

**Beauty as a Measurement of Performance:  
An Introduction to the Calculus of Predispositions**

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**Abstract**

Such seemingly unlike problems as the evaluation of a position in chess, the nonclassical analysis of the behavior of corporations, the concept of perception of art works elaborated by G. Birkhoff, etc. reveal that all of these cases lend themselves to the same formal treatment as calculus of predispositions.

The major thrust of this calculus is to bring out the degree of development via the weight function whose value is the degree of beauty. This function involves the material parameters, weighted by unconditional evaluations, and in addition relational parameters as independent variables with corresponding subjective evaluations.

**1. Some examples from economics, chess, and art**

Let us first examine some of the examples dealing with evaluation of results in various areas of human endeavor.

The first example has to do with chess. The development of chess theory led to the appearance of the positional style towards the end of the 19th century. Prior to that the combinatorial style was predominant, characterized by finding a limited, clearly formulated goal, usually the gain of material, and then elaborating a program for its accomplishment. The

accomplishment of this goal practically guaranteed a win in the whole game. The positional style was characterized, above all, by the formation of the best possible position under circumstances where one cannot tell specifically how the game will proceed later on. The positional style does not abolish the combinatorial one, it merely anticipates it.

The computerization of chess has substantially advanced the game's positional style in the sense of formalizing it. The honors doubtless belong to Claude Shannon.

According to Shannon [2], the weight function  $f$  for some chess position  $P$  could look as follows:

$$f(P)=200(K-K')+9(Q-Q')+5(R-R')+3(B-B'+N-N')-.5(D-D'+S-S'+I-I')+1(M-M')+...$$

where

$K, Q, R, B, N, P$  are White's extant kings, queens, bishops, knights, and pawns;

$D, S, I$  - doubled, backward, and isolated White pawns;

$M$  - White's mobility (measured, for example, by the number of legal moves available to White pieces).

The said letters with a sign ' refer to Black pieces.

The coefficients 200, 9, 5, 3 are the widely accepted valuations of relevant chess pieces; the coefficients .5 and .1 are the rough-and-ready valuations of positional parameters proposed by Shannon.

Shannon's formula can be represented as a linear polynomial function

$$M=C+O,$$

where

$C$  - the product of the quantitative differences of the material parameters  $K, Q, R, B, N, P$  of each player, and the evaluations of these pieces;

$O$  - the product of the quantitative differences in the positional parameters  $D, S, I, M$  of each player, and the evaluations of these parameters.

It is immediately noticeable that the independent variables of the weight function of a chess position are the same essential (in this case material) parameters and parameters of relations (in this case positional parameters) as we previously observed in the evaluation of a firm.

This sort of isomorphism in the evaluation of a firm's position and a chess position should hardly be surprising if one were to consider that in both situations we are dealing with what is in some sense a game situation under conditions of breaks between its initial state and its future (or past) development.

Of enormous interest from the general methodological perspective is the fact that chess is, apparently, precisely the only area where there has been any success in vividly revealing the necessity of unconditional evaluations for material parameters and to *analytically* construct them [3]. As for the search of positional parameters and their evaluations, its results reflect to a large extent the creative experience of a given player. These evaluations are constructed subjectively, since it is of extreme importance just who will be realizing the examined position. This does not exclude their statistical study as an auxiliary means.

The next example is from the area of economics, particularly a firm; this could equally be applied to a branch of industry or the economy in general. According to the classical theory, the estimate of the behavior of a firm is based on profit (in probabilistic terms of mathematical expectations of profit). The notion of the impossibility of completely tying in the present state of the firm with its future supposes that there are no complete (conditional) prices on the basis of which profit could be measured at any given point in the remote future. In this case a more complex procedure has to be resorted to for the evaluation of the state of the firm. First of all, the value of the output and expenses is calculated in unconditional prices and then they are subtracted from each other. Then one takes into consideration as independent variables the parameters of relations with the corresponding evaluations. These parameters are equally relevant to the production put out by the firm (for example, the firm's share of the market, the completeness of the manufactured set of products, etc.) and the resources consumed by the firm

(for example, the correlation of vertical and integral integration in the firm). As for the evaluations of the parameters of relations, they can be either positive or negative.

Hence the formula for evaluating the firm's predisposition to development is:

$$M=C+O$$

where

M - the measure of the firm's predisposition,

C - the difference between the values of expenses and output,

O - the value of the parameters of relations.

In its turn,

$$C=I-E,$$

where

I - benefits from material parameters,

E - costs of material parameters.

In its turn,

$$I=SP_M,$$

where

S - the vector of outputs,

$P_M$  - the vector of unconditional prices on products/resources.

$$E=I P_M,$$

where

I -vector of inputs

$H_M$  - the vector of unconditional prices on products/resources.

$$O= R P_R,$$

where

R - the vector of relational parameters associated

$P_R$  - the vector of valuations of relational parameters (with positive and negative components).

This formula becomes realistic under the assumption that we use prices on the *turnpike*, the path of which is determined only by existing technologies and does not depend on initial or terminal conditions. The values of relational parameters — on the basis of subjective notions in using corresponding statistical studies as control data (for example, according to the model PIMS [1]). The conclusion about the firm's competitiveness can be arrived at by comparing the estimate of its position with the suitable estimates of other firms.

Things are less familiar with the weight function measuring the beauty of a work of art. The honor of constructing it belongs to the well known American mathematician George Birkhoff. His fundamental work in this area was published in 1933 [4]. In subsequent years this book provoked great interest, expressed not merely through corresponding theoretical studies but also through attempts at an experimental verification of theses advanced in the book [5].

Birkhoff's formula for the aesthetic measure  $M$  is a function of two variables,  $C$ -complexity, and  $O$ -order.

Here is how he clarifies these measures:

"The typical aesthetic experience may be regarded as compounded of three successive phases: (1) a preliminary effort of attention, which is necessary for the act of perception, and which increases in proportion to what we shall call the complexity ( $C$ ) of the object; (2) the feeling of value or aesthetic measure ( $M$ ) which rewards this effort; and finally (3) a realization that the object is characterized by a certain harmony, symmetry, or order ( $O$ ), more or less concealed, which seems necessary to the aesthetic effect." [4]

To illustrate his ideas Birkhoff uses the example of a convex polygonal tile. The measure of its complexity is determined by the number of its sides; the measure of order - by such parameters as repetition, similarity, contrast, equality, symmetry, balance, and sequence.

Formally, Birkhoff's variables look as follows:

$$C = ra + sb + tc + \dots,$$

where

a,b,c - indices of tension of adjustments A,B,C ( that take place r,s,t times) which the nervous system must perform for the essential parameters to be perceived. These indices have a negative sign because perception here is impossible without sustained interest.

$$O=ul+vm+wn+...$$

where

l,m,n - indices of tone of feelings that correspond to different types of associations L,M,N repeated u,v,w times. Feelings could be positive, negative, or indifferent. Ambiguity, undue repetition, and unnecessary imperfection produce clearly negative feelings.

The aesthetic measure M is a ratio of the above two variables O and C:

$$M=O|C$$

While on the whole I have high esteem for Birkhoff's approach to the construction of a criterion of aesthetic measurement, I would like to offer some comments on this criterion. First of all, concerning the general appearance of Birkhoff's formula for aesthetic measurements. Some authors disagreed with this formula and held that the expression

$$M= OxC$$

is more appropriate for the measurement of a degree of aesthetic value.[6] These critical considerations were primarily founded on disagreement with Birkhoff's implicit notion that simplicity defines human perception.

Personally I would like to add that if one were to follow the form of criterion suggested by Birkhoff, it might turn out that a more complex and more organized object will possess the same degree of aestheticism as a more simple and correspondingly equally well organized one.

And now concerning the evaluations of parameters of complexity and order that are part of the formula of aesthetic measurement. According to Birkhoff, all the complexity parameters have a negative valuation, whereas order parameters can be either positive or negative. In principle, the more aesthetically evolved an object the less it will possess negative parameters of complexity. I tend to the view that both kinds of parameters, to be perceived as information signals, require an

expenditure of nervous energy, and these expenditures could have a negative sign. Having passed through our nervous system, however, these signals agitate the nervous centers that could produce both positive and negative emotions.

But, needless to say, the issue is not in the outward analogy and isomorphousness of mathematical formalisms which join together the weight functions in economics, chess, and aesthetics. The homogeneity of a mathematical formalism only serves as a pretext for pronouncing a hypothesis on the homogeneity of phenomena concealed behind them.\*

Below I will attempt to demonstrate why calculating predispositions can be essentially considered aesthetic measurement aimed at clarification of the object's degree of beauty. Naturally, this does not exclude the particularities of calculating the beauty of artworks, in nature, and in systems artificially created by people. Thus, calculating the beauty of artworks according to Birkhoff is based on *direct, immediate* clarification of level of excitation of our nervous system, i.e. the excitation of those structures which apparently store the information of value of the elements which form images or perhaps of the simplest Gestalts.\*\* The difficulty of aesthetic measurement of artifacts was apparently related, above all, to the fact that it required the construction of its own value system demanding new axiological principles. This is why, in my estimation, aesthetic measurements are so scantily developed in many areas of human activity where it is *impossible to directly* access fundamentally profound values.

## 2. Essence of the aesthetic method

Before proceeding on to the examination of the essence of the aesthetic method I would like to state the following two propositions.

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\* Just that sort of phenomenon took place in the 19th century when James Maxwell, on the basis of the discovered homogeneity of differential equations describing electrical, magnetic, and light waves demonstrated their common nature.

\*\* The evolution of Wassily Kandinsky (1866-1944), founder of abstract painting, reveals the artist's striving to discover certain aggregation in previously discovered basic elements. It was expressed in Gestalts possessing the simplest biological forms. It was precisely the search for these that characterized the last, Parisian period of the great painter's life.

The first proposition concerns the scope of the aesthetic method. Traditionally, this method has been applied to artworks, and it is with regard to them that it has been most fully developed. Still, this does not preclude its application to other objects, both natural and man-made. This wider application, however, has been quite unsystematic and desultory. Thus, a mathematician can talk about the beauty of a theorem's proof, a physicist — about the beauty of a constructed physical theory, etc., but in doing so they will characterize this beauty sharply and, moreover, in terms which in turn have to be defined, for example elegance. The beauty of nature or human behavior is characterized by much the same approach. Hence, my first proposition: the aesthetic method, under appropriate conditions, can be just as effective in analyzing any object in any field as it is in dealing with artworks.

The second proposition concerns the subject who uses the aesthetic method. Commonly, it is thought to be a prerogative of Man and, sometimes, of highly intelligent animals insofar as they are capable of producing art. That's why scholars have tried to locate the stable psychological and physiological bases of this method. Individual human valuations, of course, have not thereby been ruled out.\*\*\*

I think that any interacting objects capable of aesthetic perception ( and any object of the system so endowed can act as a subject), in any field, can use this method while by-passing human involvement. Man still has to be there, of course, to analyze what's going on. But there is a big difference between man's direct aesthetic interaction with an object and the objects aesthetic interactions between themselves. Admittedly, the aesthetic method is present in interactions between developing cells, in the formation of seemingly counterproductive intermediate genotypical and phenotypical structures, in the interactions of some particles.

Thus, my second proposition comes down to the notion that although people produce aesthetic measurements as well as all other sorts of measurements, I contend that along with the given gnoseology there is also an ontological aspect, i.e. the aesthetic method is used in various

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\*\*\* The latter statement acquired particular significance after the discovery of emotions as special physiological structures of the brain; earlier, emotions were considered only a psychological phenomenon, i.e. a product of the activity of the brain's other physiological structures. Needless to say, emotions should be distinguished from evaluations on the basis of which an individual ultimately arrives at decisions. In forming the latter, many other conditions are taken into account.



systems in the sense that in the process of functioning of these systems the interacting objects themselves produce the measurements of aesthetic nature.

To sum up, I see the aesthetic method as a general systems' phenomenon that can, under appropriate conditions, be applied to any interacting objects in any field.

In order to somewhat better comprehend the essence of the aesthetic method it is apparently relevant to clarify its place in the multitude of other methods of cognition.

It may be supposed that these methods of cognition are located in the spectrum related to the measure of objectivity. Hence I conceive that the place of the aesthetic method in the tree of knowledge can be approached from the viewpoint of the measure of objectivization of the process of creation (perception) of objects. Operationally, a method is objective if its results are reproducible, if it can be used by any qualified subject to generate similar effects from a similar set of initial conditions. Objectivity, being a matter of degree, can in principle be conceived as a continuum. But this continuum can have several "phases."

I will point out three such phase transitions from the viewpoint of difference in the methods of their realization. They correspond with the methods of *directing*, *potentiating*, and *programming*, introduced in the beginning of this book. Two such phase transitions are known — they are *belief*, to which corresponds the method of *directing*, and the *scientific method*, to which corresponds the method of *programming*. Correspondingly, in one extreme case the process is entirely subjective, while in another it is completely objective.

Indeed, within the framework of *belief* it is impossible to discover the truth or falsity of perception. Matters of belief play an important role particularly in decision-making in the area of scientific-technological innovations. Evaluations of such innovations are only partial since their side effects are unknown. Moreover, the more radical the innovation the greater our ignorance of its implications and the greater the role of beliefs in its evaluation. For instance, the choice between an extrovert and an introvert course of development, i.e. to have technological progress or not, is in the end an act of belief for neither can be proved superior to the other.

It is no accident that with such a selection available, the pluralistic method is effective, characterized as it is, above all, by maintaining, expanding, and developing variety.

In summary we could say, regarding the objectivity of the decisions, that the role of the belief factor gains with the innovativeness and radicalism of the idea.

The scientific method works in those situations where the path between the system's present and future states can be fully and consistently "described", at least probabilistically. This relation can be set up in an analytic form (in a form of a law) - as a production function, for instance, or in the form of an algorithm of the functioning of the system, balancing its input and output ingredients and the forces corresponding to them. But in all cases the probabilistic form, based on the discovery of frequencies, requires enormous information. And what is to be done with *unique* situations which are so crucial to creative businessmen?

Of interest here are the intermediary cases in the spectrum of objectivity and the special methods of action corresponding to them. At least one of such intermediary cases is specifically tied in with the *aesthetic method*.

The aesthetic method, in this scheme of things, is relevant to situations where at least the direction of the system's development has been selected, but because the path from the present state of the system to some future "desired" one cannot be fully and consistently "described". In this case creation of the system's *potential* is called for.

Potential is a system's *predisposition* to development. This approach is different from the probabilistic one which deals, albeit in terms of *frequencies*, with *fully objective* connections between the present and future states of the system.

A potential forms a structure aimed at:

1) inducing the events in the environment in which the system is immersed to the system's advantage,

2) preparing the system to channel unexpected outcomes in a way that is favorable to the system, and

3) absorbing or reducing the shocks of unexpected events harmful to the system. Hence the correspondence of the *aesthetic* method to the method of *potentiating*.

Such understanding of potential is also relevant for arriving at an evaluation of *unique* situations since it does not require knowledge of probability of use in the past of analogous situations.

For operationalization of the aesthetic method I find it appropriate to first of all measure the degree of aestheticism through a function of two arguments: measure of *complexity* and measure of *order*. The value of this function I will call *beautropy*, analogous to *entropy* but using the English word *beauty* in its stem. In a couple of paragraphs the reader will realize the reasons for which I included the word *beauty* in the suggested term. The formation of potential can be realized through *reactive* and *selective* methods. In this case the reactive method is expressed in the formation of a certain set of rules which allow the transition of the system from one state to another. However, these rules are sufficiently independent and at the same time incomplete/contradictory. The category of *harmony* reflects the formation of such a set of rules and, if possible, their accordance with decreasing incompleteness/contradictoriness.

When selective methods are used, there is an ongoing selection of predispositions to development through a *scalar* magnitude joining together various bases defining the force of the potential.

Potential-building rests on the following four elements:

- 1) essential parameters as independent parameters;
- 2) unconditional valuations of essential parameters;
- 3) relational parameters as independent variables;
- 4) valuations of relational parameters.

All these four elements make up the weight function which measures the power of the potential as a scalar quantity.

What is new about this approach is that it introduces, on one hand, unconditional valuations for essential parameters, and, on the other, relational parameters as independent

variables. It is precisely the incompleteness/ inconsistency of the links between the present and the future states that necessitates bringing in some unconditional valuations of essential parameters and augmenting them with appropriate valuations of relational parameters. In this sense the relational parameters also become *directing* parameters. Then, if I correctly understood the corresponding tenet of Eastern philosophy, one may treat relational parameters as "causes without energy".

If instead we were to measure the potential scientifically, we would have to come up with conditional (may be even probabilistic) valuations for essential parameters, i.e., a kind of valuations that take account of present conditions. Since these valuations, like the Lagrange's multipliers, would consistently, fully and economically reflect all the information about the environment, they could, under certain conditions, be sufficient to establish the unique connection between the given state and the environment.

Measuring the potential, it seems, is akin to forming the category of *beauty*. Beauty is something that enables us, however incompletely and inconsistently, to determine the influence that the present state of development has on future progress. In this sense the development of beauty is the striving towards the creation of *completed* (in the sense of maximum possible accomplished balance) *incompleteness* (in the sense of creating conditions for future development and disposal of dead ends).

Such a notion of beauty is quite parallel to its philosophical definitions.

Thus, Immanuel Kant wrote,

"Beauty is a form of worth of an object, which is appreciated without any idea of a goal." [7, p.240].

Expanding on this idea of Kant, Georg Hegel noted,

"Beauty consists in a visible realization of a unified corporeal appearance in its rest and motion and does not depend either on the object's utilitarian worth or on isolated accidental autonomous motion." [8, p.134].

This idea seems to be intuitively sound reasonable because beauty, without being a full and complete program for achieving desired ends, is still an ordered structure that creates predisposition to development.

The striving to find components, on which the potential is built, as well as the methods of their synthesis is none other than a rather ambitious attempt to demonstrate that the category of beauty can be represented structurally, i.e. it can be dismembered and synthesized.

The need for metamodels is dictated by the imperfections of the existing methods of evaluating the position of the system. Since we do not know if the available relational parameters are sufficient to produce an estimate, a good metamodel should first suggest ways of generating new parameters of this kind. From the above examples we can see that these relational parameters have been based on nothing more than unsystematic empirical observations. I do not know of any deductive theory for generating them. A more traditional task of metamodels is to help make the existing positional parameters more precise. In this sense, it resembles a common learning model, according to which a metamodel is used for making adjustments in the behavioral model as new data accumulate.

Finally, I want to note that the overall evaluation of a system's potential must be *subjective* because of the fact that the evaluation itself is inseparable from the operator who is to realize this potential. The above does not exclude the possibility of certain individual parameters being evaluated objectively using the analytic method. In particular, it would be reasonable to assume that unconditional valuations of material parameters can be largely objectivized. Subjectivity appears with the introduction of a multitude of positional parameters and their valuations. The benefits of a statistical analysis of positional parameters may lie in enhancing the operator's "understanding" of parameters significant to the evaluation of the system's potential. This is not to say that that his analysis should be limited to the above set, for he could elaborate new parameters based on the operator's perception of the situation.

Everything that has been said regarding the aesthetic method is not meant to exclude either the scientific or the belief method but rather to limit the scope of their applicability forcing them to squeeze and make room for the third approach.

### 3.Applications to Economics

In order to help the reader appraise the importance of this sort of new outlook, I will resort to statements concerning the role of the aesthetic method in the economy by one of the patriarches in this area. I am talking about Russell Ackoff.

As Ackoff notes, the role of the aesthetic method in the economy is quite great. Following in the footsteps of Ancient Greek philosophers, Ackoff includes the creation of *beauty* as an aesthetic function of society among the four conditions — along with *truth*, *plenty*, and *good* — necessary and in tandem sufficient for a person's advancement on the path to omnipotence.[9].

"This function requires more extended treatment because it is the least understood and, I believe, currently the most critical of the four. The mystery associated with aesthetics is reflected in the fact that throughout history very few systemic philosophers have been able to incorporate it in their philosophies. Of the few who have, the results have been more like appendices to their philosophies than integral parts of them. On the other hand, very few of those who have been preoccupied with aesthetics have made a significant contribution to our understanding of science, economics, ethics, or morality. Historically, aesthetics has been the black sheep of the philosophical family.

This disconnectedness of aesthetics is reflected in the fact that managers have some idea of what the science, economics, and the ethics or morality of management mean, but they often have no idea what the aesthetics of management means. It has long been assumed that aesthetics and management have little to do with each other." [9,p.39]

Ackoff sees *beauty* as people's ability to stimulate new desires and spur on the striving to seek their satisfaction. [9]. Continuing to develop his views on the subject, Ackoff ties them in with the problem of goal and means, both in the sense of formation of infinite goals which always leave to people the path of search and in the sense of value of means independent from the goal.

In connection with this, Ackoff cites certain examples illustrating the role of the aesthetic method in the management of corporations.

"The importance of style in corporate life is obvious. For example, three executives who wanted to diversify the company they owned in order to be challenged more and to become more involved in their business which pretty well ran itself. In their words, they wanted "to get more fun out of it." Fun is a matter of aesthetics and recreation, not science, economics, ethics, or morality.

Another example: a major corporation's profits have been suffering recently because of its commitment to producing only the highest quality products in the field. Its cost of materials is now inflating more rapidly than are its competitors', but it refuses to adulterate its products or abbreviate the processes by which they are made.

Degrading its products would significantly reduce the satisfaction that the managers derive from their work and their pride in the company. This too is a matter of aesthetics.

Finally, there are two separate districts of the Federal Reserve banking system that have exactly the same functions. Nevertheless, they differ significantly in the way they are organized and carry out their functions. The atmospheres in these two banks are very different. The differences cannot be explained in scientific, economic, or ethical-moral terms; they are aesthetic, or stylistic, in character." [9, p.42]

As for the aesthetic measurements of the quality of life by analytical means, Ackoff sees enormous difficulties down this path. Therefore, he suggests realizing this measurement through the participation of people in the management process, thus tying in his approach to management with the idea of participatory planning\*\*\*\*[9, p.44-45].

Thus, on the whole Ackoff's attitude to the aesthetic method remains within the framework of the classical paradigm which ties in the aesthetic method with the perception of beauty by people through their emotional mechanism. But even within the framework of such an approach, the value of which is indubitable, I conceive that it is missing an extremely important link dealing with the enrichment of a worker's intuition by analytical vision of the beauty of the system s/he manages. This vision does not deny a final evaluation by people of their own activity through the emotional mechanism, on the contrary, it can greatly enhance it.

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\*\*\*\* I find this sort of look at methods of aesthetic measurement quite profound.

An analogous phenomenon took place in the economy with respect to the measurement of usefulness of benefits. The difficulties confronted by planners in Soviet-type centralized planning systems consisted precisely of the fact that they could not measure the usefulness of benefits. At the same time life demanded it relentlessly, because for one reason or another prices had to be introduced into the economic mechanism. It would be simplistic to attribute the devotion of many Soviet economists to Marxism to just their naivete and corresponding ideological delusions. The labor cost theory as the core of Marxist teaching was very dear to these economists also because it created the illusion of clear and sufficiently easy measurability of value of benefits, so important to a planner. It seemed incongruous to accept the categories of extremal usefulness because it was unclear how they could be measured.

From this point of view one may, like Ackoff, examine the market as a mechanism where, through the participation of producers and consumers there is an ongoing process of measurement of usefulness of benefits.

See a more detailed account of this in my work [10].



So then what practical consequences in the area of economics stem from the comprehension of the aesthetic method examined in this book? I will cite some of these.

In a macroeconomic analysis the use of an aesthetic method allows to solve the problem of measuring economical dynamics in a different manner, separating the search for pace of economic growth from the measurement of economical development. In those cases when there is a possibility of constructing chain indices, essentially it is a matter of measuring the growth of the economy. Otherwise, one should seek the pace of development using the technology of calculating predispositions. Considering the role of the growth index in a macroeconomical analysis there is hardly any need to prove the importance of realizing the bounds of its utilization. An analogous situation is taking place with regard to measuring the growth of development of various countries which should be calculated through the discovery of their predispositions — potentials. The currently existing methodology of comparison of levels of development of countries used by the United Nations, in particular, for setting the dues of member countries is based on the levels of GNP measured in the prices of a base country???. And this even though the index depends on the selection of the prices of the base country! Needless to say, the calculation of levels of development through setting equivalents in the value of these countries' currencies does not change the essence of the indicated difficulties since either way one has to select a set of products common to all countries.

On the level of firms, the aesthetic method allows to enhance the intuition of firms' managers by providing a certain procedure for arriving at an evaluation of material parameters and the paths of formation of relational parameters and their evaluations. Much of what managers have been doing anyway will receive conceptual clarification with all the corresponding consequences.

Above all, the comprehension of the aesthetic method allows to dismember the methods of strategic and tactical planning, keeping in mind the conventionality of these terms. The aesthetic method is closer to strategic planning, the scientific method — to tactical planning. One of the mistakes of the departments of strategic planning has been in the fact that the plans elaborated by

them came down to compiling a program, i.e. attempts to predict the future of the firm through a complete relation of initial and future states. Programs of this sort produced by line managers for the headquarters of a firm shackled the initiative of the latter. Hence, it is no accident that some American firms liquidated strategic planning departments and made planners subordinate to line managers.

Comprehension of the aesthetic method provides an opportunity to more clearly distinguish the differences between the types of workers suitable for upper management in firms where there is more calculation of predispositions and the lower-level managers who are required to possess greater knowledge of concrete methods of action and who lean towards the scientific methods. At the same time, comprehension of the aesthetic method by the latter allows them to better understand the requirements of upper management. It is a sort of a *tunnel effect*, where managers of different levels move towards each other. This is particularly important during adoption of complex solutions by managers of a higher level. In this case it is often difficult for them to explicitly present a solution they adopted mostly intuitively to lower-level managers in terms to which they can relate.

Thus, the aesthetic method allows to more clearly formulate the need for subjectivity. Indeed, on the one hand strategic thinking demands subjectivity, while on the other hand managers (unlike private owners) must, for the most part, objectivize all serious decisions. In this situation managers have to either abandon the strategic decisions or tailor their objective calculations to fit them. In all cases, stemming from the conditions which engender the aesthetic method, it becomes clear that it is necessary to create the conditions under which the method will be utilized rather than just seeking new ways of objectivization of solutions. This note is becoming particularly important in view of the development of computers which produce the illusion of the possibility of obtaining all-encompassing objective information, as well as the appearance on the market of the PIMS model, examined in §3 of chapter 11, which claims to produce information on the objective value of relational parameters, as well. (There is hardly any need to prove the enormous role of computers and the PIMS model as means *assisting* firms' managers in adopting

decisions. One leader of a major American firm said after my lecture on the aesthetic method that this method grants him *license for subjectivity*.

To an equal extent, everything said up to now lays the methodological foundation for the firms' setting of prices for the sale of its own or purchase of someone else's business — a commodity whose role on the market is growing by leaps and bounds. It is well known that it is insufficient to set the price of a business on the basis of the balance data of the firm's own capital or the price of its stocks. The holistic effect of purchasing a firm as a whole can be grasped through the aesthetic method.

Finally, one may note that the comprehension of the aesthetic method will possibly require a reconstruction of the system of professional business college education. At the present time, the business school applicant selection process puts a tremendous focus on knowledge of mathematical methods requiring, for the most part, the development of the left brain. Meanwhile, to a great extent the thinking of firm managers requires development of the right brain which is apparently predominantly responsible for the aesthetic method. Elimination of applicants with a more developed right brain will possibly deprive firms of future talented managers. I find worthy of discussion the issue of relevance of maintaining at business schools two groups with different curricula depending on the students' predisposition to the aesthetic or scientific method of thinking.

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