

REFORMING MODERN SCIENCE BY METASCIENCE

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Abstract

The new method, '*the method of systematic intuition*', based on dialectical logic and successfully used in our research in physics, is generalized and made applicable to the revision of modern science in general, thus giving birth to a new science – *the reform science*. The reform science has *a structure* common for all branches of science, which allows to introduce *the classification of concepts*, thus purifying, perfecting and organizing the whole science. The reform science consists of three parts, called *Medium*, *Population* and *Associations*, each with a different logic, that of *transition*, *reflection* and *evolution*, respectively. The state of the reform science is described by three tables of concepts kept in the Reform Science Bulletin; the research works of the reform science are kept in a dedicated Archive. Every stage of research consists of a paragraph of speculation and a formal statement of the concept. The whole research is a series of such stages, every new stage starting with a speculation about the previous one; the first concept being the origin of the science, its fundamental contradiction suggested by the speculation about the science itself. The research starts with finding the Origin of the branch and proceeds with revealing its Essence, working out its Project and fulfilling its Realization.

Introduction

Now that civilization, enlightened, agitated and inspired by the current technological revolution, expects the proper changes in social and political spheres and, to survive, should be organized as a whole, the role of modern science as an influential source of ideology is of paramount importance. Modern science, however, despite its stunning technological achievements, is experiencing a deep crisis and unable to develop into *the spiritual guide* of society, which it is potentially. Instead, paradoxical as it is, modern science seems to present now *the main threat* to society and should be reformed and organized first.

As to the origin of the above crisis, we should note that the cognizance of the Nature and human society is not the province of science alone. Historically, it has been developing in three spheres: religion (The Unity), philosophy (The General) and science (The Specific). For common success, these three spheres should be in harmony, as was at the time of Aristotle, otherwise there arises a crisis. The present crisis of science originated mainly at the time of Renaissance, when the great success of exact sciences gave birth to the illusion of science being the only true source of knowledge, and its further development disturbed the initial tripartite harmony. Thus, to overcome the crisis of science, it is necessary restore the harmony of the above three spheres.

To reform modern science, it is necessary to have the proper ideology in this respect. Providentially, Hegel's works, critical of scientific methods of his time, convincingly suggest that such an ideology should be some systematic theory based on dialectical logic [1]. No wonder that suggestion prompted Karl Marx to undertake his own interpretation of Hegel's philosophy and apply it for his life-long research in economics [2]. However, despite the importance and great consequence of the latter, it has remained unclear whether it was worthwhile and possible to proceed on that way with other sciences and economics itself. Fortunately, in the course of our research in Systems Theory and Theoretical Physics [3], we have succeeded in our own interpretation of Hegel's Logic and found solution to the above enigma. Our research initiated the reform of modern physics and paved the way to the reform of modern science in general, which was confirmed by our recent works in politics [4] and economics [5].

1. The reform science

1.1. The method

In this work, the new method of research, first developed and applied in our research in physics [3], is generalized and made applicable to the revision of modern science in general, thus giving birth to a new science – *the reform science*. This method is based on Hegel's dialectical logic and may be called '*the method of systematic intuition*'. Although this method can potentially solve any correctly stated problem, it is not a clear-cut one easy to use in all cases; it cannot be formalized and should be applied with the highest extent of creativity.

According to this method, every stage of research consists of two phases, a paragraph of *speculation* and *a formal statement of the concept*, the former suggesting the latter by necessity, any concept corresponding to *an entity*. The whole research is a series of such stages, where any new statement is analyzed by a further speculation suggesting a new statement and so forth until the end. The first concept is the beginning of the reform science reflecting the origin of the research object; it is *a fundamental contradiction* revealed by the speculation about the nature of the object. Thus the development of the reform science follows the development of the research object. So, unlike modern science where the terms 'science' and 'research' have generally different meaning, in reform science they mean the same.

1.2. Structure of the reform science

The reform science consists of three parts, that may be called *Medium*, *Population* and *Associations*, each with a different logic, that of *transition*, *reflection* and *evolution*, respectively. Unlike modern science that is actually a collection of research works and theories in a particular field, the reform science keeps only the research works recognized as reform science works (*the sources*) and, in addition, the records of *the state* of the reform science in every particular field.

The state of the reform science is described by three tables of concepts, one for each part: Table 1 (Medium) and Table 2 (Population), each containing six rows and four columns called *Thesis*, *Antithesis*, *Synthesis* and *Quality*, and Table 3 (Associations) containing eight rows and nine columns called: 1- *Species*, 2-8 – *Substructures*, 9- *Quality*, as shown in Sec.2. The distinguishing quality of the synthesized entities of Table 1 and Table 2 and of the species of Table 3 are registered in the respective cells of the last columns.

Like any modern science, the reform science is actually a system of concepts corresponding to various *entities* characteristic of the research object. But, in contrast to modern science, the reform science has *a structure* common for all branches of science, which allows to introduce *the classification of concepts*, thus purifying, perfecting and organizing the whole science. So the reform science is the truly systematic science based on the logically consistent system of concepts. Owing to this property, the reform science is able to sort out the existing concepts, right and generalize them and find the proper meaning to them, and, when necessary, introduce new concepts.

The reform science is a thoroughly *theoretical* science, which corresponds to Hegel's dictum that '*truth cannot be observed, it can only be thought*' [1]. Thus the reform science cannot be developed or verified experimentally; on the other hand, it takes into consideration all achievements and the whole experimental base of modern science and can provide the true explanation to every experimental fact. The reform science realizes the goals advanced by modern science.

2. The research

Before starting the reform of a particular branch of science, the researcher is recommended to get

acquainted with the works mentioned above, at least. Then he may start his research in his own field, using those works for *reference by analogy*.

2.1. Part 1. Medium

The structure of Part 1, with its classification of concepts, is presented by Table 1. Transitions. In this table, the columns A, B, C are intended for the concepts and their brief description, while the column Q is for the qualitative characteristics of the corresponding *entities* of the column C. Every concept of Table 1 is classified as SC-1ik, where SC (SCIENCE) is the common two-letter abbreviation of the name of a particular science (PH for physics, BI for biology, etc.), i – the column letter (A, B, C), k – the row number (1-6). So the researcher must fill in all the cells of the table with the proper concepts and qualitative characteristics.

The research starts with a paragraph of speculation to suggest an entity introduced by the statement of its concept SC-1A1. This step may prove the most difficult, because this concept has no predecessor and, as mentioned above, should be determined by a speculation about the nature of the research object itself, its original fundamental contradiction to be resolved by the whole research.

Then the research proceeds with a speculation about the entity SC-1A1 to suggest its *transition* to its *dual* entity marked by the concept SC-1B1. After that the research proceeds with a speculation about the two preceding entities, *the thesis* and *the antithesis*, to suggest their *synthesis*, a new entity marked by the concept SC-1C1. The latter has its specific *quality* to be registered in the cell SC-1Q1. The speculation about the entity SC-1C1 generates the entity SC-1A2 to be transited by a new paragraph of speculation to the entity SC-1B2, and so forth until determining the entity SC-1C6 and its quality SC-1Q6. The entity SC-1C6 is *the essence* of the science, its concept being central for the whole theory. Every step is a *discovery* revealed by *intuition* rather than found by a formal work of intellect.

Table 1. Transitions

A Thesis	B Antithesis	C Synthesis	Q Quality
SC-1A1 (Origin)	SC-1B1	SC-1C1	SC-1Q1
SC-1A2	SC-1B2	SC-1C2	SC-1Q2
SC-1A3	SC-1B3	SC-1C3	SC-1Q3
SC-1A4	SC-1B4	SC-1C4	SC-1Q4
SC-1A5	SC-1B5	SC-1C5	SC-1Q5
SC-1A6	SC-1B6	SC-1C6	SC-1Q6 (Essence)

2.2. Part 2. Population

Part 2 is similar in many respects to Part 1. Its structure is presented by Table 2 similar to Table 1, and its concepts are classified similarly as SC-2ik. Instead of transition to the opposite, from thesis to antithesis, there takes place here their mutual *reflection* leading to their synthesis, the birth of a new *creature* which settles *the conflict* between its two constituent entities and is characterized by its specific quality. This part of the research starts with a paragraph of speculation about the concept SC-1C6 and ends with the concept SC-2C6 which, as suggested in [3], may be called *the Project*.

Every statement must again be preceded and necessitated by the proper speculation about the

statement of the preceding step. As a result, this stage of research generates a series of six creatures, SC-2C1 to SC-2C6, of increasingly higher order and quality, populating the Medium.

Table 2. Reflections

A Thesis	B Antithesis	C Synthesis	Q Quality
SC-2A1	SC-2B1	SC-2C1	SC-2Q1
SC-2A2	SC-2B2	SC-2C2	SC-2Q2
SC-2A3	SC-2B3	SC-2C3	SC-2Q3
SC-2A4	SC-2B4	SC-2C4	SC-2Q4
SC-2A5	SC-2B5	SC-2C5	SC-2Q5
SC-2A6	SC-2B6	SC-2C6	SC-2Q6 (Project)

2.3. Part 3. Associations

This part is different. Its classification of concepts is presented by Table 3 which illustrates the evolution of the *species* from the simplest one to the most complex. The classification of the species is given in the first column as SC-3-i, where $i=0, 1, 2, \dots, 7$ is the number of the row. Columns A-G are intended for the description of *substructures*, which are classified as SC-3ik, similar to the classification in the preceding tables. The evolution of species happens by developing new substructures of increasingly higher order. The simplest species, SC-3-0, has no substructures, while the species SC-3-i, $i=1, 2, \dots, 7$, have increasing numbers of substructures up to the most complex one, SC-3-7, with seven substructures. Similar substructures belonging to different species are generally different and need different classification, as shown in Table 3, but this subtlety may be omitted in the beginning. The last column is intended for the qualitative characteristics of different species.

The research of this part starts with a paragraph of speculation about the concept SC-2C5 and SC-2C6 to suggest their *merger* into the species SC-3-0, *the fundamental component of substructures*. A speculation about the latter should suggest the species SC-3-1 consisting of the substructure SC-3A1. Further speculation should expose the internal contradiction of SC-3-1 necessitating its development, *evolution*, by generating a new substructure, SC-3B2, which adds to SC-3B1 to make the species SC-3-2. The research proceeds further until generating the substructure SC-3G7 which

Table3. Evolution

Substructure Species	A	B	C	D	E	F	G	Q Quality
SC-3-0								SC-3Q0
SC-3-1	SC-3A1							SC-3Q1
SC-3-2	SC-3A2	SC-3B2						SC-3Q2
SC-3-3	SC-3A3	SC-3B3	SC-3C3					SC-3Q3
SC-3-4	SC-3A4	SC-3B4	SC-3C4	SC-3D4				SC-3Q4
SC-3-5	SC-3A5	SC-3B5	SC-3C5	SC-3D5	SC-3E5			SC-3Q5
SC-3-6	SC-3A6	SC-3B6	SC-3C6	SC-3D6	SC-3E6	SC-3F6		SC-3Q6
SC-3-7	SC-3A7	SC-3B7	SC-3C7	SC-3D7	SC-3E7	SC-3F7	SC-3G7	SC-3Q7 Realization

adds to the preceding six substructures, SC-3A7, SC-3B7, SC-3C7, SC-3D7, SC-3E7, SC-3F7, to make the most perfect species SC-3-7, *the Realization*. To complete in rough the research, it is necessary to show the concept SC-3-7 to be indeed the realization of the concept SC-2C6.

3. The research work formats

As mentioned above, the reform science publishes both the state of science and the sources, the research works themselves. To this end, there should be two kinds of media: *The Bulletin of the Reform Science*, possibly a quarterly journal, publishing the state of different branches of the reform science in the form of above three tables of concepts, and *The Journal of the Reform Science Archive*, publishing the research works recognized as the likely sources of the reform science to be kept in a specialized library, *The Reform Science Archive*.

The structure of the reform science and its logic outlined above require a definite format of the research work to be published. The first requirement is that the research work should include, at least, one of the whole Part 1 or Part 2 or, possibly, Part 3 of a particular branch of science, because otherwise it would be difficult to use the self-correction property of the reform science and estimate the correctness of the whole work. As to Part 3, which may prove to be the most difficult one, it is admissible to proceed with the research in this part and its publication by substructures, in accordance with the logic of the part. In this connection it is recommended to use the definite research work formats stated below.

3.1. Format of Part 1

Title of the work (Name of the branch. Part 1)

Introduction: a short overview of the branch showing its contradictions and the necessity of the reform.

Part 1. Title of Part 1 (The name of the *Medium* – as suggested by the concept SC-1C3)

1. The name of the branch
 - A. A speculation about the origin of the branch suggesting the concept SC-1A1.
 - B. A speculation about SC-1A1 suggesting the concept SC-1B1.
 - C. A speculation about SC-1A1 and SC-1B1 suggesting their synthesis SC-1C1, quality SC-1Q1.
2. The name of the concept SC-1C1
 - A. A speculation about SC-1C1 suggesting SC-1A2.
 - B. A speculation about SC-1A2 suggesting SC-1B2.
 - C. A speculation about SC-1A2 and SC-1B2 suggesting their synthesis SC-1C2, quality SC-1Q2.
3. The name of the concept SC-1C2 (A, B, C)
4. The name of the concept SC-1C3 (A, B, C)
5. The name of the concept SC-1C4 (A, B, C)
6. The name of the concept SC-1C5
 - A. A speculation about SC-1C5 suggesting SC-1A6.
 - B. A speculation about SC-1A6 suggesting SC-1B6.
 - C. A speculation about SC-1A6 and SC-1B6 suggesting their synthesis SC-1C6, quality SC-1Q6.

Table of concepts (Table 1)

Conclusion

References

3.2. Format of Part 2

Title of the work (Name of the branch. Part 2)

Part 2. Title of Part 2 (The general name of the *Population* suggested by the concepts SC-2C)

Introduction: a short overview of the Part 1 showing the necessity to proceed with the research

1. The name of the concept SC-1C6

- A. A speculation about SC-1C6 suggesting the concept SC-2A1.
 - B. A speculation about SC-2A1 suggesting the concept SC-2B1.
 - C. A speculation about SC-2A1 and SC-2B1 suggesting their synthesis SC-2C1, quality SC-2Q1.
2. The name of the concept SC-2C1
 - A. A speculation about SC-2C1 suggesting SC-2A2.
 - B. A speculation about SC-2A2 suggesting SC-2B2.
 - C. A speculation about SC-2A2 and SC-2B2 suggesting their synthesis SC-2C2, quality SC-2Q2.
 3. The name of the concept SC-2C2 (A, B, C)
 4. The name of the concept SC-2C3 (A, B, C)
 5. The name of the concept SC-2C4 (A, B, C)
 6. The name of the concept SC-2C5
 - A. A speculation about SC-2C5 suggesting SC-2A6.
 - B. A speculation about SC-2A6 suggesting SC-2B6.
 - C. A speculation about SC-2A6 and SC-2B6 suggesting their synthesis SC-2C6, quality SC-2Q6.

Table of concepts (Table 2)

Conclusion

References

3.3. Format of Part 3

Title of the work (Name of the branch. Part 3)

Part 3. Title of Part 3 (The general name of the *Associations* suggested by the concepts of the first column)

Introduction: a short overview of the Part 2 showing the necessity to proceed with the research

1. Name of the species SC-2C6

A speculation about SC-2C6 suggesting its merger with SC-2C5 giving birth to species SC-3-0 (the fundamental component of substructures) with quality SC-3Q0.

2. Name of the species SC-3-0

A speculation about SC-3-0 suggesting SC-3-1 (substructure-center SC-3A1) with quality SC-3Q1.

3. Evolution of the species SC-3-1

3.1 Name of the species SC-3-1

A speculation about SC-3-1 suggesting SC-3-2 (new substructure SC-3B2) with quality SC-3Q2.

3.2 Name of the species SC-3-2

A speculation about SC-3-2 suggesting SC-3-3 (new substructure SC-3C3) with quality SC-3Q3.

3.3 Name of the species SC-3-3

A speculation about SC-3-3 suggesting SC-3-4 (new substructure SC-3D4) with quality SC-3Q4.

3.4 Name of the species SC-3-4

A speculation about SC-3-4 suggesting SC-3-5 (new substructure SC-3E5) with quality SC-3Q5.

3.5 Name of the species SC-3-5

A speculation about SC-3-5 suggesting SC-3-6 (new substructure SC-3F6) with quality SC-3Q6.

3.6 Name of the species SC-3-6

A speculation about SC-3-6 suggesting SC-3-7 (new substructure SC-3G7) with quality SC-3Q7.

3.7 Name of the species SC-3-7

A speculation about SC-3-7 showing it to be the realization of the Project (SC-2C6) and the solution of the original fundamental contradiction (SC-1A1).

Table of concepts (Table 3)

Conclusion

References

4. The Reform Science Center

The reform of modern science can be achieved only by coordinated efforts of the whole scientific community. Thus it would be necessary to set up an *International Center of the Reform Science* to

coordinate the research in the reform science the world over. The Center is to become the engine and the embodiment of the reform of modern science. Governed by the Reform Science Council, it would instruct, guide and coordinate scientific activity the world over, while collecting, processing, unifying and publishing its essential results. To function properly, the Center should have a bulletin, a journal and an archive, as mentioned above. At present we have its virtual substitute, The Reform Science Center [6], that can serve as a prototype of the above main project. The Reform Science Center publishes an online Bulletin which covers the *state* of the reform science and *references* of research sources for every branch of science kept in its online Archive.

The Bulletin abides by the following policy:

1. When a research is submitted, the Editorial Board makes its rough estimation and, if recognized as a possible version of the reform science, treats it as a reform science source to be kept in the Archive and available free.
2. If there are two or more different research works in the same field of science, the Bulletin keeps them all as likely reform science sources and strives to resolve the confusion, finding the *right* source.
3. If the confusion is resolved, the Bulletin refers the state of science only to the right source.
4. Otherwise, the Bulletin publishes all the alternatives of the state of science with the respective references.
5. The Bulletin registers the state of every branch of the reform science by publishing Table 1 and Table 2 of concepts with the respective references and Table 3 with references for every substructure separately.

Conclusion

The above text suggests that the whole research of the reform science, in its every branch, is a great endeavor concerned with finding the Origin of the branch, revealing its Essence, working out its Project and fulfilling its Realization. By elucidating the structure of the reform science and the meaning of its cornerstones, this article makes the formerly unimaginable task of reforming modern science much less daunting, much more feasible and perhaps even more fascinating.

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