Updates on visual recognition in the ventral visual stream

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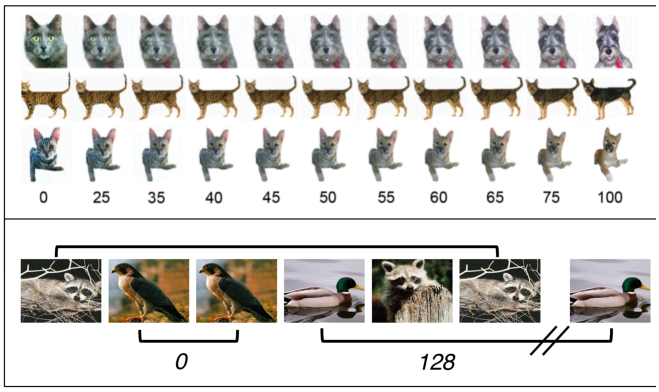

The ventral visual stream describes a set of connected brain regions that in sum underlie the ability to recognize visual stimuli. It is a set of brain regions each of which contributes to processing visual stimuli spread from its origin in primary visual cortex in the occipital lobe through the V's (V1-V4) to the inferior temporal cortex spread through areas TEO and TE. In our experiments damage in areas beyond TE, specifically the rhinal cortex has no effect on performance a visual categorization task. In the original description is was suggested that these regions function in a sequential feed-forward manner. Recently it has been pointed out that there are a considerable number of feedback connections, and feedforward connections that could lead to information 'skipping' a region, such as V4 projecting to both TEO and TE – TEO could in principle be skipped. Now we have found that in some tasks area TEO supplements the ability of area TE to carry out some visual recognition, specifically in visual categorization, that is, naming morphed images accurately as or dogs. However, in another type of visual recognition, so-called running recognition where a stimulus it must be recognized whether the stimulus has been seen before or not, damage to area TEO has no effect whereas removing area TE causes a severe impairment, Thus it seems that visual information gets to area TE via some route other than through TEO.

Reference:

Eldridge MA, Matsumoto N, Wittig JH Jnr, Masseau EC, Saunders RC, Richmond BJ. Perceptual processing in the ventral visual stream requires area TE but not rhinal cortex. Elife. 2018 Oct 12;7. pii: e36310. doi: 10.7554/eLife.36310.

Matsumoto N, Eldridge MA, Saunders RC, Reoli R, Richmond BJ. Mild Perceptual Categorization Deficits Follow Bilateral Removal of Anterior Inferior Temporal Cortex in Rhesus Monkeys. J Neurosci. 2016 Jan 6;36(1):43-53. doi: 10.1523/JNEUROSCI.2058-15.2016.

Biography:

Barry Richmond received a B.A. from Harvard University in 1965, and an M.D. degree from Case-Western Reserve University in 1971. He did residencies in Pediatrics at University Hospitals of Cleveland and Neurology in the Longwood Program at Harvard. He went to the NIH as a Postdoc with Dr. Robert Wurtz in 1976, and in 1981 started the Unit on Neural Coding and Computation in the Laboratory of Neuropsychology. The Unit became a permanent Section in 1987. Dr. Richmond has studied neural codes in the primate visual system, the circuitry underlying reward expectancy and reward seeking, and he has been among the pioneers using genetic tools to study cognitive functions in primates.