Cybernetics Applied to Plato's Theory of Forms: An Experiment

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ABSTRACT

A short but essential part of Plato's dialogue Phaedo, where Socrates introduces his "second voyage", is used in this article for a textual experiment in which a few original concepts are substituted with the cybernetic term "operation". The aim is to create an argumentation supporting and enriching Radical Constructivism as well as obtaining a source of inspiration for further developing it. After a short overview of the background to the experiment (research problem), we present the two foundations on which it is based: Kant's Copernican Revolution and Silvio Ceccato's Operational Methodology. We then introduce the method of the experiment and show its application to Plato's text (= modified dialogue). Finally we present our findings, discuss their meaning and implications and suggest future directions for this research.

Keywords: Cybernetics**,** Radical Constructivism, Copernican Revolution, Operational Methodology, Theory of Forms.

1. INTRODUCTION

In this article, we present and discuss a textual experiment[1]: a remake, in cybernetic terms, of a short but essential part of Plato's dialogue Phaedo where Socrates introduces his famous "second voyage" . The selected part has a length of less than 1,600 words and the remake is limited to substitution of a few terms, which generates a difference of only about 4% of the word count.

The cybernetic terms are a few variations on the concept of "operation". The experiment allows Plato to be connected with two essential fondations of von Glasersfeld's Radical Constructivism: Kant's Copernican Revolution as the central hypothesis of his theory of mental activity [2] and Silvio Ceccato's Operational Methodology as a cybernetic approach to modeling the mind [3, 4, 5, 6, 7]. Thus Plato's theory is transformed into an argumentation supporting and enriching Radical Constructivism [8] and could also be used as a source of inspiration for further developing the innovative approach to knowing and learning that von Glasersfeld elaborated during the last third of his life.

2. FOUNDATIONS

Shortly after the Second World War, the work of American operationalism pioneer Percy W. Bridgman attracted the attention of Silvio Ceccato (1914-1997) and later formed the foundation of his pioneering work in computer linguistics [9]. Inspired by Bridgman and with the support of a group of scholars living in Italy, Ceccato proposed the study of thought and its contents in terms of operations [10, 11].

Because of this "operational approach" or "operational methodology," Ceccato's group was called the "Italian Operational School." Through their work, Operational Methodology developed to become a cybernetic approach to mental activity (cognition) according to which any concept is analysed and described in terms of mental operations.

The key question in researching thought, according to Operational Methodology, is: "*what mental operations must be carried out to see the presented situation in the particular way one is seeing it?*" [8 p.78], [12]. What does '*mental operation*' mean here? It is an elementary step in a thought process (mental process), a sequence of identifiable, reproducible dynamic units which *constitute the content of concepts and thoughts*.

Two of the essential functions of implementing a system able to perform such mental operations and to build a seemingly continuous stream of consciousness, are:

1. "Categorisation" as the function which enables the mind *to constitute* concepts by combining elementary mental operations into more complex combinations.
2. "Correlation" as the function which enables the mind *to produce* thoughts by assembling into correlational nets the concepts (and percepts) provided by categorisation.

About two centuries before Ceccato, in his famous letter to Markus Herz of February 21, 1772, Immanuel Kant mentioned the core idea of what would become his theory of knowledge (the so-called 'Copernican Revolution'):

> "If what we call conception would be active with regard to the object, i.e. if by this the object itself would be generated, [...] then the conformity of the same with the objects would also be understood" (my translation).

Original:

> "Wenn das, was in uns Vorstellung heisst, in Ansehung des Objekts aktiv wäre, d.i. wenn dadurch selbst der Gegenstand hervorgebracht würde, […] so würde auch die Konformität derselben mit den Objekten verstanden werden können". [13 p.101].

In the second edition of the Critique of Pure Reason published in 1787, i.e. 15 years after the letter to Markus Herz, Kant presented the same idea of 1772 as the central assumption and notion of his knowledge theory:

> "Hitherto it has been assumed that all our knowledge must conform to objects. But all attempts to extend our knowledge of objects by establishing something in regard to them a priori, by means of concepts, have, on this assumption, ended in failure. Let us therefore make trial whether we may not have more success in the tasks of metaphysics, if we suppose that objects must conform to our cognition (way of knowing)."

Original:

> "*Bisher nahm man an, alle unsere Erkenntnis müsse sich nach den Gegenständen richten; aber alle Versuche […] gingen unter dieser Voraussetzung zunichte. Man versuche es daher einmal, ob wir nicht […] damit besser fortkommen, dass wir annehmen, die Gegenstände müssen sich nach unserem Erkenntnis richten*" [14 p.B XVI].

[1] Further development of a previous textual experiment [1].

But if the object conforms to our cognition, what does the cognition then do to the object? Kant assumes that a special kind of cognition, known as a priori cognition or pure cognition, is added to the raw material of sensual impressions and that this is entirely independent of experience, i.e. does not contain any empirical components. Notice that Kant himself uses the term "complete revolution" in this context:

> "Indeed, the business of this critique of pure speculative reason consists in the aforementioned attempt to change the current method of metaphysics, and through this, following the example of geometers and naturalists, to undertake a complete revolution with it." (my translation[2]).

Original:

> "*In jenem Versuche, das bisherige Verfahren der Metaphysik umzuändern, und dadurch, dass wir nach dem Beispiele der Geometer und Naturforscher eine gänzliche Revolution mit derselben vornehmen, besteht nun das Geschäfte dieser Kritik der reinen spekulativen Vernunft.*" [14, p.B XXII].

Although it was surely then (and still is today) a revolutionary idea, Kant was probably not the first to think of this solution. About 2000 years before him, Plato had a similar idea which can be found in Platon's dialogue Phaedo where it is presented as resulting from Socrates' famous "second voyage" and is used as the fourth argument for supporting the claim of the soul's immortality: the soul is immortal because it is *the cause* of life.

The demonstration of this claim is based on a *theory of causes* in which Socrates takes refuge *from things to thoughts*: an early precursor of Kant's Copernican Revolution.

3. METHOD

The method for remaking Plato's dialogue is the method of substitution in text processing [4] which consists of the following steps:

1. Choose a frame, a point of view and obtain from it a small set of relevant terms and concepts.
2. Select portions of the original text and in them substitute suitable original terms with appropriate new terms (concepts) taken from the set determined in step 1.
3. Evaluate the modified sentences with the criteria of viability and inner coherence within the context of the text selected in step 2.
4. Go back to step 1 or 2 and repeat the procedure until the substitutions satisfy the criteria of step 3.

Following this method, we chose the viewpoint of Operational Methodology and of Kant's Copernican Revolution and selected the cybernetic concept of "operation" as a relevant term.
The original text is Plato's dialogue Phaedo from which we selected a small part listed in table 1.

Table 1. Selected text from Platon's Phaedo.

Pagination range	Content
[58 c] - [59 c]	*Introductory conversation*
[95 b] - [97b]	*In search of the causes*
[97 c] - [98 c]	*Hope in Anaxagoras and disappointment*
[99d] - [101d]	*Socrates' "second voyage": "forms" as causes*
[102a]	*Joined approval of Simmias and Cebes. Echecrates agrees.*

In the Phaedo, Socrates offers four arguments for the soul's immortality. The selected part concentrates on the fourth argument (also called "Argument from Form of Life"). Here we have identified a few suitable original terms and applied to them the 8 substitutions of table 2.

Table 2. Original terms and substitutions

ORIGINAL TERMS	Substitutions
1. concept	*1. mental operations*
2. absolute beauty, beauty	*2. mental operations of beauty*
3. good	*3. mental operations of good*
4. greateness	*4. mental operations of greatness*
5. smallness	*5. mental operations of smallness*
6. number, duality.	*6. mental operations of plurality*
7. unity	*7. mental operations of unity*
8. proper essence	*8. proper mental process*

The modified text is shown in section 4, "Dialogue". According to word count, the selected original text by Plato has 1,546 words; the modified text is a little longer - it has 1,604 words: a difference of about 4% .

The whole Phaedo is a dialogue within the dialogue. In the "outer" dialogue, we meet **Phaedo of Elis**, one of Socrates' students, who relates to **Echecrates** (a Pythagorean philosopher) a dialogue between **Socrates** and his disciples. This "inner" dialogue took place the day when Socrates drunk the poison and died. The part of the original text reproduced here only mentions two further participants: **Cebes** and **Simmias**, two disciples of Socrates, both of Thebes.
Because of the modifications to what Socrates says, we will introduce a new participant, a person whom we call "**Stranger**" and replaces Socrates. This Stranger shares with Socrates the same destiny: he has also been prosecuted on charges of impiety and corrupting the youth and is now in prison where he talks with Simmias and Cebes.

4. DIALOGUE

The following text is based on the translation by Harold North Fowler [15]. Numbers and letters indicate, as usual, the pagination in the edition of H. Stephanus (Geneva, 1578). Where long sections of the dialogue have been skipped (one page or more), this is indicated by the pages interval followed by the revision mark "snip". An empty line indicates that a shorter part (less than one page) has been skipped. Modifications of the original words are typed with the following revision marks: strikethrough indicates deleted text, underlining combined with italics indicates inserted text.

[57a-58c snip]
[58c] **Echecrates**. What took place at his death, Phaedo? What was said and done? And which of his friends were with him? Or did the authorities forbid them to be present, so that he died without his friends?
[58d] **Phaedo**. Not at all. Some were there, in fact, a good many.
Echecrates. Be so good as to tell us as exactly as you can about all these things, if you are not too busy.
[58d-59c snip]
[59c] **Phaedo**. I will try to tell you everything from the beginning.
[59c-95b snip]
[95b] "My friend," said ~~**Socrates**~~ ***the Stranger***, "You demand a proof that our soul is indestructible [95c] and immortal.

[2] I use here my own translation because Norman K. Smith has changed the construction and translates Kant's term "gänzliche Revolution" as "by completely revolutionising", which is weaker than "complete revolution".

[95e] It is no small thing that you seek; for the cause of generation and decay must be completely investigated. [96a] Now I will tell you my own experience in the matter, if you wish.

When I was young, **Cebes**, I was tremendously eager for the kind of wisdom which they call investigation of nature. I thought it was a glorious thing to know the causes of everything, why each thing comes into being and why it perishes and why it exists.

And again I tried to find out [96c] how these things perish, until finally I made up my mind that I was by nature totally unfitted for this kind of investigation. And I will give you a sufficient proof of this. I was so completely blinded by these studies that I lost the knowledge that I, and others also, thought I had before. [96d] I thought I was sure enough, when I saw a tall man standing by a short one, that he was, say, taller by a head than the other, [96e] and, to mention still clearer things than those, I thought ten were more than eight because two had been added to the eight, and I thought a two-cubit rule was longer than a one-cubit rule because it exceeded it by half its length."
"And now," said **Cebes**, "what do you think about them?"
"By Zeus," said he, "I am far from thinking that I know the cause of any of these things, I who do not even dare to say, when one is added to one, whether the one to which the addition was made has become two or the one which was added; or the one which was added and [97a] the one to which it was added became two by the addition of each to the other."

"And I cannot yet believe that if one is divided, the division causes it to become two; for this is the opposite of [97b] the cause which produced two in the former case."

"And I no longer believe that I know by this method even how one is generated or, in a word, how anything is generated or is destroyed or exists, and I no longer admit this method, but have another confused way of my own. Then one day I heard a man reading from a book, as he said, by **Anaxagoras**, [97c] that it is the mind that arranges and causes all things. I was pleased with this theory of cause, and it seemed to me to be somehow right that the mind should be the cause of all things, and I thought, 'If this is so, the mind in arranging things arranges everything and establishes each thing as it is best for it to be'".

"My glorious hope, my friend, was quickly snatched away from me. As I went on with my reading I saw that the man made no use of intelligence, [98c] and did not assign any real causes for the ordering of things, but mentioned as causes air and ether and water and many other absurdities".

[99d] "Do you wish me, **Cebes**," said he, "to give you an account of the way in which I have conducted my second voyage in quest of the cause?"
"I wish it with all my heart," he replied.
"After this, then," said he, "since I had given up investigating realities,"

[99e] "I thought I must have recourse to ~~conceptions~~ *mental operations* and examine in them the truth of realities."

[100a] "But I want to tell you more clearly what I mean; for I think you do not understand now."
"Not very well, certainly," said **Cebes**. [100b]
"Well," said ~~**Socrates**~~ ***the Stranger***, "this is what I mean. It is nothing new, but the same thing I have always been saying, both in our previous conversation and elsewhere. I am going to try to explain to you the nature of that cause which I have been studying, and I will revert to those familiar subjects of ours as my point of departure and assume that there are such things as ~~absolute~~ *mental operations of* beauty and *mental operations of* good and *mental operations of* greatness and the like. If you grant this and agree that these exist, I believe I shall explain cause to you and shall prove that [100c] the soul is immortal."
"You may assume," said **Cebes**, "that I grant it, and go on."
"Then," said he, "see if you agree with me in the next step. I think that if anything is beautiful ~~besides absolute beauty~~ it is beautiful for no other reason than because it partakes of ~~absolute~~ *mental operations of* beauty, and this applies to everything. Do you assent to this view of cause?"
"I do," said he.
"Now I do not yet, understand," he went on, "nor can I perceive those other ingenious causes. If anyone tells me that what makes a thing beautiful is its lovely color, [100d] or its shape or anything else of the sort, I let all that go, for all those things confuse me, and I hold simply and plainly and perhaps foolishly to this, that nothing else makes it beautiful but the presence or communion (call it which you please) of ~~absolute~~ *mental operations of* beauty, however it may have been gained; about the way in which it happens, I make no positive statement as yet, but I do insist that beautiful things are made beautiful by *mental operations of* beauty. For I think this is the safest answer I can give to myself or to others, and if I cleave fast to this, [100e] I think I shall never be overthrown, and I believe it is safe for me or anyone else to give this answer, that beautiful things are beautiful through *mental operations of* beauty. Do you agree?"
"I do."
"And great things are great and greater things greater by *mental operations of* greatness and smaller things smaller by *mental operations of* smallness? And you would not accept the statement, if you were told that one man was greater or smaller than another by a head, [101a] but you would insist that you say only that every greater thing is greater than another by nothing else than *by mental operations of* greatness, and that it is greater by reason of *mental operations of* greatness, and that which is smaller is smaller by nothing else than *by mental operations of* smallness and is smaller by reason of *mental operations of* smallness. For you would, I think, be afraid of meeting with the retort, if you said that a man was greater or smaller than another by a head, first that the greater is greater and the smaller is smaller by the same thing, and secondly, that [101b] the greater man is greater by a head, which is small, and that it is a monstrous thing that one is great by something that is small. Would you not be afraid of this?"
And **Cebes** laughed and said, "Yes, I should."
"Then," he continued, "you would be afraid to say that ten is more than eight by two and that this is the reason it is more. You would say it is more by ~~number~~ *mental operations of plurality* and by reason of ~~number~~ *mental operations of plurality*; and a two cubit measure is greater than a one-cubit measure not by half but by ~~magnitude~~ *mental operations of greatness,* would you not? For you would have the same fear."
"Certainly," said he.
"Well, then, if one is added to one [101c] or if one is divided, you would avoid saying that the addition or the division is the cause of two? You would exclaim loudly that you know no other way by which any thing can come into existence than by participating in the proper ~~essence~~ *mental process* of each thing in which it participates, and therefore you accept no other cause of the existence of two than participation in ~~duality~~ *mental operations of plurality*, and things which are to be two must participate in *mental operations of plurality*, and whatever is to be one must participate in *mental operations of* unity and you would pay no attention to the divisions and additions and other such subtleties, leaving those for wiser men to explain. You would distrust [101d] your inexperience and would be afraid, as the saying goes, of your own shadow; so you would cling to that safe principle of ours and would reply as I have said".

[102a] "That is true," said **Simmias** and **Cebes** together.

Echecrates. By Zeus, Phaedo, they were right. It seems to me that he made those matters astonishingly clear, to anyone with even a little sense.
Phaedo. Certainly, Echecrates, and all who were there thought so, too.
Echecrates. And so do we who were not there, and are hearing about it now. But what was said after that?

5. RESULTS

With only 8 different substitutions, thus maintaining about 96% of the original text, we were able to transform Plato's argumentation for his Theory of Forms into a cybernetic way of looking at the relation between objects and concepts, consistent with Ceccato's Operational Methodology and with Kant's Copernican Revolution.

For example, consider the concept of beauty. The experimental text claims that if anything is beautiful, it is beautiful for no other reason than because it "partakes" of mental operations of beauty. And nothing else makes it beautiful but "partaking" in those specific mental operations. And this applies to every other concept, like good, greatness, smallness, number, unity, etc.

In this way, objects can conform to our cognition (way of knowing), as Kant suggested. Now, in terms of the way in which the "partaking" happens, at this stage of the enquiry the Stranger makes no positive statement; he simply notes that "partaking" could simply be considered as presence or communion. In line with our operational approach and with its move "from things to thoughts", we suggest modelling "partaking" as a specific mental processing function; it will be the task of future research to define the dynamics of this function.

6. DISCUSSION

In general, these results can be used in several ways: 1) To make explicit what every reader implicitly does (without noticing it) when reading a text. 2) To break with the tradition which limits the range of substitutions to those allowing reconstruction of the meaning intended by the author. 3) To draw inspiration from the *remade* text in order to open new horizons and find solutions to current problems. 4) To illuminate with a new light the traditional interpretations of the original text.

Specifically, we intend to use them for supporting, enriching and further developing Radical Constructivism. We can take the dialogue's argumentation and combine it with Radical Constructivism, for example as follows:

- It is the mind which arranges and causes all things, and these things are what constitutes our *experiential world*.
- In arranging things there, the mind tries to establish each thing as it is best for it to be, i.e. as *viable*.
- Our mental operations are the real causes for the ordering of things in our *experiential world* and for verifying their *viability* in our interactions with the physical world.

This viability is conceived as a state of adaptation to barriers which is established when obstacles are avoided, as defined by von Glasersfeld [16, p.20].

And a model is viable: a) if it leads to a solution to a problem situation, or b) when it is compatible with existing conceptual structures (lack of contradictions) or c) when it is in harmony with other conceptual structures which others regard as viable [17, p.506].

7. CONCLUSION

Things are things only in our *experiential world*. Here they are caused by our own mental operations and we know them if and only if they are *viable*. This *viability* is how it is best for things to be, this viability is how objects conform to cognition: a *complete revolution*, recently described in cybernetic terms [18, p. 52-53].

In Plato's time, revolutionary ideas were dangerous: Socrates went on trial for his ideas, was found guilty and sentenced to death! But Plato was a clever man: he made his Theory of Forms unthreatening and acceptable by disguising concepts as gods (godlike entities which are timeless, absolute, unchangeable and true), he made it immortal by binding it to the problem of immortality and he presented it in the context of Socrates' death: was this a tip for the reader that he had to hide something in order to avoid death by drinking hemlock?

Did Plato try to hide what Kant discovered 2000 years later? That in order to make progress in our knowledge theory, we need to conduct a *second voyage* in search of the cause of things: give up investigating objects, have recourse to thought by supposing that objects must conform to our cognition and examine in the "things" of our experiential world their viability. This would indeed be an interesting direction for future research.

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