, S equals the completion of O, and M is fully available without processing time. In slightly more general models, assuming that O, S, and M are given, i.e., time-invariant, are of optimization algorithms have been developed in management science, or operations research. A computational realization of it can be observed as what is called the 'Solver' an add-in of spreadsheet software familiar to businessperson.

Despite of the successes in industrial and management applications, most businesspersons or students are operating without the optimization tool. It is not because it is too complex that people do not use the tool. Rather people may have not been learned and familiar with how to operate and apply it to the real problem. The problem formulation is processed in, M, the memory space of a decision maker. When some components of (O, S) are seems to be time-varying and uncertain, a decision maker who troubled with dependency of those components cannot find either a compact formulation or the solution which can *satisfice* the goal.

4. Two types of interest

Now we turn our attention to three subsidiary questions about “interest” in Section 1. The literal meaning, or psychological interpretation, of a word “interest” is the feeling of wanting to know or to learn more about a substantive, or simply the attention or the attraction. This definition is rather a tautology, nevertheless suggests the stopping criteria of problem solving. Further, it answers, at least potentially, for the first subsidiary question I gave in Section 1, accompanied with the Simon’s metaphor of the mechanism of allocating attention.

As noted in the last section, most businesspeople will not use optimization technology, so they must be bounded rational, it seems not because the problem solving is computationally hard, just as a matter of “interest.”⁴

In fact, today the technique can be easily used with the software. But formulating a real business problem is not easy even for trained experts of operations research or management science (OR/MS). However, experts of OR/MS are strongly interested in such a task of modeling and solving real practical problems which may be bothering businesspeople.

Precisely, the complexity which binds rationality is not only the computational steps of a pre-selected algorithm. It should involve the cognitive process of formulation, in other word, the modeling of problematic situation to which a decision maker itself is embedded.

Now, the link of two cognitive processes should be clarified. Reasoning and interest. Let given a problem (O, S, M). *Reasoning* is a collection of cognitive activities realized in M accompanied with symbolic representations under a given goal to seek in O. *Interest* has two types. Interest *with respect to a goal* is a component of cognitive-emotional state regarding whether the goal, O, including the reasoning process, is achieved or not, when it expected to be. This first type of “interest” is of narrower sense. A simple example is question-and-answer pair. Hearing a question makes people impatient about waiting for appropriate answer. This may explain that why is annoying using cellular phone by a passenger heard in facilities of travel, while oral conversations may not.

The second type of “interest” is, to say, the *dual* variable of a constraint of the former, and is relating to the notion of trust which will be argued in next section. Interest *with respect to representation* is a component of cognitive-emotional state, which can work independently of the former type interest, or is just the degree of the independence,

⁴ Similar to other types of human reasoning it tends to be affected by cognitive representation and its availability. Other well known biases in decision making are loss aversion, decreasing sensitivity, mental accounting, etc.

regarding both whether the modeling is achieved or not, including *speculative*, hypothetical reasoning process when it expected to be. Stopping criteria, S, for reasoning in original problem can be affected by both types of interest.

5. Trust in cognitive process

On the other hand, in economics and finance, it means the extra monetary payment obligated/entitled to the borrower/investor. And an interest rate is synonym of a price of money at a moment. This second definition, maybe, confuses us further. However, using this we can connect the preceding Simon's metaphor with the former definition. That is, the *interest* motivates the hypothetical reasoning a *cognitive investment*, which produces a collection of cognitive representations (or symbols), which are not certainly contribute the final goal, ought to be gotten in when the goal promised is fulfilled, and the credit or the trust. Trust extends the upper limit of reasoning steps using unverified hypotheses, i.e., speculations. The interest as extra payment would be settled when the modeling successfully lead the solution, or even when the failure but turn out to be useful to a class of significant problems other than originally intended.

By the way, if the interest is provided unboundedly, this system would be in default as well as in real economy, and loose its control eventually. In social life, a promise which can not be fulfilled, which is called to be a lie or a betrayal, can be harmful to the mutual benefit so that people must learn to cheat-proof. Same mechanism may be embedded in our inner thought system to reach answer, in a permitted time perspective, in order to adaptively process information from the changing environment.

6. Conclusion

This paper concludes with the answer to the main problem stated in the introductory section affirmatively, if managing "interests" is sincerely implemented in our mind. In other words, the cognitive mechanism provides self-consciousness if *stable* in a sense of cheat-proof. Of course, this is only a conjecture, which I'm interested in, which is ought to be explored in future research.

References

- Simon, H. A. (1971): "Designing Organizations for an Information-Rich World," In M. Greenberger (ed.), *Computers, Communications, and the Public Interest*, The Johns Hopkins University Press, pp. 40-41.
- George A. (1983): "Informavores," In F. Machlup and U. Mansfield (eds.), *The Study of Information: Interdisciplinary Messages*, pp. 111-113, Wiley.