ENCEPHALOS 61, 41-48, 2024

In search of cognitive and neuroscientific concepts in C. P. Cavafy's poetry

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Abstract

This paper aims to examine in a systematic way for the first time both the production and the reception of C. P. Cavafy's poems through the lenses of state-of-the-art theories and hypotheses coming from modern cognitive science and neuroscience. A selected number of published poems are included. This presentation attempts to be an introduction to what theories and findings from cognitive science and neuroscience have to offer the humanities and particularly to the study of C. P. Cavafy's poetry in order to gain a new insight on literature and creativity. For example, theories about creativity, memory and learning, theories of selective attention and visual processing, theories of metacognition and metamemory, embodied cognition, as well as theories of dreaming and conscious states, will be discussed based on relevant excerpts that are in line with current empirical/experimental data coming from neuroscience.

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Key words: Cognitive science, Neuroscience, Humanities, Cavafy, Poetry

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Is there a place for cognitive science and neuroscience in Cavafy's poetry?

C.P. Cavafy is considered to be one of the most important poets in Modern Greek language of the 20th century and at the same time he has been internationally recognized as an influential poet (Jusdanis, 2015). Although, poetry is considered to be a form of communication of the poet's lived experience to the reader(s), 'typically, the dynamics in any given reader's mind will not coincide with the author's processes' (Holland, 1989). Therefore, a method of examining Cavafy's work by focusing on reports of subjective experience in the light of explanatory theories that he may or may not be aware of at his time could be a new approach of analyzing his work. So far, no attempts have been made by observers-interpreters-readers to examine Cavafy's work in this way, that is on focusing on the introspective data he provides about his experience(s) through the prism of theories and constructs about cognitive processes coming from Cognitive Science (Friendenberg et al., 2021), and Neuroscience, which highlights the underlying brain mechanisms that support thought and actually informs with relevant research data the Cognitive Science (Bear et al., 2020). Much emphasis has been given to what the readers-receivers of poetry perceive (neuroscience of reading) and the relevant cognitive mechanisms of the aesthetic experience based on the neural connections of frontal, prefrontal, temporal, visual cortices as well as limbic structures (Borknet, 2010; Burke &Troscianko, 2017; Fabb, 2015; Lakoff & Turner, 2009; Ramachandran &Hirstein, 1999; Turner, 2006; Zunshine, 2006), but the cognition of the artists themselves when producing their works of art has not been clarified in a more author-centered way.

Cavafy has not produced any scientific work (based on the findings from the existing archive) and did not receive any organized university education, but he did work as a journalist for many years and because of his thirst for learning (based on the fact that he was reading books not only from his private large collection (now dispersed and for which our record is incomplete), but he also read his brothers' and friends' books as well as books from the libraries in Alexandria) (Περίδης, 1948; Forster, 2009). Thus, we can hypothesize that he had read or heard about the most prevalent medical and psychological theories of his time (which were mainly Freudian), given that his older cousin, John Cavafy, whom C.P. Cavafy admired, was a well-known medical practitioner in London. More specifically, in his 'Genealogy', he describes his cousin as a very wise man who published articles in The Lancet and the British Medical Journal. Although he could not be aware of new theories, such as the 21st century scientific theories in

cognitive science and neuroscience, one additional point for getting involved in reporting his introspections and possible analysis of relevant cognitive phenomena, is that in his correspondence with friends and family as well as in his personal notes Cavafy demonstrates an 'obsession' with medical theories and health in general (Menelaou, 2020).

In search of cognitive and neuroscientific concepts in Cavafy's poems

Creativity

Although creative cognition has been explained by various cognitive theories, there is a general acceptance across the existing different theoretical approaches that it is based on various cognitive functions, such as cognitive flexibility, inhibitory control, working memory updating, fluency, originality, and insights (Giannouli, 2017; Khalil et al., 2019).

The importance of memory is a point highlighted by one of the first theories in cognitive science; Mednick's (1968) theory about creativity, which argues that creative insights can result from associative processes in memory. In this view, ideas are chained together, one after another, and more remote associates tend to be more original. This perspective argues that more creative individuals tend to have flatter hierarchies of associations than less creative individuals; in other words, more creative people have many more relatively strong associates for a given concept, rather than only a few. This is thought to provide greater scope for the simultaneous activation of far-flung representations, which many believe to be an important engine of creative thought. Although this theory has not been supported by neuroscientific research data as other researchers have found that creativity is not related to a special organization of associative memory, but to a more effective way of accessing these contents (Benedek & Neubauer, 2013), it is quite interesting that there is an example, where Cavafy starts by mentioning a point about stones such as in his poem 'Από υαλί χρωματιστό' (Of coloured glass) in lines 'Πολύ με συγκινεί μια λεπτομέρεια…..Όπως δεν είχαν παρά λίγους πολύτιμους λίθους' (I am very moved by one detail…Because they had only a few precious stones), and he ends discussing the general degradation of the Byzantine era. This very point opens to us a window into Cavafy's creative thinking, based on remote associations that link concepts, otherwise characterized as distant (in time and space), in a new and original way.

Memory

Memory is one of the fundamental cognitive domains based on the hippocampus, and it has been extensively studied both in cognitive science and neuroscience (Gallistel& King, 2011). One of the first proposed cognitive theories in the study of memory is Atkinson and Shiffrin's (1968) multi-store model of memory, which suggests that information exists in one of three states of memory, namely 1) the sensory, 2) the short-term, and 3) the long-term stores. According to this approach, information passes from one stage to the next the more the individual rehearses it in their minds, but these mnemonic traces can fade away if the individual does not pay enough attention to them. About the long-term storing in memory, there is a plethora of lines described by Cavafy as for example in the poem 'Μανουήλ Κομνηνός' (Emanuel Komnenos), where long-term memory is mentioned 'παλιές συνήθειες ευλαβείς θυμάται' (recalls neglected habits of piety).

Also, long-term autobiographical memories and the debated memory trace decay theory of forgetting, which supports that the mere passage of time -and not other cognitive processes such as interference or retrieval failure- makes our memory fade, and thus the longer the time the more things we forget is mentioned. This memory trace decay theory is based on transient or long-term neurochemical changes in the brain that represent something (such as an experience) stored as a memory and the problem of recalling them is described in the poem'Μακρυά' (Far off) in the lines 'Θάθελα αυτήν την μνήμην να την πω……Μα έτσι εσβύσθη πια…σαν τίποτε δεν απομένει-γιατί μακρυά στα πρώτα εφηβικά μου χρόνια κείται' (I should like to relate this memory….but it is faded now…..scarcely anything is left-because it lies far off, in the years of my early manhood).

Also references are made to the long-term declarative memory function referring to explicit semantic knowledge, which is mentioned in the poem 'Εν πόλει της Οσροηνής' (In a town of Osroini) in the line 'Ο νους μου πήγε στον πλατωνικό Χαρμίδη' (thoughts went to Plato's Charmidis), which actually is the recall of general factual information about the world that we have stored in our cognitive system/brain as in an encyclopedia.

In addition to the above, in the poem 'Γκρίζα' (Gray), Cavafy refers to a specific mechanism of memory as in the line 'Κυττάζοντας ένα παλλιό μισό γκρίζο θυμήθηκα δύο ωραία γκρίζα μάτια' (Looking at an opal, a half-grey opal, I remembered two beautiful grey eyes), we can find a statement that describes associative memory (implicit and explicit). Implicit associative memory is an unconscious process relying on priming, whereas explicit associative memory involves conscious recollection, and refers to the ability to recall relationships between unrelated items. For instance, individuals can associate smells, pictures, sounds-words (Anderson & Bower, 2014). These content-addressable memories describe a systematic relationship between the content of a representation and the brain neurons/structures mainly in the medial temporal lobes (Mayes et al., 2007), where this relationship gets encoded, have also been claimed to explain-mediate the basic binding operations in sentence comprehension by readers (McElree, 2000).

It is worth mentioning here the creative processes of memory as Cavafy presents in his poem 'Στον ίδιο χώρο' (In the same place) in the line 'σε δημιούργησα μες σε χαρά και

μες σε λύπες'(amid my joy amid my sorrows I created you), where he refers to creative memory (Beaton, 1987), and more specifically how the hippocampus is responsible not only for creating memories, but also for making connections and binding things together in a goal-directed way. This creative formation of memories (that do not necessarily correspond to the reality) as is the case in the poem 'Στο πλοίο' (On the ship) in the line 'Όμως τον θυμούμαι σαν πιο έμορφο' (But I recall him as handsomer) is multifactorial and supported by controlled retrieval, involving semantic and episodic memory, building on processes used in memory construction and differentially recruiting memory at different stages in the creative process (Benedek et al., 2003).

In the poem 'Θυμήσου, σώμα' (Remember, body), the whole poem refers to body memory, which is the sum of all past bodily experiences stored in memory (such as tactile, motor, proprioceptive, and/or painful experiences as well as accompanying emotions) that can influence an individual's behavior (Gentsch & Kuehn, 2022). These can also be described by explicit emotional memory, which refers to situations when individuals re-experience the original emotions engendered by an event, something that has been also described by Cavafy in a plethora of poems, especially in the erotic ones.

Fantasies that are mainly investigated by psychodynamic psychology are also mentioned. For example, in the poem 'Καισαρίων' (Caesarion) in the line 'και τόσο πλήρως σε φαντάσθηκα' (and so I molded you more freely in my mind), we conceive memories of what the poet has read for a specific person as a mixture of reproduction and reconstruction of information (Konox, 2001). This is close to the concepts of true and false memories (truth and fiction), with the latter corresponding to the distorted fabrication and a creation of "memories" not based on facts, of course in the case of Cavafy this is intentional and entirely consciously controlled by him, and not imposed by a third party (Loftus, 1996).

Attention

In the poem 'Στου καφενείου την είσοδο' (At the café door) 'Την προσοχή μου κάτι που είπαν πλάγι μου διεύθυνε στου καφενείου την είσοδο' (Something they said beside me made me look at the café door), we clearly find a mention to what cognitive science refers to as the cocktail party effect or phenomenon (Cherry, 1953). This can be examined in current neuroscientific research with dichotic listening tasks, and examines the brain's ability to focus auditory attention on a particular stimulus, while filtering out a range of other auditory stimuli. The name of the phenomenon is based exactly on what Cavafy reported (a partygoer focusing on a single conversation in a noisy room) (Bronkhost, 2000). This is also called selective auditory attention that refers to the mechanisms/processes that allow an individual to select and focus on a particular input further processing, while simultaneously suppressing irrelevant or distracting information from the exterior environment (Driver, 2001; Giard et al., 2000).

Visual perception

Another point that reminds us of Gestalt theory, and more specifically of the principle of figure-ground perceptual grouping can be found in the poem 'Μέρες του 1903' (Days of 1903) in the line 'το χλωμό το πρόσωπο… στο νύχτωμα του δρόμου'(the pale face…in the dusk of the street). This supports that the figure (the beloved's face) attracts the viewer's attention and not the ground (the street), thus perception segregates into figures and ground the visual images, and processes further only the figures in the visual cortex (Wageman et al., 2012). Here it is worth mentioning that the figure-ground relationship not in the visual context, but with an application to metaphors is used to attract the readers' attention (Tsur, 2009). The figure stands out (based on the momentary and guided by the artist interests of the reader) against an undifferentiated background. Cavafy (as all creative writers do) uses figure-ground organization in all of his poems by shifting our attention to specific figures (persons), time (historical period and relevant customs) or objects something that is stressed by verbs of straightforward activity (Labov, 1972).

Perception of time

The theme of time passing quickly is present in Cavafy's poems. For example, in the poem 'Απ'τες εννιά' (Since nine o'clock) in the lines 'Δώδεκα και μισή. Πώς πέρασεν η ώρα. Δώδεκα και μισή. Πώς πέρασαν τα χρόνια' (Halfpasttwelve. How the time has gone by. Half past twelve. How the years have gone by), Cavafy presents the experience of subjective time, but reports that he lacks agency on the part of the experiencer with a Time-moving perspective rather than an Ego-moving perspective (Piata, 2019). In modern cognitive science and neuroscience, time perception in healthy as well as in populations suffering with different types of neurological as well as psychiatric disorders is considered to be a complex neural mechanism influenced by many factors (perception of and past experience with stimuli related to environmental changes) as well as other cognitive-brain processes, such as emotional states, levels of attention, and memory (Fontes et al., 2016; Matthews & Mack, 2016).

Executive control

Executive functioning refers to a plethora of complex functions such as planning, judgment, reasoning, problem solving, organization, attention, abstraction, and mental flexibility, all based at frontal and pre-frontal brain areas and networks (Alvarez & Emory, 2008). Failure of executive functions, for example in this case failure of inhibitory control that is the ability to suppress or countermand a thought, action, or feeling (Li et al., 2022), has been linked to inappropriate sexual behaviors/actions (Rodriguez-Nieto et al., 2019). This is close to what Cavafy describes in his poem 'Νόησις' (Understanding) in the lines 'Κ'η αποφάσεις μου να κρατηθώ, ν'αλλάξω κρατούσαν διαρκούσαν δύο

εβδομάδες το πολύ' (And my resolutions to control myself, to change lasted for two weeks at the very most).

Metacognition and Metamemory

Metacognition refers to a) knowledge of cognition and b) regulation/control of cognition (Flavell, 1979). Furthermore, for this 'cognition of cognition' there are three divisions/categories of metacognitive knowledge: knowledge of person variables, task variables, and strategy variables. Cavafy in the poem 'Γκρίζα' (Gray), 'Μνήμη μου φύλαξε τα εσύ ως ήσαν' (O Memory preserve them as they were) mentions metamemory, which is how individuals monitor and control their own memory as external controllers, an awareness function that is based mainly on frontal lobes (Pannu &Kazniak, 2005). Cavafy also demonstrates his doubts about the efficacy of his memory system as indicated in the poem 'Εκόμισα εις την τέχνην' (I've brought to art) in the line 'κάτι αβέβαιες μνήμες' (certain vague recollections).

Theory of Mind

Theory of mind is the ability to infer and understand another person's state (e.g. beliefs, intentions, thoughts, and feelings). Theory of mind is a similar psychological construct to metacognition (Papaleontiou-Louca, 2008) and can be explained mainly by medial prefrontal cortex function (Hartwright et al., 2014). In the poem 'Εις Ιταλικήν παραλία' (On an Italian shore) in the line 'Α σήμερα βεβαίως δεν είναι θεμιτόν, δεν είναι δυνατόν ο Ιταλιώτης νέος νάχει για διασκεδάσεις καμιάν επιθυμίαν' (Today it is not right, it is not possible for the young Greek-Italian to want to amuse himself in any way), Cavafy understands that the other (a young man) has his own desires and attributes this mental state to him.

Not only Cavafy understands what is happening to the other person's mind, but he also shows empathy, that is similar, but different from theory of mind as it refers to the ability to share affective states with others, something that can be found in the poem 'Δέησις' (Prayer) in the lines 'η ιερά εικόνα ακούει λυπημένη ξέροντας πως δεν θάλθει ο υιός που περιμένει' (the ikon listens, solemn, sad, knowing the son she waits for never will come back) as well as in the poem 'Τα άλογα του Αχιλλέως' (The horses of Achilles) in the line 'Τα δάκρυα είδε ο Ζευς των αθανάτων αλόγων και λυπήθη' (Zeus saw the tears of these immortal horses and felt sorry).The topic of poetic 'empathy' also evokes the poet John Keats's notion of 'negative capability' that is the individual's ability to perceive and recognize truths beyond the reach of consecutive reasoning.

Emotions

Cavafy in all his erotic poems gets carried away by his emotions and disregards his rational thoughts, while in the rest of his poems nostalgia and negative emotions are mainly expressed. This dichotomy can be examined through the neuro-evolutionary approach of the new brain and old brain theory, which supports that the new brain (the neocortex which includes higher-order cognitive functions such as imagination, planning, reason and self-reflection) is actually hijacked and directed by the old brain structures (which is located towards the center of our brain) and functions (emotions and instincts) (Gibson & Choden, 2013).

The whole palette of basic emotions are reported in Cavafy's poems (among others anger, anticipation, joy, trust, fear, surprise, sadness, and disgust) (Plutchik, 1991). More complex emotions such as nostalgia, which arises from tender and yearnful reflections on meaningful past life events and/or important persons from an individual's past, and which involves a plethora of cognitive functions (self-reflection, autobiographical memory, regulatory capacity and reward) spread throughout the brain (Yang et al., 2022) is in the core of Cavafy's poems, such as 'Ιθάκη'(Ithaca), 'Φωνές' (Voices), 'Κεριά' (Candles), 'Ένας γέρος' (An old man), and 'Δευτέρα Οδύσσεια' (Second Odyssey) among others.

Emotional responses according to relevant cognitive theoriesare evoked by exterior or internal stimuli and many theories have been supported in an attempt to explain emotions. The James-Lange theory (James, 1884; Lange, 1912) proposes that emotion is the result of arousal (following the order:1) stimulus causing physiological response/arousal causing 2) feeling/emotion). Our bodies response to a stimulus (heart beating fast, sweating) and then we feel. The Cannon-Bard theory (Bard, 1934a, 1934b; Cannon, 1915) or thalamic theory of emotions proposes that emotions and arousal occur at the same time, that is a stimulus simultaneously, but separately produces physical reaction and emotion. Schachter and Singer's (1962) or two-factor model proposes that arousal and cognition combine to create emotion. More specifically, physiological arousal determines the strength of the emotion, while cognitive appraisal identifies the emotion label. So, physiological response and appraisal (that is the thoughts we have about our bodily changes) both influence the expression of a specific feeling/emotion. The above theories could explain the poem 'Τείχη' (Walls) in the line 'Χωρίς περίσκεψην, χωρίς λύπη' (Without consideration, without pity), but the poet implies that thought precedes the emotion of pity something that reminds us of Lazarus' (1982) theory of emotion, which supports that thoughts come before emotions or physiological arousal, while in the poem 'Στο θέατρο' (At the theater) in the lines 'η σκέψις μου και το σώμα μου συγκινηθήκαν' (my mind and body were aroused) a rather simultaneous dual response is mentioned.

Embodied Cognition

In the poem 'Επέστρεφε' (Come back), there is a clear mention to what Gibson (1950) has supported for Embodied Cognition. More specifically, in the lines 'όταν ξυπνά του σώματος η μνήμη' (when the memory of the body awakens)and 'όταν τα χείλη και το δέρμα ενθυμούνται'

(when the lips and the skin remember), it is clear that the mind is not understood just as information processing (a paradigm that was predominant in cognitive science in the 1950s, but cognition-memory is hypothesized to involve acting with a physical body on an environment in which that body is immersed. This cognition as embodied action has been also supported by other researchers (Varela et al., 1991). What is of interest is that Cavafy mentions something that is common in poetry and resembles synesthesia (one sensation produces another or when we have experience of one sense through another) as in the poem 'Σ'ένα βιβλίο παληό' (In an old book) in the lines 'Γιατί ήταν φανερό σαν έβλεπες το έργον εύκολα νιώθονταν η ιδέα του καλλιτέχνου' (Because it became clear as you looked at the work it was easy to feel what the artist had in mind), where shapes of a drawing induce sensations in the poet's body. This could be interpreted as a visual-tactile type of synesthesia, not as famous as the sound-to-colour type, but we must mention here that it is not clear if this description is real synesthesia or if these associations have been learned from experience and pop-up automatically through classical conditioning-much like the way Pavlov's dogs learned and remembered conditioned responses (Eelen, 2018).

Theories of dreaming and hallucinations from a cognitive perspective

Cavafy also mentions dreams, which have been also studied in cognitive psychology and they are considered to bea form of imagination (Hunt, 2017).Among the many theories that have been proposed, one of the classic theories in clinical psychology, although not cognitive, considers dreams as a form of wish-fulfillment (Freud, 1900) that is close to Cavafy's mention in the poem 'Φωνές' (Voices) in line 'Ιδανικές φωνές και αγαπημένες εκείνων που πεθάναν, ή εκείνων που είναι για εμάς χαμένοι σαν τους πεθαμένους' (Voices loved and idealized, of those who have died, or of those lost for us like the dead), shows exactly his desire to meet again with these people.

It is worth mentioning that Cavafy chooses to present in the next lines of this poem the fact that he hears them not only in his dreams, but also in auditory hallucinations and actually auditory verbal hallucinations, that is hearing voices (□nthony, 2004; Mc□amara, 2019). □n the same poem, Cavafy refers toboth phenomena together inthelines 'Κάποτε μες στα όνειρά μας ομιλούν εκάποτε μες στην σκέψι τες ακούει το μυαλό' (Sometimestheyspeak to us in dreams; sometimes deep in thought we hear them). This is in line with modern neuroscience, as dreams and 'daytime' auditory verbal hallucinations overlap, and both involve non-veridical unbidden perceptions that share some phenomenological (similar subjective descriptions). These two phenomenaare also based on similar neural networks (thalamocortical circuits), but insufficient evidence exists to fully support the notion that the majority of hallucinations depend on Rapid Eye Movement (REM) processes (as is the case of dreams) or REM intrusions into waking consciousness (Waters et al., 2016).

Theories of consciousness

Among one of the most widely known theories that try to explain the thorny problem of consciousness is James's (1890) 'stream of consciousness', which considers mental life as a unity that flows and changes (thus consciousness is a continuum, that can not be broken into separate parts). This continuous flow is found in the poem 'Μονοτονία' (Monotony) in the lines 'Την μια μονότονην ημέραν άλλη μονότονη ακολουθεί' (One monotonous day follows another). Although this is an old approach, there are currently four theoretical approaches to consciousness: higher-order theories, global workspace theories, re-entry and predictive processing theories, and integrated information theory (Seth & Bayne, 2022). Cavafy in his poem 'Κεριά' (Candles) in the lines 'Η περασμένες μέρες πίσω μένουν, μια θλιβερή γραμμή κεριών σβυσμένων τα πιο κοντά βγάζουν καπνό ακόμη, κρύα κεριά λιωμένα και κυρτά' (The days gone by remain behind us, a mournful line of burnt-out candles; the nearest ones are still smoking, cold candles, melted and bent). The focusing of attention only on the lighted candle sat the first line of the poem compared to all other past information (candles) is close to the Global Workspace Theory of consciousness, which is based on parallel processes and emanates from the complex and rapid interactivity of numerous regions and connectivities in the cortico-thalamic system (Baars et al., 2021). According to this approach consciousness is compared to a theater of mind (the theater metaphor). Thus, conscious contents resemble a limited bright spot on the stage of immediate memory, selected by a spotlight of attention under executive guidance. Only the bright spot is conscious, while the rest of the theater is dark and unconscious (Baars, 1988; 1997).

Another approach that incorporates better the role of the body in the emergence of emotions and consciousness as perceived by Cavafy, is the one supported by Damasio (1999), who proposes that 'we are feeling machines that think'. According to this approach, consciousness arises from the interactions between the brain, the body, and the environment, therefore conscious experiences are influenced by the emotional responses that are generated by our body's interactions with the environment.

Conclusions or further questions?

Although this is not an exhaustive attempt to explain the complete poems of Cavafy, but only a portion of examples were used that link his work to contemporary neuroscientific research supporting well-known relevant cognitive theories, the aim of this paper is to open a new discussion on whether we can approach through different lenses the work of artists not only in poetry, but also across the arts (Zaide, 2013). Cavafy (intentionally or unintentionally) describes a plethora of cognitive and emotional processes throughout his poetic work that are at the core of modern cognitive science and neuroscience. The brief description of these phenomena, highlights that ideas, concepts, and methodologies from other fields can assist not only in new insights, but also can direct us to a new experience of art.

Acknowledgements:

I would like to thank the members of the International Cavafy Summer School 2023, Onassis Foundation and Distinguished Professor Emeritus Arthur Marotti for providing valuable feedback on the paper.

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