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ABSTRACT

For centuries, many scientists, many disciplines focused on how people make decisions. These approaches tend to be incompatible, if not orthogonal most case. In this article we attempt to give guidelines to a modeling approach, that will allow the description of a human "state vector", which can be the basis for many decision making algorithms.

First we will introduce a categorization of the things that determine the decisions of the individuals, and describe their characteristics and trade. Since the trade of things in separate groups is done in different fashion, they form groups on different grounds. These groups, formed by interaction among individuals, adhere to governing ethics – which serve the purpose of defining the rules of exchange where these have not been explicitly stated. And finally, we take a look how the two dominant ethics, the Commercial and the Guardian dominate the Teacher.

KEY WORDS

CLASSIFICATION

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MOTIVATION

The validity of every theory depends on the used axioms and the introduced concepts. Our investigation in this field was started by a mathematical model of a micro- and macroeconomic synthesis, that tried to take the physical realities – namely the laws of thermodynamics – into consideration [1]. In that model, the decision making entities (humans and corporations) focused on material goods and services. This approach – although it supplied a large number of beautiful answers – prevented the modeled individuals to perform many activities, since they were sorely focused on material wealth.

In order to expand that theory, we introduce five empirical facts, and create a model that takes these into consideration. Our postulates are:

(i) a human cannot live without consuming material goods,

(ii) material goods cannot be created out of thin air, only produced from other goods and natural resources,

(iii) the process of production is always a real, material process, but it is the human who decides which process to choose. The human decides, which realized possibility can come to be,

(iv) we always choose, what we perceive as "best",

(v) everybody wants to be happy.

The fifth, last axiom seems to be a triviality, but we state this as the fundamental rule of human decision making. In this, we accept Aristotle's view about happiness: everybody strives to be happy [2]. Without going into details about happiness, or fully accepting the "justice, health and fulfillment of desires" conceptualization, we believe that there is strong evidence suggesting that there is a strong correlation between happiness and the existence of attainable desires.

In the following, we focus on well-being, that we define as the relationship between the desired and realized goals. This well-being is different from the "utility" of economics, since it contains all subjective, emotional and material capital, and the expectations about the future, too. Although both happiness and well-being depend on the individual, they have a portion that can be objectively observed. In order to be able to use this terminology in a scientific discussion, we introduce the quantifiable factors of well-being.

FACTORS OF WEALTH

In order to easily describe the quantifiable aspects of well-being, we break the term down into discrete groups. First let's see what we understand under the whole term, and then we will introduce the like-behaving components.

DEFINITION OF REAL WEALTH

For the sake of this discussion, we define the *real wealth* as **internal factors that determine, how an individual feels**, how she experiences the state of the world. In this view, "real wealth" is equivalent of a kind of "human state vector"; it is something that describes the physical, physiological, social and intellectual "possessions" of an individual – and thus it becomes the present component of well-being: real wealth and expectations together is the well-being of a person. This definition coincides with the old conceptualization of wealth: somebody can be "rich" not only because she has a lot of material possessions, but also

because she has many friends, or knows a lot ("only what you know is truly yours"), is beautiful or healthy.

The definition is, of course, self-serving, since we are concerned about the factors that determine the decisions of an individual. It is our empirical experience, when people make a decision, at the time of the decision they choose what is "best" for them. We do not claim to know all the factors that come into play, but we do attempt to give lifelike categories, groups of factors that are alike in behavior.

These factors all enable the individual to change the world – but also through these factors the world changes the individual. The definition allows us to avoid the inherent causality problem here. The internal part in the definition relates to the changing of the world: even if all factors of wealth remain the same for the individual, the changing of the world will change the way she feels, yet her human state remained the same. At this point, she can make decisions, can choose to reallocate the components of her wealth into a portfolio that makes her feel better. In essence, these factors are *the basis for human decision making*.

These factors have two common properties. One is, that they all can be accumulated in some fashion, the other is, that they all have some kind of natural deterioration. We also use the assumption, that these factors are measured in a zero-based ratio scale, and typically a higher value in one of the components of the state factor ceteris paribus means, that the individual is "better off".

FACTORS OF REAL WEALTH

To determine the components of this "real wealth" all we need to do is conduct a thought experiment: which factors of a person's life can be changed so that she will experience a change in her perceived real wealth? We define four groups as the factors of wealth. These are the material, the physiological, the human and the knowledge factors.

The material factors are the easiest to comprehend: they contain all material items an individual possesses (X), plus all the accumulated money (M) they own. These goods are alike, since they are governed by the like physical rules, they exist in material form. The difference between the two types is that money can be created (that is how banks do it, the artificiality about the creation of the money is it's boundary, not the creation itself)[1]. They both deteriorate: normal goods through usage (food is consumed, a car is worn out, houses need repairs etc.), while money through inflation[2].

The physiological factors (P) contain all the intrinsic abilities and attributes of a given individual (for example strength, agility, reasoning ability, general health, body size, looks, etc.). These factors are easily perceptible from the material factors, since they cannot be traded for. Physiological factors can only be created, and on the market one can only purchase services, that enable or help one to create or improve these (gym passes, beauty salons, even plastic surgery). The natural deterioration is also present here: fitness has to be kept up, beauty is eaten away by the years, intelligence fades if one does not use one's brain, etc.

The human resources (H) are very much like the physiological factors, in the sense that they cannot be purchased. They contain all the inter-human interactions and social networks an individual has, her friends, family, acquaintances; in some case clan or gang membership, belongingness to a minority group, etc. These factors are either given, or changeable by the individual through social interaction (going to parties to meet people, talking to the friendly storekeeper, attending schools or conferences, or lately increasingly, taking part in Internet phenomena such as creating a MySpace page, submitting YouTube videos or engaging in a virtual world like World of Warcraft or Second Life). These resources decrease with time,

and have to be kept up through direct action. Friends need to be humored, clans need to be honored and gangs have to be satisfied to be considered part of the human factors of wealth.

The last factor is knowledge (K), or more precisely, transferable knowledge[3]. It is different from intelligence, which, as earlier shown, is part of P, and it has to do with the accumulated information the individual has. Its deterioration is also automatic: people forget.

BALANCE EQUATIONS

We can use balance equations to describe the trading, exchanging or changing the various factors of wealth. Each equation pair will describe how the stock of a certain factor changes for both parties in the exchange. We will use the values X, M, P, H and K to describe the stock of factors, the parameter will show the time dependence (where "t" is for the state before the transaction, and "$t + 1$" is afterwards), and the lower index denotes the individual (in most cases, the transfer is in the direction of A $\rightarrow$ B). These equations show the basic difference between the three main groups, the material (X, M), the personal (P, H) and knowledge (K) types.

MATERIAL FACTORS

Trading material goods is a zero-sum game: what one gains the other one looses. If we denote with X the amount of material good a person has (lower index differentiates between the individuals), then the transfer of S amount of material good can be described in the following form:

$$X_A(t + 1) = X_A(t) - S, \quad X_B(t + 1) = X_B(t) + S. \tag{1}$$

Usually such exchanges have a counterpart, since in this example "A" lost S amount of goods, while "B" gained the same S amount. In the real life there is usually an inverse process, the payment, where B transfers some amount of money to A (M denoting the amount of money each participant has before and after the transaction):

$$M_A(t + 1) = M_A(t) - Y, \quad M_B(t + 1) = M_B(t) + Y. \tag{2}$$

So in other words, A sold S amount of goods to B for Y amount of money[4].

PHYSIOLOGICAL FACTORS

As mentioned earlier, neither physiological, nor human resources can be created. This means, that the person selling healthcare products or operating a fitness salon does not loose "healthiness" or fitness by doing so; although she has to invest material resources, she does not loose the factor that is the primary in the exchange. So when A sells some healthcare services for B, it will register as a loss for A in X, and a gain for B in P, while a reverse monetary transaction follows. In the example below, A sold S amount of healthcare services for Y to B, who gained Q amounts of "health" due to this transfer:

$$X_A(t + 1) = X_A(t) - S, \quad P_B(t + 1) = P_B(t) + Q, \tag{3}$$

$$M_A(t + 1) = M_A(t) - Y, \quad M_B(t + 1) = M_B(t) + Y. \tag{4}$$

In reality, equation (3) depicts the sale of a service. To keep the balance equation clean, this can be broken up to two steps: first there is the transfer of the service (5, S amounts of material goods get exchanged), that gets used up immediately (6, nearly the same time – hence the epsilon term – as 5, B uses up the S amount of healthcare services to produce Q amount of health):

$$X_A(t + 1) = X_A(t) - S, \quad X_B(t + 1) = X_B(t) + S, \tag{5}$$

$$X_B(t + 1 + \varepsilon) = X_B(t + 1) - S, \quad P_B(t + 1 + \varepsilon) = P_B(t + 1) + Q, \tag{6}$$

$$M_A(t + 1) = M_A(t) - Y, M_B(t + 1) = M_B(t) + Y. \tag{7}$$

So in essence, A is spending some of her resources to create a service for B, who purchases S amount of it for Y money. Since B has no way of actually "storing" a service, it is immediately used by B to produce Q amounts of P for herself. This shows that there is no trading for P, there is only trading for the material good that allows the self-creation of P.

The reverse of this transaction is not a reverse in the balance equation. Taking away P from someone (administering physical punishment, for example) is a sorely destructive process: the attacker does not gain what he takes away from the target. If A attacks B and does S amounts of harm to her, then the balance equation would be:

$$P_A(t + 1) = P_A(t), P_B(t + 1) = P_B(t) - S. \tag{8}$$

HUMAN FACTORS

Describing human resources is a rather complex problem. The best approach would probably be through using some kind of graph-based approach, where the nodes are the individuals, and the weights on the directed edges would describe the strength of a relationship. In this approach, there would be multiple ways of enhancing the real wealth in H: one could strengthen a pre-existing relationship (transform an acquaintance to a friendship, thus increasing the weight on a certain edge), make new acquaintances (build up new links to other nodes), or try to use the existing social capital to increase the value of her current social network (using the graph-theoretic description, enhancing the weight of an edge between one of her "children" and her "children"). This field is rather new and expands exponentially, and going into even this much detail is usually unnecessary for us. Our concern is mainly that the human relations can be "measured" in some kind of way, and this can be described in a ratio scale.

Human resources work similarly to the physiological components of real wealth, but have slightly different balance equations. When social networks develop, they develop for both parties; when A gets to know B, B also gets to know A. So building social networks, increasing H is not only a positive sum game, but is also a win-win game. If H denotes the amount of human resources an individual has, the lower index differentiates among individuals and the parameter shows the differentiation according to time, then the following events describe, that A meets B in an event, where the attendance cost is Y_A for A, Y_B for B:

$$H_A(t + 1) = H_A(t) + T_A, H_B(t + 1) = H_B(t) - T_B, \tag{9}$$

$$M_A(t + 1) = M_A(t) - Y_A, M_B(t + 1) = M_B(t) - Y_B. \tag{10}$$

Note, that A and B gain different amount of human resources by meeting each other (A gained T_A, while B gained T_B), since they do not necessarily experience the other one equally pleasant or useful[8].

The reverse of this process, when someone takes away social state from another individual, is usually another negative process. It can happen in three distinct ways. If B manages to turn some friends against A through befriending them, then it is a loss-win scenario:

$$H_A(t + 1) = H_A(t) - S, H_B(t + 1) = H_B(t) + S. \tag{11}$$

Another possibility is, that while B tries to befriend and turn some friends of A's against A, she only partially succeeds, resulting in a loss-null scenario:

$$H_A(t + 1) = H_A(t) - S, H_B(t + 1) = H_B(t). \tag{12}$$

The last option is when the decrease in human resource is a one-sided aggressive act. An example for this could be, when B decides to kill a friend or acquaintance of A. In this case A would loose some (in the example, S) amount of social wealth, but at the same time – if B's role becomes common knowledge among A's (or S's) friends, B looses some (in the following example, Q) amount of social capital, getting into a loss-loss scenario:

$$H_A(t + 1) = H_A(t) - S, H_B(t + 1) = H_B(t) - Q. \tag{13}$$

KNOWLEDGE

Knowledge is the traditional win-win scenario. Knowledge can be gained through teaching, and teaching is a process through which the teacher does not loose the information she gives out – and in most cases she has a chance to refine her knowledge by passing it on. In case the student pays the teacher, there is a monetary aspect of it, too, but this is not really necessary. In the following example, K denotes knowledge, the lower index denotes the individual (here A is the teacher, B is the student), S is the amount of knowledge gained for each participant, and Y is the (optional) payment:

$$K_A(t + 1) = K_A(t) + S_A, K_B(t + 1) = K_B(t) + S_B, \tag{14}$$

$$M_A(t + 1) = M_A(t) - Y, M_B(t + 1) = M_B(t) + Y. \tag{15}$$

Of course, in this case we do not know about the relationship of S_A and S_B (either of them can be larger), but the positive feedback is definitely present here.

Taking away knowledge is usually a disruptive process Most of the time it involves lying (for example, a conman might do this, or some social systems base their workings on intensive misinformation). This, however, does not necessarily mean that the originator believes the misinformation:

$$K_A(t + 1) = K_A(t), K_B(t + 1) = K_B(t) - S. \tag{16}$$

It is easy to see the resemblance of (16) to that of (8).

GROUP FORMATION

For the purposes of our investigation, a **group** is a **set of individuals, among whom certain activities are more common, than the same activity with non-members**. This definition does not require the group to be formal, or even the emergence of group interest.

As already discussed, the different factors are traded in different ways, and these ways have different balance equations. Using the definition above, these trades define groups among the individuals – and the structure of these groups differ just as much as the trades themselves. For example, the relationship among a convenience store worker and the customers is different than the relationship between club members, or between teacher and students.

The trade of material goods is strictly businesslike, both parties are in there for mutual material gain, so they form *trading groups*. Since these interactions are governed by self-interest, individuality is emphasized, and no group interest emerges. The group forming force is reliability and trustworthiness: buyers will frequent a seller only if the seller offers something the other traders can not. This explains why some customers knowingly do not shop at the cheapest place: they are willing to pay premium price for the service they trust. These groups are ad-hoc, time and place determined.

The development of human resources focuses on interpersonal relationships, both parties are in it for mutual benefit and protection, thus they form "*acquaintance groups*", friendships, clubs, gangs, etc. In this case, the individual becomes part of a more formalized community, where group interest appears, and individuality becomes (at least partially) subjected to the group. The group forming force here is belongingness: the feeling of being part of a greater community itself is what keeps the group together. These groups tend to partition the social space: most of the time an individual can only belong to one of them (good example for this are gangs, religions, home owners' associations, labor unions).

The student-teacher relationships are the true win-win scenarios, where both participants benefit from enhanced knowledge. This, alongside with mind-seeding, leads to the formation of "*schools*" where like-thinking people develop and further their own field. The group forming force here is the common knowledge, the paradigm, which means, that these schools are hierarchical, just like the set of paradigms that define them. For example, a scientist might, at the same time, be a teacher, an economist, and a post-Keynesian, and her interactions with others belonging to other groups is what defines her group-belongingness for the given interaction (for the monetarist, he is a post-Keynesian, for the anthropologist he is an economist, and for the layman he is a scientist[6]).

GOVERNING ETHICS

In her 1993 book, Jane Jacobs [3] introduces two distinct "modes" of human behavior. One she called the Guardian, the other the Commercial, and she basically stated, that while these modes have conflicting values, they each are good for solving certain problems. Chris Phoenix, [4], building on her work, defines ethics as "the rules of behavior that are applied to a person by a system or institution they participate in". While that definition is accurate enough, we would like to focus on the fact that these ethics are the set of rules that govern the terms of an exchange in the parts where the exchange is incomplete.

The various kinds of groups introduced in the previous chapter conform to different ethics. The **Commercial** ethic, which governs the trade of the material goods, focuses on maximum profitability, total economic efficiency, and thus forces the production process of goods and services to be most efficient[7]. It speaks for individualism, hails selfishness, idealizes innovation but shuns away from force. As the pioneering economist Adam Smith said: "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest." [5].

The **Guardian** ethic focuses on the protection of "our own", avoiding losses and damage to the "group". This is basically the opposite of the Commercial ethic, it's ideal is the self-sacrificing person, living for the group. The Guardian ethic is not worried about efficiency, instead about equality, safety, the preservation of the existing order. Instead of innovation, it focuses on tradition and morals, and is not shy to use force for the protection of the group. "Because just as good morals, if they are to be maintained, have need of the laws, so the laws, if they are to be observed, have need of good morals." [6].

To complete the set, Phoenix introduced what he called the ethics of Information. He based this ethic on the win-win scenario that he called "infinite sum" games, where the source of the information benefits from others possessing it. We argue, that this kind of behavior is not new, it has always been the basis of *knowledge*. We call this the **Teacher** ethic, where the focus is on knowledge and the dissemination of knowledge (thus it incorporates both the teaching and the researching aspect), the morals idealize intelligence and smarts, and it shuns away from both force and commercialism.

This last ethic is different since it governs a process with what the economists call *growing marginal utility*: the more one knows, the more questions one has, and the desire to know more just keeps growing. Parallel to this is the fact, that the balance equation of knowledge describes the ideal win-win scenario, so in essence this is a "utilitarian perpetum mobile": those abiding by the teacher ethic can infinitely generate real wealth among each other. Of course, those outside the ethic only experience the end result and not the process itself, but it is important to remember, that most research and education aims to understand the world, *not* to create something with an exact real world application.

SOCIAL NORMS AND GOVERNING ETHICS

A central theme in Jacobs' book is, that an ethic can only fulfill certain roles, and when it tries to do otherwise, that is usually a failure. An apt example is communism, where the guardian ethic was supposed to govern trade; its spectacular failure easily stresses her point. On the other end, when the Commercial ethic is allowed to take on roles normally reserved for the Guardian (for example, American corporation-managed towns), similar anomalies appear. Mixing the two ethics usually lead to what Jacobs called "monstrous moral hybrids", like the Mafia or a bribable government, which can be just as disastrous as the misuse of ethics.

Taking this into consideration, the prevalent and global problem of education is easier to understand. As we have shown, trading knowledge abides by a very unique balance equation, thus it forms its own, hierarchical groups. But the natural ways to interact within those groups do not conform to either the Commercial or Guardian ethics, they define their own ethic, the Teacher ethic. Despite this, today's education is usually forced to abide by the rules of some other form of ethics. In the communist countries, the prevalent Guardian ethic dominated scholarly work, which prevented the publication of scientific results in western magazines, thus blocking the dissemination and its positive effects. In the current capitalistic world governed by the Commercial ethics knowledge is made to be a product through the use of copyright laws and trademarks. Both of these ethics prevent the positive feedback knowledge needs to thrive.

ACKNOWLEDGMENT

REMARKS

[1]The limit to the creation of money through the fractional-reserve banking practice is the reserve ratio. This can either be determined externally, like in most countries, or left for the banks themselves to decide, like in Great Britain. This topic is thoroughly discussed in [7].

[2]The debate about the role and necessity of inflation is still undecided. For more about this issue, among others see [8 – 10].

[3]There are some skills that incorporate both a transferable knowledge content (K), and a non-transferable, internal content (P). Example to these could be most sports, notably dancing, where some rudimentary knowledge can be taught, but the actual ability depends on personal practice, that cannot be transferred among individuals.

[4]It is easy to see, that trades of this kind are zero-sum games (or, including transaction costs, negative-sum games) in a purely accounting sense. However in a utilitarian sense, trade is a win-win scenario, since both parties feel, that what they got in the trade is of more value for them than what they paid – otherwise the trade would not take place.

[5]In a purely theoretical sense, if the entire social network of both individuals would immediately be available to the other person, then instead of (9) the expression

$$H_A(t + 1) = H_A(t) + H_B(t) \backslash H_A(t); \; H_B(t + 1) = H_B(t) + H_A(t) \backslash H_B(t)$$

would be true. This assumption, however, is highly unrealistic, and would only allow the social networks to be described in a partitioned space, thus $H_B(t) \backslash H_A(t) \equiv H_A(t) \backslash H_B(t) \equiv \varnothing$. We do not make this assumption.

[6]Pithagoras' followers were known to dress different than common people, wanting to strengthen the "group belongingness" this way.

[7]There are a number of clues which seem to indicate, that the governing ethic of the financial corporations and large multinational entities differ from the "standard" Merchant ethic. Further

research is needed to discern whether this "capitalistic" ethic is indeed separate, or just a form of the Merchant.

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BOGATSTVO, GRUPE, ETIKA

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SAŽETAK

Stoljećima, fokus mnogih znanstvenika i mnogih disciplina je kako ljudi donose odluke. Pristupi su nesukladni, ako ne i suprotni u većini slučajeva. U ovom radu nastojimo dati smjernice pristupa modeliranja koji će omogućiti opis ljudskog „vektora stanja", kao temelja mnogih algoritama donošenja odluka.

Kao prvo uvodimo kategorizaciju stvari koje utječu na odluke pojedinaca i opisujemo njihove značajke i razmjenu. Razmjena stvari u različitim grupama odvija se na različite načine, zbog čega su i same grupe nastale na različitim temeljima. Te grupe, ostvarene međudjelovanjem između pojedinaca, vezane su uz vodeću etiku – čija svrha je definiranje pravila razmjene u slučajevima u kojima ona nisu jasno iskazana. Naposljetku, razmatramo kako dvije dominantne etike; komercijalna i etika zaštitnika, nadvladavaju etiku učitelja.

KLJUČNE RIJEČI

etika, komercijalna etika, etika zaštitnika, vektor stanja