Formalised Synthetic Modelling of Subject – Object Relations

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Abstract
The linguistic subject-object relation is the most crucial key in understanding the function of nature because it is intricately related to the human intellect and it is always used in modelling even though we might not be conscious of this role. Hence, this paper presents a novel approach to some very popular fundamental elementary scientific models in the context of the subject-object relation. The advantage of this approach is illustrated by a novel interpretation of selected perplexing scientific issues such as the equivalence of mass and energy, the uncertainty principle and the dual aspect of matter. In addition, a crucial application to social sciences is demonstrated through our description of a democratic process based on the real "essence" of democracy rather than that which is focused on the way of its realisation.
Keywords: subject-object relation, elementary modelling, social systems and processes

1 Introduction

The role of language in sciences is crucial since language, thought and reality are intricately related [Wittgenstein, 1961]. The key to this concept lies in the structure of the conditional sentence because it is one of the most important and universal models of any phenomenon or system [Turkiewicz and Turkiewicz, 2002]. The central element of this sentence is the indicative sentence as it contains the subject-object relation, which determines the elementary and synthetic manner of occurrence of all activities and changes in nature. The subject-object relation exists between all elements, systems and phenomena. Hence, it creates an unlimited set of relations, which can alter gradually from a very rigid and destructive form into a flexible and independent one. We refer to this changeable characteristic as rigidity of systems and processes, which means that a system or a process is more rigid if its characteristics or behaviours are harder to change.

The trait of rigidity of systems or processes is a very important characteristic as it determines their abilities to be altered. On the one hand, rigidity contributes to the preservation of individual traits of systems, and on the other hand, it limits their adaptation to internal or external changes. Human knowledge and understanding of this characteristic is essential to enable effective and anticipatory steering of systems, which always involves a pre-emptive preparation of appropriate ways and means to elicit changes.

Human observations of various phenomena typically involve the perception of changes in the values of parameters of these events over a period of time. As the result, these changes represent monotonic or cyclical processes of increases and/or decreases, which we usually refer to as processes of growth or simply growth. Mathematically, growth is determined by any theoretical or empirical function q(t) of changes 'q' in relation to time 't'. The most important parameter of growth is its rate as expressed by Δq, Δt, dq and dt

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($dq/dt=\lim\Delta q/\Delta t$ if $\Delta t\to 0$). In physics, the function q(t) is also called intensity of changes or intensity of forces if 'q' represents force 'F'. For example, intensity $v=dx/dt$ of changing distance 'x' is called velocity and $p=dF/ds$ is called pressure, where 's' is surface area [Sussman et al, 2001]. The time-based method of modelling of processes, however, does not address the causality of changes. This is because time is an abstract element synthesising all changes and coexisting with the human intellect only. This aspect of time is clearly evident from our earlier analysis of the structure of the conditional sentence [Turkiewicz and Turkiewicz, 2002].

Assuming that the abstract notion of force 'F' is a model of any system characterised by a subject trait, which causes changes 'q' of the parameter 'p' of another system characterised by an object trait, we can define that, for continuous processes, rigidity or durability of the object-system towards acting force 'F' is the expression $IR_F=dF/dq_p$, which is a derivative. On the other hand, the expression $IR_q=dq_p/dF$ denotes rigidity or permanence (intensity) of the process of changes 'q_p'. When rigidity of a system $IR_F=dF/dq_p$ is appropriately large or $IR_q=dq_p/dF$ is small, we regard this system as a relatively solid object or a particle. Whereas when $IR_F=dF/dq_p$ is appropriately small or $IR_q=dq_p/dF$ is great, then this system represents a process or a flow. When rigidity equals zero, force 'F' and changes 'q' are independent of each other. In addition, it should be also noted that the parameters 'F' and 'q' represent a quantitative measurement of forces and changes and that rigidity is generally represented as the ratio of rates of any two parameters, which can be force, energy, power, distance, mass, velocity, acceleration and many others.

In reality, all complex systems act towards other systems or surroundings with various types of forces and this results in changes of their appropriate parameters. Hence, every system differs with respect to rigidity of its parameters. Because this paper analyses only the main ideas of rigidity, therefore, we will restrict our analysis to continuous functions and the parameters 'F' and 'q' as elements of one-dimensional space of real numbers (p=constant).

The above-presented mathematical definition of rigidity of the subject-object relation demonstrates a crucial characteristic of duality in the function of nature that is created by durability of relatively solid objects, as expressed by rigidity dF/dq, and by permanence of changes or processes, as expressed by rigidity dq/dF. In these expressions, 'q' is the model of changes and thus has the role of a subject. This duality indicates that for any system with velocity of its changes appropriately close to zero, we are usually not able to perceive its changes, and hence, we perceive its durability. Conversely, when the elements of a system change or move with velocity of light in a vacuum, 'c', we are unable to perceive the trait of durability of this system as a solid object, but we can only perceive the trait of permanence of continuous changes. This characteristic explains the problem of equivalency of matter and energy and is the basis for our interpretation of the principle of uncertainty and of the dual aspect of matter given below. This following interpretation is particularly simple and logical in comparison to another well-known interpretation, which incorporates an additional unknown dimension of matter.

In the context of language, all objects, changes as well as their characteristics are modelled with relatively solid informational objects in the form of words. Because language underlies every method of modelling, therefore it is not uncommon that shortened and/or illogically assigned material traits are given to informational objects and/or informational traits to material objects. For example, energy is usually understood as a specific 'material fluid' and some physicists consider subatomic particles as vibration of 'pure' energy, although it can only be said for certain that energy is an extensive characteristic of the subject-object relation or a specific measurement or model of activity of matter. Clearly, in many instances, the above-mentioned interactions between informational models and reality do not influence the quality of modelling. However, in the case of duality of matter, this has led to the unnecessary conclusion that there exists an additional unidentified dimension of matter.

If matter changes or moves with velocity of light, 'c', then this process cannot be characterised by traits belonging to a relatively solid object of matter. Hence, this is an ideal continuous process, which can be treated, however, as a relatively solid material object through the use of an informational model. It is evident then, that since subatomic particles move with velocity close to that of light and that they are observed only indirectly through models, therefore the results of these observations reflect the type of models used and can be discrete or continuous. Also, depending on their velocity, the particles will be characterised by stronger solid material traits if their velocity is appropriately less than 'c' and by stronger continuous process traits if their velocity is appropriately closer to 'c'. Consequently, such particles cannot be entirely described by the parameters used for modelling of relatively solid objects. This has necessitated the development of visual models of the probability patterns of particle trajectories [Liboff, 2003]. These patterns reflect a limited space of motion of particles discussed further in part 3 of this paper.

In summary then, the function of the human intellect is so strongly influenced by language that modelling and interpretation of the ideal or near continuous processes encounters difficult obstacles. Nevertheless, as the result of this powerful influence, sciences cannot escape from searching for the linguistically fundamental 'subject-object' relations or correlations as for example in physics, in the studies of minute particles of matter characterised by a very short period of existence.

2 Elementary Monotonic and Continuous Functions of Rigidity of Systems

In terms of physics, rigidity of the subject-object relation that we define as the derivative of the functions F(q) and q(F), depends on the property of a system, which we synthetically refer to as resistance or force of resistance. Because this force not only acts against changes, but also to make changes, therefore it has the same nature as the positively or negatively acting force 'F', and hence it can be omitted without influencing the quality of models. Nevertheless, it is generally advantageous to include this force of resistance in the process of interpretation of models. In this context, the following three elementary types of rigidity of systems and processes can be distinguished:

1. constant and/or independent of the magnitude of acting forces or occurring changes,
2. variable proportionally to the magnitude of acting forces or occurring changes,
3. variable inversely proportionally to the magnitude of acting forces or occurring changes.

These types of rigidity can be expressed in the form of the following monotonic functions or differential equations of the first order:

1. $IR_\alpha = dF/dq = \alpha$,
2. $IR_\beta = dF/dq = \beta F$ or $IR_\beta = dF/dq = \beta q$,
3. $IR_\gamma = dF/dq = \gamma/F$ or $IR_\gamma = dF/dq = \gamma/q$,

where α, β and γ are the constant coefficients and they are real numbers. Force 'F' and change 'q' can represent a subject or an object in the subject-object relation depending on their relative activities or the value of rigidity. In our further analysis, the above expressions can be transformed by integration into the following functional relations of forces and changes:

1. $F = F_0 \pm \alpha q$,
2. $F = F_0 e^{\pm \beta q}$ or $q = q_0 \pm \ln F$ or $F = F_0 \pm \beta q^2/2$,
3. $F = \sqrt{(F_0 \pm 2\gamma q)}$ or $F = F_0 \pm \sqrt{(2\gamma q)}$ or $q = q_0 \pm F^2/(2\gamma)$ or $F = F_0 \pm \gamma \ln q$ or $q = q_0 e^{\pm F/\gamma}$.

Depending on the type of phenomena, these basic monotonic subject-object relations can be variously interpreted, as for example using force to make changes, making changes to create force or creating one type of changes to elicit others. In addition, the positive and negative values of changes and forces strictly correlate with the popular measurement or assessment of social occurrences, which uses the scales of 'right and wrong' and/or 'yes and no'.

Besides the functions F(q), q(F), and rigidity, the other important trait of the subject-object relation is energy. The synthetic and elementary model of this property is the following result of $E = W = \mathbf{F} \circ \mathbf{q}$, where the space of the vectors '**F**' and '**q**' is multi-dimensional and $dE = dW = dFdq$. In this relation, 'F' and 'q' are the scalar values of vectors '**F**' and '**q**', which act in the same direction. Hence, energy, as the parameter of the subject-object relation, is $E = \iint dFdq$, where 'F' and 'q' belong to the intervals determined by the appropriate limits F_1, F_2 and q_1, q_2. For example, for the subject-object relation characterised by rigidity $dF/dq = \alpha$, its energy is $E = E_0 + \alpha q^2/2$ or $E = E_0 + F^2/2\alpha$ [Sussman et al, 2001], however for rigidity $dF/dq = \gamma/q$, its energy is $E = E_0 + q(C + \ln|q|)$. Also, momentum $dp = dmdv$ is a similar characteristic to energy or it can be regarded as its reduced or specific form. Therefore, in this context, energy is an extensive characteristic of and rigidity is an intensive one of the subject-object relation.

The presented monotonic functions of rigidity can be divided into two types. The first one is characterised by negative constants α, β and γ and the second one by positive ones. Figure 1 illustrates the basic characteristics of systems $F = f(q)$ whose α, β and γ are negative ($\alpha, \beta, \gamma < 0$). These systems also correspond to the characteristics of $q = f(F)$ where $\alpha, \beta, \gamma > 0$. Such systems have the ability to make changes easily because they decrease their resistance towards changes as they occur. Hence, they are called processes and flows. Considering these processes in the context of positive-negative assessment, negative changes form self-destructive processes, as for example ageing and degradation. Whereas, for positive changes, these systems facilitate the processes of positive growth. An additional important characteristic of these processes is that as they develop beyond their initiation stage, the systems' inside tension or pressure decreases. Fuels are a typical example here. In general, it is accepted that fuels have great energetic density, which allows a spontaneous release of energy once ignition is successful. Other examples include spontaneous disintegration (decay) of radioactive isotopes as expressed by the function $N=N_0e^{-\lambda t}$, whose structure is identical with $F=F_0e^{-\beta q}$ [Liboff, 2003]. In economics, the functions of demand have also the same character. The most general and important trait of this characteristic is that its course is similar to some extent to the course of the function of conservation of energy (E=Fq=constant) as shown on Figure 4.

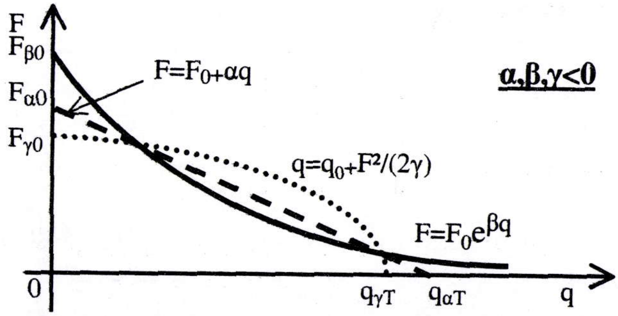

Figure 1: Examples of elementary functions of force 'F' in relation to changes 'q' characterised by $\alpha,\beta,\gamma<0$

Figure 2 represents examples of systems F=f(q) whose α, β and γ are positive ($\alpha,\beta,\gamma>0$) or q=f(F), whose $\alpha,\beta,\gamma<0$. For these systems to preserve their identity and/or existence, it is crucial to maintain appropriately small changes. This can be achieved by increasing resistance against forces acting upon them and against changes. Therefore, such behaviour of systems is associated with an increase in the internal and/or external tension or pressure. An appropriate increase in tension represents the means of development of violent changes and eventual destruction of a system. These influences can be avoided for example by isolation. In comparison to the earlier-discussed characteristics, their course is opposite to the course of the function of conservation of energy.

These properties lead to the conclusion that the systems analysed in Figure 2 form appropriate mechanisms of transforming their elementary characteristics of rigidity in relation to changes in the magnitude of acting forces and of occurring changes. The points A, B, C, D and E are examples of the central points of fuzzy intervals where transformations of characteristics of rigidity occur. For example, physics distinguishes proportional, elastic and plastic regions. Once an appropriately great force, F_{max}, acts on a certain system, its characteristic of $\alpha,\beta,\gamma>0$ is transformed into a characteristic of $\alpha,\beta,\gamma<0$ (system's resistance starts to decrease) and this leads to its weakening or destruction. The conceptual points of transformation of the positive characteristics into the negative ones are called in physics stress breaking points and they are marked by B, D and E in Figure 2. In the context of social changes, we can refer to them as turning points.

If the effects of changes at these points are positive we often regard them as lucky or fortunate changes but if they are negative then they are usually considered as terroristic in nature.

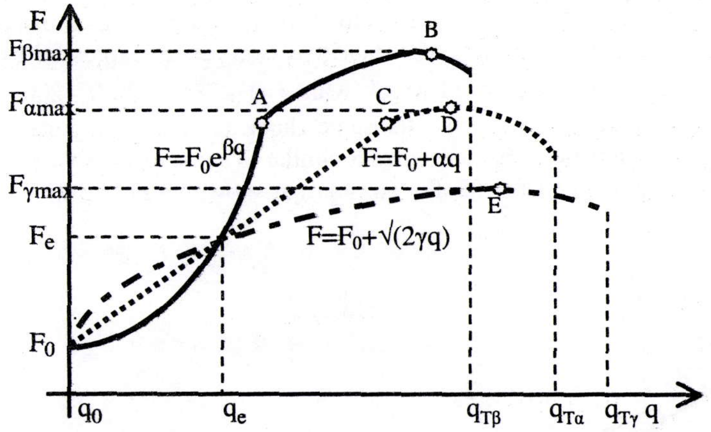

Figure 2: Examples of characteristics of systems, which must maintain relatively small changes to preserve their identity and/or existence

A special case is the function of proportional changes $F=F_0+\alpha q$, which was used by Newton to formulate the second law of motion. When we assume that $F_0=F(0)=0$, $\alpha=m$ (mass), $dq=dv=a=constant$ (acceleration), we obtain $dF/dv=m$ and $F=ma$. In this analysed mechanical subject-object relation, mechanical rigidity (dF/dv) of motion is constant and equals mass 'm', which is interpreted as inertia creating resistance against acceleration or deceleration, whereas its energy is described by the expression $E=\int\int dFdq=\int\int mdvdv=E_0+mv^2/2$ [Sussman et al, 2001]. In the case when a particle has mass 'm' and moves with velocity of light in a vacuum, c=constant, energy of the subject-object relation is $E=\int cd(mc)=mc^2$ for $m\in\{0,m\}$. In addition to the presented fundamental mechanical relations, the function of constant rigidity ($dF/dq=\alpha$ or $dq/dF=\alpha$) is very widely applied across sciences and its examples include Hook's law, Ohm's law, linear and thermal expansivity, special cases of supply and demand functions and many others.

In the context of social phenomena, the behaviours of individual people, organisations and societies that follow the characteristics of $F=F_0+\alpha q$, $F=F_0e^{\gamma q}$, $F=F_0+\beta q^2/2$ or $F=F_0+\sqrt{(2\gamma q)}$, where $\alpha,\beta,\gamma>0$, are very common because there are numerous social forces, which mutually weaken and destroy each other as well as create resistance against such activities. For example, when a person perceives impending negative changes, he usually mobilises his forces to oppose them. This process can represent a competition between two people, systems or between a system and its surroundings. However, the development of competition through continuous and mutual escalation of acting and resisting forces as well as of all types of tension leads to terrorism and war, which culminates in weakening and/or destruction of some or all of the competitors. This process represents a social example of transformation of system's characteristics in relation to changes. The most obvious and relevant examples of such transformations of the modern social systems are those that occur under the influence of monotonically and rapidly growing economical and political forces. As the result, democratic systems become transformed into autocratic ones, where the wave of terrorism continues to grow.

When a system is more complex, it has a greater possibility and ability to develop its own characteristics of rigidity. Hence, it has the ability to use the presented elementary types of rigidity both on individual and complex basis. There are two ways of development of this complexity: intensive and extensive. Therefore, rigidity of a complex system $RI_S(F)$ created in an intensive manner is the sum of the following three elementary types of rigidity $IR_\alpha(F)=\pm\alpha$, $IR_\beta(F)=\pm\beta F$ and $IR_\gamma(F)=\pm\gamma/F$, and it is expressed as $RI_S(F)=\pm\alpha\pm\beta F\pm\gamma/F=(\pm\beta F^2\pm\alpha F\pm\gamma)/F$ and $RI_S(q)=\pm\beta q\pm\alpha\pm\gamma/q=(\pm\beta q^2\pm\alpha q\pm\gamma)/q$. Figure 3 shows four basic functions of rigidity of complex systems. These characteristics are appropriately determined by the following conditions: ($\beta>0,\Delta<0$), ($\beta>0,\Delta>0$), ($\beta<0,\Delta>0$) and ($\beta<0,\Delta<0$), where $\Delta=\alpha^2\pm\beta\gamma$.

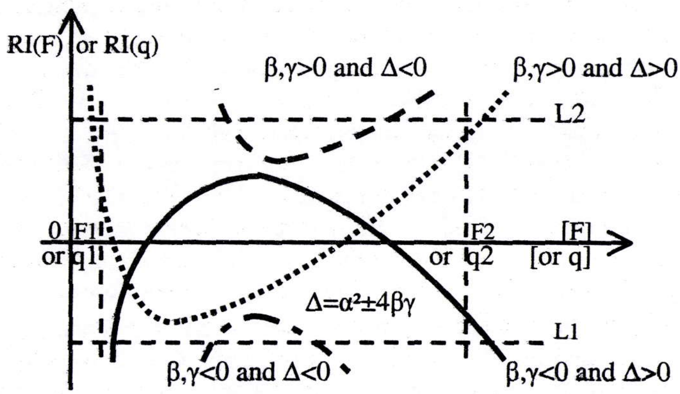

Figure 3: General and basic characteristics of rigidity of complex systems whose elementary functions of rigidity are monotonic

If we assume that changes 'dq' are proportional to changes of time dt (dq=adt), we can interpret the presented functions as the functions of life of a system, all of which have implications on the formation, existence and destruction of systems. These basic elements of existence possess a broad range of function, which is determined on the one side by violent (revolutionary) ways due to acting of great forces and making great changes and on the other side by non-violent (gradual) ways due to acting of small forces and making small changes. Moreover, positive and negative forces and changes also influence this range, and they can transform from positive into negative and vice versa. A particular characteristic of life of systems, whose rigidity is below the bottom limit, is that their continuing existence requires appropriate isolation from aggressive surroundings (protection and care) and/or increasing of their rigidity by surroundings (upbringing and education).

Biological organisms are particularly complex systems, in which various organs, elements and processes function in appropriately more or less independent or dependent manner, and therefore they can have many different characteristics of rigidity ranging from those of relatively solid objects to those of processes and flows. In addition, they have an appropriately developed system of transformation of characteristics of rigidity. As the result, organisms have a great elasticity and flexibility in their function in that they are able to resist some changes in some conditions and make these changes in other conditions. For humans, motivation feelings play a particularly significant role in this process. Overall, these characteristics contribute to a great flexibility in the function of nature in general. A particularly relevant phenomenon here is the ability of the same substances to exist in various states, and for humans, to change their motivations from rigid to flexible.

3 Limitations of Systems and Their Characteristics

The most fundamental trait of any subject-object relation is its limitations, which result from the existence of continuous changes in nature. In our previous work, we have derived this concept of limitations from a very common notion of "lifetime", which applies to all systems. Generally, we can also justify this concept by the following analysis. The most important limitation of any subject-object relation is energy ($E=Fq$), whose magnitude for any system must be always finite and different to zero ($E\neq 0$). When a system increases its energy, it invades its surroundings and when it decreases its energy, it is invaded by the surroundings. These invasions appropriately depend on the aggressiveness and endurance of the system as well as of its surroundings. Because rigidity characterises aggressiveness of the subject-object relation, therefore we can say the following. When rigidity dF/dq or dq/dF approaches zero (when $F\rightarrow 0$ and $q\rightarrow\infty$ or $q\rightarrow 0$ and $F\rightarrow\infty$), the subject described by 'F' becomes independent from changes 'q' and the subject-object relation $\{F,q\}$ no longer exists. Because all systems have appropriate resistance and/or sensitivity, therefore real independence occurs at $F=F_{bl}>0$ (bottom limit) and $q=q_{tl}<<\infty$ (top limit) or at a bottom limit $q_{bl}>0$ and a finite top limit $F_{tl}<<\infty$. The bottom limit can be also called necessity and the top one possibility. When dF/dq or dq/dF is appropriately great, the efficiency of the relation $\{F,q\}$ becomes inadequate in that, in the first case, it leads to excessively high internal and/or external aggression of a system and, in the second case, it leads to weakening of a system and subsequent destruction by the surroundings.

Figure 4 illustrates the idea of the fundamental limitations of any subject-object relation or any real system observed and/or experienced by a human being. For example, this figure shows the area 'ABCD' representing the fundamental limitations of any system. This area is marked by the appropriate levels of energy 'E_2' and 'E_3', the magnitude of force F_{lim} and changes q_{lim}. In reality, the boundary 'ABCD' is not sharp, but fuzzy and therefore more irregular. In consequence, it is often difficult to notice these limitations, especially for very flexible systems such as social systems. In addition, depending on the system, its surroundings and the type of force 'F' and change 'q', the area 'ABCD' can be variably located in the space of {(0-F),(0-q)}.

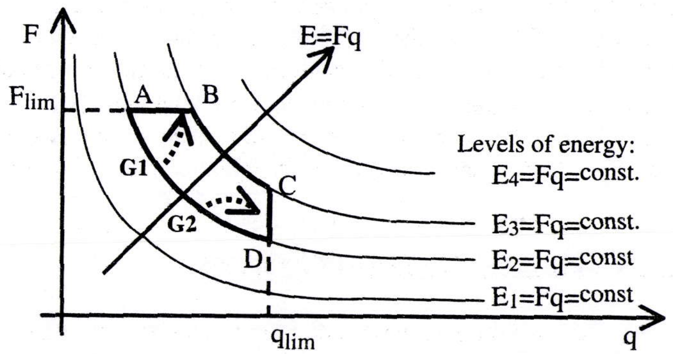

Figure 4: The idea of fundamental limitations of any subject-object relation or system

Let us assume that a certain system has:

- two poles, where one is characterised by subject traits and the other by object traits,
- the resultant force of these interacting poles 'F' and the resultant changes 'q', and
- the limitation 'ABCD' as marked in Figure 4.

These assumptions reduce the analysed system into a simple subject-object relation in which the subject acts upon the object with force 'F' and as the result of this the object accomplishes changes 'q'. The values of 'F' and 'q' do not extend beyond the area 'ABCD'. If the subject acts with increasing force 'F' following the trajectory 'E=Fq', it approaches the limit 'BC', which is determined by the balance created by the system and its surroundings. Violation of this balance represents excessive invasion or escalation of the system's aggression towards its surroundings. When the surroundings violate this balance, then it is them that invade the system. This problem can be also interpreted as appropriate strengthening or weakening of the system and its surroundings or development of conflicts between them.

The existence of strong motivations to increase force 'F' on the one side and the lack of an appropriate possibility and/or motivations towards invasion of surroundings by the system on the other side leads the subject to develop its strength following the trajectory 'G1' in Figure 4. This growth reflects that the intensity of using the force in relation to changes dF/dq rapidly increases, because the subject escalates aggression towards the object, which increases its resistance against the development of more changes 'q'. This situation causes a decrease in the efficiency of function of the subject and its consequent aim at invasion of the surroundings. When stronger aggression against the surroundings is not possible, then further growth of force 'F' across the limit 'AB' leads to the turning point. At this point in the analysed system, force 'F' loses its subjective traits and the object or change 'q' becomes a new subject. This process can occur violently if the limit 'AB' is significantly exceeded.

In a different case, when force 'F' of the subject changes following the trajectory 'G2', this force is weakened and changes 'q' are increasing. This process weakens the system and allows it to be invaded by the surroundings. In order to avoid this, force 'F' of the subject must not reach the limit 'CD'. When the rigidity of the system exceeds the limit 'q_{lim}', the system undergoes disintegration and destruction. It is possible to rebuild the system, but there has to be a change in the subject of the system, which now has to fit the new conditions of growth. This is because the excessive intensity of the changes in relation to the force being used, dq/dF, makes it difficult to organise force 'F' to act as a subject.

4 Cyclical Processes of Change of Rigidity of Systems

Because changes in nature are continuous, therefore systems, in order to extend their life span and/or identity, have to appropriately adjust the values of their parameters according to all limitations. This is possible only through fluctuations in increases and decreases in the values of their parameters of growth. We refer to these processes of fluctuations as cyclical processes.

With respect to rigidity, cyclical processes contain alternating changes of rigidity, which reflect alternating changes between subject and object functions of the elements in a system. These cyclical processes may be regarded as equivalent to the changes in their monotonic dynamic characteristics. This can be described as $\{+dF/dq \rightarrow -dF/dq \rightarrow +dF/dq \rightarrow -dF/dq...\}$ or $\{dF/dq \rightarrow dq/dF \rightarrow dF/dq \rightarrow dq/dF...\}$. With respect to energy, cyclical processes aim at conservation of energy (E=Fq=constant) by complex systems over appropriately long periods of time. Ideal cyclical processes conserving energy are harmonic processes in which resistance against the flow of substance or 'energy' in both directions equals zero. Commonly they are modelled by the following differential equation of rigidity of cyclical processes $Ld^2f(t)/dt^2+Rdf(t)/dt+f(t)=f_0\sin(\omega t+\varphi)$, where resistance R=0, as well as by the applying function $f_0\sin(\omega t+\varphi)=0$.

A particularly numerous class of continuously cyclical processes, that also includes the solutions of the above-mentioned differential equation, is represented by a set of functions determined by the expression $f(t)=f_0\pm f_1(t)\sin[\omega(t)t+\varphi]$. These processes can be cyclically convergent or divergent or cyclically alternating convergent and divergent depending on the function $f_1(t)$. Their cycles can be regular or variably changeable depending on the function $\omega(t)$. In similarity to the monotonic processes, the values of parameters of cyclical processes are also limited by top and bottom limits, as for example amplitude, frequency and period. In reality, a too long period of cyclical processes for some elements results in a monotonic process and a too short period decreases the stability of monotonic processes in a complex system. Also, as already mentioned, the above-presented time-dependent method of modelling of cyclical processes poses a significant problem in that it often excludes or hides the subject-object relation. Hence, it contributes to a common opinion of the lack of causality in nature even though there are many searches in sciences for the subject-object relations or correlations due to strong language influences on the human intellect. The other special systems are motors, which make cyclical changes within the boundary 'ABCD' in Figure 4.

In nature, all long-lasting phenomena function on the basis of cyclical processes. Social processes are also cyclical, because they are formed as a part of the phenomenon of a relatively long-lasting life on Earth. For societies, it is periodicity in the changes of the social structure and economy that is most important. But periodicity is also associated with periodicity of motivation and feelings, which is most obvious in the example of the repeatable ideas of fashion. Another interesting social phenomenon arising from periodicity is the absurd of exaggeration. According to our research, it can be said that social cyclical processes form a framework for all social systems and they determine to a very large extent the duration of existence of societies, social systems, organisations and individuals. Because nature is characterised by an enormous variety, therefore there is a vast number of different cyclical processes and hence many different classes of cyclical functions, both theoretical and empirical.

The most important problem faced by the modern societies is the extremely rigid human motivation of maintaining the monotonic growth of the population and economy as well as the activities, which rapidly realise this motivation. Because this is against the natural rule of periodicity in gradual and long-lasting processes, therefore there are spontaneously occurring violent processes aiming at preservation of periodicity in the natural environment and in economic and other social processes and systems. Hence, there is a real threat that further such development can exceed dangerous limits and initiate turbulent social conflicts as well as conflicts between people and nature.

A positive social example of the functioning gradual cyclical processes is political democracy, which involves regular cyclical changes of governments. The next essential trait of democracy is that it cyclically changes political disproportions in society and it limits these disproportions through elections. If an election works efficiently, it limits the power of governments and politicians (top limit) and it increases the political power of ordinary people (bottom limit). Moreover, the political power of politicians and ordinary people differs at the time of elections and other times. Following this simple idea of political democracy, we can say that a democratic process is the process, in which the disproportion between its strongest and weakest elements is changed in a gradual and cyclical way. Such a change is possible only when this disproportion does not exceed a certain top and bottom limit. Therefore, economic democracy is determined by the cyclical changes of the economic gap within appropriate top and bottom limits [Turkiewicz and Turkiewicz, 2003].

At present, as the result of the level of globalisation, economic processes form the strongest field of social force and they have the strongest influence on other processes and fields. Because the main idea of economy is a continuous monotonic increase of its force and elimination of gradual periodicity, current economy of the Western world is non-democratic. Similarly, the process of rising population in the world is non-democratic. Hence, the efficiency and existence of the political democracy and gradual changes in societies and natural environment are under a serious threat from these two powerful and destructive processes.

5 Conclusion

The presented analysis of the linguistic subject-object relation based on formalised models utilising mathematical continuous functions show that this relation has strongly influenced all sciences. This influence originates from this fundamental aspect of language without which it is impossible to understand any phenomena and without which science could not advance to the current form. Because this relation is organically and permanently incorporated into the human intellect, it is used automatically and subconsciously. Hence, despite the lack of awareness of this relation, it is always the fundamental element of every scientific theory unifying all sciences. In addition to energy, the trait of rigidity is a very important and basic property of the subject-object relation that allows the analysis of basic behaviours of all types of systems and processes and it is already well developed for some of them and it can be developed further or anew for others.

Emphasising the analysis of social processes based on the physical modelling of the subject-object relation we have to conclude that cyclical processes form a framework or a basis for all relatively long-lasting social systems and processes. Monotonic processes are only their simple elements, and as such, they are steered adaptively omitting the analysis of the future of systems and their surroundings. Therefore, this type of steering facilitates excessive monotonic increases of systems that lead to violent conflicts with long-lasting cyclical processes. On the other hand, the anticipatory way of steering, which considers the cyclical and gradual future of systems allows strong limiting of these conflicts and hence contributes to the democracy of all social processes.

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