When no fair dreams before my mind's eye flit
Keats, truth and imagination

Exploring the Mind's Eye
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Introduction

Creative, imaginative artworks appear vague, and for the uninterested, sceptic and the cynical, they may also seem vulgar[1]. The quotable Victorian art critic John Ruskin takes it as a given when he points out that "it is a strange habit of wise humanity to speak in enigmas only, so that the highest truths and usefullest laws must be hunted for through whole picture-galleries of dreams, which to the vulgar seem dreams only"[2]. Given that the imagination can be uncanny, what is its place vis a vis the Truth?

Of all the Romantic poets, John Keats is singular in his preoccupation with the nature of imagination and the most serious about the poetic vacation outside history[3,4]. His hopeful first verses,

O let me think it is not quite vain
To sigh out sonnets to the midnight air!

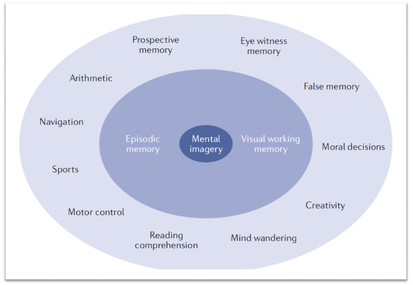
later deliberations,

Wherein lies happiness? In that which becks
Our ready minds to fellowship divine,
A fellowship with essence; till we shine,
Full alchemiz'd, and free of space. Behold
The clear religion of heaven!

and highest proclamations all attest the fact.

'Beauty is truth, truth beauty,' – that is all
Ye know on earth, and ye need to know'

In this poster, I look at John Keats' life and poetry under the light of information processing theory of cognitive sciences[5,6], correlating with recent viewpoints of computational neuroscience and artificial neural networks[7]. Practically, thrusting a scheme from a recent review[8], I collect random facts picking at poet's mind.



With varying effect sizes and degrees of evidence above cognitive processes are linked to mental imagery after [8]. Keats' biographies are full of references to unusual applications of nearly every single one of them.

A fellowship with essence

John Keats' "sensitivity and his vivid comprehension of the fundamental elements of people, places and ideas" are invariably underscored by his biographers and his later critics[3,4,9]. His poetic endowment --his neuropsychology has to deal with the dirt, clutter and the turmoil of Regency England in order to search for a moral centre ground beyond 'a vale of tears'.

"O solitude! If I must with dwell
Let in not be among the jumbled heap
Of murky buildings; climb with me the steep-
Natures observatory."

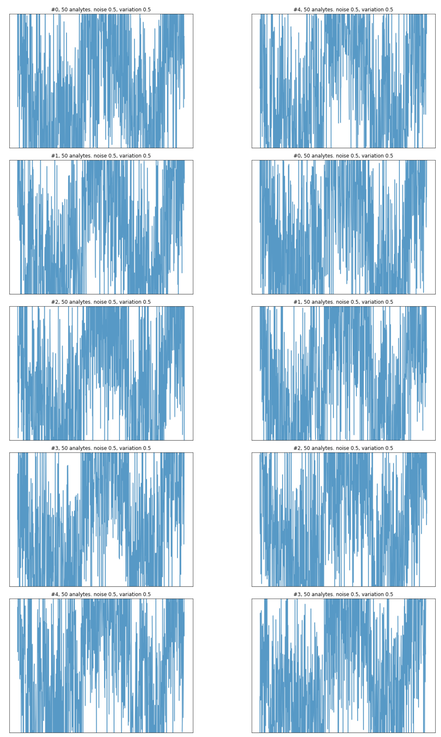
The common cognomen of this world among the misguided and the superstitious is "a vale of tears" from which we are to be redeemed by a certain arbitrary interposition of God and taken to Heaven- What a little circumscribed straightened notion!"[10]

One can relate poet's search for the essence and meaning of things with neural computational: The exquisite ability of artificial neural assemblies to sift through noise and high variation in order to identify archetypal patterns "among the jumbled heap'. Consider the routinely deployed feat of deep convolutional neural nets, near perfect identification of the essence from arrays of shifting numbers as the identity of a person.

An example of deep convolutional neural networks. Google Photos application identifies people and things in irregular and varying frames with human like accuracy.

Prophetic machine vision

Discretionary power of networking neurons, biological and *in silico,* is a truly wonderful feature of neural computing. We illustrate another example of poetic/prophetic machine vision from our deep spectroscopy research[11]. The parallels are striking. Spectroscopy of organic compound mixtures until recently concentrated on single features of the spectrograph for want of a better fingerprinting technique. The advent of deep learning[7] opened the way for gestalt study of the spectrum. A two layer feed forward network of total 1500 neurons can differentiate thousands of very low signal-to-noise ratio and variable spectra with high accuracies (>99.9%) and confidences. Try yourself to match the spectra from the left column with the ones from the right***. The Python/TensorFlow code creating and classifying the signals are available on GitHub repository[12]



The fingerprint Fourier Transform Infrared spectra of selected volatile organic compound mixtures between 500-1000 cm^{-1}. Signals vary with each measurement, in a way similar to photography. Classifications are based on gestalt imagery of the whole spectra.***Hint see figure labels.

Conclusions

The thesis of this poster is that we can peek into the mechanics of poetic imagination by relating it to neural computation as it takes place in artificial neural networks. Processing visual imagery is essential in understanding the recent renewal and success of neural networks. Unlike previous attempts that was based on parsing images into a priori defined elements, current research instead concentrates on self organization to identify hierarchical elements for a truly imagery based representations[13]. The corollary is, therefore, the superior performance of such imagery based AI suggests the mechanics of the extraordinary acuity of poets' vision might be based on a similar representation and processing. Imagination is best understood and celebrated with an appreciation of the neural processes that underlie them[8,13,14].

We drew parallels with the upstream pathway from perception to imagery in which representations get weaker as they move to the higher brain areas[8]. This fact may explain the vagueness of imagery. However we have not made any effort towards explaining the how the top-down imagery signal moves to perception areas and translated into articulated words in the case of poetry. Auto-encoder networks may provide some answers to this reciprocal process.

John Keats' life and letters is a tribute on imagination. As William James asserts that 'it always leads to a better understanding of a thing's significance to consider its exaggerations and perversions, its equivalents and substitutes and nearest relatives elsewhere.' In this spirit it is appropriate and profitable to study John Keats, his superabundance and debilitating deficiencies are a treasure store for imagery research.

Resources and references

[1] For John Keats' case, the critics were dishearteningly harsh. The influential Blackwood's magazine introduced John Keats as a 'bantling ignorant and unsettled pretender to culture'. Byron ridiculed his yearlong imaginative effort as 'frigging his imagination'. Wordsworth's initial response to Endymion was that it is 'a pretty piece of paganism.'
[2] Ruskin as Literary critic Selections, Edited by A.H.R. Ball, Cambridge University Press, 2013.
[3] Keats Truth & Imagination, Edited by K.E. Sullivan, Brockhampton Press, 1996.
[4] Stephen Coote, John Keats A life, Hodder and Stoughton, 1995.
[5] L.E. Berk, Development Through the Lifespan 7th edition, Pearson, 2017.
[6] José Luis Bermúdez, Cognitive Science: An Introduction to the Science of the Mind 2nd edition, Cambridge University Press, 2014.
[7] Y. LeCun, Y. Bengio, G. Hinton, Deep Learning, Nature 521, 436-444, 2015.
[8] J. Pearson, The human imagination: the cognitive neuroscience of visual mental imagery, Nature Reviews Neuroscience 20, 624–634, 2019.
[9] H.C. Notcutt, An interpretation of Keats' Endymion, S.A. Electric Printing Co., 1891.
[10] As quoted in reference [4], page 240.
[11] Mecit Yaman, Conference presentation, The case for neuro-backed-nano, NanoTR'14, Izmir, 2018.
[12] https://github.com/mecityaman/imagination_conference
[13] Cortex, Edited by Adam Zeman, Matthew MacKisack, John Onians, 105, 1-188, 2018.
[14] William James, The varieties of religious experience, Penguin Classics; Later Printing edition 1982.