

Guest editorial essay

Dedicated to the memory of Richard Gregory who, like Peter Mark Roget, revelled in the allusory aspects of vision and words.

Vision and the word

“Vision, sight, optics, eye-sight, view, look, espial, glance, glimpse, peep, gaze, stare, leer, perlustration, contemplation, regard, survey, introspection, speculation, watch, *coup d’œil*, *espionage*, ocular demonstration, autopsy.”

This is the entry that appeared in Roget’s original *Thesaurus* published in 1852. It was written after Peter Mark Roget (figure 1) had retired from a life as a man of medicine, and as an organiser of science *par excellence*. Its success has all but obliterated the memory of his science generally, and of his perception in particular.

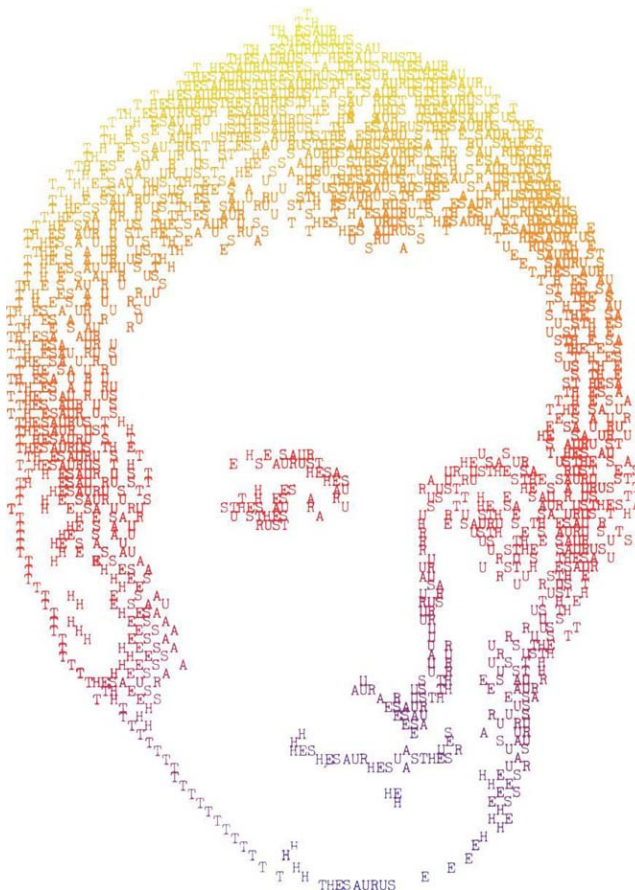


Figure 1. [In colour online, see <http://dx.doi.org/10.1068/p3909ed>] *Coloured Thesaurus of Roget* by Nicholas Wade. The illustration is based on an engraved portrayal of Peter Mark Roget (1779 – 1869) in Pettigrew (1840). Using a manual typewriter the letters of the word THESAURUS were typed from left to right on each line with the spaces between them defining the facial features. The colours were added electronically.

Roget was an authority on vision and optics; he had been an observer of optical phenomena since childhood and conducted various experiments in vision, which was “a subject which I early took great delight in cultivating”. While he discussed all the senses in his *Bridgewater Treatise*, one was of particular significance: “No subject can be more interesting or instructive than the physiology of Vision, the most refined and most admirable of all our senses” (Roget 1834, page 444). Nowadays, Roget is known more for his *Thesaurus of English Words and Phrases* than for his work on the physiology of vision. His father, Jean Roget, was a Swiss pastor who emigrated from Geneva to Britain and lived and preached in London, where Peter Mark was born. His mother, Catherine, was a member of the prominent Romilly family which had its roots in southern France (see Emblen 1970). His father died when Peter was only four years old and his education was closely supervised by his mother. They both moved to Edinburgh, where Peter entered the University at the age of 14 to study mathematics and medicine. After graduating in 1798 he spent a year in Bristol, assisting Thomas Beddoes (1760–1808) and Humphry Davy (1778–1829) at the newly opened Pneumatic Medical Institution. There he met a range of scientific and literary luminaries many of whom he encountered later in his career. Roget sampled nitrous oxide (variously referred to as laughing gas, joy-producing gas, and factitious airs) and his description of its dramatic effects was printed by Davy (1800). He was not inclined to repeat the experience, which was anything but a laughing matter: “The effect of the first inspirations of the nitrous oxide was that of making me vertiginous and producing a tingling sensation in my hands and feet” (in Davy 1800, page 509).

Roget contributed many entries to the 1824 *Supplement* to the *Encyclopædia Britannica* including long articles on Craniology, Deaf and Dumb, Kaleidoscope and Physiology. He was a trenchant opponent of craniology (phrenology) which he treated as a branch of physiology. Possible functions of the brain formed a substantial part of Roget’s article on Physiology. He developed the idea that transmission along the nerves was akin to electrical conduction and that it had a chemical component. Moreover, he speculated that the sensory nerves could transmit to different locations in the brain: “Although the unity of the power of perception of which we are conscious, naturally suggests the idea of some central organ in which the corresponding corporal impressions may be united, it is yet obvious that the necessity of such a union of parts does not admit of proof; and that it may be very possible to conceive the different parts of the sensorium disseminated among the organs at considerable distances from each other, and still to be capable of performing their functions, provided they were in sufficient correspondence with each other by nervous connexions” (Roget 1824, page 191).

The senses were a source of fascination for Roget from an early age, and vision took pride of place. Sensation was distinguished from perception and they were both treated extensively in his lectures and writing. His courses included lectures on Vision, the Laws of Sensation and Perception, as well as Perception and Feeling in Animals. All these topics were given full rein in the second volume of his *Bridgewater Treatise on Animal and Vegetable Physiology considered with reference to Natural Theology*, published in 1834. Part 3 was devoted to Sensorial Functions, with chapters for each of the five senses, followed by one on Perception. As was his wont, this required a definition: “The term *Perception* expresses the belief, or rather the irresistible conviction, thus forced upon us, of the real existence of these external agents, which we conceive as constituting the material world” (Roget 1834, page 509). Perception was an active process which was contrasted to the passivity of sensation, and his theory was closely allied to that of Berkeley. The retinal image did not furnish the “notion of the situation, distances, or magnitudes of the objects they represent ... The knowledge

of these relations is acquired by a process exactly analogous to that by which we learn a new language” (page 519). The parallels between the senses and language are amplified elsewhere. When considering vision in its comparative context, he wrote: “In attempting to investigate these obscure functions of the animal and vegetable economy, we might fancy ourselves engaged in the perusal of a volume, written in some unknown language, where we have penetrated the meaning of a few words and sentences” (page 445).

Roget’s intrigue with instruments also found an outlet in the sphere of the senses. Indeed, an impetus for inventing devices that could synthesise visual motion derived from observations made of spoked wheels rotating behind or in front of vertical railings. He provided illustrations and a mathematical analysis of it, and he related it to persisting visual images. In the conclusion to his article he observed that it “might therefore, if accurately estimated, furnish new modes of measuring the duration of the impressions of light on the retina” (Roget 1825, page 140). His observations were pursued by Michael Faraday (1791–1867), who wrote: “The eye has the power, as is well known, of retaining visual impressions for a sensible period of time; and in this way, recurring actions, made sufficiently near to each other, are perceptibly connected, and made to appear as a continuous impression” (Faraday 1831, page 210). This statement excited the interests of others (in 1833) to construct instruments that present a sequence of discrete and slightly different pictures that appeared to move (see Wade 2004).

Persisting images were considered to be visual illusions and he applied his powers of classification to such “fallacious perceptions”. His more detailed consideration of illusions was presented in the *Bridgewater Treatise* where they were placed in three classes: “The first class included illusions in which an impression is really made on the organ of sense by an external cause; but in a way to which we have not been accustomed” (Roget 1834, page 532) to which mirages, mirror, and kaleidoscopic images belonged. “The second class comprehends those in which the cause of deception is more internal, and consists in the peculiar condition of the nervous surface receiving the impressions” (page 535). Ocular spectra (afterimages) and persisting visual images were in this category. “The third class of fallacies comprehends those which are essentially mental in their origin, and are the consequences of errors in our reasoning powers” (page 535). The three classes that Roget presented are similar to those that are applied in contemporary visual science.

Fallacious perceptions, in all their manifestations, were also sources of stimulation for Richard Gregory (figure 2). Like Roget, he was fascinated by visual illusions and he, too, classified and interpreted them. The categories were not unlike those listed by Roget, and they were presented in a “periodic table of illusions” (Gregory 2009). The causes of illusions were given as either “optics, signals, rules, knowledge” (page 90) or “reception, perception and conception” (page 242) and the interpretations were in terms of the Helmholtzian concept of unconscious inference or, as Richard put it, perceptual hypotheses. He proposed that illusions were seen because inappropriate hypotheses were applied to the patterns of stimulation so that two-dimensional representations were interpreted with respect to their three-dimensional referents. The influence of cognitive processes on perceptual experiences defined his approach and he applied it to a wide range of phenomena: “Perceptions are considered as being *predictive hypotheses*—essentially similar to hypotheses in science” (Gregory 1981, page xv). His final book, *Seeing Through Illusions*, displayed his perception and his delight in word play; chapter titles and subtitles included “Unlocking Locke”, “Lost behind bars”, “Flipping ambiguity”, “Op Art, and all that jazz”, “Illusory table tennis”, “Moving experiences”, and “Empirically impossible”.

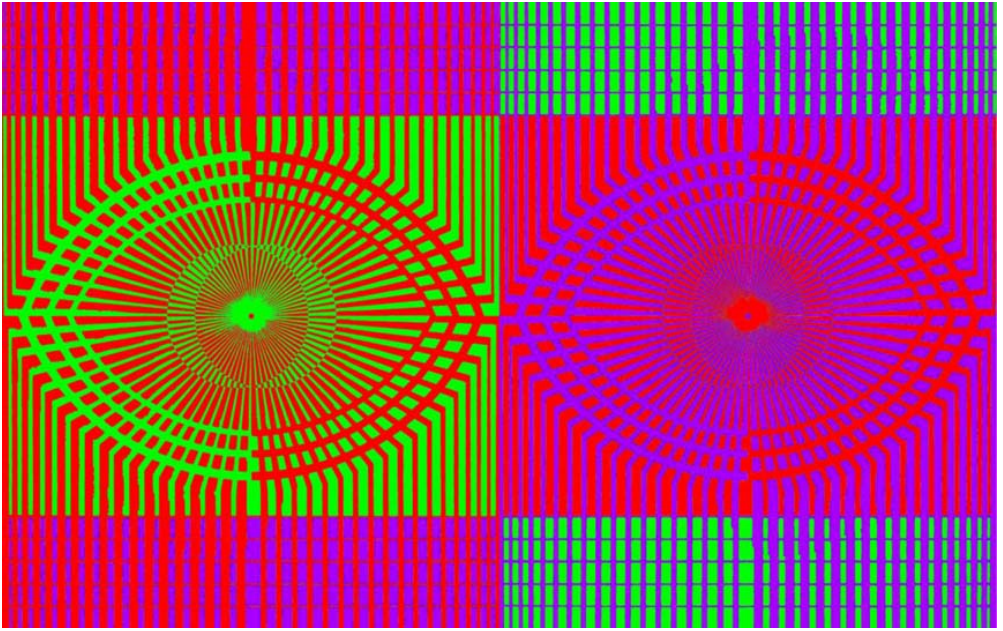


Figure 2. [In colour online] *Eyes and Brains* by Nicholas Wade. Each half contains a portrait of Richard Langton Gregory (1923–2010) embedded in a design that presents a hypothetical eye and brain, and the same three colours (RLG: red, lilac, and green) are used throughout. The radiating lines are like light rays that enter the eye through a small aperture and then strike the retina. Within the retina there are three levels consisting of receptors, bipolar cells, and retinal ganglion cells—all of which have lateral connections. The axons from the ganglion cells travel to the visual cortex, undergoing partial decussation so that the temporal and nasal hemiretinae project to opposite hemispheres; however, there is some bilateral projection along the vertical midline. At the level of the visual cortex there is an organisation in terms of vertical columns, within which are six horizontal layers.

Clearly, Richard had a penchant for punning as well as for perception. Like Roget, he collected words but he delved into the paradoxes of their use rather than the precisions of their definition. For example, he referred to the well-known wife/mother-in-law ambiguous drawing as an instance of hagiography! Surprisingly, there is no entry for ‘puns’ in *The Oxford Companion to the Mind* (Gregory 1987) and that for ‘paradox’ is ‘see illusions’. Roget, on the other hand, did have an entry for ‘pun’: “play upon words, paragram, *jeu de mots*, palindrome, conundrum, acrostic, archaism”. Accordingly, it seems suitable to allude to Richard in figure 3 both visually and verbally. The text in which his face can be read relates to the paradoxes of pictures and is taken from *The Intelligent Eye* (Gregory 1970, page 32). Extracting word from image and vice versa points to the complexities of perception, particularly when pictures are concerned. Richard captured this nicely: “It seems that the brain can store several alternative perceptual hypotheses, each with its prior probability” (Gregory 2009, page 15). He also saw, like Roget, the similarities between perception and language.

Roget’s *Thesaurus* (figure 4) was not a dictionary; indeed he argued quite the reverse: “The purpose of an ordinary dictionary is simply to explain the meaning of words; and the problem of which it professes to furnish the solution may be stated thus:—The word being given, to find its signification, or the idea it is intended to convey. The object aimed at in the present undertaking is exactly the converse of this; namely,—The idea being given, to find the word, or words, by which that idea may be most fitly and aptly expressed. For this purpose, the words and phrases of

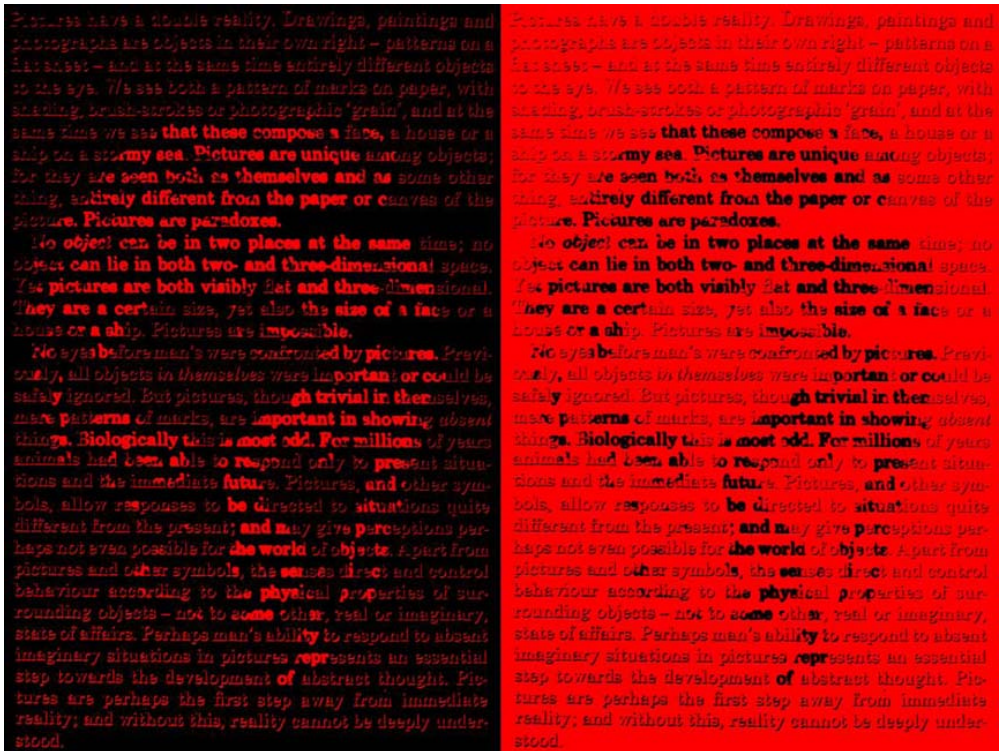


Figure 3. [In colour online] *Read and Black* by Nicholas Wade.

the language are here classed, not according to their sound or their orthography, but strictly according to their *signification*” (Roget 1852, page v). It was a listing of synonyms and antonyms organised under the following six headings: abstract relations, space, the material world, intellect, volition, and finally sentient and moral powers. Roget had been working on a thesaurus for many years before it was first published, in 1852. He opened the Preface to the first edition with these words: “It is now nearly fifty years since I first projected a system of verbal classification similar to that on which the present Work is founded. Conceiving that such a compilation might help my own deficiencies, I had, in the year 1805, completed a classed catalogue of words on a small scale, but on the same principle, and nearly in the same form, as the Thesaurus now published”. The *Thesaurus* went through many editions during the remainder of Roget’s life, and it was further fostered by his son and grandson (Emblen 1970; Hüllen 2004).

Both Roget’s and Gregory’s contributions to sense (in science and in language) are based on their desires for clarity in classification. It is too soon to assess Richard’s legacy, but it seems likely that he will be remembered for the enthusiasm with which he pursued perceptual paradoxes and for imbuing a similar sense of wonder in generations of students. By contrast, interest in Roget’s research on vision has all but petered out; however, the mark he left on the word has proved visionary.

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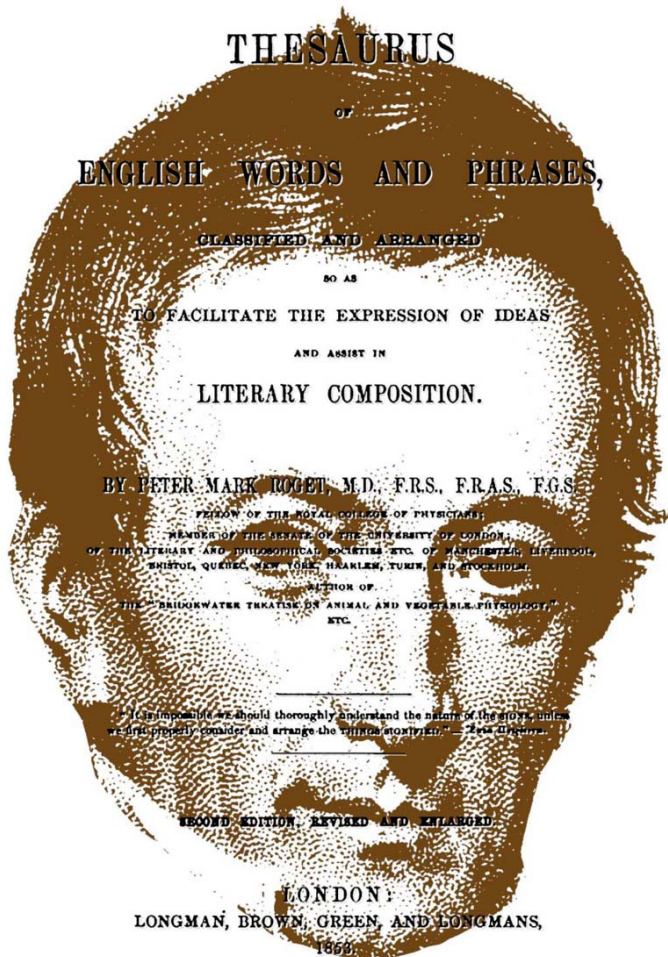


Figure 4. [In colour online] *Man of Words and Vision* by Nicholas Wade.

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