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Self-Referential Analogies, Problems Solving and Power Tests

ABSTRACT. This article will focus on particular analogies: self-referential analogies. Self-reference is probably one of the most complex semantical products necessitating minimal initial knowledge. It is also the essential component of mathematical proofs like Gödel's first proof of incompleteness, Russell's paradox of "Set of the sets that do not contain themselves" and of artistic works like Escher and Magritte paintings and drawings. Analogies appear to be an excellent tool to build original, powerful and subtle self-references. Some of these interesting and surprising self-referential analogies can be found in Power Tests. Indeed, Power tests provide an excellent context to develop powerful items with minimal knowledge, particularly by using analogies, one of the simplest structures. The notion of self-reference as expression of the consciousness of its own existence will be developend and illustrated through three-parts analogies, leading to the birth of a new paradigm where classical consciousness appears to have two sisters : infra-consciousness and supra-consciousness. Finally, on the basis of these developments, a classification of levels of abstraction and cognitive abilities related to problems solving will be proposed.

KEYWORDS: self-reference, analogy, power test, logico-divergence, consciousness

1. What is a Power Test?

A Power Test is an IQ test more difficult than a classic IQ test but without a time limit to find the solutions to the items. The main bias in classical IQ tests is the time limit. Because of this time bias, classical IQ tests cannot contain too complicated items. In addition, Power tests are not supervised. The first Power test was created in the Seventies by an American named Ron Hoeflin. He created the Mega test, the "test of the million" intended to serve as an admission test to a very selective high IQ society in

which one must achieve a score of 176 in deviation 16 to be admitted. Remember that the minimum score required to be admitted to the society Mensa, the 1st high IQ society, consisting of more than 100,000 members across the world, is 132 in deviation 16. The most commonly used admission tests in Mensa are the Cattell and the Raven. In all cases, the tests used should be official. The Mega test is not an official test. It has been published in Omni Magazine. The principle of the Power Tests has been relayed in Europe by the Dutch test designer Paul Cooijmans. He created the "Test for genius" and a multitude of other tests. A deficiency of most Power Tests, and of the IQ tests in general, is their cultural bias. The 9I6 test, put online in 2000, is one of the least biased Power Tests and has become a reference test in the so called underground High IQ community.

The 9I6 test is one of the three tests constituting the Power Scale.

Power tests gives the opportunity to experiment complex analogies. Analogy is one of the favorite kinds of items in Power Tests.

2. What is an Analogy ?

In Logic, an analogy is a form of reasoning in which one thing is inferred to be similar to another thing in a certain respect, on the basis of the known similarity between the things in other respects.

The Principle of an analogy is as follows: “correct : incorrect :: true : false”; it must be read as this: false is to true as incorrect is to correct. This is called the “Aristotelian format” of an analogy. In this example, we have a logic of opposition. In modern terminology, the first part “a : b” of the analogy “a : b :: c : d” can be called the “source” and the second part “c : d” the “target”. In the standard modelling, analogical reasoning involves two "objects": the source and the target. The target is supposed to be incomplete and in need for a complete description using the source; for example: “Right : Left :: Dexter : ?”. The target has an existing part S_t (“Dexter” in our example) and a missing part R_t (“?” in our example). We assume that we can isolate a situation of the source S_s (“Right” in our example) which corresponds to a situation of the target part S_t (“Dexter” in our example) and the result of the source R_s (“Left” in our example)

which correspond to the result of the target R_t ("Sinister" in our example). We have B_s, the relation between S_s and R_s, and we want B_t, the same relation (::) between S_t and R_t.

On the basis of this structure, infinite variants are possible.

3. What is an Analogy in Power Tests ?

In a Power Test, an analogy intends to highlight the similarity of the relations between two couples of elements. This is more than a simple relation between elements. In this case, the « common feature » item is used. In analogies, a logical « process » is to be discovered. The same logic applies to both couples.

For the record, the particular context where we discovered interesting and surprising analogies is that of Power IQ Tests. What is the interest of Power-test like analogies ? They constitute an opportunity of evaluating very high cognitive abilities and a particularly stimulating context for innovations.

The following analogies are extracted from the 9I6 Test, the Hyper Test and the Concep-T test, the three Power Tests of the Power Scale.

Question 1:

PI : IQ :: 9I6 : ?

Answer :
PI : IQ :: 9I6 : I79

Here is precisely a variant of the format "a : b :: c : d" where the source and the target are intermingled. Indeed, the "source" relation is the link between PI and 9I6, i.e. a reverse alphanumerical correspondence.

Question :
Chronoscope : Time :: 9I6 : ?

Answer :
Chronoscope : Time :: 9I6 : IQ

Explanation: IQ is measured by the 9I6 test as Time is measured by a Chronoscope.

Question 2:

Analogy : : :: : :: Equation : ?

Answer :

Analogy : : :: : :: Equation : =

Explanation: "=" is to Equation as ": :: :" is to Analogy;
"=" is the operator of an Equation as ": :: :" is the operator of an Analogy.

Question 3:

Nowhere : Now :: Never : ?

Answer:

Nowhere : Now :: Never : Here

Explanation: Here is to Never as Now is to Nowhere.

Question 4:

Before before : Before :: Before after : ?

Answer :

Before before : Before :: Before after : Before

Explanation: The word "Before" is before the word "after" as the word "Before" is before the word "before".

Question 5:

/ : Fraction ::  : ?

Answer :

Fractal

Fractal describes  as fraction describes /.

.

These analogies are not very difficult. They are interesting because their resolution requires minimal knowledge. The other analogies (like self-reference analogies) studied in this article are more complex than analogies used in classical IQ tests. We will indeed focus more particularly on « self-references » in analogies. Self-referential analogies are one of the best ways to avoid knowledge and cultural bias. Indeed, in order to reduce the impact of knowledge bias, it is necessary to create items where no other knowledge than that required to understand the words used is necessary.

4. What is a Self-Reference ?

In self-reference, the definition of an object, or entity, applies to the object, entity itself.

In other words, self-reference is the adequacy between the meaning and the being or the expression of something.

Self-reference occurs in natural or formal languages when a sentence, idea or formula refers to itself. The reference may be expressed either directly – through some intermediate sentence or formula – or by means of some encoding. In philosophy, it also refers to the ability of a subject to speak of or refer to itself. It is like having the kind of thought expressed by the first person nominative singular pronoun, the word “I” in English. Indeed, another kind of self-reference is the capacity to refer to oneself. This ability seems to be found in human beings only. If another entity could

express the consciousness of its own existence, we could express in an analogy the existence of similar ontological self-references.

We suggest a typology of three kinds of self-references: syntactical (point 4.1), semantical (4.2) and ontological (4.3) self-references. There is probably no pure syntactic self-reference since a process must be described to highlight or explain the self-reference, but we will classify in syntactic self-references those where only symbols are used.

Let us add that the notion of self-reference is related to self-similarity and recursivity.

4.1. Syntactic Self-References

Syntactic self-references are best illustrated in numerical series.

Here are some of them:

Golomb series

1, 2, 2, 3, 3, 4, 4, 4, 5, 5, 5, 6, 6, 6, 6, 7, 7, 7, 7, 8, 8, 8, 8, 9, 9, 9, 9, 9,…

This series is self-descriptive if it is admitted that spaces between numbers must be read as : There is 1 times the number 1, 2 times 2, 2 times 3, 3 times 4, 3 times 5, 4 times 6, 4 times 7, 4 times 8, 5 times 9…

The « blank » series is self-referential : « ».

Indeed, we have 0 times 0.

Number 1 notation is self-referential.

Indeed, we have 1 times 1.

0 (0 « 1 ») (x-times the following number)

The following series

555554444333221

is self-referential when read as this :

we see 5 « 5 », 4 « 4 », 3 « 3 », 2 « 2 », 1 « 1 », 0 « 0 »

In the same spirit, here is the classical Hilgemeir series:

1 11 21 1211 111221 312211

It is generally read from the second number which is referring to the previous one : I see 1 « 1 », 2 « 1 », 1 « 2 » 1 « 1 », 3 « 1 » 2 « 2 » 1 « 1 », …

This is a complex infinite self-referential series.

If we include all the previous lines in the reading, it gives this :

1 11 31 311311 31131113211321

As a transition to the following chapter devoted to semantical self-references, we may evoke Gödel's first incompleteness theorem. The first of Gödel's proofs of incompleteness in 1931, includes a self-reference as heart of the proof by a « coding » of a sentence making possible the use of the self-reference. If a system S devoted to write proofs proves only true things, and allows writing a sentence G meaning « This sentence cannot be proved in S », then necessarily the sentence G cannot be proved in S, and so G is true. Consequently, S can express true sentences that he cannot prove.

4.2. Semantical Self-References

This sentence is made of the words : « This sentence is made of the words : « … » ».

Question 1:
What question does this question ask ?
Answer :
What question does this question ask ?

Explanation : the question is its own answer.

Question 2:
What is not « clear » in this question ?
Answer :
What is not in this question ?
Sub-Answer :
Clear

Explanation : the answer to the initial question is made of all the words of the sentence but the word « clear ». This answer « What is not in this question ? » is a new question. The answer to this new question is the word removed from the initial question : « clear ». Is it clear ?

4.3. Ontological Self-References

Here we evoke self-reference in its highest power : the ability to express by oneself its own existence. As far as we know, this is the privilege of the human being. But maybe something else has this power – something in human beings, and something that uses human beings to express its own existence.

Before developing some ontological self-references through analogies, it is necessary to put some premises and to draw an interesting conclusion:

❖ The Universe is defined as including anything that exists, has existed, will exist in any way:

- materially or not;
- in any kind of dimension;
- transfinitely if necessary;
- including the largest possible (meta-) structure ;
- This definition is of course a part of the universe.

❖ Necessary apparatus for awareness-consciousness:

- Brain
- Central nervous system
- Senses
- Language

❖ The brain is the only organ aware-conscious of itself.

❖ Material and immaterial beings (Objects and thoughts) are conceived as sets of properties.

❖ Tools used in the proofs
- Inclusion
- Analogy

Proof of self-awareness and self-consciousness of the universe :

- Consciousness-awareness apparatus C is a subset of the human particular being H
- H is a subset of the Universe U
- C is a subset of U (transitivity)

Conclusion 1 : Human brain belongs to and is a way for the universe to be aware-conscious of itself.

Conclusion 2 : The classical semantics must be extended in order to take into account the fact that the brain is the only organ that knows that it exists and that the universe can know that it exists thanks to its « human forms ». Two new personal pronouns must be created :

- « I » that stands for a particular (human or not) form: I know that I exist as L. D.
- « I^I » or « u_I » that stands for the Universe expressing itself through one of its particular forms (Translation: « I^I » stands for ME expressing MYself through one of MY particular forms).
- « i » that stands for the brain as the only organ knowing that it exists; « i » know that i exist and that i am prisoner of a body.

The brain says : « i » am a brain. The human being says « I » am human. The universe says : « I^I » am the universe. So we have three different personal pronouns used by the same entity.

A lot of other consequences are implied by the possibility for the universe to be aware-conscious of itself, but this is the object of other articles.

What is of interest for us here is this : if another entity than the human being can express the consciousness of its own existence, as it seems to be the case, we will be able to express in an analogy the existence of similar ontological self-references.

5. Some Remarkable Self-Referential Analogies

Now it's time to use self-references in analogies.

5.1. Syntactic Self-Referential Analogies

Question 1:
: : : : : : : : ?

Answer :

:: is to :: as : is to :

We have here a simple or static self-reference.

Question 2:
X : Y :: Y : X : Y : X :: X : Y : Y : X :: X : Y : X : Y :: Y : X : : Y : X :: X : Y : X : Y :: Y : X : ?
Answer :
X : Y :: Y : X : Y : X :: X : Y
So the complete analogy is :
X : Y :: Y : X : Y : X :: X : Y : Y : X :: X : Y : X : Y :: Y : X : : Y : X :: X : Y : X : Y :: Y : X : X : Y :: Y : X : Y : X :: X : Y
Here is a simple way to solve this complex item :
Question 2 broken down:
X : Y :: Y : X :
Y : X :: X : Y :
Y : X :: X : Y : X : Y :: Y : X
: :
Y : X :: X : Y : X : Y :: Y : X : ?
Answer :
X : Y :: Y : X : Y : X :: X : Y

5.2. Semantical Self-Referential Analogies

Semantical self-references bring into play the meaning of the words used in the analogy.

Question 1:
Eror : Correct : Error :: ?
Answer :
Incorrect : ?

Explanation : Incorrect is to Error (because Error does not contain an error) as Correct is to Eror (because Eror does contain an error). Eror is self-referential as long as it is admitted to have the meaning of the word « error ».

Question 2:
Analogy : : :: : :: Question : ?
Answer :
?
Explanation: "?" is to Question as ": :: :" is to Analogy.

Here is the self-reference : the symbol of the question in the analogy is the answer to the analogy. We have here a "simple" or "static" self-reference because there is no "mise en abyme".

Question 3:
Repetition : Repetition :: Disappearance : ?
Answer :
A blank « »

Explanation : The word « repetition » is repeated ; the word « disappearance » disappears.

Question 4:
Raga Man. : Anagram. :: Gran Ma A. : ?
Answer :
Raga Man. : Anagram. :: Gran Ma A. : Anagram.

Question 5:
Raga Man : Anagram :: Se quen ce : ?

Answer :
Raga Man : Anagram :: Se quen ce : Sequence

Question 6:
Raga Man : Anagram's Anagram :: Raga Man : Anagram's Anagram :: emordnilap : palindrome : ?

Answer :
Raga Man : Anagram :: Raga Man : Anagram :: emordnilaP : Palindrome : Self-referential Relations
Explanation : Self-referential Relations is to Raga Man : Anagram :: emordnilap : palindrome as Anagram's Anagram is to Raga Man

Question 7:
Whole :Whole : … : : Hole : : : Hole : ?

Answer :

Whole :Whole : … : : Hole : : : Hole :

Explantion: A blank is to "Hole" as the whole analogy is to "Whole"

Both simple or static self-reference (the answer) and dynamical self-reference (the first part of the analogy).

Question 8:

Whole : Whole : … : : Whole : ? : : Whole : ?

In order to understand and solve this analogy, let us consider a more simple case:

Question 8.0 :

Whole : ? :: Whole : ?

Answer :

Step 1:

Whole : Whole : ? :: Whole : ? :: Whole : Whole : ? :: Whole : ?

First we replace the first question mark (reading from left to right), and after that the second question mark with the same elements.

Step 2:

Whole : Whole : Whole : Whole : ? :: Whole : ? :: Whole : Whole : ? :: Whole : ? :: Whole : Whole : Whole : ? :: Whole : ? :: Whole : Whole : ? :: Whole : ? :: Whole : Whole : Whole : ? :: Whole : ? :: Whole : Whole : ? :: Whole : ? :: Whole : Whole : Whole : ? :: Whole : ? :: Whole : Whole : ? :: Whole : ?

.
.
.

The process is infinitely repeated. We have a double «mise en abyme».
At each step, every question mark must be replaced by the entire "sentence" of the previous step. The process is exponential and leads to the building of a fractal analogy.

Now back to question 8:

Whole : Whole : … : : Whole : ? : : Whole : ?

In this version, the initial left question mark has already been replaced by the whole analogy (version 8.0) so that there is a shift between the two parts of the analogy. Now, the two visible question marks must be replaced by the whole analogy such as expressed in question 8, which gives :

Whole : Whole : … : : Whole : Whole : Whole : … : : Whole : ? : : Whole : ? : : Whole : Whole : Whole : … : : Whole : ? : : Whole : ?

Question 9:

Part : Part: Part: Part: (…) :: Whole : ?

Answer :

Part : Part: Part: Part: Part:(…) :: Whole : Part: Part: Part: Part:(…) :: Whole: Part: Part: Part:(…) ::Whole :Part: Part:Part: (…) :: Whole:(…)

Again focus on « parts » and « whole », but in a converse process. The whole analogy, including the "?", is to "Whole" as the part "Part :" of the analogy is to "Part".

The first part of the analogy induces a linear self-reference ; the second part of the analogy induces an exponential self-reference.

In any case, we have a dynamical self-reference : the answer contains the question and consequently the answer. The question mark is an essential element of the non-solved analogy; it is replaced by the answer to the analogy, so it is the key and the generator of the «mise en abyme» process. And we have again a fractal analogy. Fractal analogies are good examples of Logico-Divergent solutions. Let us recall that Logico-Divergence is a standard (logical) process that leads to non-standard (divergent, non expected) solution(s) (conclusion(s), answer(s)).

Let us note the difference between the infinity implied in a potentially infinite series and the infinity of a fractal analogy. The fractal infinity induces a temporal dimension.

5.3. Ontological Self-Referential Analogies

Here the analogy is a way to express self-reference in its other acceptance : the ability for an entity to express its own existence through the personal pronoun « I ».

We have seen that something in the human being (the brain), and something that uses the human being to express its own existence (the universe) know their own existence. Indeed, the human brain is the only organ that knows that it exists. And the universe can know that it exists thanks to its « human part ».

The brain says : « i am a brain ». The human says : « I am human ». The universe says : « I^I am the universe ». So we have three different (voluntarily spelled as they are) personal pronouns used by the same entity.

Expressed in a three-parts analogy, it will give :

Brain : « i am » :: Human : « I am » :: Universe : « I^I am »

« I^I am » is to the universe (consciousness) as « I am » is to the human (consciousness) as « i am » is to the brain (consciousness).

We will call « infra » self-reference the awareness-consciousness of the brain; self-reference the awareness-consciousness of the human being; supra self-reference the awareness-consciousness of the universe. In the same way, we can call « infra » awareness-consciousness the awareness-consciousness of the brain; awareness-consciousness the awareness-consciousness of the human being; supra (or higher, or meta-) awareness-consciousness the awareness-consciousness of the universe.

Higher consciousness is the result of a qualitative jump. Nothing, in human consciousness, the last and most qualitative step in evolution, allows to foresee the occurrence of supra-consciousness, i.e. the consciousness-awareness of MYself as whole. I^I will call Meta-Consciousness or Metaphysical Consciousness the consciousness of MY-self as Whole (entire reality).

This analogy illustrates the birth of a new paradigm, maybe the best example of Logico-Divergence. If confirmed, the discovery of the existence of three existential identities in a same entity constitutes a cognitive, semantic, psychological, logical, physical and metaphysical revolution. Numerous consequences can be drawn from this discovery, and this is the object of other articles.

Conclusion

An analogy can be seen as an inference from one particular (source) to another particular (target), contrary to major inferences like the deduction,

the induction and the abduction, where at least one of the premises or the conclusion is general. An analogy is in itself a weaker form of inference. Now it constitutes the basis necessary for other kind of inferences as it is the first step and the simplest way to highlight relations between elements. And if we combine the principle of the analogy with the process of self-reference, we have seen that it becomes a very powerful tool to create and/or to subsume semantic and conceptual « mise en abyme » and fractals expressed in the Aristotelian format « x : y :: a : b ».

We saw that very interesting self-referential analogies can be found in what is called Power Test (more particularly in the 9I6 test and in the Concep-T test) in a kind of underground community made of people interested in high level solving problems and high performance in cognitive abilities. Some original self-referential analogies were even created for these Power Tests. Analogy appears to be very useful in scientific and artistic problems solving. Power Tests constitute one of the most exciting problem solving contexts. This is why analogies used in them can reveal useful in larger context like science and art, especially when they imply self-references. With conceptual self-references illustrated in three-parts analogies, we have the expressions of highest levels of abstraction where a « qualitative » conceptual jump is necessary in order to understand the solution.

These original self-referential analogies allow to extend the typology of kinds of abstraction and to suggest a classification of the different ways of understanding the solution of a problem. So we suggest a typology of six kinds of cognitive abilities :

- The answer is found without help.
- The answer is understood without explanation.
- The answer is understood with an explanation and without particular mental effort or concentration : it may be the case with self-referential sentences.
- The answer is understood (with or without explanation) with some concentration : it may be the case with numerical series, for example.
- The answer is understood (with or without explanation) with some mental effort : it may be the case with dynamical self-references.

– To be understood, the answer (with or without explanation) need some « qualitative mental jump » : it is the case with problems implying meta-consciousness.

In any case, the solution to a self-referential problem is under the eyes.

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