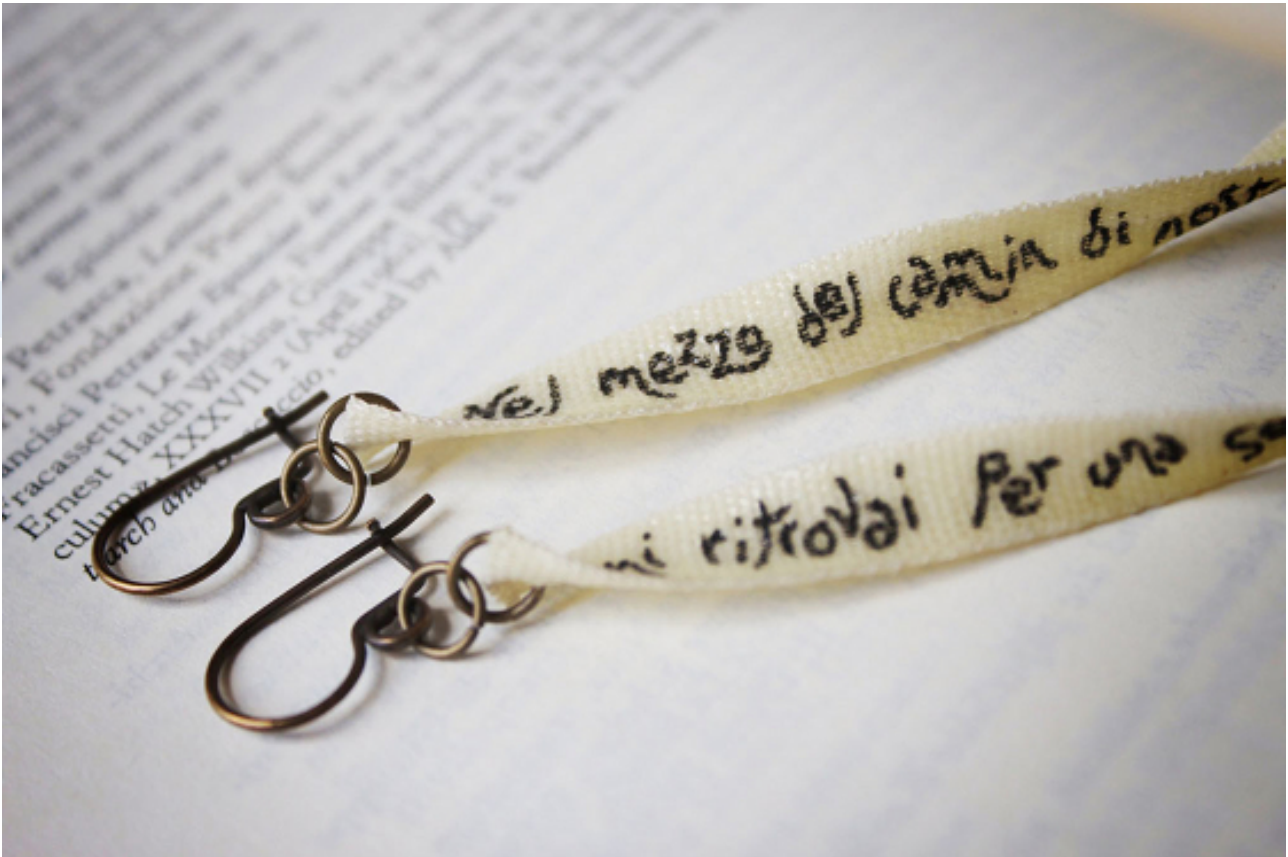




Paths and Spaces of Language



Pole Position for international project headed up by SISSA's Alessandro Treves

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A “three-handed” project which has the International School for Advanced Studies (SISSA) in Trieste collaborating with the University of Tel Aviv and the Ecole Normale Supérieure of Paris has been awarded a program grant by the *Human Frontier Science Program* for over a million dollars. The funding will be used to study “analogical processes” at the foundation of human language, a largely unexplored field.

This award comes as another success for SISSA, which continues to win international research grants. This time, congratulations are in order for SISSA Professor in the area of Neuroscience, Alessandro Treves, who was awarded (along with linguist, Naama Friedman of the University of



Tel Aviv and theoretical physicist, Remi Monasson from the Ecole Supérieure de Paris) a grant by the Human Frontier Science program, an international organization that supports excellence in scientific research involving interdisciplinary and international collaboration. The project was ranked first out of the twenty-five funded projects chosen from 672 initial proposals.

The grant of \$1.05 million over the next three years, will allow the three researchers and their teams to collaborate beyond current research programs, in order to explore new possibilities that can only be made possible with an interdisciplinary approach. Treves is project coordinator. "Analog computations underlying language mechanisms" is the title of the research, which is being conducted in such a highly original and innovative field that it may even turn out to be the beginning of a new area of research: the study of analog computing at the base of human language.

To better understand, imagine the sequence of phonemes which makes up a word. How is it encoded by the brain? The current hypothesis is that somewhere in the cerebral cortex (in the lower left inferior frontal gyrus when the word is being produced, further back in the temporal lobe when it is being heard) the word is represented as a "trajectory" in a "space," which is certainly multidimensional and complex, but no one has ever tried to imagine its structure. Understanding and describing this structure, however, is essential for understanding how a continuous and extremely variable trajectory can correspond to a precise sequence of phonemes. This "match" must be learned by the individual, because it depends on the language used. The project proposed by Treves and his colleagues will investigate the learning processes of analog-digital correspondence, both at the phoneme level, as in the previous example, and at the level of higher linguistic mechanisms that have evolved culturally and help us to remember verbal material such as meter and rhyme. In this way, the basis for poetry will be explored through Dante's triplets, using mathematical models and brain imaging.

The fact that the Treves and colleagues project finished in "pole position" is further recognition not only of the value of SISSA and its scientists, but also of their individual capacity, both individually and in collaboration, to follow their curiosity rather than the logic of scientific research management, to go in new and original directions that are often ignored by the mainstream. As Treves explains, "This project came about in a very unpredictable and unplanned way from ideas developed in an area which may appear completely unrelated: spatial memory, in collaboration with 2014 Nobel laureates, Edvard and May-Britt Moser."

USEFUL LINKS:

- **Human Frontier Science Program website: <http://www.hfsp.org/>**



IMAGES:

- Credits: Roberta Cortese (Flickr: <https://goo.gl/Hl9ooe>)

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