Mathematizing the soul: The development of Ptolemy’s psychological theory from On the Kritêrion and Hêgemonikon to the Harmonics

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A R T I C L E   I N F O

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1. Introduction

While Claudius Ptolemy is widely considered one of the most significant figures in the history of science, one area of his scientific system is nearly unexplored: psychology. Ptolemy portrays psychology as the science that studies the physical nature and formal structure of the human soul, and he presents his psychological theory in three texts: On the Kritêrion and Hêgemonikon, Harmonics, and Tetrabiblos. The first is a short epistemological treatise, which examines the components of the criterion of truth—the manner by which one attains knowledge—as well as the nature and structure of the human soul; the second includes an analysis of the ratios defining musical relations as well as, by analogy, human souls and celestial phenomena; the third is an astrological text, in which Ptolemy analyzes the effects celestial bodies and their configurations have on sublunary phenomena, including human souls. In the Tetrabiblos, Ptolemy only mentions the soul’s components in passing, but he puts forward complete and systematic accounts of the soul in both On the Kritêrion and Hêgemonikon and the Harmonics.

Despite its explicit ascription to Ptolemy in the manuscript tradition, On the Kritêrion and Hêgemonikon has engendered doubt concerning its authenticity. It seems unbelievable to some historians of science that Ptolemy could have written a text that is not only devoid of mathematics but also manifestly philosophical. G.J. Toomer, for instance, calls On the Kritêrion “an insignificant philosophical work,” and he claims that its style is dissimilar to the style of Ptolemy’s authentic texts. Nevertheless, stylistic and thematic arguments, as well as Alexander Jones’ recent discovery that On the Kritêrion contains at least three words which exist in Ptolemy’s texts but appear either nowhere else in the Greek corpus or not until late antiquity, lend strong support to its authenticity. Persuaded that On the Kritêrion is an authentic text of Ptolemy, I will assume its authenticity for the purposes of this article and address its relation to the remainder of his corpus.

The fate of On the Kritêrion in modern scholarship has been predominately source criticism. Franz Boll argues that Ptolemy utilized a late Peripatetic compendium. Friedrich Lammert maintains that On the Kritêrion is representative of the Middle Stoa, and Paola Manuli, acknowledging a Stoic and Peripatetic presence, posits a closer relation with Middle Platonism. Critiquing this purely philosophical mode of analysis, which has led to such diverse accounts of Ptolemy’s sources, A.A. Long notes that because many of the terms Ptolemy employs were no longer school-specific but rather common intellectual currency in the second century, intellectual history is necessary to assess Ptolemy’s relation to the contemporary philosophical milieu. Accordingly, Long argues that Ptolemy’s philosophy in On the Kritêrion is eclectic—distinguished by Platonic, Aristotelian, and Stoic features—and that his method is characterized by...
“optimum agreement,” seeking as much coherence as possible with every dogmatic philosophical tradition. In addition, Long claims that in On the Kritērion Ptolemy investigates epistemological questions which arose in his work as a ‘scientist’: “His little essay should be read, I suggest, as a practicing scientist’s statement of where he stands on the epistemological issues that arise in his day-to-day work.”\(^8\) Surely the question of which part of the soul is the ἕγεμονικόν did not arise in Ptolemy’s mathematical pursuits, but Long’s focus is not Ptolemy’s psychology. Long presents a detailed intellectual history of Ptolemy’s criterion of truth and epistemology, but he does not analyze Ptolemy’s psychological account in any great detail nor investigate why Ptolemy presents his theory of the human soul alongside his criterion. Long mentions his conviction that the psychological accounts in On the Kritērion and the Harmonics are entirely consistent, but he does so without argumentation.\(^9\) Employing Long’s study as a stepping-stone, I will examine the intellectual history of Ptolemy’s psychological accounts in On the Kritērion and the Harmonics, I will investigate whether the accounts are consistent, and, having exposed significant disparities, I will explain why it is that they differ.

The psychological exposition in Harmonics 3.5-7 has received a modicum of consideration, but much of it has been dismissive. Although he grants that Ptolemy’s psychology lies outside the scope of his article, Noel Swerdlow discloses his low opinion of Ptolemy’s correspondences between musical relations and the soul by calling them “rather strained.”\(^10\) Similarly, Massimo Raffa contends that the analogies appear today as alternatively symbolically efficacious or forced,\(^11\) and Andrew Barker judges Harmonics 3.5–7 to be less than rigorous:

The chapters on the soul and the virtues, rewarding though they are if considered as an episode in Greek moral psychology, display nothing of the rigorous reasoning of a proper counterpart to harmonics. Little argument is offered to support the proposed analyses and correspondences; and one cannot help feeling that Ptolemy, in his role as a scientist, is only half-heartedly engaged in the project.\(^12\)

Because Ptolemy jettisons the more technical aspects of his harmonic theory when ascribing harmonic relations to psychological phenomena, a scholar may aptly describe Harmonics 3.5–7 as mathematically less rigorous than the books on music theory. Although he elsewhere concedes the heuristic value of Ptolemy’s psychological excursion,\(^13\) Barker infers from this fact that Ptolemy must have felt not entirely committed to the project. Barker’s initial assessment is consistent with Jon Solomon’s remark that the chapters on the soul and celestial phenomena in the Harmonics “cannot give the reader confidence that Ptolemy labored hard or long on these passages”\(^14\) as well as Long’s proposal that Ptolemy’s psychology in On the Kritērion had little independent value for Ptolemy but is merely preparatory to his “specialized scientific writings.”\(^15\) I would argue that these appraisals prematurely devalue Ptolemy’s psychology. It is, of course, impossible to reconstruct with certainty Ptolemy’s attitude toward this science, but I would maintain that the assiduousness of Ptolemy’s psychological investigations and their occurrence in several of his texts indicate that Ptolemy took the project quite seriously. I hope to demonstrate that the complexities of Ptolemy’s psychology—in particular the manner in which he responds to contemporary and authoritative philosophical traditions as well as the development of his psychological method alongside the maturation of his general scientific method—reflect Ptolemy’s significant interest in the nature and structure of the human soul.

Considering that the psychological accounts in On the Kritērion and the Harmonics have received little scholarly attention, it is not surprising that no scholar has made substantial study of their relationship. Presenting an intellectual history of Ptolemy’s psychology, I will demonstrate Ptolemy’s appropriation of Aristotelian, Platonic, and Stoic ideas as well as, correspondingly, his embedding in the contemporary philosophical culture and its characteristic eclecticism.\(^16\) I will demonstrate that Ptolemy’s eclecticism is not indiscriminate; he is deliberate in his choice of when and where he uses terms which allude to historically distinct philosophical traditions. By providing a side-by-side analysis of the psychological accounts in On the Kritērion and the Harmonics, I will bring to light significant terminological and thematic disparities between the texts, and I will argue that these disparities strongly suggest the development of Ptolemy’s psychological theory from a less to a more restrictive model of the soul. Moreover, I will argue that this development encapsulates the maturation of the general scientific method Ptolemy employs throughout his corpus.

2. Ptolemy’s psychological account in On the Kritērion and Hēgemonikon

The human soul falls into a special category for Ptolemy. It is a physical body that is mortal and imperceptible. To begin with, in Harmonics 3.4 Ptolemy characterizes human souls as mortal (ὥμοιοι). The term ὥμοιοι arises in only one other instance in Ptolemy’s corpus: in the introduction to the Almagest. In the relevant passage, Ptolemy argues that, of the three theoretical sciences, mathematics is intermediate between physics and theology for two reasons. First, while the object studied by theology—or, as the text implies, the Prime Mover—is imperceptible and physical objects are perceptible, mathematical objects can be thought of (ὑποκείμενοι) both with and without the aid of the senses. Second, Ptolemy explains that the subject matter of mathematics “is an attribute of all existing things without exception, both mortal and immortal (καὶ θνητοῖς καὶ ὥμοιοις). On the one hand, for those things which are perpetually changing in their inseparable form, it changes with them; on the other hand, for eternal things which have an ethereal nature, it keeps their unchanging form unchanged.”\(^17\) In other words, Ptolemy argues that mathematical objects are intermediate between physics and theology because mathematical objects can be abstracted from all bodies, sublunary and superlunary, mortal and immortal (θνητοῖς καὶ ὥμοιοις), physical and theological. Mortality, then, is a trait that distinguishes sublunary, physical bodies from superlunary, theological bodies. As mortal, the human soul is a sublunary, physical body and, as such, it is the subject matter of physics.

The human soul, however, is unlike other physical bodies in that it is not perceptible. In this way, it differs from the human body.

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\(^8\) Ibid., p. 163.
\(^9\) Ibid., p. 170.
\(^12\) Barker (2000), p. 268.
\(^16\) For studies of eclecticism in the period 50 B.C.E. to 200 C.E., see Dillon & Long (1988).
\(^17\) Ptolemy Almagest 1.1, Heiberg (1898), p. 6, translation after Toomer (1998).
While both soul and body are physical, the soul is imperceptible. Ptolemy contrasts soul and body in On the Kritêrion: "The parts in us being grasped according to the most general differentiae are body and soul. By 'body' we mean the part composed of bones, flesh, and similar perceptible things (τῶν τοιούτων αἴσθητῶν), and by 'soul' the cause of the movements occurring in or through these and which we can only grasp through its powers (ψυχὴν δὲ τὸν ἐν τούτοις ή διὰ τούτων κινήσεως αἴτιον, οὗ τῶν δυνάμεων μόνον ἄντικυμ- βασικόμευτον)." Despite its imperceptibility, the soul is apprehensible by means of the effects it causes in and through the body. Ptolemy refers to these effects as powers, or faculties (δυνάμεις), the term which Aristotle uses in the De Anima to signify the soul's capacities. According to Ptolemy, the soul is the cause of a human being's thinking (διανοοῦσιν), as well as "both sensory and all other movements (τὰς τε συναίσθητικὰς καὶ τὰς ὀλικᾶς πάσας κινήσεις)." By observing the effects the soul's faculties have on the body, or the movements the soul causes in and through the body, one apprehends the soul's nature.

While the soul and body have different capacities, in their material consistency they differ merely in degree. Examining the effects death has on soul and body, Ptolemy explains that the soul consists of finer particles than body:

The soul is so constituted as to scatter immediately to its proper elements (τὰ οἰκεῖα στοιχεῖα), like water or breath (πνεῦμα) released from a container, because of the preponderance of fine particles (ἐλεπτομερεῖς) ... the body, on the other hand, although it remains in the same state for a considerable time because of the thick consistency of its matter (τὸ τῆς ὀλικῆς πνευματικῆς), nevertheless is not seen to have any sensation or to make any movement of the kind it did previously.21

Recalling Epicurean materialism in particular, Ptolemy portrays the soul as consisting of fine particles that scatter upon release from the body; the body has a thicker consistency and is more material (ὑλικότερον) than the soul.22 Hence, the particles composing the soul are finer than the constituents of body, and these fine particles are so small that they are imperceptible.

Ptolemy affirms that the soul consists of matter, even different kinds or a single sort, in the following:

Further, if soul is composed not of one but the same but of different kinds of material (ὅλης ὀλικῆς), it will be the individual characteristics of these different materials that shape the parts of the body which surround each of them to suit the properties of their own substance and so make them able to cooperate with the faculties of the soul. If, on the other hand, the underlying nature (ὑποστάσεως) of the whole [soul] is one and the same, the variety of the [soul's] faculties will be produced by the differences in the surrounding parts of the body...23

Ptolemy ultimately argues that the soul consists of different types of matter. Appropriating Aristotle's five-element theory, he claims that the human soul is composed of three of the five elements: air, fire, and aether. Distinguishing body and soul by their elemental composition, he classifies the soul in accordance with its relationship with the more active elements: "Among the compounds too, we apply the term 'body' properly to what is more material and less active (τὸ ὑλικότερον καὶ ἀνεφεύρητον) and 'soul' to what moves both itself and body. It is therefore reasonable that the body should be classed in accordance with the elements of earth and water and the soul in accordance with the elements of fire, air, and aether."24 In this passage Ptolemy states that the soul merely should be classed (τεταχθεῖσι) in accordance with fire, air, and aether, but thereafter he makes a stronger claim and asserts that the soul is composed of these elements: "It will also be a consequence of this that the substance (οὐσίαν) itself of the soul has a distinct nature akin to the elements of which it is composed (τοῖς ποιοῖσιν οὕτωι στοιχείοις), so that its nature will be both passive and active in its proper movements in proportion to the air and fire, but active only in proportion to the aether."25 Thus, Ptolemy maintains that the soul is composed of the elements air, fire, and aether.

According to the members of the Liverpool/Manchester Seminar on Ancient Philosophy, Ptolemy's particular ascription in On the Kritêrion of passivity and activity (πάσχειν καὶ ποιεῖν) to the five elements is neither Peripatetic nor Stoic.26 Following Boll, I would argue that Ptolemy joins these two traditions by amalgamating Aristotle's five-element theory with a Stoic conception of the passivity and activity of the elements.27 Like the Stoics, Ptolemy portrays air and fire, the constituents of the Stoics' pneuma, as active in comparison to earth and water, which both the Stoics and Ptolemy depict as passive. Unlike the Stoics, Ptolemy appropriates Aristotle's fifth element, labels the aether active, and defines air and fire as both passive and active. Ptolemy's portrayal of the soul as consisting of air and fire stems from the Stoic conception of pneuma, and his inclusion of aether as an elemental component of the soul proceeds from the Peripatetic tradition. In Generation of Animals 736b30–737a1, Aristotle describes a faculty of the soul which has a body that is more divine than the elements, and he describes semen as containing within it a substance that is analogous to the element of the stars (τῶν ἀστρῶν στοιχεῖον). Providing a Hellenistic reference to this tradition, Cicero relates in Academica 1.7.26, "Aristotle deemed that there existed a certain fifth sort of element, in a class by itself and unlike the four that I have mentioned above, which was the source of the stars and of thinking minds."28 Ptolemy appropriates this association of aether with the human soul, and he adapts it to the Stoic system of the activity and passivity of the elements. Accordingly, he portrays

19 Ptolemy On the Kritêrion and Ἡγεμονικὸν, La11, translation after Liverpool/Manchester Seminar on Ancient Philosophy (1989).
20 Ptolemy On the Kritêrion and Ἡγεμονικὸν, La11, translation after Liverpool/Manchester Seminar on Ancient Philosophy (1989).
21 Ibid., La12.
23 Ptolemy On the Kritêrion and Ἡγεμονικὸν, La12, translation after Liverpool/Manchester Seminar on Ancient Philosophy (1989).
24 Ibid., La19.
25 Ibid., La20.
aether as active, fire and air as active and passive, and these three elements as constituents of the human soul.  

Ptolemy proceeds, however, to assign all five elements, including earth and water, to the soul’s faculties, as delineated in Figure 1. In On the Kritêrion, the soul consists of three faculties: the faculty of thought (διανοητικῶν), the faculty of sense perception (παθητικῶν), and the faculty of impulse (ἀρμητικῶν). The faculty of sense perception is around (περὶ) the passive elements, earth and water; the faculty of impulse is around the elements that are both passive and active, air and fire; the faculty of thought is around the element that is only active, aether. Ptolemy further divides the faculty of impulse into two parts: the appetitive (ἀρκετικῶν) and emotive (θημικῶν). The former has more air in its composition (ἄροιοδεστερον) and the latter has more fire (πυροδεστερον). In general, the soul exists in greater proportion in the more hot and moist areas of the body, but each faculty has its own, distinct location(s).  

The term Ptolemy uses for the faculty of impulse, ἀρμητικῶν, derives from the Stoic tradition, but it became common intellectual property by the second century. For instance, in Didaskalikos 25.7, Alcinoös—a Platonic most likely contemporary with Ptolemy—portrays the faculty of impulse as a faculty of gods’ souls that transforms into the emotive faculty (θημικῶν) and emotive (μπασικῶν). The former has more air in its composition (ἄροιοδεστερον) and the latter has more fire (πυροδεστερον). In general, the soul exists in greater proportion in the more hot and moist areas of the body, but each faculty has its own, distinct location(s).  

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animal, because it is the first part of an embryo to develop and, once developed, it provides nourishment to the growing animal in the form of blood.33 Post-Hellenistic philosophers adapted these earlier arguments to characterize the heart as the seat of the ἡγεμόνικον. In De Anima 39.21–40.3, for instance, Alexander of Aphrodisias argues that the ἡγεμόνικον resides in the heart because, as the container of blood, it is the source of nutriment for the body. Ptolemy joins this tradition by designating the faculty located around the heart as the ἡγεμόνικον with respect to living.

Like the faculty of impulse, Ptolemy's faculty of sense perception (διάνοιατικόν)—which Aristotle describes as a faculty of the soul in the De Anima—is multiple in location and capacity. It governs the contact of the sense organs with perceptible bodies and the transmission of sensory impression (ἐισαγωγή) to the intellect (νοῦς). Concerning the senses, Ptolemy identifies five, each with its own location in the body. Touch, more material (διϊκοῦτερον) than the other senses, extends through the body's flesh and blood. The other four senses exist in the parts of the body that are more easily penetrated and moist. Taste and smell are located lower in the body than sight and hearing, and, accordingly, they are closely related to the faculty of impulse. Residing physically higher in the body are sight and hearing. They are the more easily activated and valuable (τὰς μὲν μᾶλλον εὐκινητοτέρας καὶ τιμιωτέρας) of the senses, and they are closely connected with the faculty of thought, which Ptolemy labels the ἡγεμόνικον with regard to both living and living well. While the emotive part of the soul is secondary to the faculty of thought as the ἡγεμόνικον of living, the senses sight and hearing are secondary ἡγεμόνικα of living well.

The faculty of thought (διάνοιατικόν) is the most valuable and divine, in both capacity and substance, of the soul's faculties. It is undivided, and Ptolemy appropriates its location from the Timaeus. In On the Kritêrion, Ptolemy maintains that the faculty of thought “has its seat in the head and around the brain (ἐν τῇ κεφαλῇ καὶ περὶ τῶν ἐγκέφαλων),”34 and in Timaeus 44d the immortal part of the soul resides in the head. While Ptolemy's faculty of thought is single in location, like the other faculties it is multiple in capacity. Ptolemy states, “It exhibits a capacity for forming opinions (δοξοστηρίκη) according to its connection to the senses and a capacity for knowledge (ἐπιστημονική) according to its independent re-examination of affairs.”35 In addition, Ptolemy describes a rational faculty (λογικόν), which encompasses thought (διάνοια), the activity of the faculty of thought (διάνοιατικόν), as well as speech (διϊλεκττος): “Of the rational faculty, by which the special properties of human beings is defined, on the one hand, thought is the logos which is an internal analysis and repetition and differentiation of what has been remembered; on the other hand, speech is the vocal symbols through which what were thought are revealed to people.”36 The agent of judgment, the intellect (νοῦς), uses thought, or internal logos, as the means by which it judges. Speech, on the other hand, makes no contribution to the process of judgment, because it is secondary to thought as an image is to an original.

The dichotomy between internal and external discourse was standard in ancient Greek philosophy. Plato and Aristotle distinguish between the two in Sophist 263e, Philebus 38e–39a, and Posterior Analytics 76b24–27, respectively, and the Stoics developed the distinction between internal and external logos, specifically.38

In portraying uttered logos as an image (εἰκόνα) of internal logos, Ptolemy utilizes a distinctively Platonic metaphor. Internal logos, for Ptolemy, takes two forms: 1) opinion and supposition (δόξα καὶ ἀπηρίας), and 2) knowledge and understanding (ἐπιστήμη καὶ γνώσεις). Furthermore, the intellect makes judgments within two fields of inquiry, the theoretical and the practical, and the faculty of thought has a capacity for each of these fields. Thus, Ptolemy portrays internal thought as the activity of the faculty of thought. Thought takes the form of either opinion or knowledge, and the intellect has the capacities to make judgments in theoretical and practical philosophy.

Although Ptolemy appropriates the terms of his psychology from the Aristotelian, the Platonic, and, to a lesser extent, the Stoic traditions, he contends that observation would corroborate his psychological account:

Even if we do not apply what is reasonable and appropriate to the natures of things (τὸ εὐδοκοῦν καὶ οἰκεῖον τῶν ὄστεων), we also could learn that these [natures] exist in this way from the movements of each faculty of the soul, provided we are willing to investigate in a way that is loving of truth (φιλολογὴ τηθοκ). We shall observe (κατασκηνοποιομεν) that the exertions which accompany these [movements], whether they are passive or active, always take place in the parts of the body recounted. The sensory [exertions] take place in each of the corresponding sense organs, the apprehensive in the area below the liver, the emotive in the area around the heart (these last include cases of pleasure, pain, fear, and anger), and only the cognitive (διανοητικά) occur when the other parts of the body are at rest but the head is being filled, like exertions [caused] by the permanent internal movement.39

Ptolemy claims that both reason and perception substantiate his account of psychological phenomena. He employs reason when introducing the account by considering what is reasonable and appropriate to the soul's nature, and he asserts that observation of the movements the soul causes in and through the body would corroborate his exposition.

Ptolemy's claim that observation would corroborate his psychological account may allude to the ancient medical traditions' attempts to discover the location(s) of the soul. In the second century, for instance, Galen devoted Books 1-6 of De placitis Hippocratis et Platonis to a demonstration (πρὸς τῶν ἐν τὰς σοφίας) of the soul's parts and their locations.40 Galen supports his argument with empirical evidence derived from the dissections of animals. The fact that the rational soul is situated in the brain is evident from the observation that the brain is the source of the nerves; that the spirited soul is situated in the heart is evident from the observation that the heart is the source of the arteries; that the appetitive soul is situated in the liver is evident from the observation that the liver is the source of the veins. While Ptolemy simply claims that empirical evidence would support his psychological account, Galen actually provides empirical evidence, which substantiates his own account of the soul's parts and locations.

By claiming that his psychological account is founded on both reason and perception, Ptolemy grounds his psychology in the criterion of truth he outlines in the first portion of On the Kritêrion and ἡγεμόνικον. Investigating how it is that a human being judges

33 Cf. Parts of Animals 666a19-b1.
34 Ptolemy On the Kritêrion and ἡγεμόνικον, L21, translation after Liverpool/Manchester Seminar on Ancient Philosophy (1989).
35 Cf. Plato Timaeus 96a-b.
36 Ptolemy On the Kritêrion and ἡγεμόνικον, L21, translation after Liverpool/Manchester Seminar on Ancient Philosophy (1989).
37 Ibid., 1a.
objects for the sake of knowing the truth (ἀλήθεια), he lists several elements involved in this judgment:

1) That being judged, or what is (τὸ ὄν)
2) That through which it is judged, or sense perception (ἀισθήσεως)
3) That which judges, or intellect ( νοησις)
4) That by which it is judged, or reason (λογος)
5) That for the sake of which it is judged, or truth (ἀλήθεια).

Mapping Ptolemy’s criterion onto his statement of how the soul’s faculties and their locations may be determined, one notes that the objects being judged, or the soul’s faculties and their locations, may be judged through perception of the movements the soul’s faculties cause in and through the body, by the intellect in terms of what is reasonable and appropriate, and in a way that is concordant with a love of truth. While Ptolemy’s dually rational and empirical criterion provides the foundation for his psychology, his psychology, in turn, elucidates the components of his criterion. After delineating the criterion, Ptolemy examines the relationships among its components: “Since sense perception and intellect are principles and elements, but the others are secondary to them as capacities, instruments, or activities, if we grasp both the similarities and differences between [sense perception and intellect], we shall have the whole procedure within our sight.”43 Thus, Ptolemy’s exposition of the criterion of truth and the human soul mutually reinforce one another.

3. Ptolemy’s psychological account in the Harmonics

Having examined On the Kritêrion, let us turn now to Harmonics 3.5 in order to assess its consistency with the former. As mentioned earlier, A.A. Long maintains that Ptolemy’s divisions of the cognitive part of the soul in Harmonics 3.5 and On the Kritêrion are consistent.44 Although Long is correct in highlighting certain similarities, he does not mention the differences, which, as I will demonstrate, reveal a significant shift in the themes and methods Ptolemy employs in On the Kritêrion and the Harmonics. Most conspicuously, in the former Ptolemy presents a single account of the human soul, but in the latter he outlines three: an Aristotelian, a Platonic, and a synthetic of the previous two. Presenting three alternative accounts, Ptolemy exhibits a particular attitude toward eclecticism. As in On the Kritêrion, he appropriates his terms from the Aristotelian, Platonic, and Stoic traditions, but in Harmonics 3.5 he does not choose from among these traditions nor synthesize them into a single account, as he does in On the Kritêrion. When transitioning from the Aristotelian to the Platonic account, Ptolemy merely remarks that the human soul is also divided in another way (κατ’ ἄλλον τρόπον διαιρομένης τῆς ψυχῆς ἴμων). In other words, the three accounts of the soul in Harmonics 3.5 are interchangeable; each accurately describes the soul’s structure.

In addition, Ptolemy uses different terminology in On the Kritêrion and the Harmonics to describe the soul’s components. In the former, he discusses three faculties (δυναμεικὲς) of the soul; in the latter, he lists the soul’s three parts (μέρη) and their forms, or species (εἴδη).44 In order to explain this discrepancy, one might simply note that, as a result of his eclecticism, Ptolemy appropriated historically distinct sets of terminology which he applied to the same set of phenomena. In this way, the terms ‘faculties’ and ‘parts’ would stand as simple alternatives, as the terms for the soul’s individual parts and species are alternatives in the Aristotelian, Platonic, and synthetic accounts of Harmonics 3.5. This interpretation, however, does not explain why Ptolemy chose to employ distinct terminology in On the Kritêrion and the Harmonics. I would argue that this terminological distinction is a consequence of the texts’ dissimilar themes. In On the Kritêrion, Ptolemy emphasizes the perceptibility of the movements the soul causes in and through the body, and he grounds his psychology in a dually rational and empirical criterion of truth. Ptolemy’s empiricism is heavily dependent on Aristotle’s theory of cognition in the De Anima,45 and the empirical emphasis of On the Kritêrion may have led Ptolemy to appropriate Aristotle’s terminology in the De Anima for the soul’s faculties. In the Harmonics, Ptolemy appropriates the harmonic analogy of the soul’s structure from the Platonic and Stoic traditions.46 and, in order to analyze the soul’s structure in harmonic terms, he uses language that is suitable for relationships among musical pitches as well as the soul’s components: parts and species. Therefore, Ptolemy’s choice of Aristotelian or Platonic terminology for the soul’s components depends on his adherence to disparate textual themes.

In the Harmonics, Ptolemy explains that the human soul is tri-partite because it has a harmonic form. After distinguishing matter, movement, and form in Harmonics 3.3, Ptolemy defines harmonia as a formal cause, a cause “which preserves the proper form on the underlying [matter] (δὲ τὸ ὑποκειμένῳ περιτοιχεῖ τὸ οἰκεῖον ἔλεγχος).”47 and in Harmonics 3.4 he describes the faculty, or power, of harmonia (ἡ ἀρμονία τῆς δύναμις)48 as a capacity possessed by all self-moving objects:

One also must insist that this sort of power must necessarily be present to some extent (καὶ ὅσονον) in all things that have in themselves a principle of movement, just as must the other [powers], but especially and to the greatest extent in those that share in a more complete and rational nature (τὰς τελευταῖς καὶ συμμετέχουσας φύσεως κεκοιμώμενοις), because of the suitability of the way in which they were generated.49

All self-moving bodies have the power of harmonia to some degree. They all have the capacity to be enformed by harmonic ratios, but three sets of objects have this power to the greatest extent:

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43 In listing several components of the criterion, Ptolemy follows a contemporary trend. Both Alcinous and Sextus Empiricus divide the criterion into three components. See Alcinous Didaskalikos 4.1-2; Sextus Empiricus Adversus mathematicas 7.35. For a comparison of both Alcinous’ and Sextus’ accounts of the criterion with Ptolemy’s, see A.A. Long (1989), pp. 153, 158-162. Cf. Lehoux (2007), pp. 461-462.

44 Ptolemy On the Kritêrion and Hêgemonikon, I.7; translation after Liverpool/Manchester Seminar on Ancient Philosophy (1989).


46 In harmonics, ‘species’ describe the ways in which melodic intervals within a concord may be rearranged. Each of the primary concords—the fourth, the fifth, and the octave—has a distinct number of species. Ptolemy applies this manner of distinguishing the concords, and dividing them into species, to analyzing the components of the human soul. See Plato Republic 4.440e-9, 4.443d-e, and Timaeus 69c7, 77b4, 90a3. On the Stoic use of the harmonic metaphor, see A.A. Long (1996), pp. 202-223.

47 Ptolemy Harmonics 3.3, D92.

48 The ‘power of harmonia’ is most likely a periphrasis of dynamis harmonikê, to which Ptolemy ascribes several meanings in the Harmonics, including, I would argue, 1) The capacity of objects to have the formal characteristics of harmonic ratios; 2) The function of objects when characterized by these ratios; and 3) The capacity human beings have to understand and impose these ratios on physical objects. The distinction between 1) and 2) may follow from the two senses of potentiality Aristotle describes in De Anima 417a10. Concerning Ptolemy’s theory of harmonia, see Feke (2005). Sswelow (2004, p. 151) seems to interpret Ptolemy’s dynamis harmonikê as the formal cause of harmonic ratios as well as the power human beings have to discover and cause harmonic ratios. Barker interprets dynamis harmonikê as only a human capacity in Scientific Method in Ptolemy’s Harmonics (2000, pp. 259-263, 267), but in “Ptolemy’s Musical Models for Mind-Maps and Star-Maps” (2006, p. 276) he broadens the term’s scope to signify entities’ “capacity to grasp, to construct and to conform themselves to harmonious and beautiful patterns of order.”
musical pitches, celestial bodies, and human souls. These three sets of objects have the most complete and rational nature of all objects in the cosmos. Ptolemy explains in Harmonics 3.4 that heavenly bodies and human souls have the most complete and rational natures of divine and mortal things, respectively. Like musical pitches, heavenly bodies and souls experience only one type of change, the primary and most complete type of movement, or motion from place to place. Concerning the motion of heavenly bodies and human souls, Ptolemy proclaims, "It reveals and displays, so far as it is possible for a human being to grasp it, the pattern of organization in accordance with the harmonic ratios of the notes, as it is possible to see when dividing each kind into parts...."50 In the case of the human soul, the relationships among its parts reveal its harmonic structure.

More precisely, Ptolemy maps the most fundamental relationships in music—the homophone, also known as the octave, and the concords, the fourth and the fifth—onto the three parts of the soul. He presents these correspondences as follows:

Now, on the one hand, there are three primary parts of the soul: the intellectual, the perceptive, and the part that maintains a state. On the other hand, there are three primary forms of homophone and concord: the homophone of the octave, and the concords of the fifth and the fourth. Hence, the octave is attuned to the intellectual part—since in each of these there is the greatest degree of simplicity, equality, and stability—the fifth to the perceptive part, and the fourth to the part that maintains a state.51

The soul's parts and species in the Harmonics differ in name and description from the soul's faculties in On the Kritêrion. According to this, the first of the three psychological accounts, the soul consists of three parts: the intellectual (νοερόν), the perceptive (χισσοητικών), and the part that maintains a state (ἐκτικόν). The terms for the first two parts are Aristotelian. The third is Stoic; it is the adjective derived from ἐξεῖξεν, which refers to the function of pneuma in binding objects into a cohesive form.52 Each of the soul’s parts has several species, as listed in Figure 2. The number of species depends on the part's correspondence to the octave or a concord in music. Just as the concord of the fourth has three species, the part that maintains a state (ἐκτικόν) has three species. Ptolemy explains, "One can say that the part of the soul that maintains a state has three species, equal in number to the species of the fourth, related respectively to growth (συνέστησιν), maturity (ἀκμήν), and decline (ψθίσιν)—for these are its primary capacities (πρώται δυνάμεις)."53 These species do not correspond in any way to the soul's components in On the Kritêrion, and, indeed, the terms do not even appear in the text. While the term ἐκτικόν is Stoic, the species are Aristotelian. Aristotle lists growth, maturity, and decline as definitional aspects of living beings in De Anima 411a30-411a35 and 434a24-25. In the latter passage, he declares, "Everything that lives and has a soul, then, must have the nutritive soul (Ἀρτετικήν ψυχήν), from birth until death. For what has been born must have growth, maturity, and decline (συνέστησιν ἐγείρειν καὶ ἀκμήν καὶ ψθίσιν), and these are impossible without nourishment."55 Although Ptolemy does not utilize Aristotle's term for the most basic capacity of the soul, the nutritive soul (Ἀρτετικήν ψυχήν), he appropriates Aristotle's description of it. Aristotle's nutritive soul supports the growth, maturity, and decline of all living beings, and Ptolemy's part of the soul that maintains a state has three species: growth, maturity, and decline.

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50 Ibid.
51 Ibid. 3.5, D95-96.
54 Boll (1894, p. 104) identifies this passage as a source for Ptolemy's three species of the part of the soul that maintains a state. See also Düring (1934), p. 271; Barker (1989), p. 375.
Corresponding to the octave, the intellectual part of the soul has at most seven species, which Ptolemy lists as the following seven: phantasia, intellect ( νοεως), conception ( ἴδεος), thought (διανοια), opinion (δοξας), logos, and knowledge (ἐπιστήμη). Although in On the Kritêrion thought is the principle movement of the faculty of thought, and opinion and knowledge are capacities of this faculty, in the Harmonics thought, opinion, and knowledge lie on the same level of a hierarchical model; they are species of the intellectual part of the soul. A more striking difference between On the Kritêrion and Harmonics 3.5 is their contradictory definitions of phantasia. Again, in On the Kritêrion Ptolemy defines phantasia as the medium which transmits sensory impressions to the intellect. Albeit a medium, phantasia belongs solely to the faculty of sense perception and not to the faculty of thought. In Harmonics 3.5, however, Ptolemy defines phantasia as a species of the intellectual part of the soul, rather than the perceptive part as one might expect. Hence, On the Kritêrion and Harmonics 3.5 are in direct contradiction concerning the ascription of phantasia to a component of the soul, perceptive or cognitive.

I would argue that Ptolemy lists phantasia as an intellectual, rather than as a perceptive, species in the Harmonics because of the confines of the harmonic model and, in particular, the restriction to list a certain number of species for each of the soul's parts. To begin with, the seven species Ptolemy ascribes to the soul's intellectual part are components of the criterion of truth in On the Kritêrion. Providing a more detailed exposition than the initial list, examined above, Ptolemy enumerates the criterion’s components: the objects of sense perceptions, the attributes of objects, the sense organs, sense perception, phantasia, intellect ( νοεως), conception ( ἴδεος), logos, and knowledge (ἐπιστήμη). This list resonates with an account of cognition in Porphyry’s commentary on Ptolemy's Harmonics—in particular 13.15-15.29 Düring (1930)—which derives, so Harold Tarrant argues, from the epistemology of Thrasyllos, who lived in the first century CE. Porphyry's commentary describes the following epistemological faculties: the sensory grasp (ἀπὸ τῆς χορηγῆς- ἐκ ἄντικκην), the opinion-giving assumption (δοξατικὴ ὑπολογίας), phantasia, conception (ἐννοια), opinion (δοξας), knowledge (ἐπιστήμη), and intellect ( νοεως). Ptolemy’s criterion fundamentally differs from this account, in that Porphyry’s epistemology aims at knowledge of the forms and Ptolemy acknowledges knowledge only of perceptible objects. Nevertheless, the resemblance of the two sets of criteria is pronounced and, if Tarrant is correct in attributing Porphyry’s to a first-century source, then Ptolemy may have acquired his particular manner of delineating the criterion from first-century Platonists.

Concerning the relationship between Harmonics 3.5 and On the Kritêrion, the seven species of the soul’s intellectual part correspond to seven of the criterion's components, including phantasia and six of the seven components associated with the faculty of thought. One may wonder why Ptolemy does not include speech as a species of the intellectual part of the soul. After all, speech is the only cognitive component of the criterion that Ptolemy omits as an intellectual species. Moreover, by listing speech rather than phantasia as an intellectual species, Ptolemy could have met the requirements of his harmonic model—including the necessity to list seven species of the intellectual part of the soul—while enumerating intellectual species that are indisputably cognitive. Furthermore, had Ptolemy listed speech rather than phantasia as a species of the soul’s intellectual part, he could have reserved phantasia for the soul’s perceptive part and thereby maintained its association with sense perception. Nevertheless, Ptolemy may have had sufficient reason to omit speech. As noted above, he argues in On the Kritêrion that speech makes no contribution to the process of judgment. As a repetition of thought, like an image to an original, it may not deserve classification as a species. Therefore, Ptolemy may have omitted speech deliberately and reasonably, but why did he allocate phantasia to the soul’s intellectual part? If Ptolemy intended to maintain consistency between the criterion of truth and the soul’s intellectual species, it is possible that once he eliminated speech he had no choice but to include phantasia as an intellectual species. After all, it seems that phantasia was the best option for the seventh intellectual species. Of the components of the criterion associated with sense perception, it is the most closely related to cognitive function.

Moreover, Ptolemy’s perceptive part of the soul could not accommodate phantasia. While the soul’s intellectual part has seven species, the perceptive part has only four. Ptolemy explains, “The perceptive part has four [species], equal in number to those of the concord of the fifth, related respectively to sight, hearing, smell, and taste, if we regard the sense of touch as being common to all, since it is by touching the perceptibles in some way or another that they produce our perceptions of them.” The idea that touch need not be counted as a sense because the four senses have it in common is inconsistent with Ptolemy’s description of the senses in On the Kritêrion, where Ptolemy depicts touch as follows: “Of the senses, touch is more material and extends over the whole of the flesh and blood of the body, but the others are restricted to the parts that are more easily penetrable and more moist (the passages).”64 While touch is unlike the other four senses in that it extends through the body’s flesh and blood, Ptolemy still calls it a sense alongside the other four. Andrew Barker suggests a potential Stoic and/or Epicurean influence on the characterization of the senses in the Harmonics, but, notwithstanding the materialism of the Stoics, none argued that four of the senses are reducible to touch and, while the Epicureans may have advanced this position, Ptolemy generally incorporates few Epicurean concepts into his philosophical system. More likely is the explanation Franz Boll propounds. He finds a precedent for Ptolemy’s association of sense perception with the number four in Pythagorean number symbolism, which drove Platonists, such as Theon of Smyrna, to claim that touch is common to the four senses. Theon states, “Sense perception exists in four divisions. All the senses operate according to touch, since touch is common to all [the senses] in a fourfold manner.” Ptolemy appropriates this idea in order to justify his fitting of the perceptive faculty to a harmonic model. In order to maintain a strict correspondence between the soul’s perceptive part and the concord of the fifth, Ptolemy portrays the perceptive part as having only four species. Classifying sight, hearing, taste, and smell as perceptive species, he could not add another, fifth species for touch or, for that matter, phantasia.

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56 I leave this term translated in response to the well-documented difficulty of translating it into English. The most common translation, ‘imagination,’ hardly captures its meaning. Phantasia, for Ptolemy, is the faculty which transmits sense impressions to the intellect, and phantasias are individual sense impressions. For a history of phantasia, see Watson (1988).


58 Tarrant (1991), pp. 108–147. I must thank the anonymous referee who directed me to this passage in Porphyry’s commentary.

59 Ptolemy Harmonics 3.5, D6, translation after Barker (1989).

60 Ptolemy On the Kritêrion and Hêgemonikon, La20, translation after Liverpool/Manchester Seminar on Ancient Philosophy (1989).


63 Theon of Smyrna On Mathematics Useful for the Understanding of Plato 98.4-7.
Consequently, Ptolemy claims that touch need not count as a species if one regard it as common to the four senses, and he classifies phantasias as an intellectual rather than a perceptive species of the soul.

Thus, Ptolemy presents several accounts of the human soul in his corpus. According to both On the Kritērion and the Harmonics, the soul is tripartite, and the names, descriptions, and locations of its components derive from Platonic, Aristotelian, and Stoic psychology. In On the Kritērion, Ptolemy utilizes Aristotelian language for the soul’s ‘faculties’, and in the Harmonics he employs Platonic terminology for the soul’s ‘parts’ and ‘species’. I have accounted for this terminological distinction with reference to the texts’ disparate themes. In the former, Ptolemy grounds his psychology in a criterion of truth, which derives from Aristotle’s theory of cognition and possibly a Platonic mode of delineating the criterion; in the latter, Ptolemy applies mathematics, specifically harmonics, to psychology, and he delineates the parts and species of the soul in harmonic terms. Whereas Ptolemy’s employment of Aristotelian terminology for the soul’s faculties is appropriate to the empirical emphasis of On the Kritērion, the choice of Platonic language, employable in both psychology and harmonics, is appropriate to the harmonic analogies of the Harmonics.

In addition, the accounts of phantasias and the senses in On the Kritērion and Harmonics 3.5 are contradictory. In the former, Ptolemy associates phantasias with the faculty of sense perception, and in the latter he defines it as a species of the intellectual part of the soul. In the former, he describes touch as a sense alongside the other four, but in the latter he claims that it is common to the four senses. These contradictions follow from Ptolemy’s commitment in the Harmonics to a restrictive, harmonic model, which dictates an exact number of species for each of the soul’s parts. When mapping the harmonic model onto the psychological phenomena, the phenomena—phantasias and the five senses, in particular—did not fit. In order to list seven intellectual species, Ptolemy chose to characterize phantasias as an intellectual rather than a perceptive species of the soul, and in order to list four species of the soul’s perceptive part he claimed that touch is common to the four senses.

4. The Development of Ptolemy’s Scientific Method

I would argue that this shift in Ptolemy’s psychological theory illuminates the manner in which he developed his mature scientific method. Central to this argument is the chronology of the texts. The dates of composition of On the Kritērion and the Harmonics are unfortunately unknown. The latter is generally considered an early text of Ptolemy because of the relation of Harmonics 3.14-16 to the Canobic Inscription. Though lost, these chapters of the Harmonics apparently examined the relations between musical pitches and celestial bodies tabulated in the Canobic Inscription, which, in turn, is believed to predate the Almagest because it contains numerical values that Ptolemy corrects in the Almagest. On the Kritērion is typically considered one of the earliest—perhaps the earliest—of Ptolemy’s extant texts, and the most persuasive evidence for its early dating appeals to its relation to the Harmonics. It is more likely that Ptolemy wrote On the Kritērion before the Harmonics, because 1) The criterion of truth presented in the Harmonics is indisputably more developed than the criterion in On the Kritērion, and 2) Ptolemy merely summarizes his psychological models in the Harmonics, but he deliberates on the soul’s nature and structure in On the Kritērion.

In spite of this underdetermined chronology, if one aims to offer a cogent explanation of the texts’ incongruities, one must accept that Ptolemy composed On the Kritērion before Harmonics 3.5. The opposite supposition would preclude any rigorous explanation for why Ptolemy does not ascribe phantasias to the faculty of thought or describe only four senses in On the Kritērion. Unlike Ptolemy’s harmonic model of the soul, the psychological account in On the Kritērion is sufficiently unrestrictive that it could accommodate the classification of phantasias as cognitive as well as the elimination of touch as a sense, and these slight alterations to the existing text would have the added benefit of maintaining the consistency of On the Kritērion with the Harmonics.

Comparison of the scientific methods Ptolemy employs in these texts with the method he exercises in the remainder of his corpus provides additional evidence for the composition of On the Kritērion before Harmonics 3.5. Again, On the Kritērion is the only text of Ptolemy devoid of mathematics, but in the Harmonics he applies a branch of mathematics, harmonics, to a physical science, psychology. Ptolemy applies mathematics to physics consistently in his corpus. For example, he applies harmonics to astrology, the science which studies and predicts physical changes in the sublunar realm caused by the powers emanating from celestial bodies. In Harmonics 3.8-9 as well as in Tetrabiblos 1.13 and 1.16, he argues that harmonic relations account for the effects of aspects and disjunct relations on zodiacal signs and the planets in them. In addition, Ptolemy applies astronomy, another branch of mathematics, to astrology in the Tetrabiblos, he applies astronomy to cosmology in the Planetary Hypotheses, and he applies geometry to element theory in several of his texts: Almagest 1.1 and 1.7, Planetary Hypotheses 2.3, and his lost works On the Elements and On Weights.

Ptolemy articulates and justifies this method—the application of mathematics to physics—in both the Geography and the Almagest. In Geography 1.1, he states that mathematics reveals the physical nature of the heavens and earth, and in Almagest 1.1, after arguing that physics and theology are conjectural, he contends that not only is mathematics singular in yielding sure and incontrovertible knowledge, but it also can make a good guess at the nature of theological activity and contribute significantly to the study of physics. Ptolemy explains, concerning physics, “[T]he mathematical part of theoretical philosophy] contributes to the physical [part] not accidentally. For almost every peculiar attribute of material nature becomes apparent from the peculiarities of its motion from place to place.” While physics on its own is conjectural, the contribution of mathematics discloses bodies’ physical characteristics.

With the exception of On the Kritērion, Ptolemy consistently applies mathematics to physics in his natural philosophical investigations. Why, then, does Ptolemy not apply mathematics to psychology in On the Kritērion? I would argue that the only plausible answer rests with the text’s early composition. When Ptolemy composed On the Kritērion, he had not yet formulated his mature scientific method, and the shift in psychological theory from On the Kritērion and Hēgemonikon to the Harmonics marks the point at which he devised it. When composing On the Kritērion, Ptolemy demonstrated his commitment to his criterion of truth—the
collaboration of reason and perception—but it was only after completing On the Kritêrion, but before completing the Harmonics, that he advanced the position that physics requires the contribution of mathematics. Thereafter, Ptolemy put this claim into practice by employing mathematics in each and every of his natural philosophical investigations, including the psychological chapters in the Harmonics. Despite the contradiction of Ptolemy’s description of certain psychological phenomena in the Harmonics with their earlier account in On the Kritêrion, by applying harmonics to psychology Ptolemy established his psychological theory on what he considered to be firmer epistemic ground. In this way, the psychological account in the Harmonics stands as an improvement on the corresponding account in On the Kritêrion and Hegemonikon.

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