



## Words for Science

### KEYWORDS

Sorites, language, inferences, logic, non-classical logic

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**ABSTRACT** *In this article, we progress further into our semiological studies. We here sketch a procedure to include words in Science and a set of criteria to judge inclusion levels of those. Objectivity cannot be attained in Science if we do not choose our words extremely well: We choose the word heap and spend even millennia talking about the problem we have created, but if we had put more thought into the words we include in the scientific literature, we would actually not have a problem. We would have at most an allurements to show how many problems could be created in Science out of the freedom that common language terms allow us to have instead. A bit more thinking when designing a scientific problem and we will be able to optimize the distribution of investment in Science, what will then allow us to solve many more problems that matter.*

### Introduction

It all started with our studies on the Sorites Paradox. Whilst performing those, we noticed that the limitations imposed by the own human beings to their mental faculties, as well as to the expression of those to others, has led people from Philosophy to treat The Sorites as a computer-friendly problem.

In this article, we prove that there is no sense in applying any inferential system that originates in Non-classical Logic (NCL) to natural language (NL) as a whole, rather than to exclusively the terms that point to a univocally determined object.

People like Frege started precursor work on studying the terms of language from a very objective perspective (Zalta, 1995). Frege has split each term of the language into two components: *denotation* and *sense*.

Frege did not consider the *personal meaning*, or *private logic*, as we call it, in his theories. He calls different senses of the *number four*, for instance, *4* and *8/2*, and says that both *4* and *8/2* denote the same entity in the world, which would be *four units*, what then implies that *4* and *8/2* have the same denotation (four items of something). We hold strong criticism to Frege's view, for not only if a person had intended to express the idea of the four units, they would have used *4* and not *8/2*, but *4* and *8/2* are not two different senses of the same *sigmatoid*.

If a person states *I ate 8/2 of pizza*, and they would like to denote *4 pizzas that were cut into two halves* through their *speech function*, their oral expression is pointing at something that is not simply *4*.

Basically, each and every *sigmatoid* will acquire a temporary meaning each time it is used by someone on earth, not mattering if we talk about use through reading, hearing or writing.

This temporary meaning will only by infinite amount of luck, almost all the time, coincide with the dictionary meaning.

Adaptation and personalization of what relates to us seem

to be a constant in human kind.

The United Nations has declared that a human being is only a human being if the article 22 of (United Nations, 1996), the one that has to do with free development of personality, is respected. Well, they did not use these words, but human rights are considered basic elements to include a person in the set of those seen by others as human beings, and every human being should enjoy all human rights, so that we can assert things the way we have just done.

To make sure that the formation of the personality of the individual is free, we would have to accept that a person may simply like the sound of a *sigmatoid*, for instance, and use that *sigmatoid* for everything on earth, perhaps by simply pointing at things and pronouncing it.

Are people who do what we have just described logically wrong? Should they be fined each time they do it? Are they applying an almost infinite number of senses to the same *sigmatoid*?

We do not think so: Oral, or written, production of language is something ultra-personal and has to be always analyzed from this perspective.

There is obviously a limit for Science: Nobody can be told that *they cannot write or speak the way they do*, for instance. They may, at most, be told that, considering a specific intent, their language usage is inadequate, or not suitable.

Language is then formed of *sigmatoids* and each *sigmatoid*, when used in discourse of any nature (written, oral, and etc.), receives a *load*, let's say, which is what we could call *energetic context of the sigmatoid*. This context is basically formed of whatever is in the mind of the individual when they use the *sigmatoid* (reading, writing, and etc.).

Tarski, Russell, Gentzen, and Frege had some intersection in terms of lines of work, but it was Gentzen who gave the greatest contribution of all to Classical Logic: The symbolology (see (Gentzen, 1939), as mentioned in (Mints, 2011)).

Working out which symbols of the human language give us an interpretive function whose inverse comes back to the departure element is obviously the worst part of the story. That is what Gentzen did.

One interesting thing to notice is that each one of the symbols of Gentzen refers to sigmatoids which do not lead human beings to imagine pictures as they use them.

In fact, we could now theorize that if one gets to have a mental image for a sigmatoid, such as it happens with *hill*, then there is no chance that the association (*sigmatoid*; *real world object x*) be passive of bijection (both (*sigmatoid*  $\rightarrow x$ ) and ( $x \rightarrow$  *sigmatoid*)).

This is then one more explanation as to why the *Sorites Paradox* was just a mistake, similar to the Parallax Mistake, which could have been called Parallax Paradox in the beginning: The language of the problem could never have been that of Classical Logic (*heap?* Say *yes* or *no*).

Any mental image that appears during the day, inside of a person's mind, whilst the person is alert, must be a fruit of their imagination, and therefore will obviously contain all complexities from their psychiatric and psychological worlds. That makes it (perhaps almost) impossible that we have the world object *x* appearing repeatedly, even if we consider the simplest case of all, that involving the own person repeating a sigmatoid, in our speech/interpretive function.

Science is obviously about the absolute: Nobody can say that they are doing Science if whatever they write, or talk about, generates double interpretation in the mind of the average listener (or the reader) of their work.

Philosophical papers proving a simple statement usually have more than ten pages while one page is usually enough for a theorem in Mathematics, for instance, to be fully proven.

If proving a point, in a universal way, in Philosophy, takes us at least ten times the time it takes us to prove a theorem in Mathematics, it has to be the case that we must think for longer (ten times more at least) when preparing ourselves to discuss (purely) human events than we do when preparing ourselves to discuss machine-friendly ones.

That, per se, is a statement on the level of complexity of the elements involved in all and this statement provides us with an obvious proof regarding the complexity of the relationship *human beings x world objects*: Whenever a human being performs some action (philosophical papers are usually about words that people wrote or said, or events people have observed), that is, whenever there is some interaction between human beings and world objects, the complexity of the events is at least ten times bigger than the complexity of the events in which no human being interacting with the object of discussion is a rule.

Mathematics is a place where abstract symbols interact with abstract symbols, so that nothing could be simpler or more machine-friendly: Abstract symbols are not normally in our imagination; all of them are *introduced* in our minds artificially, so that when they are introduced, there is no chance for us to hold emotional, or subjective, memories on them.

They are *unnatural* things for us, and the fact that they

are the most unnatural things on earth for us makes them be the most isolated entities in our universe, or the most abstract, so that it is severely unlikely that we do not understand what is being stated on them any time we read, or listen to, assertions that involve them, what obviously makes communication extremely objective and easy.

If we think of our higher levels of reasoning as being a *psi*, each time our discourse hits *psi*, we get out of the computational world, therefore we get away from the logical universe: We are not necessarily away from the Logic universe; however, when doing that, for it is still possible that a human being performs an action that be fully included in the World of Logic, yet one that be fully human, that is, that escape the machines, or passive-of-programming, world.

For instance, person *X* sees a fifty dollar bill that does not belong to them over the table. Invariably, in this sort of situation, they will look around to see if they are on their own and, if that is the case, they will steal it.

That may not be an acceptable action for us, and *X* might not be an acceptable human being for us, but that is something *X* always does, as a rule.

Therefore, for *X*, that is a fully logical action, as automated as a computer program action.

There will be people on earth, in the average universe, who will come up with a thousand theories as to why *X* does what *X* does and as to how we can change their behaviour.

Are we able to assert that *X* will always do what we have described here, like even if we use Pavlov's theories (McLeod, 2007) to condition them not to do it, for instance?

#### **Obviously not.**

Are we able to assert, without any sort of fear, that *X* will definitely do it in a next time?

Suppose someone says that we will get one million dollars if *X* gets that particular fifty dollar bill in front of them when nobody is around, and, if *X* does not do it, we will lose money we cannot even dream about.

Are we going to dare playing this game and risking this much?

The answer is obviously *no*, for even a fully retarded person may change action patterns all of a sudden.

The unpredictability of the results of the experiments with humans is obviously what makes each and every piece of the human actions belong to the statistical, rather than to the mathematical, or computational, realm.

Therefore, all human actions are contained in the complementary set to that of the computer systems.

They are contained in the complementary set to that of the mathematical systems as well, since Mathematics involves, at most, Classical Logic, but the computer systems set involves also all the Nonclassical Logic systems.

Philosophy should involve all logical actions of human kind that be statistically observable, therefore should involve way more than what is involved in the computers systems.

We call all three levels of reasoning scientific: mathematical, logical, and purely philosophical.

Notwithstanding, the only level we, considering all that we have access to, may be sure to progress on is at most the level of the computer systems, that is, we can judge with no mistake (as for all we know, have access to) things that are at most on the level of the computer systems.

Does that mean that the truths up to there are eternal and surely absolute?

Not at all. It is definitely possible that we find a more evolved race, for instance, with members who have even fewer neurons than women (scientists have proven that women have fewer neurons than men ((Heilman, 2005), but please disregard the information about creativity from this source, since it cannot possibly be true). Yet, they are able to do all that men do. Put together with their ability to have kids, therefore deciding on whether the race keeps on growing or stops forever, dying and disappearing, that makes of women something superior, or more evolved, to men, what does associate evolution with less head material), which will be able to find all our *faults* when producing results and theories even in the lowest level of all, that of Mathematics.

All our Science is then a *relative place*.

Perhaps we should state that *for our race, as for all we have access to, considering all our limitations, this is an absolute truth* each time we write books or papers in Mathematics or Computer Science, since that happens when humans try to become *eternal* and prove they are *meaningful* in a universal way.

We should aim at reducing mistake in Science as much as we can.

One simple thing, which looks irrelevant, but is actually one of the most important items of all, is the scientific jargon, the *Language of Science*.

In this paper, we attempt to determine which words are suitable for Science and therefore allow progress of true nature to take place.

### Once more, The Sorites

This is the original *sorites*:

- A) This is a *heap*
- B) Subtracting one grain cannot stop it from being a heap (it is preferable treating the Sorites in the negative direction instead of the other way around in scientific presentations)
- C) Therefore, this, with a grain less, is still a heap
- D) Loop (back to A, then B, then C, then back to A, then B, then C, and etc.) until there are no grains left

The most obvious problem, from a semantical point of view, is that *heap* and *this* may be pointing at any of their allowed possibilities in language (dictionary): Just for starters, *heap* of what (sand, sorrow or others)?

Because people may use *heap* as they please, that is, in a discretionary way (how many grains?), the next question is *whose heap do we talk about?*

Suppose that Mary thinks it is a heap of sand and she is presenting it to an audience.

Suppose that John is part of this particular audience and disagrees with Mary: In asked what he would need in order to see a heap of sand there, John said that he would need to see four times the current amount of sand.

John, however, thinks that this is irrelevant for Mary's proposal, and gladly, mentally, he replaces Mary's heap with his.

Suppose that nobody in the audience will manifest themselves: They will all go with whatever John and Mary decide.

A *logical observer*, and that, we assume, could be us, would then stop all and tag both heaps (John's and Mary's).

As Mary subtracts one grain, John sees his heap in his mind.

Up to this moment, he agrees: no difference, the *thing* is still *his heap*.

Another person, who was not present there, but read all that, instead of imagining a heap of sand imagines a heap of beans and sees one grain in the proposal as being one bean... .

We now have a problem: Science must be universal in all its pointers so that a reader is able to understand even better than a real-time watcher.

The problem proposed in the way that we have described here is not scientific enough, for if it was scientific enough for John, who has accepted *imagining*, in his own head, the problem adapted for his own heap, it is not scientific enough for the general reader.

Besides, suppose that we *pick* the intersection of Mary's and John's heaps and then say that the resulting heap is definitely a heap. What is wrong with this move?

First of all, Mary has not agreed that the resulting heap is definitely a heap... .

Taking away one grain of extremely rocky sand, the one that has been imagined by Mary, whose house is by the beach, is very different from taking away one grain of extremely fine sand, the one that has been imagined by John, for, in Mary's case, the grains are so huge that one grain will make, in fact, a significant difference.

In Mary's mind, by the thousandth grain subtracted, we would already not have a heap, but John would take a long time subtracting grains until he reached the same conclusion: The amount of grains would then be completely different in terms of time to get to the point where the non-heap appears for sure.

Then, let's now proceed like the *numberphiles*: The inferential step is 100% true for that audience minus John, Mary's heap, and until the thousandth grain is reached.

Person x, who was not present on the date, in reading all that, and in seeing a picture of John's and Mary's heaps, may think that, on the eight hundredth grain out, it is not a

heap anymore... .

Our numberphiles wished for scientific, therefore universal, truth. How is that possible now?

All this seems to relate to Bloom's taxonomy (Coffey, 2008): Only words that *sacrifice* us up to the mental level *Application* when we use them might be called *scientific*.

This way, *red*, for instance, would not be scientific, or *heap*, for the trial of using these words in a scientific context should demand that we went up to the mental level *Evaluation* (it suffices that we consult the list of verbs (Coffey, 2008b) to know the level of reasoning we are at).

Notice that Gentzen's terms demand that we use at most the level of reasoning *Application*, since it is just translating elements of language into symbols, in principle (we here consider where we are in the vast majority of the time when assessing terms and deciding on their placement inside of the Bloom's Taxonomy).

To be passive of inclusion in the Universe of Science, an element of discourse needs to be:

Unnatural (the element appears from manufacturing it);

An entity that *exists per se*, that is, that does not need to have any association with human beings to exist (for instance, the symbols of Classical Logic, such as =>); and

Part of a language which is dominated by the vast majority of the world, that is, a language that be considered universal (logical symbols or English, for instance).

Notice that the scientific acceptance of a sigmatoid is directly proportional to our ability to judge its application in terms of scientific accuracy.

### Conclusion

Every word that is translated into symbols for the purpose of scientific deduction needs to be univocally translated by everyone who reads it. Therefore, either those symbols are passive of being taught like the linguistic symbols, univocally determined by rules and speech, or they cannot be used in linguistic analysis of any sort (mathematical analysis being an example).

For a term to be considered scientifically OK, it has to: be unnatural, exist *per se*, and be expressed in a universal language.

We may make use of the Bloom's Taxonomy to decide on whether a term is a good candidate to become part of Science or not. In this case, we must study the level of reasoning we reach when applying the term to something: What counts is the level on which we most remain in this case.

We must create a concern with the words we use in Science to better guarantee long life to our statements and to reduce the chance of committing mistakes in general (as a race).

It is wise re-writing our statements in the language of Science, from a personal perspective, because the more we include people in our discussions, the more chances we will have of fixing our theories whilst alive and, with that, perpetuating our own names.

Perhaps we should always state that *for our race, as for all we have access to, considering all our limitations, this is an absolute truth* each time we write books or papers in Mathematics or Computer Science, since that happens when humans try to become *eternal* and prove they are *meaningful* in a universal way.

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