



SEEDS HackSciArt

SEED 07-IA

RESEARCHERS

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1. ESSENTIAL DIMENSION

(Objective descriptive information of the scientific seed)

NAME

“Complexity and indefinability”

KEYWORDS

Arithmetic theories, computational complexity, incomputability, incompleteness.

BRANCH

Mathematical logic.

ABSTRACT

The work in mathematics and in general the deductive work within a science, advances to a great extent by introducing new concepts that are formally expressed together with their basic properties. New properties are then deduced through a fairly formal and to some extent automatable process. However, these formal methods have quite strong limitations. Turing's or Godel's results show that there are problems that we cannot solve algorithmically or truths that cannot be demonstrated in fundamental theories. Usually, this phenomenon is shown in the existence of a certain maximum level for the complexity of the notions and results that we can handle within a certain formalism. This raises the question: how can we become aware of the limits of our scientific methods? What practical implications does the existence of these limits have?

METAPHOR

Not only our personality or our way of seeing the world prevents us from appreciating many aspects of what surrounds us, but possibly we are not even capable of expressing what we ignore.

PHASES OF THE USUAL SCIENTIFIC METHOD

1. Isolate the principles we want to study (for example, Induction)
2. Express these principles in a formal theory.
3. Characterize interesting properties of the models (interpretations) of these theories.
4. Apply the previous results to show the expressive limits of the theories obtained.

TOOLS

My work only develops formal aspects (quite abstract) of the processes of computation or formal proof.

RESOURCES

1. 01_Journal Paper_Cell Report
[https://www.cell.com/cell-reports/fulltext/S2211-1247\(22\)01075-0](https://www.cell.com/cell-reports/fulltext/S2211-1247(22)01075-0)
2. 02_Informative article
https://elpais.com/ciencia/2022-08-23/parecidos-por-fuera-y-por-dentro-personas-desconocidas-con-caras-similares-comparten-un-adn-semejante.html?event_log=go&event_log=go
3. 03_Summary Graph



2. ADDITIONAL DIMENSIONS

(The following sections add subjective information from the scientific seed, in order to inspire creatives in the creation of a SciArt work. Some of the sections may not have information if the researcher chose not to specify anything.)

SCIENTIFIC MOTIVATION

I am fascinated by the nature of the results that are obtained. They bring us closer to the limits of mathematics in a very strong sense.

A recurring theme of my work is identifying the expressive limits of various (formal) languages. For example, what problems can NOT be solved by algorithms (of a certain family)? Are there truths that we cannot formally demonstrate in a theory?

METAPHYSICS

How does our DNA determine our way of being and acting in the world? Are we really free of thought and action, or does our genome determine our decisions?

ETHICS

Showing limits to algorithmic formalisms and methods helps set a limit to the blind trust we can place in the AI.

COLORS

White, sky blue.

AROMAS

Citrus, alcohol.

FLAVORS

citrus, bitter

SOUNDS

Unanswered.