

# THE MAGIC OF THE PUPILS OF YOUR EYES

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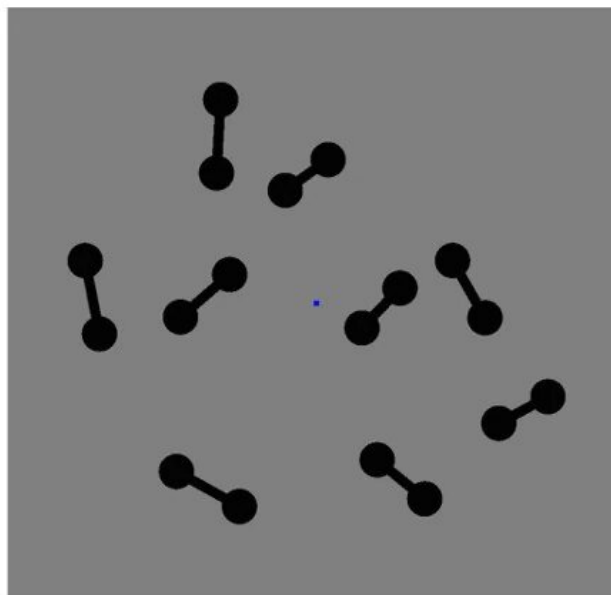
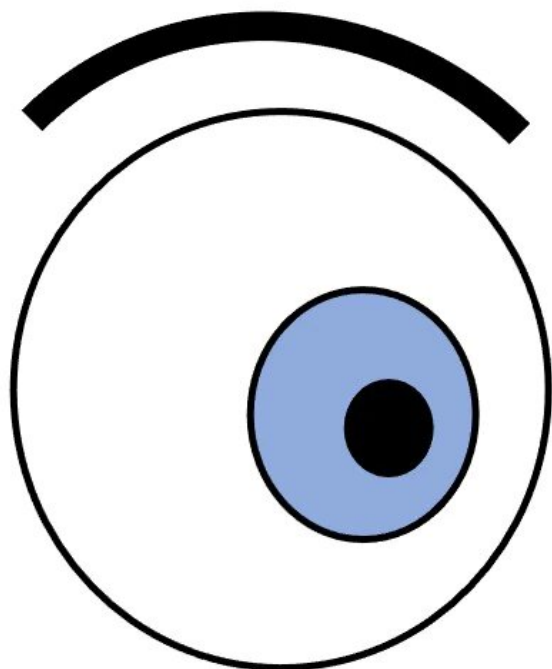
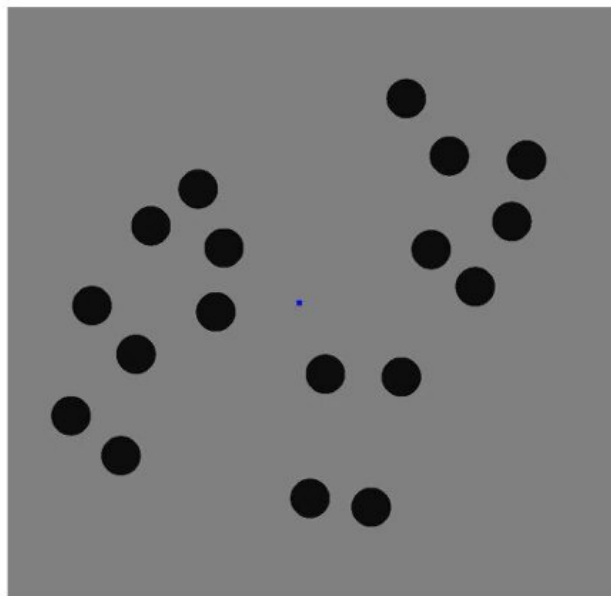
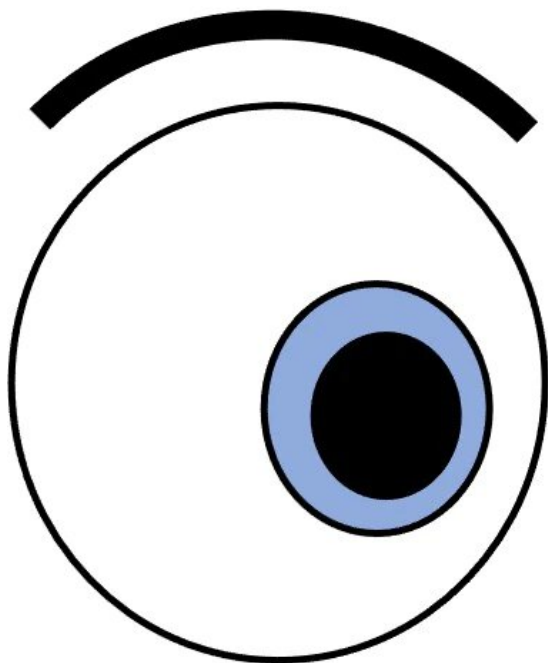




Figure 1. Credit: University of Sydney

The mechanisms by which we measure quantity reside in our students. This is the result of a study by the School of Psychology at the University of Sydney in collaboration with the Universities of Pisa and Florence (Italy), which was recently carried out in. has been published *Nature communication*.

“When we look around, we spontaneously perceive the shape, size, movement and color of a scene. We perceive the number of objects in front of us just as spontaneously. This ability, which is shared with most other animals, is an evolutionary foundation: It immediately reveals important variables, such as how many apples are hanging on the tree or how many enemies are attacking,” says co-author Professor David Burr from the Universities of Sydney and Florence.

Information about numbers is so important that most species are believed to have a “number sense” of their own,” said Professor Burr of the School of Psychology.

Given the importance of the spontaneous perception of quantities, scientists asked whether it could be revealed by a primitive, automatic physiological response.

The pupillary light reflex is probably the most automatic physiological response: it narrows when there is light and expands when it is dark. “Recent research from our laboratory shows that pupil size is also regulated by cognitive and perceptual factors,” said lead author Professor Paola Binda from the University of Pisa.

The present study took advantage of this discovery. To a group of adult participants, the researchers presented images with a variable number of points (1

8 or 24) that were either isolated or connected by lines (see Fig. 1). Connecting the dots into dumbbell shapes makes the dots appear fewer (even though they are the same number), a familiar illusion.

Participants passively observed the patterns without paying particular attention to the number of objects or other attributes they contained.

Although the number of pixels (black or white) was the same for all samples, the diameter of the pupils of the participants varied according to the number of points perceived; they were greatest when the perceived number was high and smallest when it was low.

“This result shows that numerical information is inextricably linked with perception,” said Dr. Elisa Castaldi from the University of Florence. “This could have important practical implications. For example, this ability is impaired in dyscalculia, a dysfunction of math learning, so our experiment can be useful in the early detection of this condition in very young children. It’s very simple: subjects simply look at a screen without actively reacting, and their pupil reaction is measured remotely. ”

Pupillary reaction to glare illusions of different colors

**More information:**

Elisa Castaldi et al., The student reacts spontaneously to perceived numerosity, *Nature communication* (2021). DOI: 10.1038 / s41467-021-26261-4

Provided by the University of Sydney

**Quote:** More Than Light Detectors: The Magic of the Pupils of Your Eyes (2021, October 25), accessed October 25, 2021 from <https://medicalxpress.com/news/2021-10-detectors-magic-eyes-pupils.html>

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