

On the hunt for universal intelligence

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On the hunt for the universal intelligence test. Credit: SINC

How do you use a scientific method to measure the intelligence of a human being, an animal, a machine or an extra-terrestrial? So far this has not been possible, but a team of Spanish and Australian researchers have taken a first step towards this by presenting the foundations to be used as a basis for this method in the journal *Artificial Intelligence*, and have also put forward a new intelligence test.

"We have developed an 'anytime' intelligence test, in other words a test that can be interrupted at any time, but that gives a more accurate idea of the intelligence of the test subject if there is a longer time available in which to carry it out", José Hernández-Orallo, a researcher at the Polytechnic University of Valencia (UPV), tells SINC.

This is just one of the many determining factors of the universal

intelligence test. "The others are that it can be applied to any subject – whether biological or not – at any point in its development (child or adult, for example), for any system now or in the future, and with any level of intelligence or speed", points out Hernández-Orallo.

The researcher, along with his colleague David L. Dowe of the Monash University, Clayton (Australia), have suggested the use of mathematical and computational concepts in order to encompass all these conditions. The study has been published in the journal *Artificial Intelligence* and forms part of the "Anytime Universal Intelligence" project, in which other scientists from the UPV and the Complutense University of Madrid are taking part.

The authors have used interactive exercises in settings with a difficulty level estimated by calculating the so-called 'Kolmogorov complexity' (they measure the number of computational resources needed to describe an object or a piece of information). This makes them different from traditional psychometric tests and artificial intelligence tests (Turing test).

Use in artificial intelligence

The most direct application of this study is in the field of [artificial intelligence](#). Until now there has not been any way of checking whether current systems are more intelligent than the ones in use 20 years ago, "but the existence of tests with these characteristics may make it possible to systematically evaluate the progress of this discipline", says Hernández-Orallo.

And what is even "more important" is that there were no theories or tools to evaluate and compare future intelligent systems that could demonstrate intelligence greater than human intelligence.

The implications of a universal [intelligence test](#) also impact on many other disciplines. This could have a significant impact on most cognitive sciences, since any discipline depends largely on the specific techniques and systems used in it and the mathematical basis that underpins it.

"The universal and unified evaluation of intelligence, be it human, non-human animal, artificial or extraterrestrial, has not been approached from a scientific viewpoint before, and this is a first step", the researcher concludes.

More information: José Hernández-Orallo y David L. Dowe.

"Measuring Universal Intelligence: Towards an Anytime Intelligence Test". *Artificial Intelligence* 174(18): 1508, Dec 2010. [DOI: 10.1016/j.artint.2010.09.006](#)

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