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Cognitive circuitry in the Pseudo-Hippocratic *Peri Diaites* and Plato's *Timaeus*

by John E. Sisko

It is widely acknowledged that, in the *Timaeus*, Plato draws upon a number of theories that were advanced by his Italo-Sicilian predecessors in natural science and medicine. Philolaus and Archytas are among the Italian scientists who are thought to have influenced Plato's views on the mathematical structure of the world, and Plato's general debt to Sicilian medicine is evident, owing to a number of mutually shared themes.¹ The Sicilians employed cosmological speculation when theorizing about human physiology; they placed great emphasis on the physician's use of exercise and diet, as opposed to his use of pharmaceuticals, in the treatment of his patients; and they held the rather esoteric view that we breathe, not only through the mouth and nose, but also through the skin.² Plato advances each of these Sicilian themes in the *Timaeus*. He proposes an analogy between human cognitive functioning and the motion of the heavens (see *Tim.* 41A-44D); he champions the view that the physician should focus on the regulation of diet and exercise, as opposed to the use of drugs, in the treatment of patients (see *Tim.* 89A-D); and he maintains that we breathe through our skin (see *Tim.* 79C). These parallels mark a general Sicilian influence upon Plato's thought.³ Yet, suggestions have been made concerning more specific influences. One such suggestion can be found in the unpublished doctoral dissertation of A. L. Peck. Peck argues that the account of soul in the first book of the Sicilian medical treatise *Peri Diaites* (*On Regimen*) informs Plato's treatment of the nutritive soul in the *Timaeus*.⁴ Peck's

¹ On Philolaus and Archytas see Huffman, 1993, pp.149-151 and Kahn, 2001, p.56.

² See Longrigg, 1998, pp.67-68 and Jones 1979 (/1946), p.11.

³ For more on the general influence of Sicilian (as opposed to Coan) medicine upon Plato see A.E. Taylor, 1928, p.18 and Cornford, 1937, p.352.

⁴ Peck writes, 'The soul in *peri diaites* corresponds to the third soul in the *Timaeus* and it behaves exactly as that Soul behaves' (*Pseudo-Hippocrates Philosophus*,

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analysis is surely correct, yet Peck only broaches the topic of possible links between *Peri Diaites* and the *Timaeus*; for his research focuses on just the first book of this crucial Pseudo-Hippocratic work. I suggest that when we consider the whole of *Peri Diaites* and, especially, when we consider the theme of the physics of cognition, which is introduced in the first book and is taken up again in the fourth book, a deep and programmatic link between *Peri Diaites* and the *Timaeus* emerges.⁵ In what follows, I shall argue that the cognitive psychology and cosmology advanced in *Peri Diaites* play crucial and substantive roles in shaping both Plato's theory of the human rational soul and his account of the relation between the rational soul and the heavens in the *Timaeus*.⁶

Cambridge University Library, 1928, p.74). This 'third soul' is the appetitive (or nutritive) soul, standing as third in rank within Plato's tripartite hierarchy, behind the spirited soul and the rational soul. Neither Peck nor Jones, who accepts Peck's assessment (see Jones, 1929, p. xliii), suggests that *Peri Diaites* may have influenced Plato's account of human reason in the *Timaeus*. (I would like to thank David Sedley for providing me with access to a microfilm copy of Peck's dissertation.)

⁵ There is little doubt that *Peri Diaites* was written about a half-century prior to the writing of the *Timaeus*. While a broad range of possible dates for *Peri Diaites* have been suggested, the treatise is best dated to around 400 BC. (See both Jones, 1929, p. xliii and Kahn 1994 (1960) pp.189-90. Kahn, to my mind, soundly refutes Jaeger's contention that the text dates to around 350 BC.) The *Timaeus* was written late in Plato's career, most likely some time after his third visit to Sicily (362 BC) and (obviously) prior to his death in 346 BC.

⁶ My thesis is chiefly philological and historical. Nevertheless, if it is sound, it provides buttressing support for the literalist interpretation of Plato's claims concerning the shape, arrangement and structure of the human rational soul. Until quite recently, it had long been unquestioningly accepted that, when Plato writes of the circular structure and motions of reason within the head (e.g. see *Tim.* 43B-44D, 47B-C, & 90A-D), he means this metaphorically. (See Archer-Hind, 1888, p.114; Taran, 1971, p.34 & p.54; and Lee, 1976.) But, during the past decade, this metaphorical interpretation has come under attack by defenders of a literalist view. (See Sedley, 1999 (1997), p.317-318; Johansen, 2000, pp.90-1; and Burnyeat, 2000, p.46. Each of these authors acknowledges the influence of a contribution by Sarah Broadie to a May Week seminar on the *Timaeus* at Cambridge University in 1993. So, it appears that Broadie sparked the move toward the literalist interpretation.) Most recently, the emerging literalist interpretation has been counter-challenged by at least one defender of the metaphorical view. (See Steel, 2001, p.125.) I show that the author of *Peri Diaites* maintains that the rational soul both possesses spatial properties and engages in circular motion. Further, I argue that Plato, in the *Timaeus*, accepts and elaborates upon these very elements from *Peri Diaites*. So, my findings suggest that Plato's assertions regarding the shape, structure and motion of the rational soul are to be taken literally and not metaphorically.

Let us begin with a single term: *periodos*. This term is employed in *Peri Diaites* both in the author's discussion of the human rational soul and in his account of the nature of the heavens. *Periodos*, however, is seldom used in the writings of the other early medical theorists. Further, it is rarely used in the writings of the Pre-Socratic cosmologists. In fact, amongst all the pre-Platonic philosophical, scientific and medical texts, *periodos* plays a doctrinal role only in *Peri Diaites*. Yet, *periodos* is employed with noteworthy frequency in the *Timaeus* and there it plays a doctrinal role both in Plato's discussion of the rational soul and in his account of the heavens. The role *periodos* plays in the *Timaeus* is strikingly similar to the role the term plays in *Peri Diaites* and the similarity is too thoroughgoing to be a matter of mere happenstance. The best explanation for the similarity is, as I see it, the presence of a firm historical connection between these two works.

The term *periodos* occurs 146 times in the extant writings of the early medical theorists, Plato, and the major Pre-Socratic cosmologists.⁷ Over half of these occurrences, 78, are in the medical texts and the greatest numbers of these, 17, are in *Peri Diaites*.⁸ In this Sicilian text, *periodos* is consistently used to mean 'circuit, or 'way round', and it is employed both in describing celestial phenomena and in describing phenomena of the human soul. While *periodos* occurs in other medical texts, it is rarely used therein to mean 'circuit'.⁹ In most cases it is used to mean something like 'periodic'. With this meaning, it typically marks intervals of time between the manifestations of symptoms or the onslaught of fits of disease.¹⁰ In addition, *periodos* is used both to mark the menstrual period and to refer to prescribed walks.¹¹ But, importantly, in the medical texts

⁷ TLG search for 'period-' in Thales, Anaximander, Anaximenes, Anaxagoras, Empedocles, Democritus, Heraclitus, Hippocrates, Pseudo-Hippocrates, Plato, Pythagoras and Xenophanes.

⁸ See *Peri Diaites* 1.9.33, 1.10.17, 1.19.4, 1.35.56, 1.35.57, 2.66.22, 2.66.27, 3.71.9, 3.76.5, 4.89.10, 4.89.12, 4.89.48, 4.89.85, 4.89.88, 4.90.11, 4.90.29, and 4.93.27.

⁹ Although, see both *De Aere Equis* 19.10 and *De Capitis Vulneribus* 21.21.

¹⁰ See *De Natura Hominis* 8.3, *Prognosticon* 7.19, *Epidemics* 1.1.13.19 & 2.1.4.1, and *Aphorisms* 1.12.2 & 4.59.1.

¹¹ Regarding menstruation, see *Epidemics* 2.3.17.16. Regarding walks, see *De Affectionibus Interioribus* 25.24, *Epidemics* 6.3.18.3, and *Prorrhetic* 2.3.25.

outside *Peri Diaites*, this term is not used to describe the structure of the human soul.

In Plato's dialogues, the term occurs 49 times and nearly half of these occurrences, 23, are in the *Timaeus*.¹² (Most other occurrences are in the *Laws* and *Epinomis*.¹³) In the *Timaeus*, *periodos* is consistently used to mean 'circuit' and Plato employs the term both in describing phenomena of the human rational soul and in describing celestial phenomena. The Pre-Socratic cosmologists, by contrast, rarely use the term. When describing motions within the heavens, these authors tend to use terms such as *dinos* (whirl), *kuklos* (circle), and *strophe* (twist).¹⁴ Further, in those limited instances in which these authors describe routes of organic motion within the body, they tend to use terms such as *phleps* (vein), *poros* (pore), and *suringos* (pipe).¹⁵

In *Peri Diaites*, the author claims that the human soul is formed into three circuits (*periodoi*) and he asserts that these circuits are copies of kindred circuits within the heavens. The human soul is, in fact, a copy of the whole (*apomimesin tou holou*: *PD* 1.10.3): it is a copy of the heavens. The soul is comprised of an inner circuit, with the power of the moon; an outer circuit, with the power of the stars; and an intermediary circuit, with the power of the sun (*PD* 1.10.15-26). Such, contends the author, is the nature that we have been given by the celestial gods (*PD* 1.11.4-6).¹⁶ Regarding his chief interests, prodiagnosis and therapeutics, the author maintains that our

¹² See *Timaeus* 34A6, 38C8, 39B5, 39C2, 39C5, 39D5, 42C5, 43A5, 43D2, 44A4, 44B2, 44D3, 47A5, 47B7, 47D3, 58A5, 76A7, 83A2, 85A6, 86A7, 90D2, and 91E5.

¹³ A full 36 of the 49 occurrences of *periodos* in the Platonic corpus are in the *Timaeus*, *Laws* and *Epinomis*.

¹⁴ For *dinos*, see Anaxagoras fr. 12.8 and Empedocles fr.35.4. For *kuklos*, see Anaximander, testimonia, Fr. 11.15 and Empedocles fr. 26.1. For *strophe*, see Heraclitus, testimonia, fr.12.3.

¹⁵ For *phleps*, see Democritus, testimonia, fr.87.1. For *poros*, see Democritus, testimonia, fr.135.264 and Empedocles fr. 100.17. For *suringos*, see Empedocles fr. 100.2.

¹⁶ The author expands on the theme of copying the heavens in his discussion of human craft (*technē*). He claims that we have been taught various crafts by the gods so that we might copy their divine functioning. These crafts include basket weaving, in which circuits of reed are made to go round, beginning where they end (*PD* 1.19.1-5), and pottery making, in which the potter's wheel spins round and round (*PD* 1.22.1-10).

health depends upon the balance of fire and water within the body, together with the condition of the circuits of the soul. Motion of the circuits must persist at a proper rate of speed. Otherwise, our intelligence shall be diminished. If the motion of our circuits is too fast, we shall come to make over-hasty judgments (*PD* 1.35.101-107) and if the motion is too slow, perception shall outstrip reason and we shall come to grasp objects in only an unreliable and spasmodic fashion (*PD* 1.35.55-58). In addition, the author maintains that the circuits of the soul must not be obstructed or in any way impeded (*PD* 1.35.40-41): these circuits must be permitted to flow freely and naturally.

The author's therapeutic art is one of prescribing complex regimens of diet and exercise (*PD* 3.69.10-14). Along with other Sicilian medical theorists, the author sees little value in the use of pharmaceuticals (*PD* 3.67.17-25). He does, however, go into great detail concerning the value of a wide range of foods (including not only the flesh of dogs, but also the flesh of puppies: *PD* 2.46.23-26) and he stresses the importance of the proper preparation of food (some foods should be grilled, others boiled in water, and yet others boiled in vinegar: *PD* 3.81.17-22). The author also discusses a host of exercise regimens (showing, perhaps, an over-fondness for brisk runs on a circular track and wrestling in dust: *PD* 3.81.22-24).

Regarding prodiagnosis, the author considers the physiological signs of emerging disease (such as headaches, flatulence, stomach pains, and loose stool: *PD* 3.73-75), but he also considers the cognitive signs of emerging disease and, when it comes to cognition, he takes special interest in the content of dreams. The author asserts that the circuits of the soul are cognitive circuits (these circuits are responsible for thought: *PD* 1.10.21-25) and he maintains that the soul never fails to be active. Consequently, he claims that, during sleep, the soul achieves independence from the body and '...administers its own household...<remaining>...cognizant of all things' (*PD* 4.86.9-12). Dreaming is, according to this author, the true cognitive life of the soul: it is the one work that is entirely the soul's own.

The first signs of emerging illness are revealed in the celestial content of dreams. In our dreams, the heavenly bodies may

appear to be discolored or to be in someway disfigured; in addition, they may appear to be frozen in place or to be moving in odd directions (*PD* 4.89.74-95). These aberrations, the author maintains, have as their immediate cause abnormalities in the functioning of our cognitive circuitry and these abnormalities amount to a lack of isomorphism between our internal circuits and the circuits of the heavens. This becomes evident once we consider the therapeutic regimens that the author recommends in response to aberrational dream content. Regarding a patient who experiences aberrational content concerning the stars, the author states,

It is beneficial for this man to make his runs long, wearing his cloak the while, to increase them gradually, that he may perspire as freely as possible, and after exercise to take long walks...and also use the vapour-bath: for as the mischief lies in the outer circuit, it is expedient to make the purgation through the skin.

(*PD* 4.89.17-27; trans. Jones, 1929)

For aberrational content concerning the moon, the author recommends an emetic after acrid and salty foods, together with voice-exercises (*PD* 4.89.27-36). He adds, 'the revulsion must be directed inwards because the harm showed itself at the hollow part of the body' (*PD* 4.89.36-38; trans. Jones). Finally, for aberrational content concerning the sun, the author asserts that the underlying malady will be especially difficult to eliminate, occupying, as it does, the intermediary cognitive circuit. He claims, 'It is necessary to effect the revulsions in both directions' (*PD* 3.89.39-40) and he recommends long runs on a double track, additional runs on a circular track, walks, and an emetic (presumably, after acrid and salty foods) (*PD* 4.89.40-44). By directing treatment toward precise spatial zones within the body, our Sicilian theorist aims to return his patients' internal circuits to a state of isomorphism with the celestial circuits.

The author of *Peri Diaites* maintains that, when we are in good health, the heavens appear in our dreams just as they truly are in the waking world. Further, he holds that celestial content in dreams is determined by the physical structure and motion of our cognitive circuits. He does not merely defend the general position that if one is to be in good health, one's cognitive circuitry must be functioning properly. He defends the specific

position that if one's cognitive circuitry is to function properly, it must be maintained in a state that is kinetically and structurally isomorphic to that of the kindred celestial circuits. One is in good health when one's own internal circuits of sun, moon, and stars behave just as the heavenly circuits behave in the waking world. Considerations of cognitive and celestial circuitry are, thus, crucial to this author's project and, for this reason, it is evident that *periodos* plays a doctrinal role in *Peri Diaites*. To reiterate: first, the author of this Sicilian text relies on an account of circuits (*periodoi*) when advancing his theory of structural and kinetic kinship between the human soul and the heavens. Second, he contends that one is, as a whole, healthy, when the circuits of one's soul are in a dynamic state of isomorphism with their kindred celestial circuits. Third, the author asserts that the key to maintaining this state of isomorphism is proper regimen in diet and exercise. And, finally, he not only argues that important signs of emerging disease are found in the celestial content of dreams, but he also asserts that celestial content in dreams is determined by the state of our internal cognitive circuitry.

In Plato's *Timaeus*, the world-soul (i.e. the soul of the heavens) is formed by a divine craftsman. This soul consists of a pair of circuits: a circuit of the same and a circuit of the other. The first circuit is responsible for the motion of the fixed stars, while the second circuit, having been divided into seven distinct loops, is responsible for the motion of the sun, the moon and the five known planets (*Tim.* 34B9-36D8). The world-soul revolves unceasingly and its life of circular motion is a blessed and intellectual life (*Tim.* 34A2-3 & 36C1-D1). The craftsman also creates the human rational soul and he forms this soul as a likeness of the world-soul. Our soul is constructed out of the same material as the world-soul and it consists of a circuit of the same and a circuit of the other (*Tim.* 41D4-E1 & 44D2-5). The human rational soul first comes into existence situated within the heavens. Each rational soul has its own native star, which serves as its initial abode. While residing on its native star, the rational soul, like the world-soul, enjoys a blessed and intellectual life (*Tim.* 42B8-9). But the rational soul ultimately comes to be placed within a perishable body. It comes to be situated within the human skull, while two lesser mortal souls (a

spirited soul and a nutritive soul) are sited below within the torso (*Tim.* 69C1-70A2).

As Plato sees it, the body is a cause of much mischief for the rational soul. Rectilinear and upward tending motions, caused by perception, growth, and nutritive functioning, disrupt the motions of the rational soul and, owing to such bodily influences, the rational soul becomes twisted and convoluted (*Tim.* 43D10-E3). Being waylaid by irrational forces, we ourselves become irrational. We become foolish and err in judgment whenever our cognitive circuits fail either to have their proper shape or to engage in their proper motion (*Tim.* 44A5). Plato contends that these mischievous rectilinear motions are most powerful when we are young (*Tim.* 44A10-B2). Accordingly, on his account, each of us comes into this world lacking cognitive health. And, under these circumstances, we cannot simply seek to maintain health. We must first seek to regain health and, by regaining our intellectual health, Plato contends, we earn the right to return to our native star: we earn the right to return to a life that is both blessed and rational. In order to regain health, we must initially rely on therapeutic intervention. According to Plato, we must appropriately regulate diet and exercise in order to minimize the traffic of rectilinear motions within the head. By minimizing this traffic, we protect our cognitive circuitry from any further damage or distortion (*Tim.* 85A1-B7).

At this point, a number of similarities have become evident. Like the author of *Peri Diaites*, Plato advances a theory of kinship between the human rational soul and the heavens and, while his own cosmology and cognitive psychology are certainly more complex, Plato, like his Sicilian predecessor, explains this underlying kinship in terms of parallels between our cognitive circuitry and the circuitry of the heavens. Further, Plato, like the author of *Peri Diaites*, asserts that we have intellectual health when our cognitive circuits function well. In addition, he stresses the importance of proper diet and exercise. But, here, Plato's view is somewhat different from that which is advanced in *Peri Diaites*. According to our Sicilian author, proper diet and exercise are sufficient for health, while, for Plato, these are merely necessary for health. Diet and exercise alone do not repair the damage that has already been done to our cognitive

circuitry: good regimen only wards off any further (or future) damage. Yet, Plato's therapeutic art is not limited to the mundane balancing of diet and exercise: his art has a second component. This, oddly enough, is the study of astronomy: the study of the heavens. Astronomy is, for Plato, a form of intellectual diet and exercise. He states,

...the way of tendance (*therapeia*) of every part by every man is one – namely, to supply each with its own congenial food and motion (*trophas kai kineseis*); and for the divine part within us the congenial motions are the intellections and revolutions of the Universe. These each one of us should follow, rectifying the revolutions (*periodous*) within our head, which were distorted at birth, by learning the harmonies and revolutions of the Universe, and thereby making the part that thinks like unto the object of thought, in accordance with its original nature...

(*Tim.* 90C8-D6; trans. Bury).¹⁷

The study of astronomy is, for Plato, a form of therapy. On Plato's view, we come to realign and redirect our own internal

¹⁷ At first blush, Plato, here, seems to treat astronomy as sufficient for our best mode of existence. Yet, if this were Plato's exact meaning, then the claim would be highly problematical; for, in *Republic* book VII, Plato treats astronomy as one of five bridge disciplines, leading the philosopher toward contemplation of the Forms. He treats astronomy as a propaedeutic discipline and, considered as such, astronomy cannot stand alone as sufficient for human fulfillment. Attempts to soften the perceived conflict between Plato's claim, at *Tim.* 90D, and the content of *Republic* book VII have not been fully successful. Scholars have proposed limitations upon the scope of Plato's claim, in the *Timaeus*, so as to allow it to be viewed as being consistent with the account of astronomy in the *Republic*. But, unfortunately, only very sketchy text-based evidence has been found in support of the proposed limitations. (Sedley maintains that Plato's claim at *Tim.* 90D is given from the point of view of physics (see Sedley, 1999 (1997), p.327). He cites other passages in the *Timaeus* in which claims are made *phusikos*, but he does not offer a direct justification for viewing *Tim.* 90D as falling within this precise context. Betegh takes *Tim.* 47A-C to provide a more complete articulation of Plato's claim at *Tim.* 90D (see Betegh, 2003, p.297). Yet, while at *Tim.* 47A-C Plato does maintain that considerations of the motions of the heavens are only a means toward a higher end, he does not actually discuss the science of astronomy in this passage: he discusses only our initial perceptual acquaintance with the heavens.) It is, perhaps, not unreasonable to construe my thesis as providing a rationale for taking Plato's claim, at *Tim.* 90D, to have limited scope. I show that the claim falls squarely within a governing medical context: the context of bringing the individual person to a state of general intellectual health. This context may well be sufficiently limited, when compared to the larger epistemological plan of the *Republic*, to allow astronomy, in the *Timaeus*, to be viewed as playing no more than a propaedeutic role in the philosopher's ascent.

circuits by studying the structure and motion of the heavenly circuits. The study of the heavens, thus, allows us to return our own cognitive circuits to a state of structural and kinetic isomorphism with the divine circuits of the world-soul. This study returns us to the original state that each of us had once enjoyed on his or her own native star.

Plato's discussion of astronomy is tied to the discussion of dreams in *Peri Diaites*. According to our Sicilian author, accurate cognition of celestial phenomena in dreams stands as a key sign of intellectual health. Cognition, in dreams, is the soul's pure activity: the work which it engages in when it is truly mistress of its own household. Plato seems to rely on this very account. Yet, he is an innovator and he modifies the account in two ways: first, he transforms what is initially an accurate grasp of celestial phenomena into the intellectual comprehension of the science of the celestial region: astronomy. And, second, he transforms that which is initially linked to signs of health into a discipline that is sufficient (when conjoined with proper regimen in diet and exercise) for regaining health. The study of astronomy is, for Plato, a therapeutic and restorative mode of cognition and such cognition is, as he sees it, an activity that reason is meant to engage in when it is truly mistress of its own household.

In conclusion, I hope to have shown that there is, most likely, a strong historical connection between Plato's *Timaeus* and the medical treatise *Peri Diaites*. First, it is in *Peri Diaites* that we initially discover the notion that the human soul has circuits (*periodoi*) that are akin to heavenly circuits. Second, it is in this treatise that we are first told that if one is to be healthy, one's cognitive circuits must be in a dynamic state of isomorphism with their kindred celestial circuits. Third, it is in *Peri Diaites* that we first learn that proper regimen in diet and exercise is linked to the healthy functioning of one's cognitive circuitry. And, finally, it is in this treatise that we first learn that there is a type of cognition regarding the heavenly circuits that is tied to the proper operation of one's own cognitive circuits. Although Plato innovates upon some of these basic themes, he is essentially in agreement with the author of *Peri Diaites*. So, it is reasonable to hold that the Sicilian medical treatise *Peri Diaites* has a significant influence upon Plato's thought, in the *Timaeus*,

concerning human cognitive circuitry and its relation to celestial circuitry.¹⁸

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