



International School for Advanced Studies

## How rats see things



### Rodents recognize objects using sophisticated perceptive strategies

03 April 2013

The image of an object, when projected into the eyes, may take on the most diverse shapes depending on the chosen point of view, as this can change its distance, perspective and so on, yet generally **we have no difficulty in recognizing said object**. This is a well-known notion that concerns humans and primates, yet now **Alireza Alemi-Neissi, Federica Rosselli and Davide Zoccolan** of **SISSA** (the International School for Advanced Studies of Trieste) have shown that also rats possess such a sophisticated visual recognition ability, and that their brain employs complex strategies. The study has been just published in *The Journal of Neuroscience*.

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Sight is such a spontaneous activity that we are unaware of the complexity of the brain mechanisms it implies. For instance, we easily recognize objects, which appear to look always the same, without realizing that we observe them from **ever-changing points of view** and that their



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image – the luminance profile cast onto the retina –varies significantly each time we look at them.

To maintain such “invariance” in the shape, our brain performs procedures that extract from the two-dimensional image “key” visual information that enables us to recognize the object under any condition. Scientists believe that such ability belongs to humans and to other primates, but whether such ability may be applied also to other mammal species is still controversial.

In the experiments carried out at SISSA the rats observed objects under variable conditions regarding size, position, distance and points of view. The objects were covered with masks that exposed them only partially. The rats showed a great ability to evaluate whether two objects were identical or not.

Such experiments have shown that the recognition strategy employed by the rat’s brain is based upon the gathering of the visual characteristics of the object which maximize the available information. In practice, the visual system of the rodent identifies and actively looks for the most typical features of the object which are subject to the smallest changes with each perspective variation.

The study therefore confirms that rats can reveal plenty of information on the functioning of sight, also in humans. “Such observations suggest that the rats’ visual system may act as a powerful model to study the neural basis of object recognition” Zoccolan commented.

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**Image credits:** SISSA

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**Contacts:**

Communication Office:

[pressroom@sissa.it](mailto:pressroom@sissa.it)

Tel: (+39) 040 3787557 | (+39) 340-5473118, (+39) 333-5275592

via Bonomea, 265

34136 Trieste

For further information on SISSA: [www.sissa.it](http://www.sissa.it)